PROCEEDINGS

INTERNATIONAL SEMINAR

"The 1st International Conference on Innovation and Commercialization of Forest Product"

Banjarbaru, South Kalimantan, Indonesia
November 22nd - 23rd, 2016

Edited by:
Prof. Dr. Ir. Gt. Muhammad Hatta, M. S.
Prof. Yasushi Morikawa
Prof. Dr. Ir. Wasrin Syafii, M. Agr
Prof. Dr. Ir. Yusuf Sudo Hadi, M. Agr
Prof. Dr. Enos Tangke Arung, S.Hut, M. P.
Dr. Sigit Sunarta, S.Hut, M.P., M.Sc.
Dr. Satria Astana
Ir. Harry Budi Santoso., M. P.

Organizer

Center of Excellence
Research Consortium for Sustainable Tropical Forest Management
Lambung Mangkurat University

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RISTEKDIKTI

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Research Consortium for Sustainable Tropical Forest Management,
Lambung Mangkurat University

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PREFACE

Forest resources have the potential multi function that can provide economic benefits, environmental and social well-being of mankind. The existence of multiple functions in terms of economic, ecological and social have put Natural Resources (SDA) is an important part of many contributors to national development in realizing the overall prosperity of the people of Indonesia. The benefits derived from timber and non-timber and ecotourism. Forest products have the potential and very important role for the formation of economic activities that are labor intensive in order to create a cottage industry that a lot of absorbing manpower and strengthening the joints of the rural economy. Diversity of forest products is a major force for the provision of a wide range of green goods product, product services and the development of diversified products and services of forest resources.

The 1st International Conference on Innovation and Commercialization of Forest Product held at Roditha Hotel Banjarbaru, November 22nd, 2016, and then We will enjoy to take a field trip in Kampung Apisiliculute based on Honeybee (Desa Telaga Langsat, Pelaihari) on November 23rd, 2016.

This Event, the committee has received 73 fullpaper submissions covering 4 fields, consist offield A (Regulation of Innovation and Commercialization of Forest Product: 15 tittles), field B (Innovation and Commercialization of Timber Forest Product: 10 tittles), field C (Innovation and Commercialization of Non Timber Forest Product: 42 tittles) and Poster (6 tittles).

This Seminar could not be conducted without the support and cooperation from many sources. We would like also thank to Government of Tanah Laut Regency, Lambung Mangkurat University, PT Adaro Indonesia, BNI 46 Branch Banjarmasin.

Also, we want to say thank to the steering committee, all of committee, and students as volunteers in this symposium.

Banjarbaru, November 2016
Head of Committee

Dr. Hamdani Fauzi

OPENING SPEECH

Head of Committee

By :

Dr. Hamdani Fauzi, S.Hut, M.P

Bismillahirahmanirrahim

The honorable DR. Ir. Rufi'i, M.Sc from Ministry Environment and Forestry

The honorable Rector of Lambung Mangkurat University represented by Prof. Yudi Firmanul Arifin

The Honorable Tanah Laut Regant represented by Ir. Akhmad Hairin, M.P

The honorable Prof. Gusti Muhammad Hatta (minister of research and technology in Kabinet Indonesia Bersatu)

The honorable Keynote Speakers, Invited Speakers, Conference speakers, and all participants

Ladies and Gentlement

Assalamu'alaikum Warahmatullahi Wabarakatuh

Alhamdulillahirabil'alamin. All praises is to Allah God almighty, the most gracious and the most merciful for his blessing to every of us, we have opportunity to attend this conference in good health. May Shalawat and salam always be upon our Prophet Muhammad SAW, His family, companions and those who follow his steps till the day of judgement.

It is a great honor for me to stand here in the opening ceremony of the ceremony of the **The 1st International Conference on Innovation and commercialization of the Forest Products.**

The Bacground of this seminar is

Forest resources have the potential multi function that can provide economic benefits, environmental and social well-being of mankind. The existence of multiple functions in terms of economic, ecological and social have put Natural Resources is an important part of many contributors to national development in realizing the overall prosperity of the people of Indonesia. The benefits derived from timber and non-timber and ecotourism. Forest products have the potential and very important role for the formation of economic activities that are labor intensive in order to create a cottage industry that a lot of absorbing manpower and strengthening the joints of the rural economy. Diversity of forest products is a major force for the provision of a wide range of green goods product, product services and the development of products and services of forest resources.

In line with the above, it is necessary to held an international seminar with the title "**The 1st International Conference on Innovation and commercialization of the Forest Products"**. Hopefully, by the seminar, researchers, bureaucracy, practitioners, industry, business and policy makers related to the business development of forest products can come together to share research experiences, ideas and concepts as well as business experience relating to innovation and the commercialization of Forest products.

The 1st International Conference held at Roditha Hotel Banjarbaru, November 22nd, 2016, and then Tomorrow We will enjoy to take a field trip in Kampung Apisiliculute based on Honeybee (Desa Telaga Langsat, Pelaihari).

We appreciate and thank to Speaker :

1. Keynote Speaker :
   a. DR. Ir. Rufii, M.Sc from Ministry of Enviroment and Forestry
   b. Mr. Akhmad Hairin from Local Government of Tanah Laut
   c. Dr. Suprapto from Javara Indegonus Indonesia

2. Invited Speaker
   a. Dr. Gerhard Manurung (International Center for Research in Agroforestry / ICRAF)
   b. Assc. Prof. Dr. Futoshi Ishiguri (Utsunomiya University, Japan)
   c. Prof. Fauzi Febrianto (Bogor Agriculture Institute)
   d. Dr. Mahrus Aryadi (Research Consortium for STFM and INAFE)
   e. Prof. Yudi Firmanul Arifin (Research Consortium for STFM)

Ladies and Gentlement
We are very surprised because Your motivation are very high to participate in this seminar. We have only one mont for preservation this seminar. But We notice over 200 person aplly to be participant in this seminar. Applause for all of you

This Event, the committee has received 73 (seventy tree) fullpaper submissions covering 3 fields, consist of field A (Regulation of Innovation and Commercialization of Forest Product: 15 fifteen tittles), field B (Innovation and Commercialization of Timber Forest Product: 10 ten tittles), field C (Innovation and Commercialization of Non Timber Forest Product: 42 forty two tittles) and Poster (6 tittles). Today, after break, We also conduct Forestry Bussines Meetting with invite Asosiasi Pengusaha Hutan Indonesia, Forum HHBK Kalsel, Himpunan Pengusaha Petani Madu Tanah Laut, and Forest Management Unit.

All of participants came from various backgrounds such as; Academics, Researchers, Bureaucracy, Policy makers, Business/industry and Forest communities. They are came from Japan, Malaysia, Indonesia (from Universitas Palangkara, Universitas Sriwijaya, Universitas Haluoleo, Universitas Mulawarman. Akademi Farmasi Samarinda, Universitas Tadulako, Politeknik Negeri Tanah Laut, Univeristas Borneo Tarakan, Universitas Sam Ratulangi. Balai Penelitian dan Pengembangan Lingkungan Hidup dan Kehutanan Makassar, BP2LHK Palembang, Banjarbaru, Balai Litbang Ekosistem Hutan Diptercarpa Samarinda, Balai Perbenihan Tanaman Hutan Bogor, Balai Litbang HHBK Mataram, LSM Walhi, YCHI, Yayasan Muller, KPH ati Kalsel/ Kalteng, dan other stakeholders.

Ladies and Gentlement

This Seminar could not be conducted without the support and cooperation from many sources. We would like also thank to Government of Tanah Laut Regency, Lambung Mangkurat University, PT Adaro Indonesia, BNI 46 Branch Banjarmasin.
Also, we want to say thank to the steering committee, all of committee, and students as volunteers in this symposium.
Forgive us, If you find any mistake
Finally, We hope Rector LMU give a speech dan open This Seminar.
Thank You Very Much.
Wabillahitaufiwalhidayah
Wasalamu'alaikum. Wr.Wb

Head of Committee

Hamdani Fauzi

Director of Research Consortium for Sustainable Tropical Forest Management

By :

Prof. Dr. Ir. H. Yudi Firmanul Arifin, M.Sc

On behalf of Research Consortium Sustainable Tropical Forest Management (RCSTFM), I would like say welcome in the first international conference on Innovation and Commercialization of Forest Product" . This seminar is the first international conference held by collaboration with Faculty of Forestry Lambung Mangkurat University.

Forestry issues become a hot issue (climate change, global warming, and soon) that should be addressed as well, because of the impact that occurs very broad and affect for human life. Rehabilitation of forest becomes a prime target for the restoration of forest ecosystems are changing due to exploitation and human activities. These activities would require many experts from different sciences, so this conference is very important to gather the thinking of experts to work together to find the best solution for rehabilitation of forest and also the useful of forest for people, particularly the people live around the forest. Most of the people depend on product from the forest, but until now they sell only raw material without process become semi-finished or finish-products. So innovation and commercialization of product is very important to increase added value and income.

I hope this conference will develop the innovation and commercialization of forest product, so forest product has been higher value to become feature product and to be able to increase the income of people around the forest. Thank you for all the committee to success this agenda, so this event can be accomplished.

Rector Speech
(Prof. Dr. Sutarto Hadi, M.Sc)

By :

Prof. Dr. Ir. H. Yudi Firmanul Arifin, M.Sc

Excelency: Directorate Jenderal Pengelolaan Hutan Produksi Lestari represented by Director Pengolahan dan Pemasaran Hasil Hutan Dr. Rufi'i

Honorable
Assoc. Prof. Dr. Futoshi Ishiguri (Utsunomia University, Japan)
Dr. Gerhard Manurung (International Center for research in Agroforestry/ICRAF)
Prof. Dr. Ir. Fauzi Febrianto, M.Sc. (Institute Pertanian Bogor)
Dr. Suprapto (Practicy)
Ir. Akhmad Hairin, M.P. (former Head of Dinas Kehutanan Kabupaten Tanah Laut)
Prof. Dr. H. Gusti Muhammad Hatta (former-Ministry of Environment and Ministry of Research and Technology

Honorable: All sponsor (PT. Adaro Indonesia and Bank BNI 46)
Honorable: All presenters from University, Researcer, Practicy, Students, and so on.

First of all, lets pray and thanks to our God ALLAH SWT who has been giving us some mercies and blessings so we can attend and gather in this place in good condition and happy situation. Secondly, may peace and salutation always be given to our prophet MUHAMMAD SAW Who has guided us from the darkness to the brightness.

Ladies and Gentleman

On behalf of Lambung Mangkurat University, I would like say welcome in the first international conference on Innovation and Commercialization of Forest Product" . We hope all partisipants can enjoy following this seminar.

This International conference on Innovation and Commercialization of Forest Product is the first international conference held by Research consortium for Sustainable Tropical Forest Management collaborated with Faculty of Forestry Lambung Mangkurat University.

As a scientific institution ULM strongly supports all of international conference, especially it conducted in ULM. Forestry issues become a hot issue (climate change, global warming, and soon) that should be addressed as well, because of the impact that occurs very broad and affect for human life.

Rehabilitation of forest became a prime target for the restoration of forest ecosystems are changing due to exploitation and human activities. These activities would require many experts from different sciences, so this conference is very important to gather the thinking of experts to work together to find the best solution for rehabilitation of forest and also the useful of forest for people, particularly the people live around the forest. Most of them has livelihood depend on product from the forest, but until now they sell only raw material without process become semi-finished or finish-products. Innovation and commercialization of product is very important to increase added value and income.

We hoped this conference can develop the innovation and commercialization of forest products, so they are higher value to become feature product and to be able to increase the income of people around the forest. Thank you for all the committee to success this agenda, so this event can be accomplished.

As human being, I and all of committee realize that we can't avoid the mistakes, so we apologize to you all. And I don't forget to say thanks so much for your nice attention. That's all my speech, may what I have delivered be useful in our life in this world and here after. If you found many mistakes in my speech please forgive me.

With say "Bismilahirohmanirohim"

"I OPEN THIS INTERNATIONAL CONFERENCE on Innovation and Commercialization of Forest Product**"**

Wassalamua'alaikum Wr. Wb.

TABLE OF CONTENTS

PRAFACE iv
OPENING SPEECH : v
Head of Commitee vi-viii
Director of Research Consortium for Sustainable Tropical Forest Management ix
Rector of Lambung Mangkurat University x-xi
TABLE OF CONTENT xii-xix
CONCLUSIONS xx-xi

KEYNOTE SPEAKER

Director General of Sustainable Management of Production Forests Ministry of Environment and Forestry
Enhancement of Added Value, Legality and Export Policy of Forest Products
By : Ida Bagus Putera Parhama, PhD.. 1-5

Local Government of Tanah Laut
Mewujudkan Kesejahteraan & Hutan Lestari Melalui Pengembangan Hhbk (Lebah Madu)
Bupati Tanah Laut... 6-21

Business/Industry
Commercializing agro-forestry food products: From smallholders to global market
By: Dr. Suprapto S.T., MSc. 22-29

INVITED SPEAKER

Smallholder Agroforestry Systems for Timber and NTFPs Development
By : Dr. Gerhard Manurung (International Center fot Research in Agroforestry/ICRAF) 30-38

Innovation and Commercialization in Forest Products Research Field
By : Prof. Dr. Ir. Fauzi Febrianto, M.Sc (IPB, Bogor) 39-67

Innovation and Commercialization of Non-Timber Forest Product: A Case Study in South Kalimantan Province
By : Prof. Dr. Yudi Firmanul Arifin (Research consortium for STFM) 68-74

The Primary Non Timber Forest Product (NTFPs) of Some Regencies in South Kalimantan
By : Assc. Prof. Dr. Mahrus Aryadi (Research consortium for STFM) 75-77

Wood quality of tropical trees
By : Assc. Prof. Dr. Futoshi Ishiguri (Utsunomiya University, Japan) 78-86

ORAL PRESENTATION

COMMISSION - A (Regulation of Innovation and Commercialization of Forest Product)

Cultural Ecology of Malaysia's Reducing Emissions from Deforestation and Forest Degradation (REDD+)
Ismi Rajiani and Ahmad Rozelan Yunus 88-96

Silvicultural Systems Applied at the Production Forest in Indonesia
Wahyudi.. 97-107

Closure Structure of Vegetation Urban Forest as on Optimal Condition for the Environmental Balance
Merryana Kiding Allo 108-118

Evaluation of Cost Components to Calculation K Index of Pricing Fresh Fruit Bunch (FPB) Under the Government Regulation (A Case Study)
Muhammad Hudaya, Nur Fatiah, Rawintan Endas Binti, Rifqi Novriyandana, Dahniar, Rasidah, Rano Wijaya..119-130

Contributions Subsector Forestry to Domestic Product Gross Based Environmental Valuves
Jumri..131-136

Negative Impact Toward Deforestation Economic Value of Forest Plant
Sari Mayawati...137-142

Information System Development Based Spatial for Sustainable Forest Management in FMU
Ahmad jauhari, Rina Kanti..143-150

Policy Analyze to People Forest in Balangan Regency
Hamdani Fauzi & Violet Burhanuddin...151-164

The Total Economic Value of Catchment Forest Ecosystem Services of Baubau Wonco Watershed in South East Sulawesi, Indonesia
Safril Kasim, Aminuddin Mane Kandari, La Ode Mid...165-172

The Use of Moral DilemmaWorksheet on the Issue of Forest Ecosystem Through Science/IPA Learning at SMPN 6 Banjarmasin
Aminuddin Prahatamaputra 173-184

Development of Role Model: Empowerment for Capital Expenditure in Planning "KUA" and Determination "DPA" Work Unit of Government Regional
Syaiful Hifni 185-205

Hancing the Role of Community in Managing Village Forests Through the Development of Non Timber Forest Products
Sri Lestari, Bambang T. Premono 206-215

Non-Timber Forest Products that are Potentially Developed in South Sulawesi
Suhartati and Basir..*2*16-230

Measurement of Arsenic (As) and Nickel (NI) in the Mangrove Shellfish **(***Polymesoda bengalensis*) at the Estuary of Asam-Asam River in Tanah Laut Regency
Bunda Halang, Ika Purnama Sari, St. Wahidah Arsyad..231-236

ORAL PRESENTATION

COMMISSION – B (Field of Innovation and Commercializtion of Timber Product)

Packaging Techniques Of Forest Tree Seedlings To Maintain Their Viability During Conveyance
NaningYuniarti,DidaSyamsuwida and RinaKurnianty.. 238

The Propertis Of Particleboard Made Of Bambo Mayan (Gigantochoa Robusta) And Wood Waste Galam (Melaleuca Cajuputi)
Siti Hamidah,Yudi Firmanul Arifin, Lusita Wardani, Darni Subari,
I.M. Sulastiningsih *239*

Potency And Charakterristic Of Fast Growing Tree Species In Indonesia A Review
Wiwin Tyasistikowanti, Futoshi Ishiguri, Shinso Yokota 240-249

The Effect of Site to Potension of Gelam Stands
Alpian and Wahyu Supriyati..*250*-265

Improving The Properties of Oil Palm Trunk (Elaeisguineensis Jack)
Enih Rosmah, Lambang Subagiyo 266

The Effect Of Macro Nutrients On The Growth Of Tengkawang (Shorea Stenoptera Burck) In The Nursery
Tri Wira Yuwati, Safinah S. Hakim 267

Effect Of Land System To Wood Quality Of Teak (Technograndis L.F) In Humid Tropics
Yusanto Nugroho..268

Variation Morphology Of Nyawai (Ficus Variegata Blume) Provenance Borneo
Junaidah..269

The Effect Of Rooting Media On The Success Of Cratoxylumarborescens Cuttings
Reni Setyo Wahyuningtyas And Arif Susianto..270

Tissue Culture (Dyrralowii) On Basic Media
Adistina Fitriani, Dina Naemah, Rodinah, Fakhrur Razie...271-278

Growth Variant Of Bitti (Vitex Cofassus) Seedling From Several Families
C.andriani, Tri Wira Yuwati, Purwanto Budi santosa 279-287

ORAL PRESENTATION

COMMISSION – C (Innovation and Commercialization of Non Timber Forest Product

Vegetation Analysis Of Bamboo In The Hulu Banyu Village, Loksado,
Hulu Sungai Selatan Regency
Dina Naemah, Emmy Winarni, Susilawati...289-297

Policy analysis on bio and wood energy development in East Kalimantan
Tien Wahyuni...298-305

The Prospects Of Producing Bamboo Shoots In Tana Toraja, South Sulawesi"
(Prospek bambu penghasil rebung di Tana Toraja, Sulawesi Selatan)
Merryana Kiding Allo 306-314

Biomass And Carbon Content On Peat Swamp Forest After Fire
Ahmad Yamani, Sulaiman Bakri...315-321

Nepenthes gracilis as an Important Species for Conservation of Kerangas Forest:
Ethnobotanical Identification and Antibacteria Activities
Kissinger, Zuhud AM.E., K.D. Latifah, S.Z. Iskandar...322-327

A Natural Coagulant from Cellulose of rattan umbut (*Calamus sp*):
Isolation, Characterization and Potential for River Water Purification
Retno Agnestisia, Deklin Frantius 328-334

River Water Purification Using the Coagulant of Rambutan Tree Bark
(*Nephelium lappaceum L.*)
Nasrul Latif , I Made Sadiana, Retno Agnestisia..335-340

Utilization of Medical Plants of Dayak Community in Saka Mangkahai Village,West Kapuas in Central Kalimantan as Local Wisdom
Wahyu Supriyati, Alpian..341-345

The Ability of Wood Vinegar From Gelam (Melaleuca cajuputi) as a Coagulant Latex
Siti Hamidah, Yudi Firmanul Arifin 346

Agroforestry Study As A Business To Improve Community Food Security In Krph-Oro Oro Ombo Bkph Pujon Kph Malang
Joko Triwanto...347-358

Natural Honey Quality in Tabukan Barito Kuala and Development Potentials
Rosidah Radam, Arfa Agustina Rezekiah, Eva Prihatiningtyas , Anna Marya Makalew.. 359

Improving Economic Value Of South Borneo Indigeneous Fruits Through The Processing Of Chips Fruit
Yuniarti, Henni Aryati, Lusita Wardhani...360-365

The Population Structure Of Vegetation On Rawa Kalang Hakurung Village
Dharmon, Maulana Khalid Riefani, Mahrudin...366-372

Improving Management of Bitter Honey Production in Loksado, South Kalimantan
Trisnu Satriadi, Yudi Firmanul Arifin, Siti Hamidah 373

Feasibility Study Agroindustry Cajuput Oil "Burung Kenawai" UPT. KPHL Tarakan
Mohammad Wahyu Agang , Fendi Asrian 374

The Influence of Organic Additives on Low Cost Flat Membrane Support Fabrication From Clay
Muthia Elma, Nor Aldina, Hesti Kesumadewi, Isna Syauqiah, Yulian Firmana Arifin, Nurhakim, Agus Triantoro 375-382

What is Pirdot (Saurauiabracteosa dc)? (Challenges and Oppor Tunities of Pirdot Development in South Kalimantan)
Sudin Panjaitan, Tri Wira Yuwati 383-386

The Potential Of Jernang Rattan (Daemonoropsdraco) Development In South Kalimantan
Sudin Panjaitan.. 387

Sub-Acute Erythrocytes Toxicity Evaluation Of The Aqueous Extract Of Leaves Of Gemor (*Nothaphoebe Coriacea*)

Iskandar Thalib, Purwanto Budi Santos, Eko Suhartono... 388-393

The Role of Green Tea Bioactive on Tnf-Induced Grp78 Endothelial cell
Oski Illiandri... 394-399

The Phytochemical Contents ff Local Peat Swamp Orest Species in Central Kalimantan
Reni Setyo Wahyuningtyas.. 400

Population Structure of Mahar Plant (*Kleinhovia hospita l*.) in the Forest Batu Tangga Village Batang Alai Timur Sub-Districts Hulu Sungai Tengah Regency
Ema Lestari..401-406

Preliminary Study of Tumbang Nusa Designated Forest for Ecotourism Activities
Safinah S.Hakim, Purwanto B. Santosa...407-414

Rattan Management in Central Kalimantan Indonesia
Basir 415-434

Agroforestry of *Cinnamomum burmanii* Blume: Farmer Livelihoods Strategy in Merangin Regency, Jambi Province
Sri Lestari, B. Tejo Premono..435-444

The Product Diversification of Palm Sugar to Improve the Welfare in The Lok Tunggul Village
Dina Naemah, Aditina Fitriani, Emmi Winarni..445-451

Optimication of Non Timber Forest Product: Innovated Bee Culture to Increase Welfare in Tabukan Barito Kuala South Kalimantan
Arfa Agustina Rezekiah, Basir, Anna Maria Makalew, Ratna 452

Carrying Capacity of Tabunio Watershed in Tanah Laut Regency
Syarifuddin Kadir, Badaruddin, Nurlina, and Ichsan Ridwan...................................... 453-470

The Possibility Of Gel Made Of Leaves Used As An Additive Peat Forest Fire Fighting Water
Acep Akbar.. 471

Habitatof Local Medical Plants Based On Geo-Spatial Information at Sub-District Mandiangin Sputh Kalimantan
Dr. Rer.nat. Ir. H. Wahyuni Ilham, MP... 472

Strategy of Non Timber Forest Product (NTTP) Development on Barito Timur Regency
Hamdani Fauzi.. 473-484

Screening of Anti-Diabetes Activity of Agarwood Extracts from Gyrinopsversteegii(Gilg.) Domke in Lombok Island, indonesia)
Agus Sukito, Saptadi Darmawan 485

Essential Oil of Actinodaphne Sp
Harlinda Kuspradini... 486

Potency of Mangrove Medicinal Plant of Baluran National Park
Susy Andriani.. 487-496

The Use of Sawdust and Rice Husk in Cultivating Oyster Mushroom (Pleurotusostreatus) at Karang Intan District Banjar Regency
Abdi fithria, Siti saidah, Fauzi rahman 497-504

POSTER

Growth Variation Of Bitti *(Vitex Cofassus)* Seedling From Several Families
C. Andriyani, Prasetyawati, Purwanto Budi Santosa, Tri Wira Yuwati.............................. 506

Utilization Potential Of Famili Palmae Plants In The Bajuin Waterfall Area Tanah Laut Regency
M. Arsyad, Ervina Y.. 507

Medicinal Plants Of The *Litsea* Genusfrom Indonesia
Dewi Alimah.. 508-516

Characteristics Of Crystal Palm Sugar In The Batang Kulur Village
Yuniarti, Fatriani, Henni Aryati...517-520

Model Operasional Infrastructure Development Of Special Economic Zones Tanjung Api-Api
Dinar dwianugerahputranto, Heni Fitriani, Gunawan Tanzil, Ratna Dewi........................ 521

Formulation And Evaluation Of A Herbal Body Wash Containing Kokang (*Lepisanthesamoena* (Hassk.) Leenh.) Leaves Extract
Husnul Warnida,Sapri,Titin Hartini..522-530

Development Silvofisheries Cultivation Brackish Water As It Shrimp Windu (*Penaues Monodon*)
Rukmini 531

APPENDIX

COMMITTEE OF INOVCOM – FP 2016 533

SCHEDULE OF INOVCOM – FP 2016 534

PARTICIPANT OF INOVCOM – FP 2016 535-548

DOCUMENTARY OF INOVCOM-FP 2016 549-552

CONCLUSIONS

Conclusions from 4 divisions of paper group session

Division A: Field of Policy Polling & Development of Forest Product

Regulation of innovation and characterization of forest product is having deal with policy about land use planning, cultural, ecology of REDD + in Indonesia, sylviculture system, GIS tool that systematically be used, payment for environmental services, and enhancing the rule of community in managing village forest trough the development of new timber forest product.

Division B: Field of Innovation & Commercialization of Timber Product

Innovation and characterization of timber product need to be improved by increasing wood quality product trough management system, sylviculture activities, and technology application in processing products.

Division C: Field Innovation & Commercialization of Non Timber Forest Product

Forest can be used as a source of medicinal plant, food, and industrial.

Division D: NTFPs Business meeting

- One type of NTFPs from South Kalimantan potential to be developed is honey and gaharu.
- In the framework of the development of honey bee cultivation, Innovation to produce of bee feed to be available enough and can produce a good quality honey, and innovation of diversification product besides honey is needed.
- Local fruit plants are very potential as bee feed, therefore Innovation of local fruit cultivation is very necessary because of local fruits that are very potential and also to support the sustainability of native germplasm Indonesia / biodiversity.
- Diversification of products that can be done is to utilize the harvest of honey, such as beeswax and propolis.

KEYNOTE SPEAKER

\

Director General of Sustainable Management of Production Forests Ministry of Environment and Forestry

By :

Ida Bagus Putera Parhama, PhD

Enhancement of Added Value, Legality and
Export Policy of Forest Products

Good morning,
Assalamu'alaikum Warahmatullahi Wabarokatuh,
Om Swastiastu,

Honorable Rector of Unlam, represented by Prof. Yudi Firmanul Arifin,
Distingushed speakers,
Ladies and Gentlemen, all conference participants,

It is trully a great honor to me, to be here addressing this very important gathering. As requested, I will use this particular occasion to share with you about policies on forest products, especially improvement of added value through Innovation, Timber Legality Assurance System or we called *Sistem Verifikasi Legalitas Kayu (SVLK)* and timber export policy.

But before that, first of all I thank God the Almighty, because it is upon his blessings that we are able to be here attending International Seminar: The 1st International Conference on Innovation and Comercialization of Forest Products.

I also would like to start by extending my sincere appreciation to the *Pusat Unggulan Iptek Perguruan Tinggi, Konsorsium Riset Pengelolaan Hutan Tropis Berkelanjutan, Universitas Lambung Mangkurat*, for taking the initiative. Being DG who is responsible for SFM and forest products primary industries, I really appreciate any initiative to promote innovation and commercialization of forest products.

Ladies and Gentlemen,

Innovation is simply defined as a new idea, device, or method. It is also viewed as the act of process of introducing new ideas, devices, or methods (Merriem-Webster.com). It also means the application of better solutions to meet new requirements in expected or existing market needs (Maranville, S (1992) Entrepreneurship in the Business Curriculum, Journal of Education for Business, Vol. 68 No. 1, pp.27-31).

With these definitions, I would like to start my speech with the wood/timber processing in Indonesia. As you may know that in the 90's Indonesia was the biggest producers of plywood in the world. As the raw materials from natural forests are becoming scarcer, the productions and the exports are declining. We cannot rely only on "traditional" plywood production using tropical hardwood timber species. One solution is using plantation wood, especially lightwood.

Lightwood is incredible material which offer big potential for the future plywood productions. Indonesia is one of the leading countries in producing and exporting plywood and other wood panel products like blockboard and barecore. The fast-growing lightwood species like Sengon (*Falcataria moluccana* or *Paraserianthes falcataria*) and Jabon merah (*Anthocephalus macrophyllus*) are abundantly available. To get the benefit from this potential, the timber industry has to undertake the steps beyond the traditional products.

There are at least two possible applications of lightwood products. The first one is that timber/wood has a good coefficient of thermal conductivity. Lightwood also has a great strength to weight rasio. This makes lightwood suitable for construction such as housing and interior part of recreational vehicle (RV). The lightwood timber can be used as the core of plywood and the more precious tropical timber can be used as the face and back. The other issue is the transportation cost. By reducing the weight the cost transportation is also reduced.

Ladies and Gentlemen,

Other important issue that I would like to address is Indonesia timber legality assurance system or Sistem Verifikasi Legalitas Kayu (SVLK). SVLK/TLAS is basically an instrument developed for improving our forest governance, hence achieving sustainable forest management (SFM). It is especially designed for addressing illegal logging and the accompanying illegal timber trade. At the same time, it emerged as a trade/export document that indicates the legality of Indonesia's wood products. As you all certainly know, the global market is now demanding for such legality assurance of imported wood products. Thus, although it was not the main purpose at the outset, it turned out SVLK also contribute to our readiness to enter the new era of trading on legal timber products in the global market.

Indonesia's commitment to address illegal logging and the related trade is unconditional. Given the importance of forests as one of our main natural resources, eradicating illegal logging is imperative to this country. For decades illegal logging has been creating a spectrum of problems. This extraordinary crime has been robbing this country million of dollars every year, it has been destroying our forests which in turn ignite disasters such as forest fire, it has been contributing the degradation of the value system of the people, and it stamped a negative stigma to Indonesia in the global community.

From experience we learned, repressive or hard approach alone has not been quite effective in deterring illegal logger from committing the crime. This led us to consider another approach, namely devising a system that will prevent illegal logs or wood products from reaching markets.

Fifteen years ago, more specifically in September 2001, Indonesia hosted an international ministerial meeting on common efforts to find the appropriate and effective way to curb illegal logging. The meeting resulted in the 'Bali Declaration on Forestry Law Enforcement and

Governance or '*Bali FLEG Declaration'*. Following the Bali Declaration, a long-term program to curb illegal logging and the related trade was formulated and concrete actions were continuously implemented.

Curbing illegal logging and illegal timber trade requires effort from both sides; supply and demand. All efforts taken in the supply side will be meaningless if there remain countries or markets that are willing to accept illegal wood. Therefore, in devising and implementing the system, international and bilateral cooperation is very instrumental right from the outset. The system was developed in a good cooperation with EU. At the implementation stage, we are enganging in bilateral cooperations with Australia, China, Japan, Korea, UK and the United States. Bassicaly, we request partner countries to totally restrict non-legally verified timber or wood products to enter their respective countries.

Ladies and Gentlemen,

That was, a brief background of SVLK development. Now, what is the impact of SVLK implementation on trade?

SVLK is a robust system, and by no means is intended to be, and surely it will not be, another regulation that put an additional burden to wood industry, hence negatively impact trade or export. Latter on I will show you data supporting this claim.

SVLK is basically a system that "forces" business to obey the existing regulations. It was developed through a long and intensive multistakeholder consultation, taking almost a-10 year period. Business representatives and NGOs were among the key stakeholders in the process. It is a comprehensive system that covers the entire industry, starting from upstream (forest management) to the downstream (wood industry and trading).

For a business to be certified, the requirement is as simple as to comply with the existing regulations. Fourteen sets of verifiers were formulated for as many as different types of businesses. The simplest set of verifiers was for small-medium enterprises, which is as simple as being registered/licensed, have an NPWP (tax payers number), and legal sources of raw material.

The complaint that SVLK is complicating the business process is absolutely wrong. How could in a regulated country, being registered and paying tax, is considered complicating businesses?

Some argue that the system does not need to be covering from upstream to downstream. In other words, if you already made sure that all timber are legally harvested, why do you still need to certify the legallity of furniture manufactured from the timber. That might be true sometimes in the future, when we already totally eradicated illegal logging. But today, we have to admits illegal logging is still taking place, although in much a smaller magnitude than it used to be. Beside that, we also need to ensure not only the legality of raw material used, but also the businesses. Again, that is just normal in regulated country.

In the implementation stage of the system, NGOs remain a key component. There is a consortium of NGOs who functions as an Independent Monitoring Network (JPIK-Jaringan Pemantau Independent Kehutanan). This JPIK continuously and cautiously doing the monitoring to make sure the system is consistently implemented. JPIK may fill an appeal when it found there is a deviation or incompliance.

Ladies and Gentlemen,

SVLK is a robust system by design, as indicated by the entire mechanism of certification as well as issuance of legal document for products, as follows:

First, there are independent assessors or certification bodies, that will certify companies. These certification bodies must be acrredited by the National Acrreditation Committee or KAN (Komite Akreditasi Nasional) using ISO/IEC 17021. There are currently arround 20 such certification bodies.

A wood processing or trading company that apply for a certification will be assessed by an acrredited certification body, referring to one of the 14 sets of verifiers, according to the type of the company. The assessment and certification process is monitored by JPIK.

When a wood processing or trading company is successfully certified, this company will be given an access right to SILK (Sistem Informasi Legalitas Kayu). SILK is an on-line system integrated with INSW at the Custom and INATRADE at the Ministry of Trade. Using the access right, the certified company will be able to produce the so called V-Legal document that will accompany its wood products. The V-Legal document will only be issued upon clearance by the respective certifying body. All of the process is on-line, transparent, and only take minutes. It is clear in this mechanism, the Government is fully a regulator.

With the V-Legal document, a wood product is assured its legality and can be exported to anywhere in the world. Started from 15 November 2016 Today, EU recognized our V-Legal document as EUTR-FLEGT licence. Indonesian wood products enter EU markets without due diligence.

Clearly, SVLK is positive to trade or export, in contrast with the argument that Indonesia is like creating its our a non-tarrif barrier for its own products, inadvertently helping the other side of the trading. That is not true. In fact Indonesia becomes the first country in the world that wil only export legally verified wood products, and its V-Legal document is recognized by EU. A lot of other countries will follow the path as the world market, sooner or latter, will demand for legally verified products.

Ladies and Gentlemen,

Finally I want to show you the real impact of SVLK on trade or export. Since SVLK was implemented in 2013, exports of timber products from Indonesia showing an increasing trends.

In 2013, total exports from Indonesia ammounted to US$ 6,067,386.152 and in 2014 US$ 6,602,595.732 and US$ 9,857,678.521 in 2015. There is an obvious increase.

By 20 November 2016, as shown in our real time recording of V-Legal documents, the figure of export is US$ 8.1 billion.

Data covering Januari 1, 2013 until December 31, 2015, shows that most of the exports (72,75%) goes to the Asian Contries i.e : China, Japan and Republic of Korea. The North America (i.e The United States) and the European Union in the second and third biggest market

This figures show nothing else than a succesfull policy of SVLK implementation. It is fair to expect that this progress is responded by consumer countries by joining us in the effort to curb illegal logging and illegal timber trade, hence realizing SFM of Indonesian forests, which we frequently claim as part of the lung of the planet earth.

With regards to imported wood, we just issued a Director General Sustainable Management of Production Forest Regulation number P.7/PHPL-SET/2015 concerning ‘Procedures for Due Diligence, the Issuance of Import Declarations and Recommendations Forestry Product Imports. The regulation is a follow-up of the Ministry of Trade regulation number 97/M-DAG/PER/11/2015 concerning Provisions on the Import Trade in Forest Products. According to that regulation, beginning on January 1, 2016 imports of wood product must be upon recommended the Ministry of Environment and Forestry. Again the process will be on-line through SILK. SILK will provide data concerning the legality of the exporting companies abroad and the assurance of its product legality.

Ladies and Gentlemen,

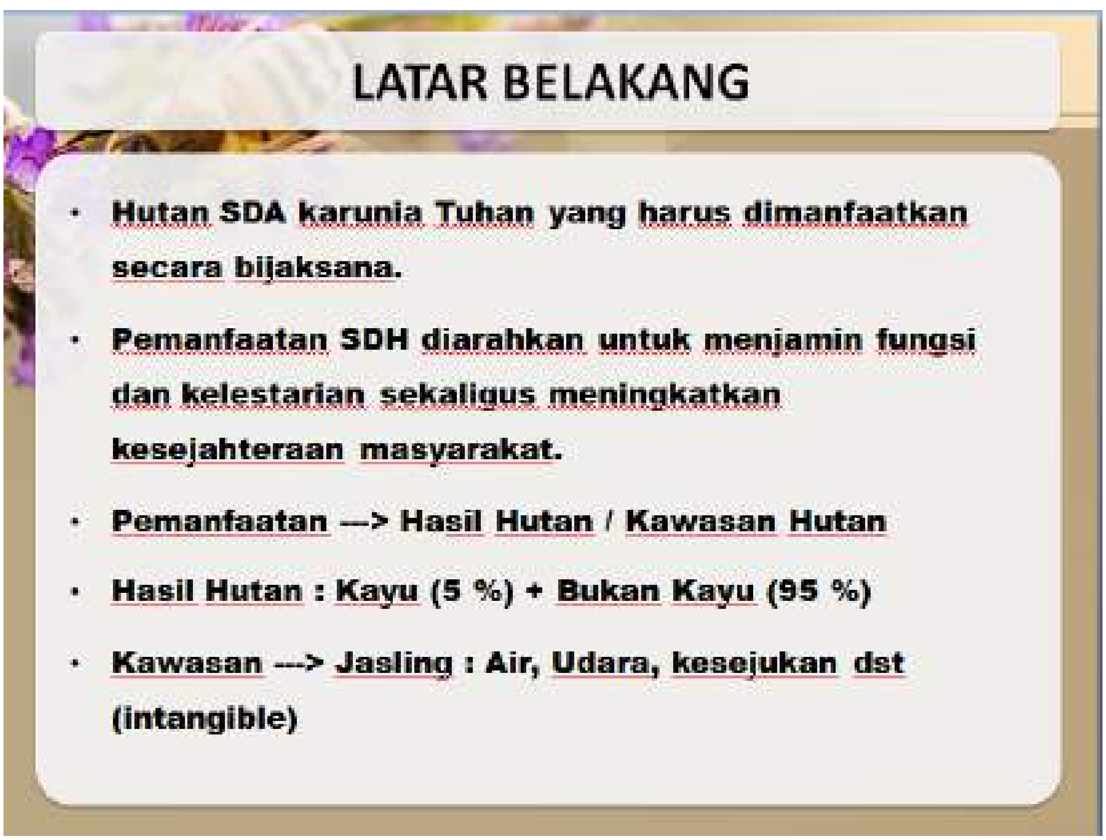
I have shared with you about SVLK, and its impact to trade which is positive. Therefore, at the end of my speech, the only thing I want to request from you all is, please joint us to conserve out tropical rain forests, by supporting SVLK, and never buy non legally verified wood products anymore.

With that, I conclude my speech. Thank you very much for your kind attention.

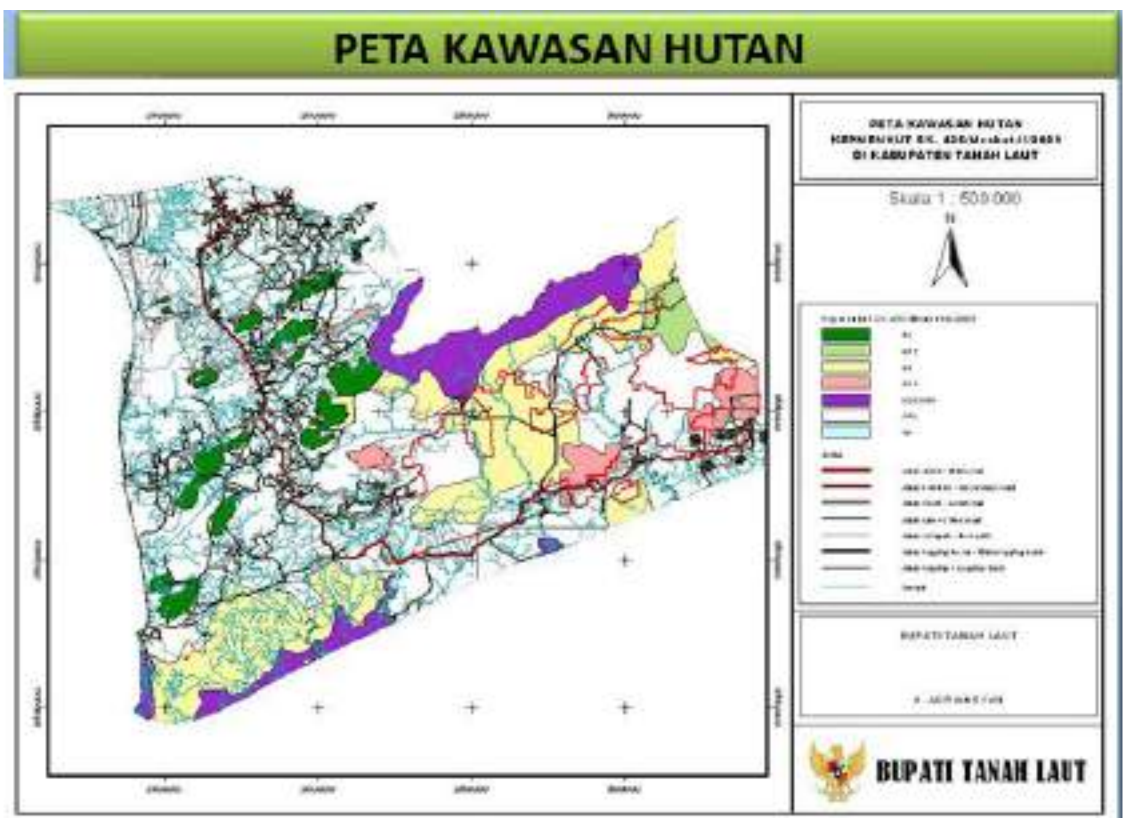
Wassalamu’alaikum Warohmatullahi Wabarokatuh

Om santih santih santih Om.


PEMERINTAH KABUPATEN TANAH LAUT
MEWUJUDKAN KESEJAHTERAAN & HUTAN LESTARI MELALUI PENGEMBANGAN HHBK (LEBAH MADU)
BUPATI TANAH LAUT
Disampaikan Pada:
"The 1ST International Confrence on Innovation and Commercialization of Forest Product"
Banjarbaru, 22 November 2016


LATAR BELAKANG
• Hutan SDA karunia Tuhan yang harus dimanfaatkan secara bijaksana.
• Pemanfaatan SDH diarahkan untuk menjamin fungsi dan kelestarian sekaligus meningkatkan kesejahteraan masyarakat.
• Pemanfaatan ---> Hasil Hutan / Kawasan Hutan
• Hasil Hutan : Kayu (5 %) + Bukan Kayu (95 %)
• Kawasan ---> Jasling : Air, Udara, kesejukan dst (intangible)


PERMASALAHAN
Masy di dalam/sekitar hutan masih miskin
Hutan rusak/terdegradasi --- fungsinya menurun/ berubah --- Lahan kritis terus bertambah
Hutan/Lahan belum memberikan manfaat maksimal
Paradigma pemanfaatan masih berorientasi pada Kayu --- HHBK dan Jasling belum tergali
Sengketa lahan, okupasi, karhutla, Banjir, Erosi, Tanah Longsor dll


PETA KAWASAN HUTAN
Skala 1 : 500.000
N
BUPATI TANAH LAUT


LUAS KAWASAN HUTAN DI TANAH LAUT
SK.435/MENHUT-II/2009
• Luas Wilayah ± 363.135 Ha
(11 Kecamatan, 130 Desa + 5 Kel)
• Luas Kawasan Hutan ± 127.848,043 Ha
(± 35,21 % dari luas wilayah) terdiri dari :
HK : ± 27.601,242 Ha
HL : ± 13.876,985 Ha
HPT : ± 5.293 Ha
HP : ± 71.238,546 Ha
HPK : ± 9.838,720 Ha
Tahura : 19.141,10 Ha
TWA : 1.361,30 Ha
SM : 7.159,60 Ha


POTENSI KEHUTANAN DI TALA
▪ HTI --- PT. HRB ± 20.000 Ha dan PT. Inhutani III ± 27.500 Ha
▪ HGU Tanaman Kayu --- PT. Emida ± 698,853 Ha dan PT. Anugerah Alam Meratus Abadi ± 988 Ha
▪ HR --- ± 11.164 Ha
▪ HHBK ---> Madu, Gaharu, Arang Kayu, Kayu Bakar, Nipah, SBW
▪ Industri ---> 23 Sawmill dan 2 Vinir/Plywood
▪ HTR : Pencadangan ± 5.355 Ha (± 2.692 Ha --- utk 5 Kop)
▪ HD : Penetapan Areal Kerja ± 160 Ha
▪ HKm : Penetapan Areal Kerja ± 8.860 Ha (76 KT)


???????????????
MAMPUKAH POTENSI HUTAN TERSEBUT MENJAWAB PERMASALAHAN YANG ADA
(Masyarakat miskin – Hutan Tidak Lestari)


???????????????
"PASTI BISA"

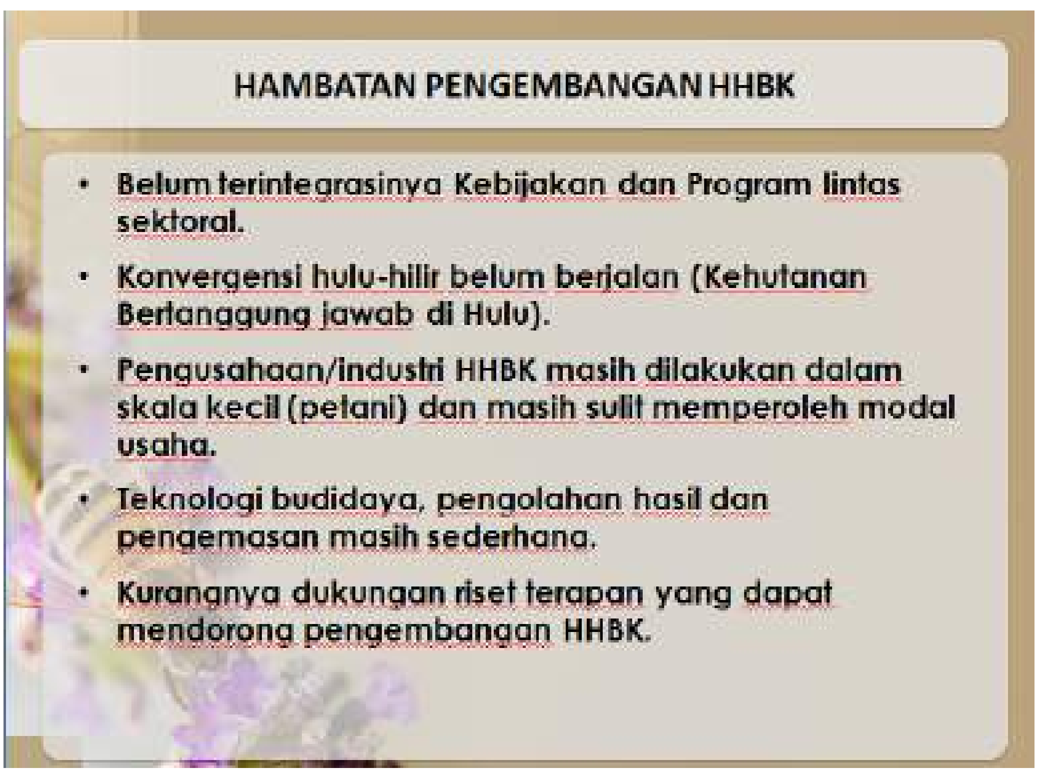

??????????????
CARANYA ?????
!?

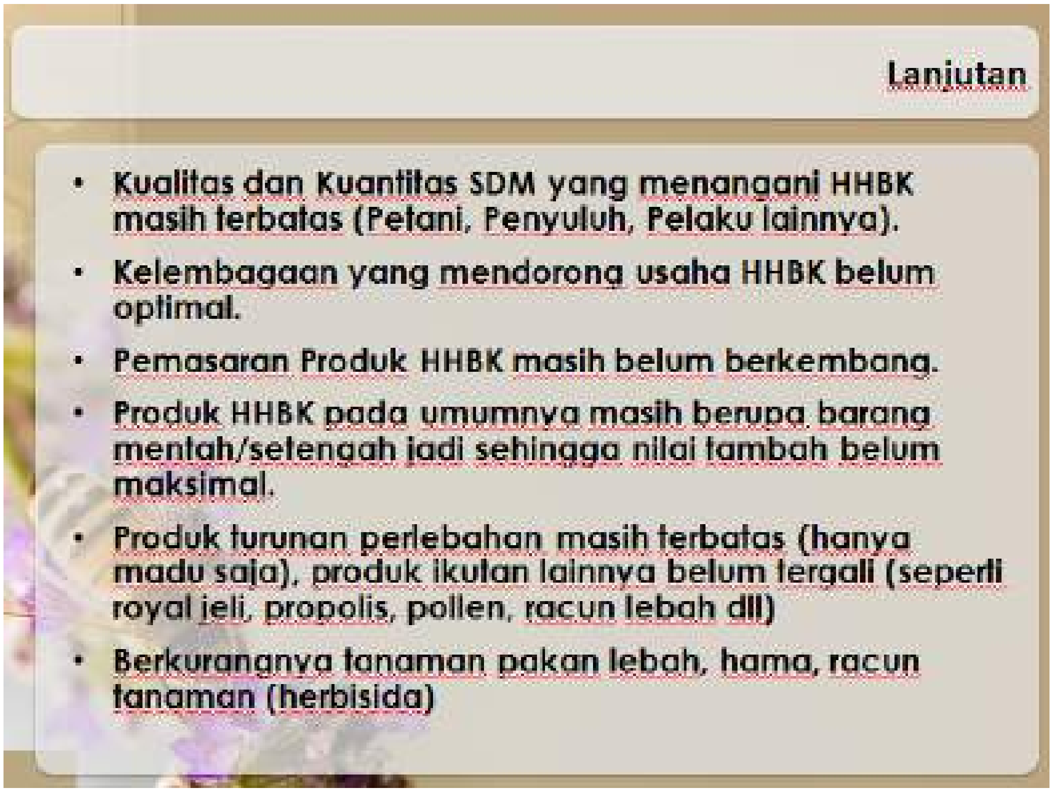

TANAH LAUT
PENGEMBANGAN HHBK


HHBK UNGGULAN TANAH LAUT
KEPUTUSAN BUPATI TANAH LAUT
NOMOR : 188.45/463-KUM/2013
MADU, GAHARU,
NIPAH

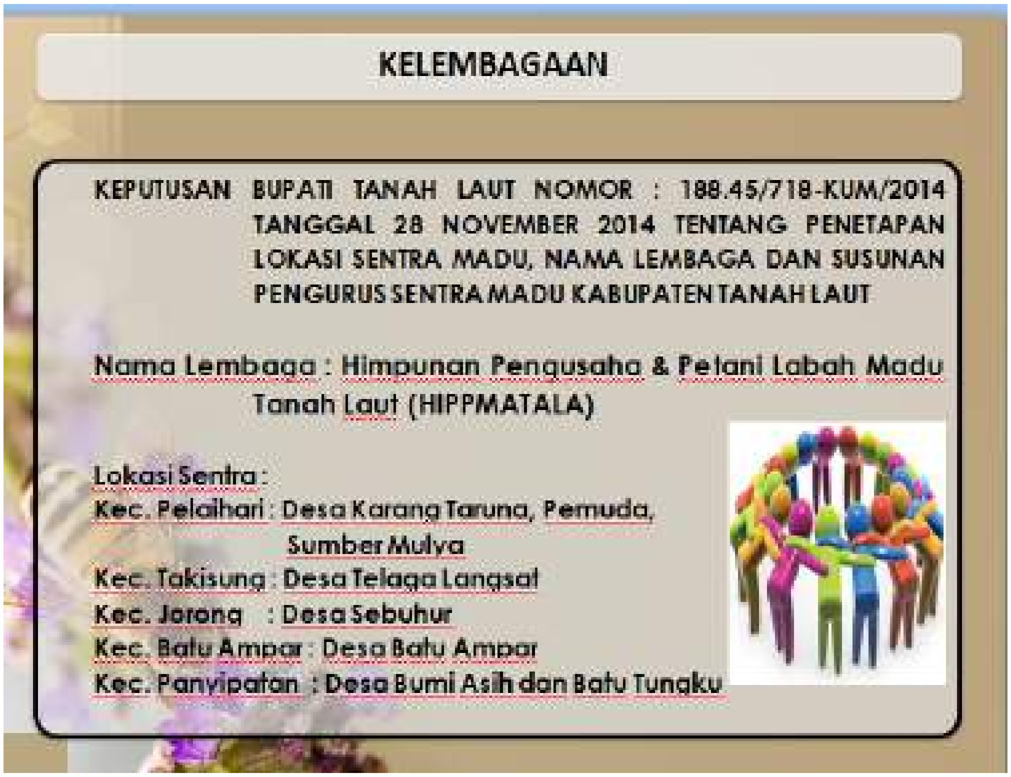

TANAH LAUT
LEBAH MADU


POTENSI DAN SEBARAN LEBAH MADU
• Sebaran lebah madu saat ini : Kecamatan Pelaihari, Batu Ampar, Takisung, Panyipatan, Jorong, Bajuin dan Kurau.
• Desa yang telah mengembangkan : Desa Telaga Langsat, Karang Taruna, Batu Ampar, Sabuhur, Sumber Mulya, Tebing Siring dengan jumlah ≥ 1600 stuf.
• Melibatkan ≥ 50 Kelompok Tani
• Jenis yang diusahakan : Apis cerena, A. dorsata, A. Melifera, kelulut


HAMBATAN PENGEMBANGAN HHBK
• Belum terintegrasinya Kebijakan dan Program lintas sektoral.
• Konvergensi hulu-hilir belum berjalan (Kehutanan Bertanggung jawab di Hulu).
• Pengusahaan/industri HHBK masih dilakukan dalam skala kecil (petani) dan masih sulit memperoleh modal usaha.
• Teknologi budidaya, pengolahan hasil dan pengemasan masih sederhana.
• Kurangnya dukungan riset terapan yang dapat mendorong pengembangan HHBK.

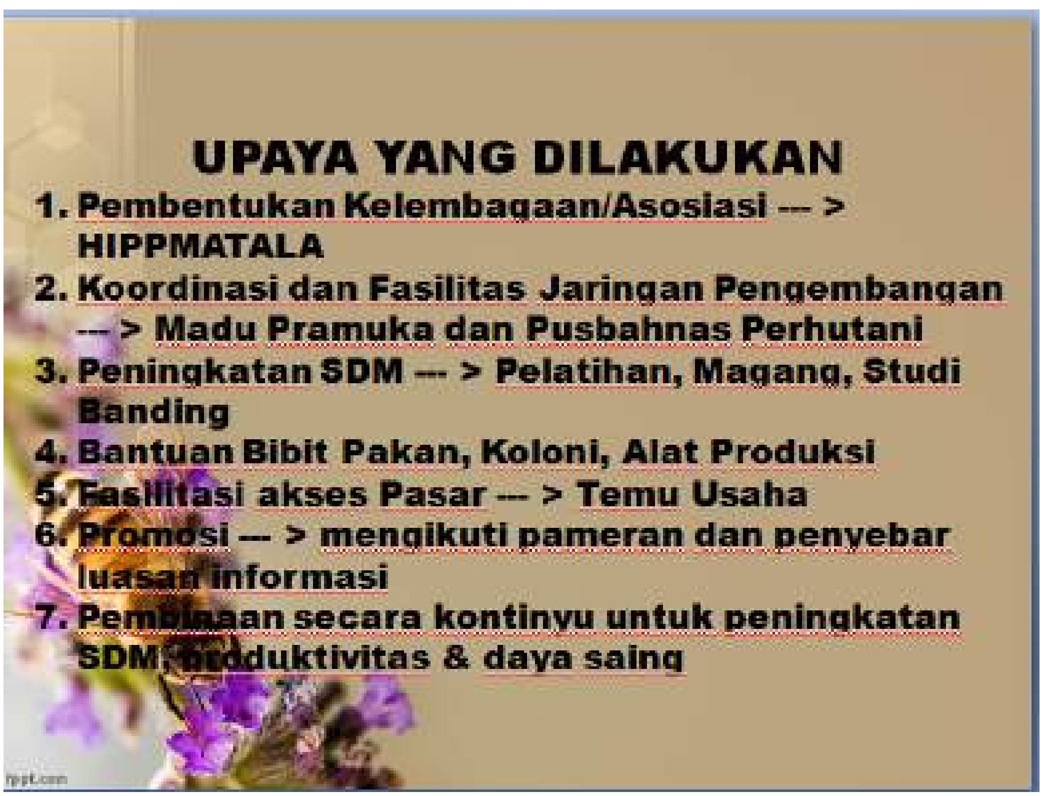

Lanjutan
• Kualitas dan Kuantitas SDM yang menangani HHBK masih terbatas (Petani, Penyuluh, Pelaku lainnya).
• Kelembagaan yang mendorong usaha HHBK belum optimal.
• Pemasaran Produk HHBK masih belum berkembang.
• Produk HHBK pada umumnya masih berupa barang mentah/setengah jadi sehingga nilai tambah belum maksimal.
• Produk turunan perlebahan masih terbatas (hanya madu saja), produk ikutan lainnya belum tergali (seperti royal jeli, propolis, pollen, racun lebah dll)
• Berkurangnya tanaman pakan lebah, hama, racun tanaman (herbisida)


JAWABAN TANTANGAN PENGEMBANGAN HHBK
=
SENTRA HHBK UNGGULAN
"pusat integrasi ekonomi produktif kelompok usaha berbasis HHBK unggulan pada daerah atau kawasan tertentu serta memiliki prospek untuk dikembangkan kedalam klaster"


KELEMBAGAAN
KEPUTUSAN BUPATI TANAH LAUT NOMOR : 188.45/718-KUM/2014 TANGGAL 28 NOVEMBER 2014 TENTANG PENETAPAN LOKASI SENTRA MADU, NAMA LEMBAGA DAN SUSUNAN PENGURUS SENTRA MADU KABUPATEN TANAH LAUT
Nama Lembaga : Himpunan Pengusaha & Petani Labah Madu Tanah Laut (HIPPMATALA)
Lokasi Sentra :
Kec. Pelaihari : Desa Karang Taruna, Pemuda, Sumber Mulya
Kec. Takisung : Desa Telaga Langsat
Kec. Jorong : Desa Sebuhur
Kec. Batu Ampar : Desa Batu Ampar
Kec. Panyipatan : Desa Bumi Asih dan Batu Tungku


LOKUS PENGEMBANGAN HHBK
Kawasan Hutan
Luar Kawasan Hutan
Hutan Produksi
Hutan Lindung
Hutan Rakyat
Areal Lainnya
• HKm
• Hutan Desa
• H T R
• H T I
• HKm
• Hutan Desa


PERAN PEMKAB
1. Sosialisasi Program/Kegiatan
2. Bimbingan & Pembinaan Masy
3. Fasilitasi Kegiatan
4. Pendampingan Masyarakat
5. Diversifikasi Kegiatan/usaha dan pengembangan lebih lanjut


UPAYA YANG DILAKUKAN
1. Pembentukan Kelembagaan/Asosiasi --- > HIPPMATALA
2. Koordinasi dan Fasilitas Jaringan Pengembangan --- > Madu Pramuka dan Pusbahnas Perhutani
3. Peningkatan SDM --- > Pelatihan, Magang, Studi Banding
4. Bantuan Bibit Pakan, Koloni, Alat Produksi
5. Fasilitasi akses Pasar --- > Temu Usaha
6. Promosi --- > mengikuti pameran dan penyebar luasan informasi
7. Pembinaan secara kontinyu untuk peningkatan SDM, produktivitas & daya saing


PEMBENTUKAN SENTRA HHBK MADU
Juli 2014


SUMBER PAKAN
Mahoni
Jati
HTI
Karet


SILVOPASTURA
fppt.com


LEBAH MADU


PAKAN LEBAH
Tanaman Kaliandra
Bunga Kaliandra


PENINGKATAN SDM PETANI LEBAH MADU


PROMOSI
Stand di Pasar Tani


PERALATAN PANEN LEBAH
Ekstraktor
Penyaringan Madu
Pengemasan/Packing


KUNJUNGAN
MENTERI LHK


HARAPAN
▪ Memaksimalkan fungsi dan manfaat hutan/lahan.
▪ Manciptakan lapangan kerja dan kesempatan berusaha.
▪ Mengurangi ketergantungan pada hasil hutan kayu.
▪ Meningkatan pendapatan masyarakat.
▪ Menumbuhkan kesadaran memelihara hutan.
▪ Mengurangi lahan kritis.


MADU UNTUK :
KESEHATAN
KECANTIKAN
KEHARMONISAN
PENDAPATAN
KELESTARIAN HUTAN
KESEJAHTERAAN !!


وَأَوْحَىٰ رَبُّكَ إِلَى ٱلنَّحْلِ أَنِ ٱتَّخِذِى مِنَ ٱلْجِبَالِ بُيُوتًا وَمِنَ ٱلشَّجَرِ وَمِمَّا يَعْرِشُونَ ﴿٦٨﴾ ثُمَّ كُلِى مِن كُلِّ
ٱلثَّمَرَٰتِ فَٱسْلُكِى سُبُلَ رَبِّكِ ذُلُلًا ۚ يَخْرُجُ مِنۢ بُطُونِهَا شَرَابٌ مُّخْتَلِفٌ أَلْوَٰنُهُۥ فِيهِ شِفَآءٌ لِّلنَّاسِ ۗ إِنَّ فِى ذَٰلِكَ
لَءَايَةً لِّقَوْمٍ يَتَفَكَّرُونَ ﴿٦٩﴾
Artinya : "Dan Tuhanmu mewahyukan kepada lebah: "Buatlah sarang-sarang di bukit-bukit, di pohon-pohon kayu, dan di tempat-tempat yang dibikin manusia, Kemudian makanlah dari tiap-tiap (macam) buah-buahan dan tempuhlah jalan Tuhanmu yang Telah dimudahkan (bagimu). dari perut lebah itu ke luar minuman (madu) yang bermacam-macam warnanya, di dalamnya terdapat obat yang menyembuhkan bagi manusia. Sesungguhnya pada yang demikian itu benar-benar terdapat tanda (kebesaran Tuhan) bagi orang-orang yang memikirkan". (An-Nahl : 68 – 69)


JAVARA
Commercializing agro-forestry food products:
From smallholders to global market
Dr. Suprapto S.T., MSc.
The 1st International Conference on Innovation
and Commercialization of Forest Products
22 November 2016, Banjarbaru

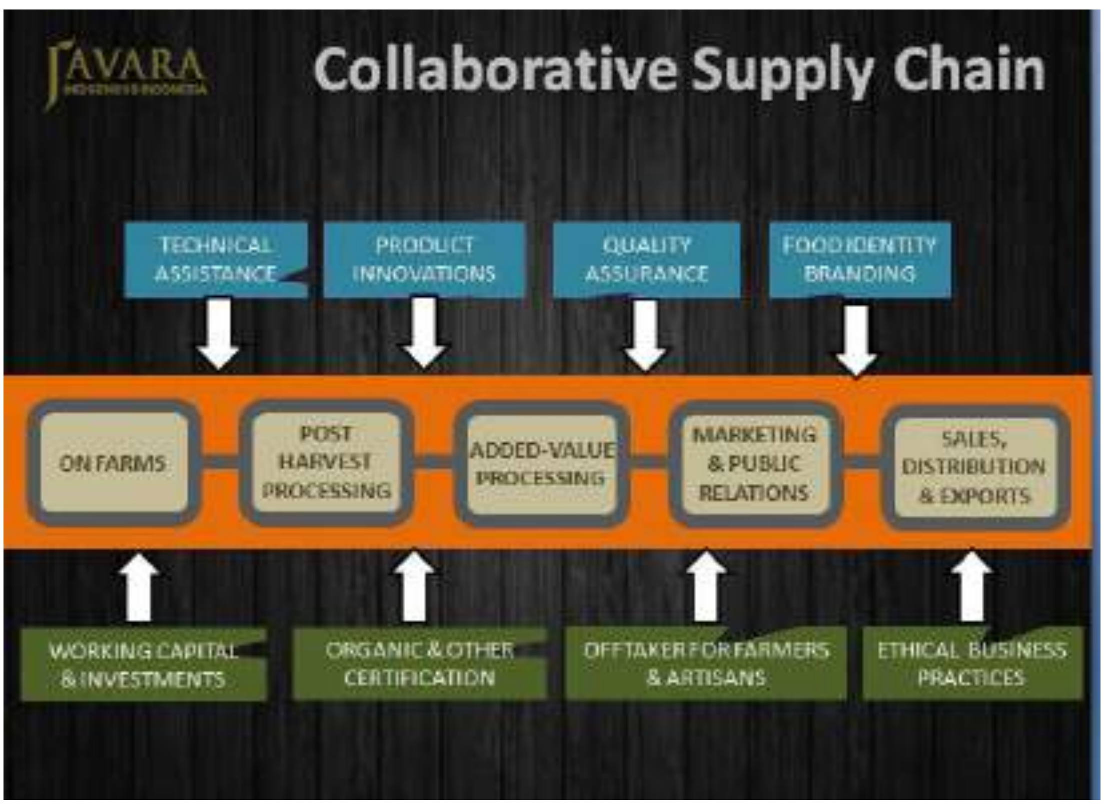

JAVARA
Mission
Preserving Indonesia's food biodiversity
and culinary tradition
&
Sustaining Indonesian
farmer profession


JAVARA
Organic Food Products
Natural/Organic = on farm: no chemical fertilizers & persticides +
Processing: no chemical additives & preservatives
Honey
Oil
Spices
Rice
Gluten-Free
Flour
Salt
Jams & Spreads
Noodles
Sugars & Syrups
Snacks


JAVARA
Partners
Origin of Sourcing
100% Indonesia
50,000
10,000
2,000
1,000
Farmers Certified Organic
Food Artisans Certified Organic
20% of our farmers are certified organic
50% of our food artisans are certified organic
Distribution: >300 premium supermarket, hotel, restaurant & caterings in Indonesia
Export to Europe, North America, Asia, Australia (Organic Certified USDA, EU, JAS, Kosher)
Over 80% of turnover generated from exports


JAVARA
Forestry Food Products
What's in it from forest?
Colorants
Fruits
Sugar
Starch
Superfood
Spices


JAVARA
Why Forestry Food Products?
Preserving biodiversity, naturally grown, non chemical fertilizers and pesticides
→ independence (seeds, inputs) and organic-certifiable
→ better access to market.
• Organic dan naturally grown
• Raw superfood (single ingredient)
• Vegan/vegetarian
• Special dietary (low GI, gluten free)


JAVARA
Collaborative Supply Chain
TECHNICAL ASSISTANCE
PRODUCT INNOVATIONS
QUALITY ASSURANCE
FOOD IDENTITY BRANDING
ON FARMS
POST HARVEST PROCESSING
ADDED-VALUE PROCESSING
MARKETING & PUBLIC RELATIONS
SALES, DISTRIBUTION & EXPORTS
WORKING CAPITAL & INVESTMENTS
ORGANIC & OTHER CERTIFICATION
OFFTAKER FOR FARMERS & ARTISANS
ETHICAL BUSINESS PRACTICES


JAVARA
Competitiveness factors
Product Segmentation: Niches vs. Mainstream
Uniqueness/Compelling: What makes the product stands out from the crowd?
Sustainable supply chain! conforming quality standard and cost effective.
Pricing: reasonable and competitive.


JAVARA
Business case:
organic coconut-based industry
Blossom nectar
Nectar syrup
Crystal sugar
Block sugar
Coconut fruit
Meat
Chips snack
shell
Milk
CCO/VCO
Activated charcoal
Jam
On Farm:
community-based, smallholders
Artisans, community-based,
Industrial scale


JAVARA
Knowing your product lifecycle
Cumulative Revenues
Pre-Diffusion phase
Diffusion phase
Innovation phase
Market adaptation phase
Market stabilization phase
Sunset
Maturing (high-volume)
Industrial production & Large-scale diffusion
First market introduction
Fast growing (Star)
Niches (Heritage/ New Product)
T_0 Idea
T_1 Market Introduction
T_2 Sales/Business takeoff
Time (in year)
(Roland J. Ortt, 2004)


Challenges in Upscaling
Diverse products mix: lack of focus in growing stage?
- Efficiency (cash cow), Expansion (star)
- Heritage products as special collections
Supply chain capacity: community-based, smallholders
- Long-term partnership
- Develop capabilities (the whole supply chain)
- Flexibility & scalability in production system
- Transparent pricing
Financing for expanding capacity: how much can you share?
- Trade financing, low interest loan
- Equity financing


Approach to Challenges
Commercial viability: organic certification both on farm and processing are costly!
Economies of scope:
- groups of farmers & multiple crops
- multiple products with closely similar processes
Efficiency :
- shared processing (storaging, drying, sorting, packing)
- shared logistics (20 ton in a truck vs 1 ton with pickup)
- marketing and sales (transaction handling)

JAVARA
Supply chain cost structure
Sharing roles and sharing costs
Purchase Raw Goods
Transfer
Manufacturing
Transfer
Distribution Warehouse
Logistics
Customer
Farmers/ Artisans
Collectors
Manufacturers
Distributors
Retailers
Raw material + post-harvesting costs
+margin (5-10%)
+ Collection and transport costs
+margin (10-15%)
+ Processing + packaging material + overhead
+ selling cost
+ overhead
+margin (10-15%)
+margin (20%)
+ inventory + promotion & marketing + transportation cost

JAVARA
Collaborative supply chain
• Common vision and co-developing
• Fair pricing and fair risk-sharing
• Contracts are based on collaborative relationship: openness, honesty, commitment, teamwork, trust

INVITED SPEAKER

Smallholder Agroforestry Systems for Timber and NTFPs Development

World Agroforestry Centre

Gerhard Eli Sabastian
Associate Scientist in Agroforestry System

The 1st International Conference on Innovation and Commercialization of Forest Product
Banjarbaru, 22 – 23 November 2016

Transforming lives and landscapes with trees

Outline

- Introduction
- Agroforestation in Asia
- ICRAF in Indonesia:
  - Enhanced production systems through participatory extension programs
  - Improved marketing strategies and value chains of smallholders' production
  - Developed policy frameworks of smallholders' production and marketing linkages

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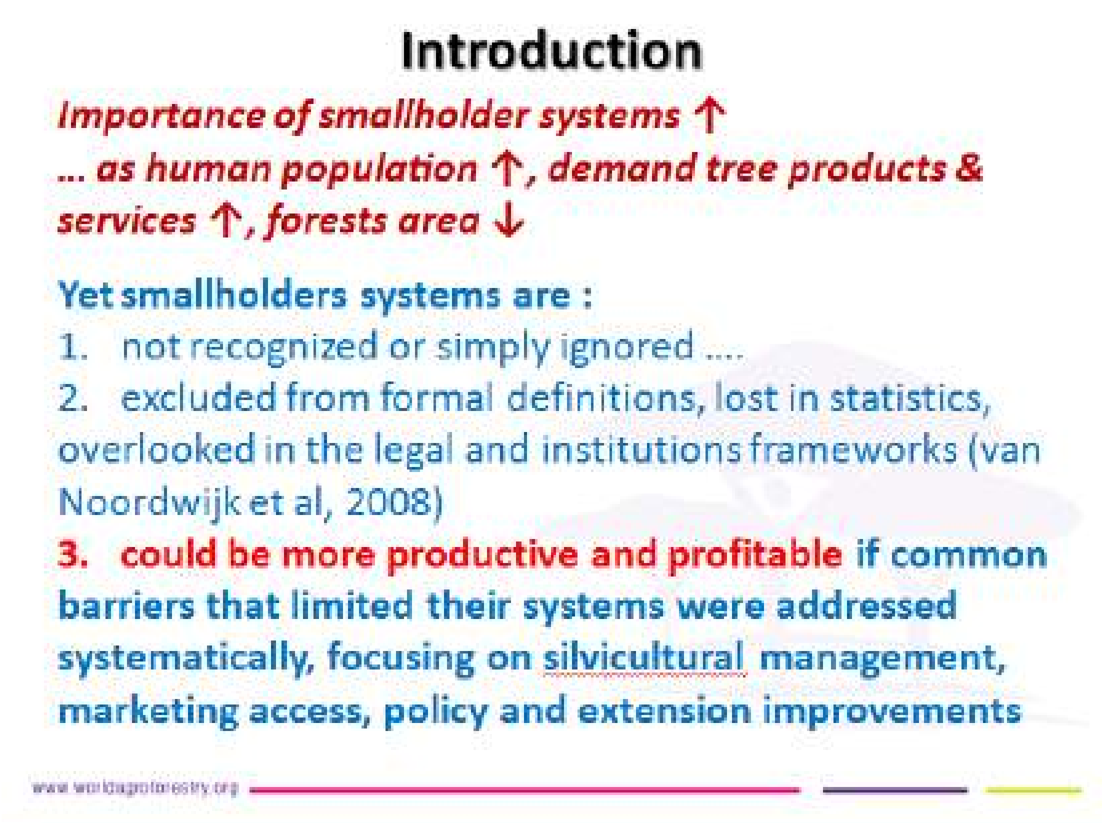
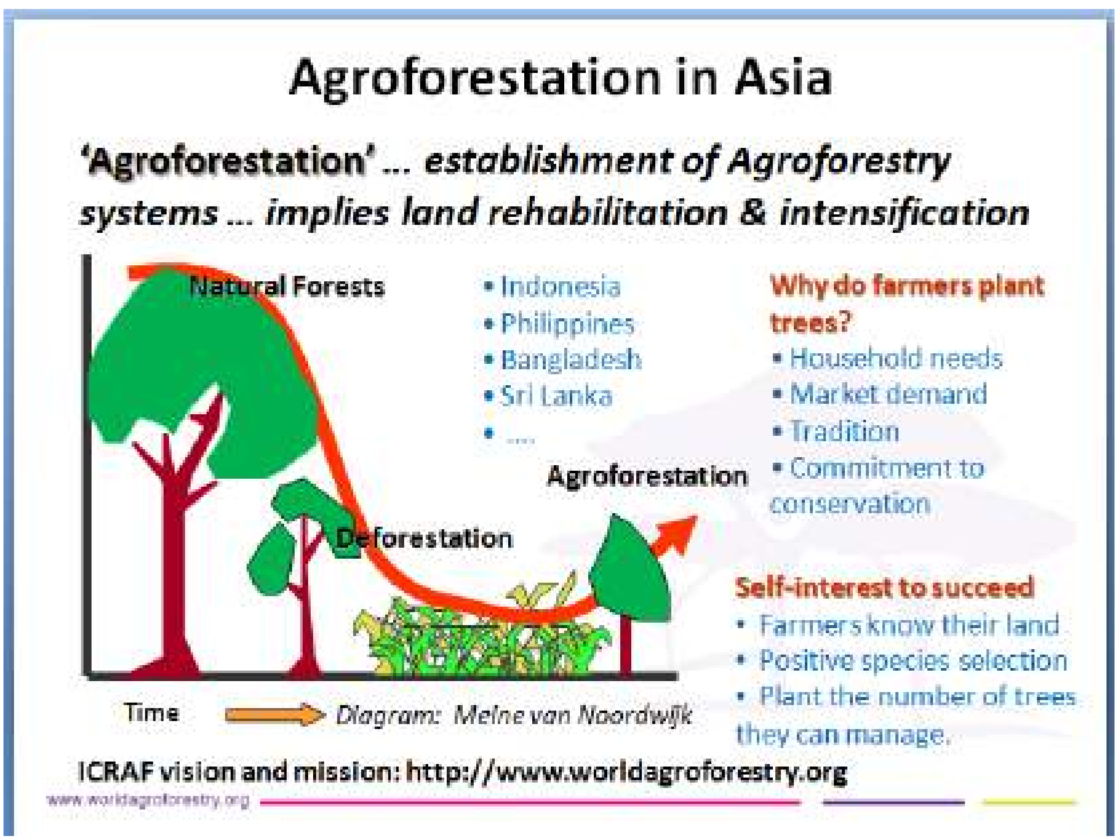
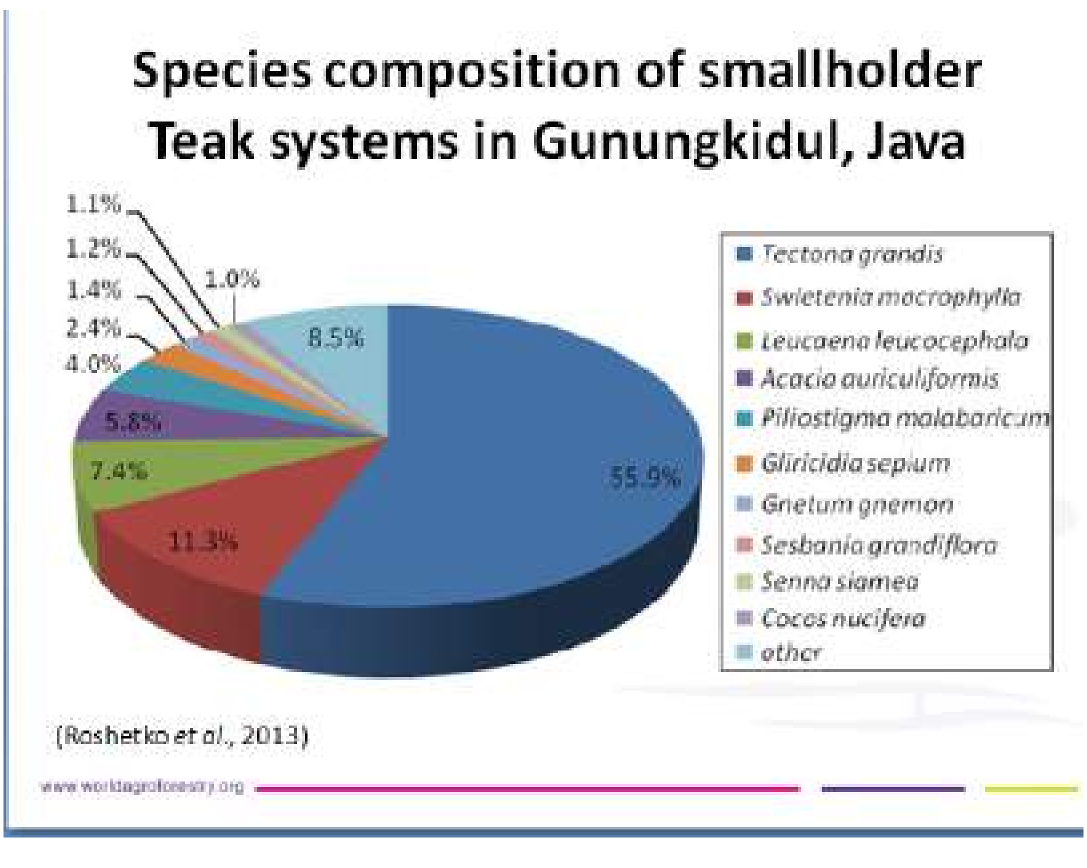

Introduction
Importance of smallholder systems ↑
… as human population ↑, demand tree products & services ↑, forests area ↓
Yet smallholders systems are :
1. not recognized or simply ignored ….
2. excluded from formal definitions, lost in statistics, overlooked in the legal and institutions frameworks (van Noordwijk et al, 2008)
3. could be more productive and profitable if common barriers that limited their systems were addressed systematically, focusing on silvicultural management, marketing access, policy and extension improvements
www.worldagroforestry.org


Agroforestation in Asia
'Agroforestation' … establishment of Agroforestry systems … implies land rehabilitation & intensification
Natural Forests
Deforestation
Agroforestation
Time
Diagram: Meine van Noordwijk
• Indonesia
• Philippines
• Bangladesh
• Sri Lanka
• ….
Why do farmers plant trees?
• Household needs
• Market demand
• Tradition
• Commitment to conservation
Self-interest to succeed
• Farmers know their land
• Positive species selection
• Plant the number of trees they can manage.
ICRAF vision and mission: http://www.worldagroforestry.org
www.worldagroforestry.org


Smallholder Agroforestry Systems in Indonesia for Timber and NTFPs
Woodlots on karst landscape
Intercropped teak hedgerows
Fruit-based multistrata
(Homegarden)
Timber alley farming


Species composition of smallholder Teak systems in Gunungkidul, Java
1.1%
1.2%
1.4%
2.4%
4.0%
1.0%
8.5%
5.8%
7.4%
11.3%
55.9%
Tectona grandis
Swietenia macrophylla
Leucaena leucocephala
Acacia auriculiformis
Piliostigma malabaricum
Gliricidia sepium
Gnetum gnemon
Sesbania grandiflora
Senna siamea
Cocos nucifera
other
(Roshetko et al., 2013)
www.worldagroforestry.org

Contribution (%) of Timber, NTFPs and other commodities in on-farm income

Agriculture production categories	Commodity crops	Gunungkidul	Sumbawa	TTS
Timber (Harvested from Tree)	Teak, Mahogany, Acacia, Ampupu, Casuarina	1.78	1.14	0.94
NTFPs (Harvested from Tree & Non-tree)	Sesbania, Candlenut, Wild-honey, Turmeric, Lemongrass, Indigo, Avocado, Bamboos	2.35	20.92	29.83
Timber & NTFPs (Harvested from Tree)	Mango, Jackfruit, Kapok, Tamarind, Gnetum	0.36	11.27	9.43
Agricultural crops	Paddy, Maize, Peanuts, Cassava, Soybean	94.59	38.54	51.97
Plantation crops	Coffee, Coconut, Cashew, Citrus	0.92	28.13	7.83

Agroforestation in Gunungkidul, Indonesia

(Roshetko et al. 2013, Sabastian et al. 2014, Broto 2015, Sabastian et al. 2016)

Period	Institutional	Smallholders Agroforestry development objectives
Land rehabilitation (1970-1980s)	No community institution in managing Agroforestry	- Planted trees and crops (teak, mahogany, fruits, maize, cassava) on degraded land - Established terraces for soil and water conservation
Household subsistence needs (1980s – 2000s)	Farmer Groups established in village level	- Smallholder Agroforestry systems were used to meet HH subsistence needs - Farmer groups kept planting timber trees
Smallholder timber industrialization (2000s-current)	• ICRAF trials: silvicultural management • Farmer Cooperatives established with focusing on timber products	- Utilized high quality germplasm and pruning-thinning-coppicing practices - Focused on timber log and NTFPs production


ICRAF in Indonesia
Enhanced production systems through participatory extension programs
• Access to high quality germplasm (AgFor project)
▪ Tree crops nursery and vegetative propagation trainings, including seedlings and bud-wood gardens certification (cacao, clove, rubber, coffee, durian, rambutan, teak, mahogany, etc)
▪ 1.1 million seedlings, 25 bud-wood gardens
www.worldagroforestry.org


• Access to high quality germplasm, continued..
▪ Tree nursery established and commercial focused by individual and groups of farmer, including women participants
▪ 92 group & individual nurseries, 33% women of 11,622 farmers
▪ USD 43,219.5 revenue of seedlings sold in 3 yrs nursery period


• Access to high quality germplasm, continued..
▪ Motivated farmers in nursery and Agroforestry development were trained to be Farmer Specialist
▪ 23 farmer specialists: Farmer – to – Farmer approach
▪ Involved District Extension Officers and District Forestry-Agricultural Agencies


• Designed and established Farmer Demonstration Trials
▪ Species enrichment and GAP approach (AgFor project)
▫ Farmer designed & managed (132 trials conducted by 770 farmers)
▪ Silvicultural management for Timber and NTFPs production (Kanoppi project)
▫ Farmer + Researcher designed and Farmer managed (11 trials)

- Silvicultural management for Timber and NTFPs production (Research Trials):
  - Intercropping Teak silvicultural practices (pruning & thinning) and Ginger fertilization for timber and rhizome production in Teak production system
  - Effect of thinning & fertilization intensities on Rumput Ketak (*Lygodium* sp) production in Candlenut production system
  - Effect of fertilization & species varieties on Tarum (*Indigofera* sp) in Homegarden
  - Identifying coppicing and fertilization intensity for enhancing fruit production of Kayu Ules (*Helicteres isora*) in Fallow system

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Improved marketing strategies and value chains of smallholders' production

- Identify tree crops and NTFP species priority for local livelihoods through analysis of value-chain, governance, socioeconomics, and silvicultural practices
- Establish models of smallholders' enterprises for identified species priority
- Develop integrated marketing strategies and assess the possibility of establishing partnerships between farmers or farmers' associations and key traders and corporations



Developed policy frameworks of smallholders' production and marketing linkages

- Review policy and regulatory frameworks that hinder tree crops and NTFP production and marketing, in consultation with policy makers, community producers, traders along value chains and company buyers. These may include tree and land tenure
- Propose improved regulations and government support, focusing on effective and practical implementation, in consultation with identified key stakeholders

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Some key publications

- Sabastian GE, Kanowski P, Williams E, Roshetko JM, 2016. Tree diameter performance in relation to site quality in smallholder timber production systems in Gunungkidul, Indonesia. *Agroforestry Systems*, DOI: 10.1007/s10457-016-0018-9
- Sabastian G, P Kanowski, D Race, E Williams, and JM Roshetko, 2014. Household and farm attributes affecting adoption of smallholder timber management practices by tree growers in Gunungkidul region, Indonesia. Agroforestry Systems. DOI 10.1007/s10457-014-9673-x
- Roshetko JM, D Rohadi, A Perdana, G Sabastian, N Nuryartono, AA Pramono, N Widyani, P Manalu, MA Fauzi, P Sumardamto, N Kusumowardhani, 2013. Teak agroforestry systems for livelihood enhancement, industrial timber production, and environmental rehabilitation. Forests, Trees, and Livelihoods 22 (4): 251-256, DOI: 10.1080/14728028.2013.855150
- Dawson IK, Leakey R, Clement CR, Weber JC, Cornelius JP, Roshetko JM, Vinceti B, Kalinganire A, Tchoundjeu Z, Masters E, Jamnadass R, 2014. The management of tree genetic resources and the livelihoods of rural communities in the tropics: non-timber forest products, smallholder agroforestry practices and tree commodity crops. Forest Ecology and Management, 333, 9-21. http://dx.doi.org/10.1016/j.foreco.2014.01.021
- Roshetko JM, E Nugraha, JCM Tukan, G Manurung, C Fay, and M van Noordwijk, 2007. Agroforestry for Livelihood Enhancement and Enterprise Development. 137-148 p. In: S. Djoeroemana, B. Myers, J. Russell-Smith, M. Blyth, and I.E.T. Salean (eds). Integrated Rural Development in East Nusa Tenggara, Indonesia. Proceedings of a workshop to Identify Sustainable Rural Livelihoods, held in Kupang, Indonesia, 5–7 April 2006. ACIAR Proceedings No.126. 197 p.

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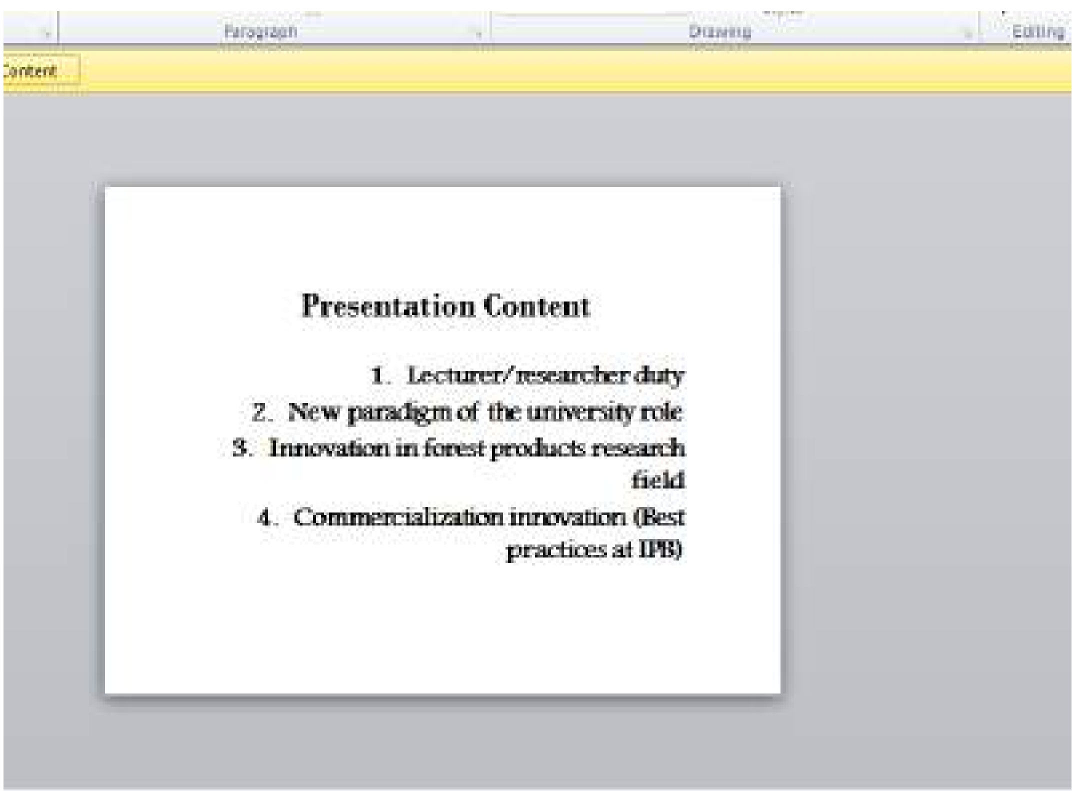
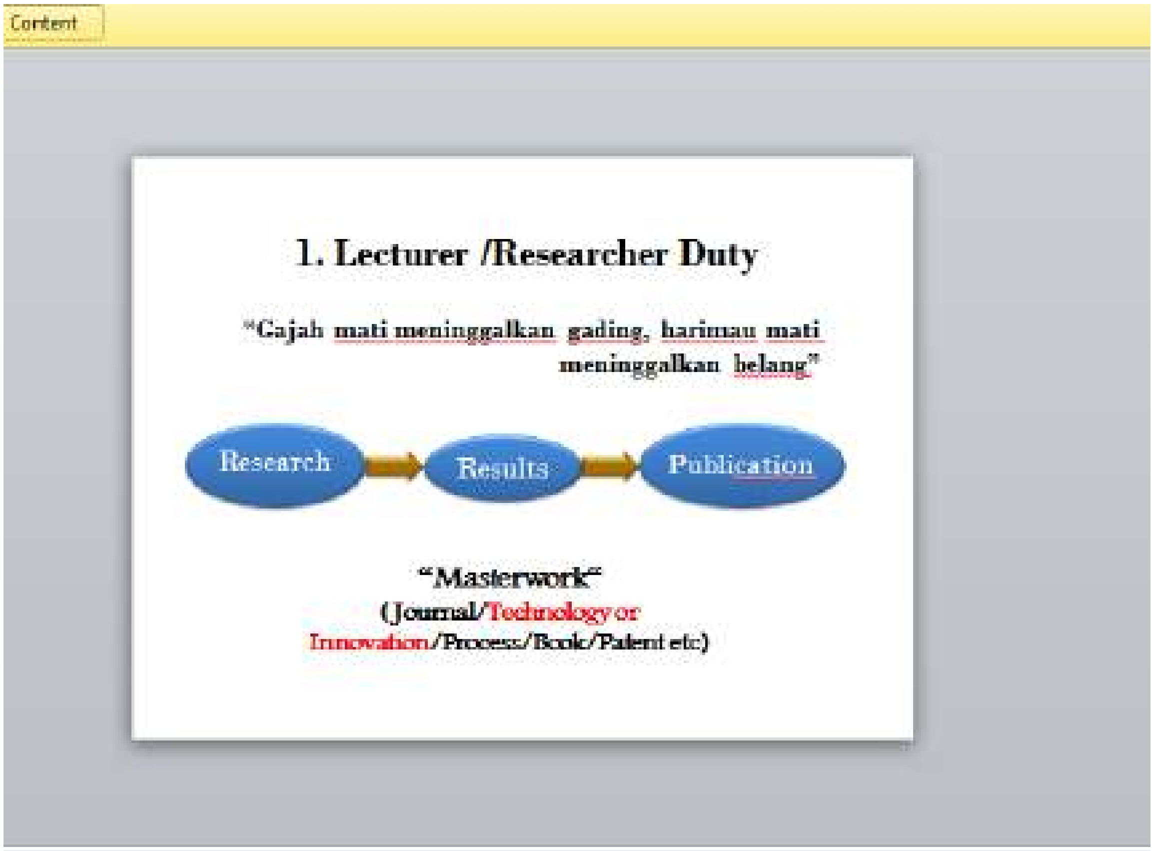
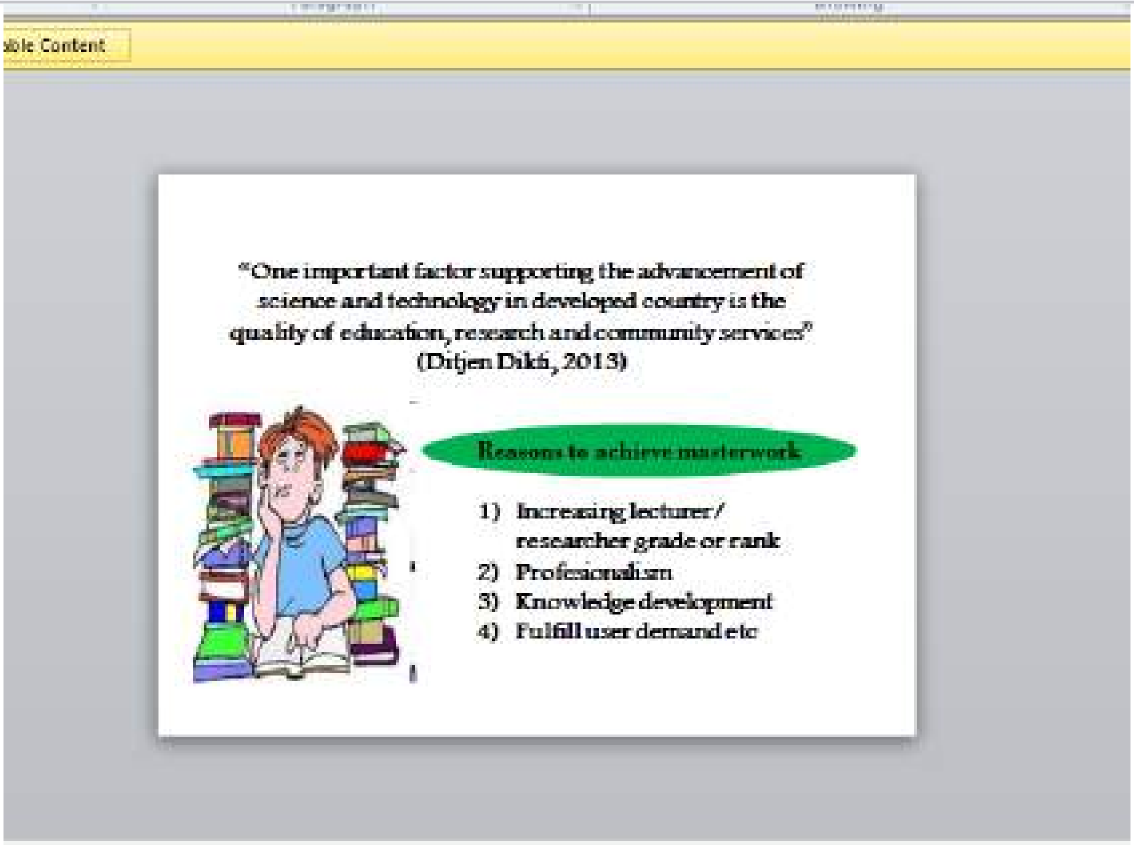
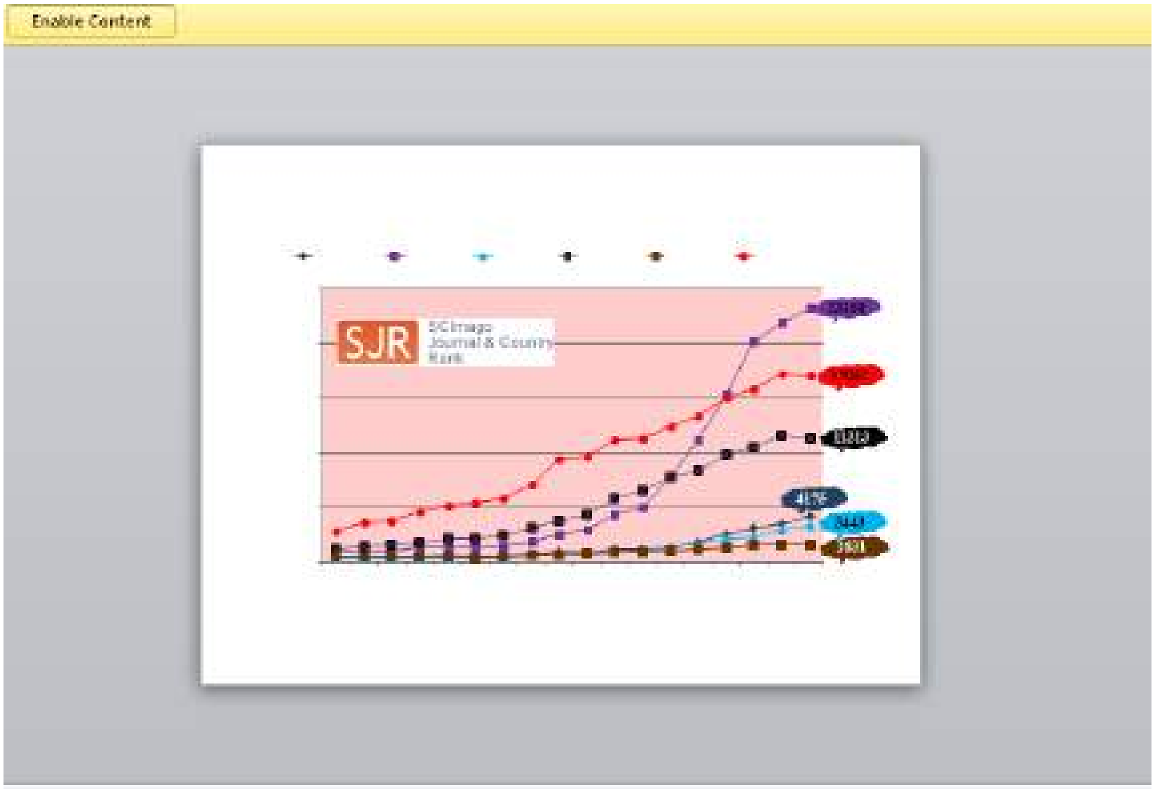
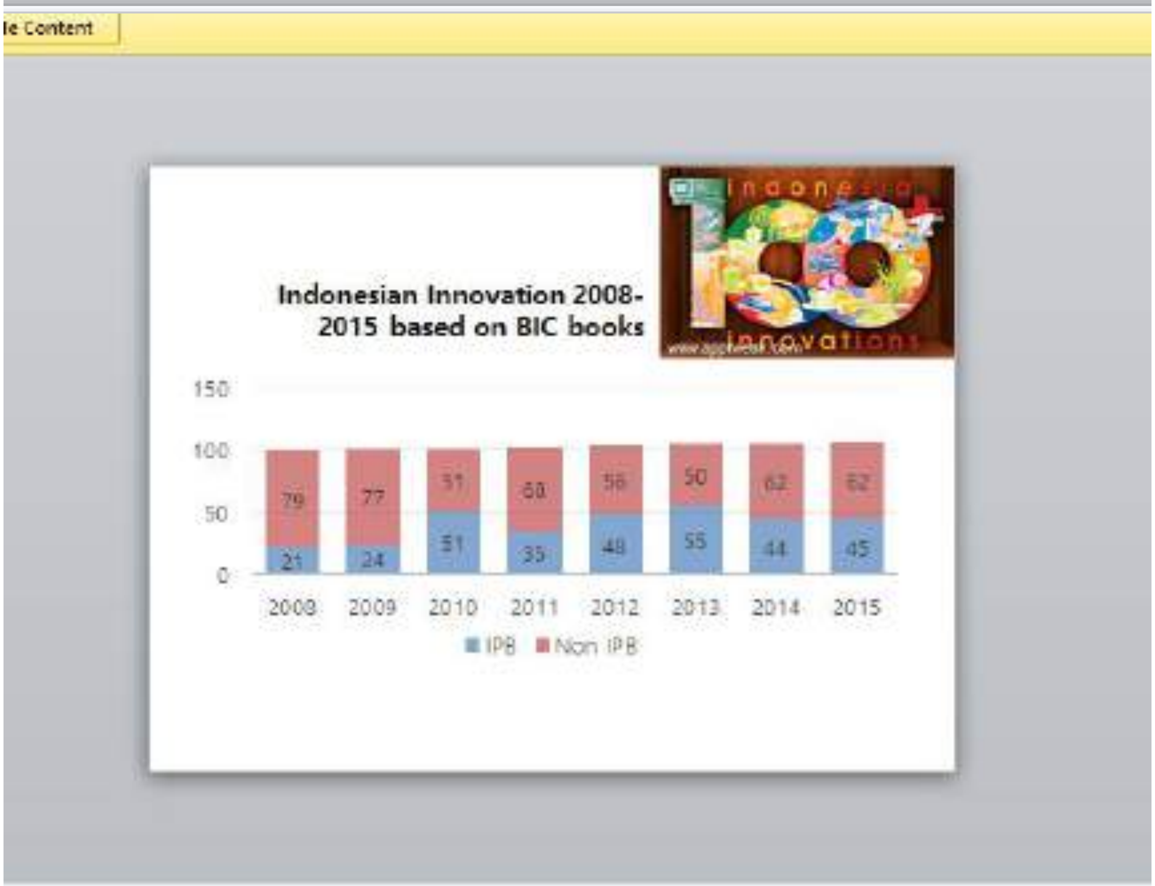
Content
Innovation and Commercialization in
Forest Products Research Field
Prof. Dr. Fauzi Febrianto
Presented at The 1st International Conference on Innovation and
Commercialization of Forest Products, Lambung Mangkurat
University, Banjarmasin, November 22-23, 2016

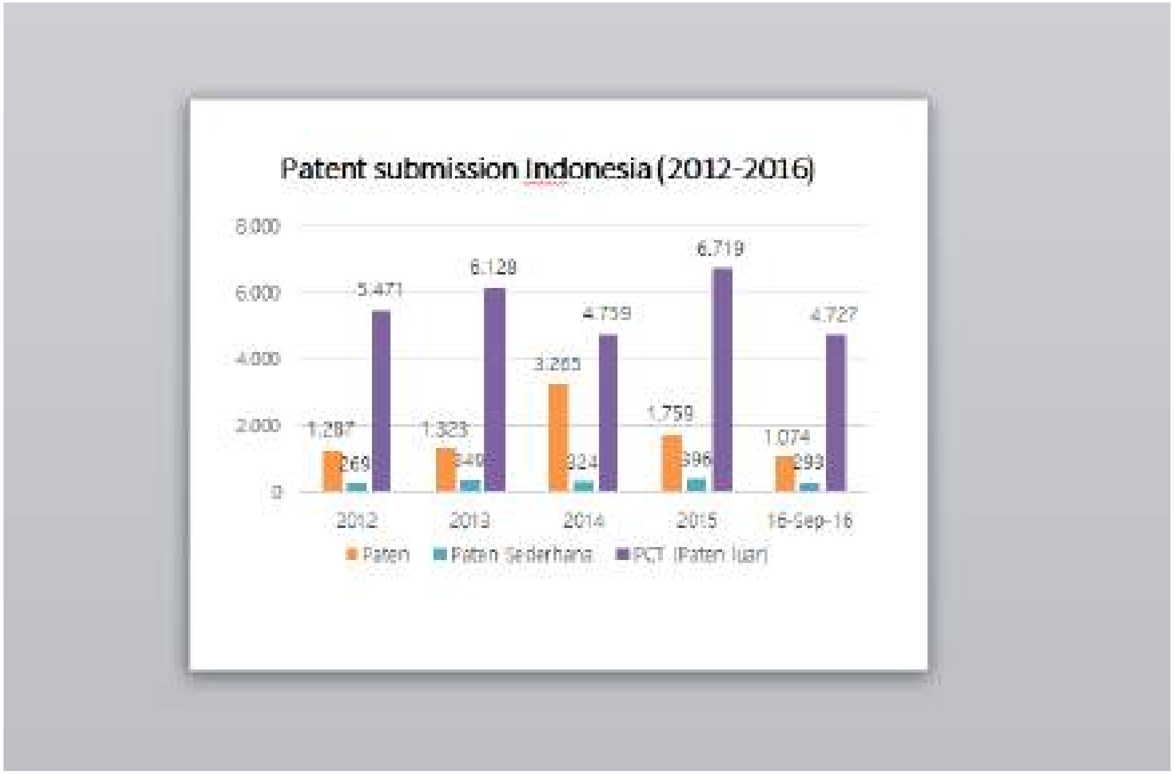

Paragraph
Drawing
Editing
Content
Presentation Content
1. Lecturer/researcher duty
2. New paradigm of the university role
3. Innovation in forest products research field
4. Commercialization innovation (Best practices at IPB)

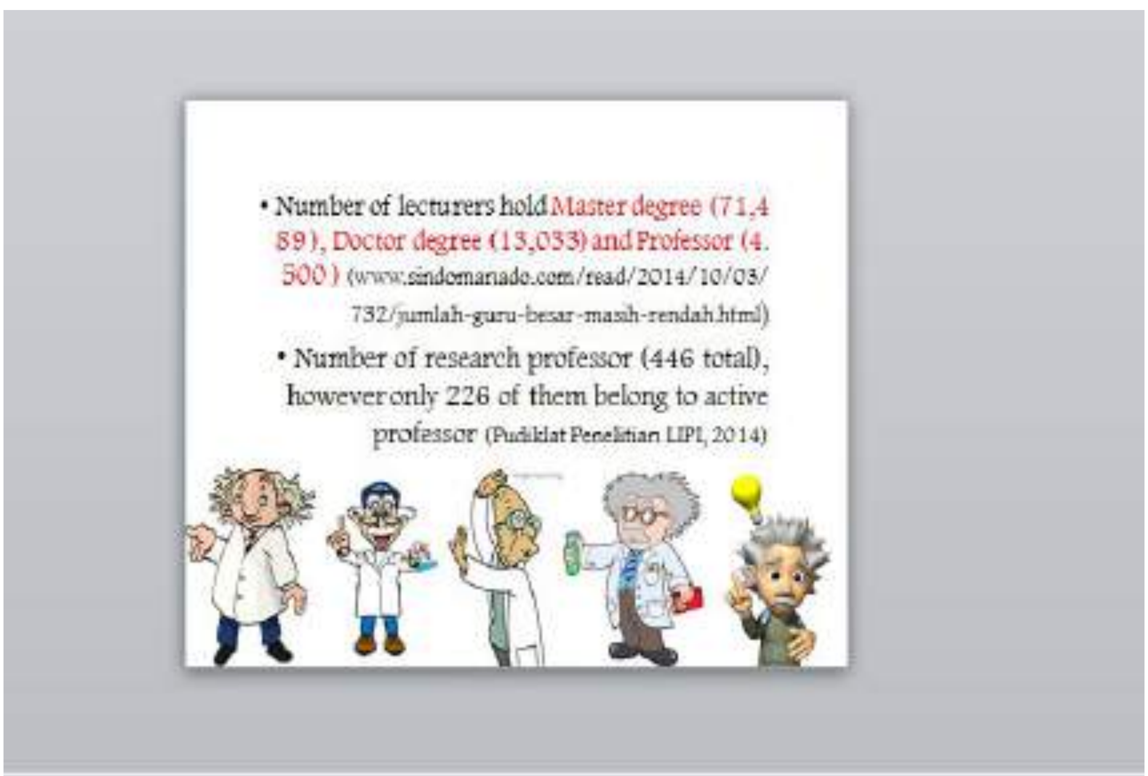

Content
1. Lecturer /Researcher Duty
"Gajah mati meninggalkan gading, harimau mati meninggalkan belang"
Research
Results
Publication
"Masterwork"
(Journal/Technology or Innovation/Process/Book/Patent etc)

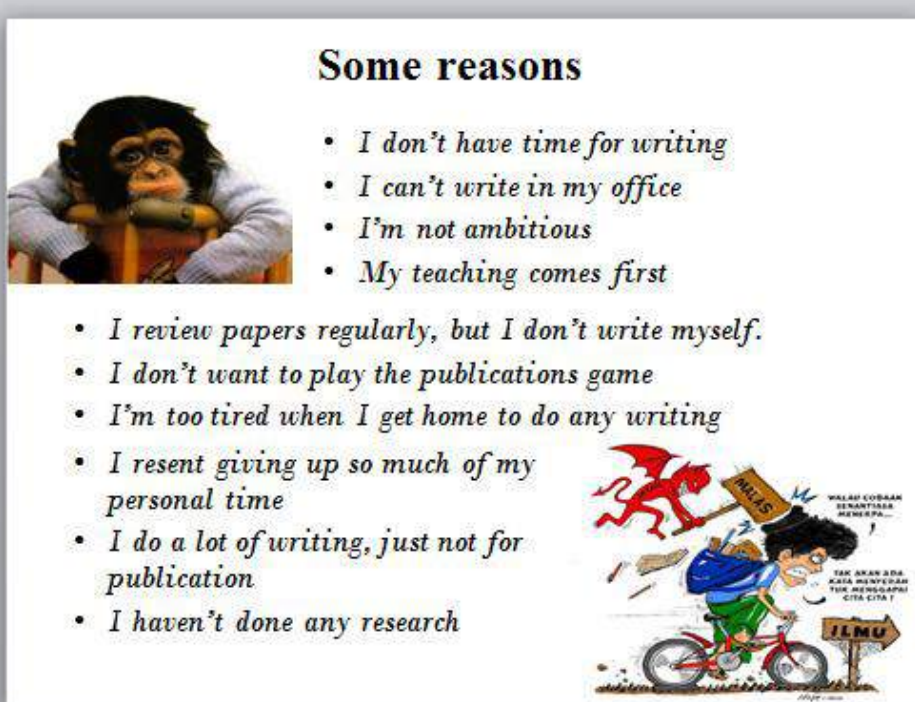

ble Content
"One important factor supporting the advancement of science and technology in developed country is the quality of education, research and community services"
(Dirjen Dikti, 2013)
Reasons to achieve masterwork
1) Increasing lecturer/ researcher grade or rank
2) Professionalism
3) Knowledge development
4) Fulfill user demand etc

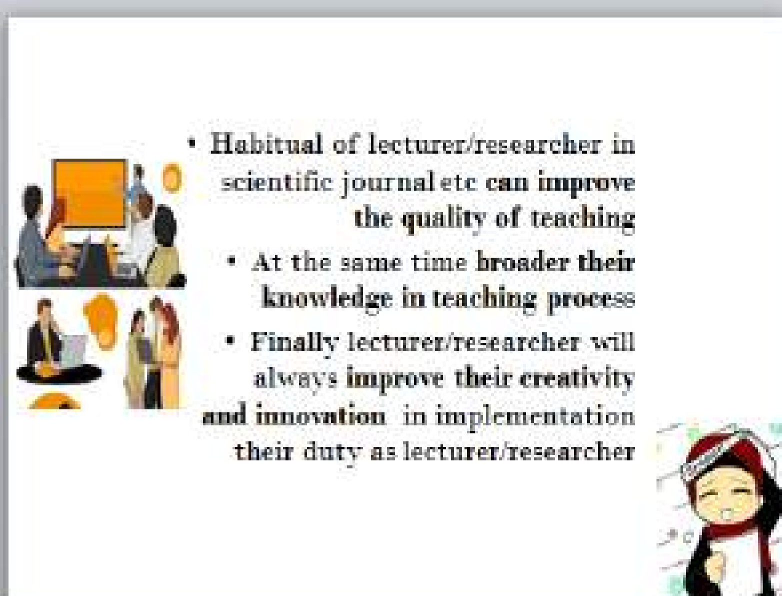

Enable Content
SJR
SCImago
Journal & Country
Rank

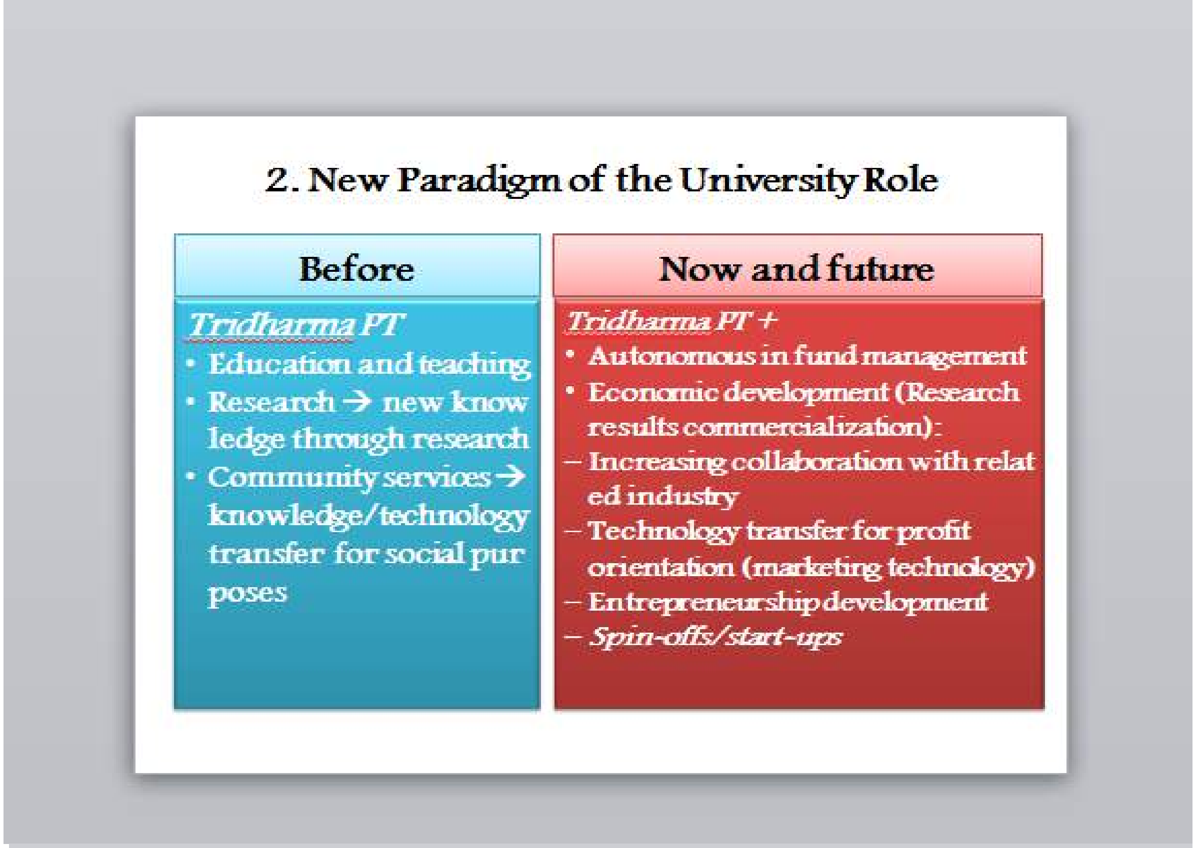

le Content
Indonesian Innovation 2008-2015 based on BIC books
Indonesia
100
innovations
150
100
50
0
79
77
51
68
56
50
62
62
21
24
51
35
48
55
44
45
2008
2009
2010
2011
2012
2013
2014
2015
IPB
Non IPB

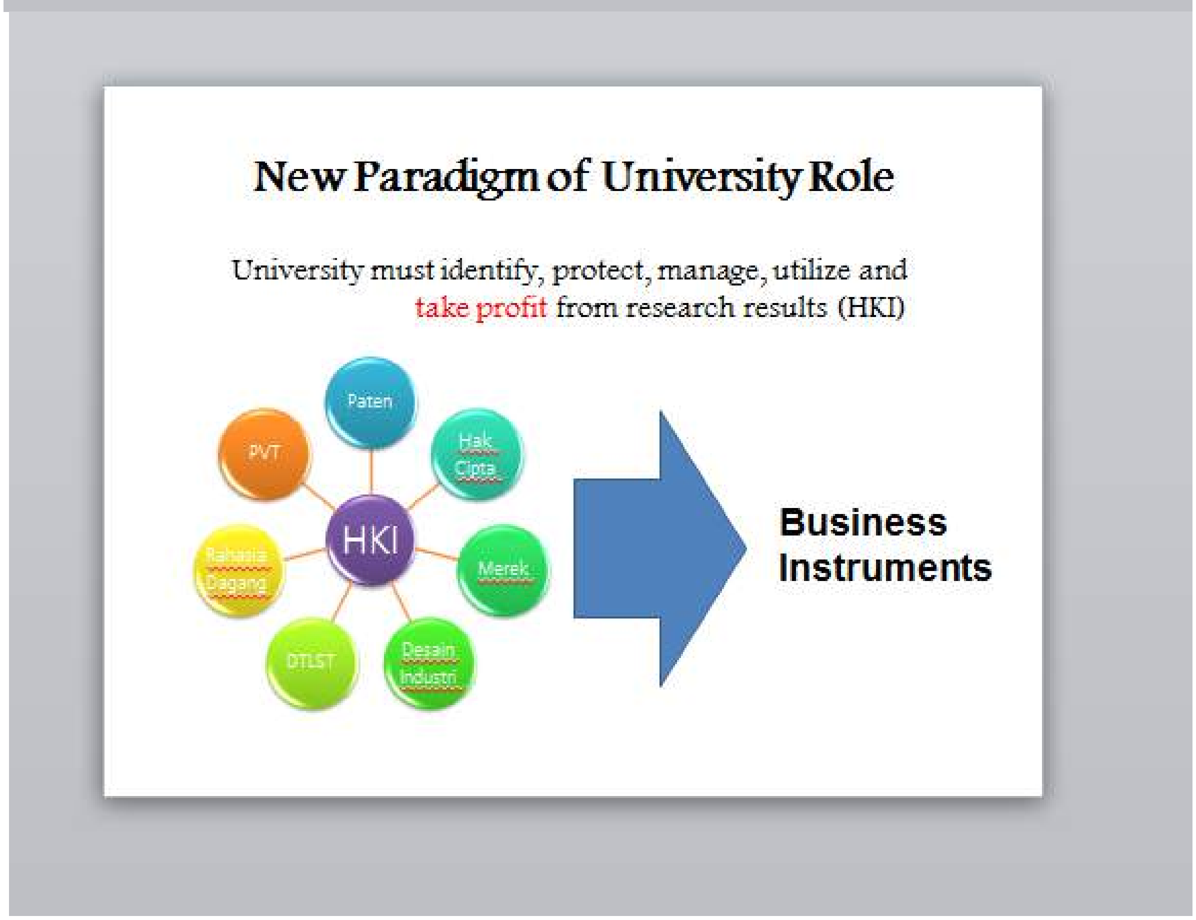

Patent submission Indonesia (2012-2016)
8.000
6.000
4.000
2.000
0
5.471
6.128
4.739
6.719
4.727
1.287
269
1.323
340
3.265
324
1.759
396
1.074
293
2012
2013
2014
2015
16-Sep-16
Paten
Paten Sederhana
PCT (Paten luar)

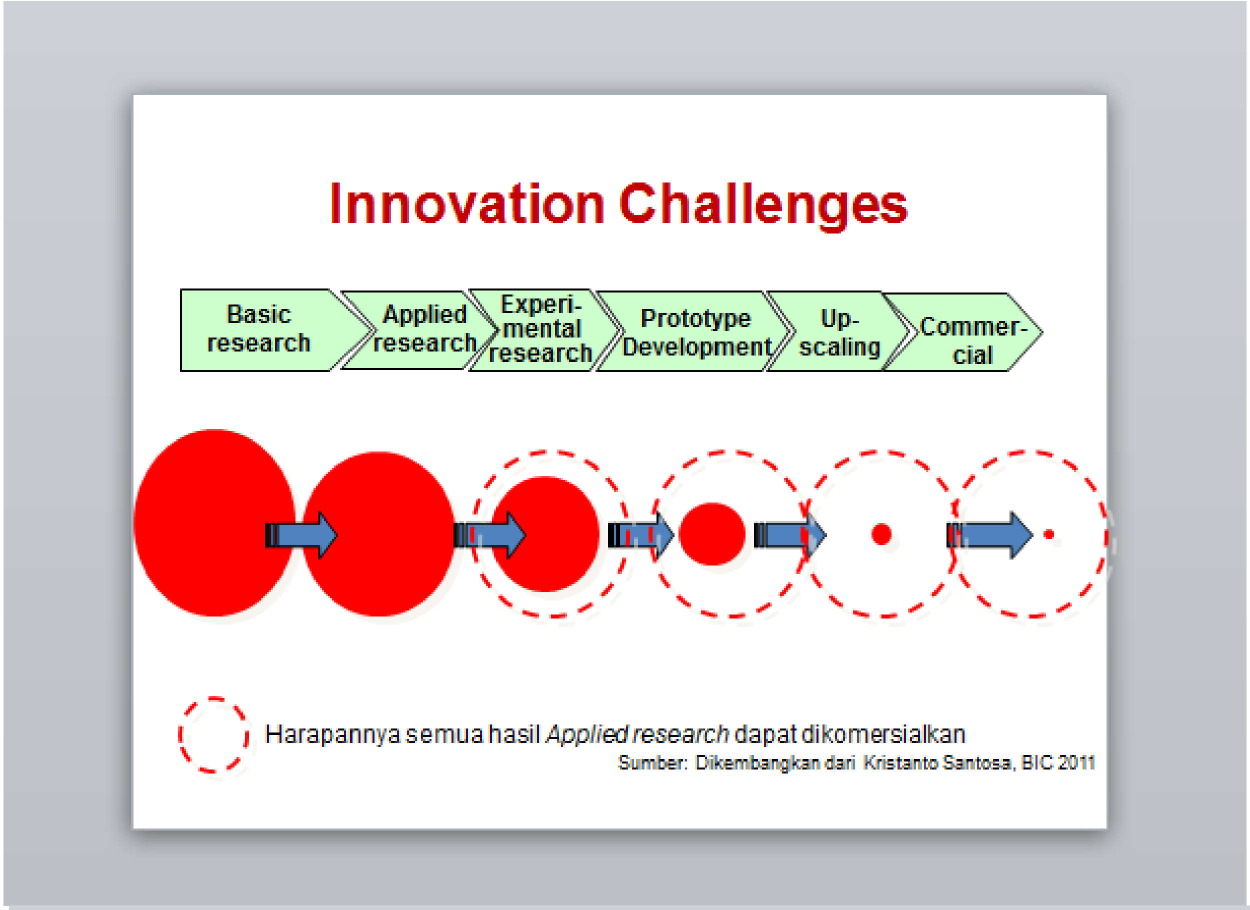

• Number of lecturers hold Master degree (71,489), Doctor degree (13,033) and Professor (4.500) (www.sindomanado.com/read/2014/10/03/732/jumlah-guru-besar-masih-rendah.html)
• Number of research professor (446 total), however only 226 of them belong to active professor (Pudiklat Penelitian LIPI, 2014)


Some reasons
I don't have time for writing
I can't write in my office
I'm not ambitious
My teaching comes first
I review papers regularly, but I don't write myself.
I don't want to play the publications game
I'm too tired when I get home to do any writing
I resent giving up so much of my personal time
I do a lot of writing, just not for publication
I haven't done any research
MALAS
ILMU


Habitual of lecturer/researcher in scientific journal etc can improve the quality of teaching
At the same time broader their knowledge in teaching process
Finally lecturer/researcher will always improve their creativity and innovation in implementation their duty as lecturer/researcher


2. New Paradigm of the University Role
Before
Tridharma PT
• Education and teaching
• Research → new know ledge through research
• Community services → knowledge/technology transfer for social pur poses
Now and future
Tridharma PT +
• Autonomous in fund management
• Economic development (Research results commercialization):
– Increasing collaboration with relat ed industry
– Technology transfer for profit orientation (marketing technology)
– Entrepreneurship development
– Spin-offs/start-ups


New Paradigm of University Role
University must identify, protect, manage, utilize and take profit from research results (HKI)
Paten
Hak Cipta
Merek
Desain Industri
DTLST
Rahasia Dagang
PVT
HKI
Business Instruments


Innovation Challenges
Basic research
Applied research
Experi-mental research
Prototype Development
Up-scaling
Commer-cial
Harapannya semua hasil *Applied research* dapat dikomersialkan
Sumber: Dikembangkan dari Kristanto Santosa, BIC 2011


Masih menjadi tantangan dalam komersialisasi teknologi
LOW RISK
HIGH RISK
TRUST
STAY IN TOUCH!
• Perbedaan antara kebutuhan industri dan hasil riset perg uruan tinggi
• Hasil riset yang masih skala laboratorium, baru, belum te ruji, belum ada prototipe, dan mempunyai resiko tinggi.
• Kurangnya kepercayaan pelaku bisnis di Indonesia untuk memanfaatkan hasil riset atau melakukan alih teknologi terhadap riset-riset yang dihasilkan perguruan tinggi
• Keterbatasan dana ventura yang diperlukan untuk start-up bisnis juga menjadi kendala dalam pengembangan in ovasi.
• Dana riset yang belum memadai untuk riset multi years
• Pelaksanaan temu bisnis yang belum efektif → *follow up* masih lemah

3. Innovation in forest products research field

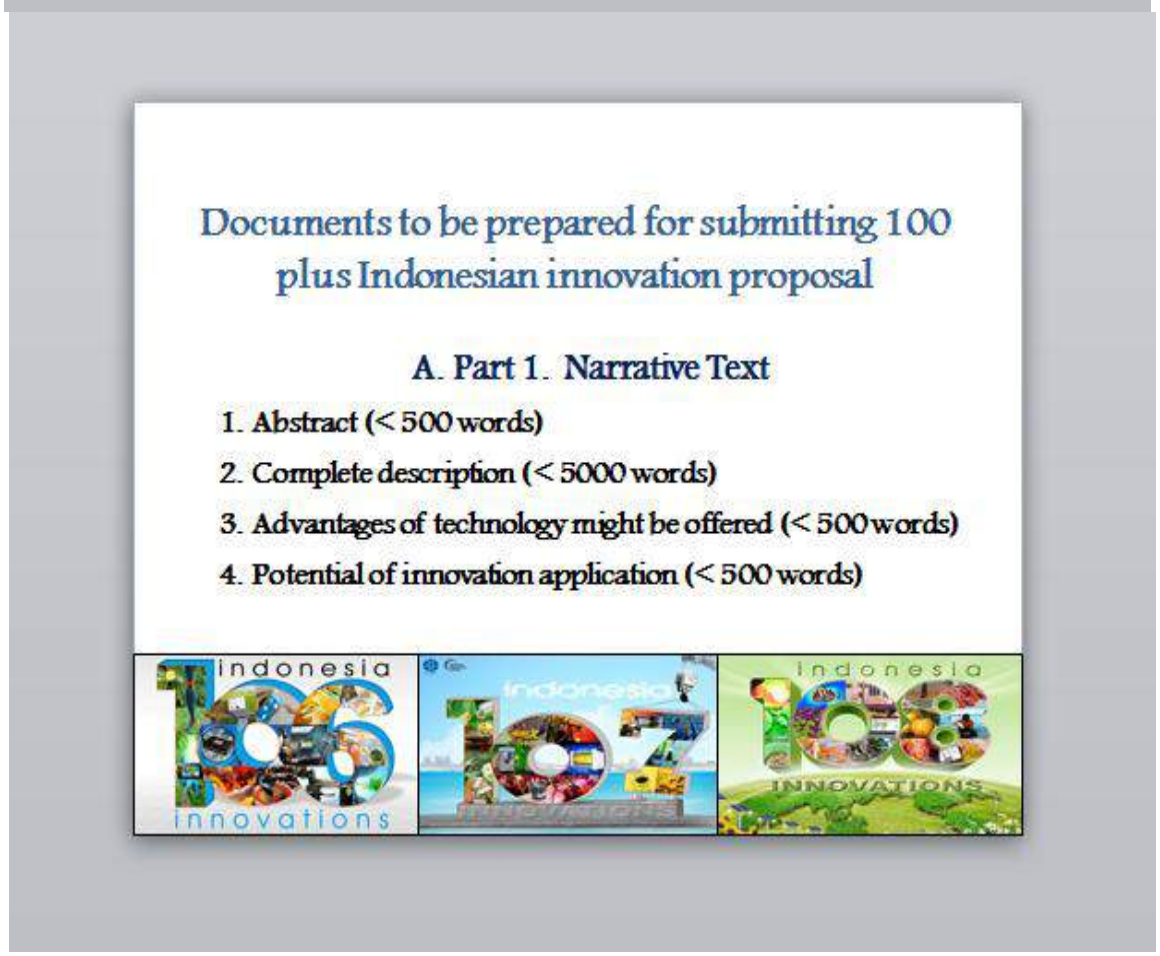
Wood and Non Wood Forest Products

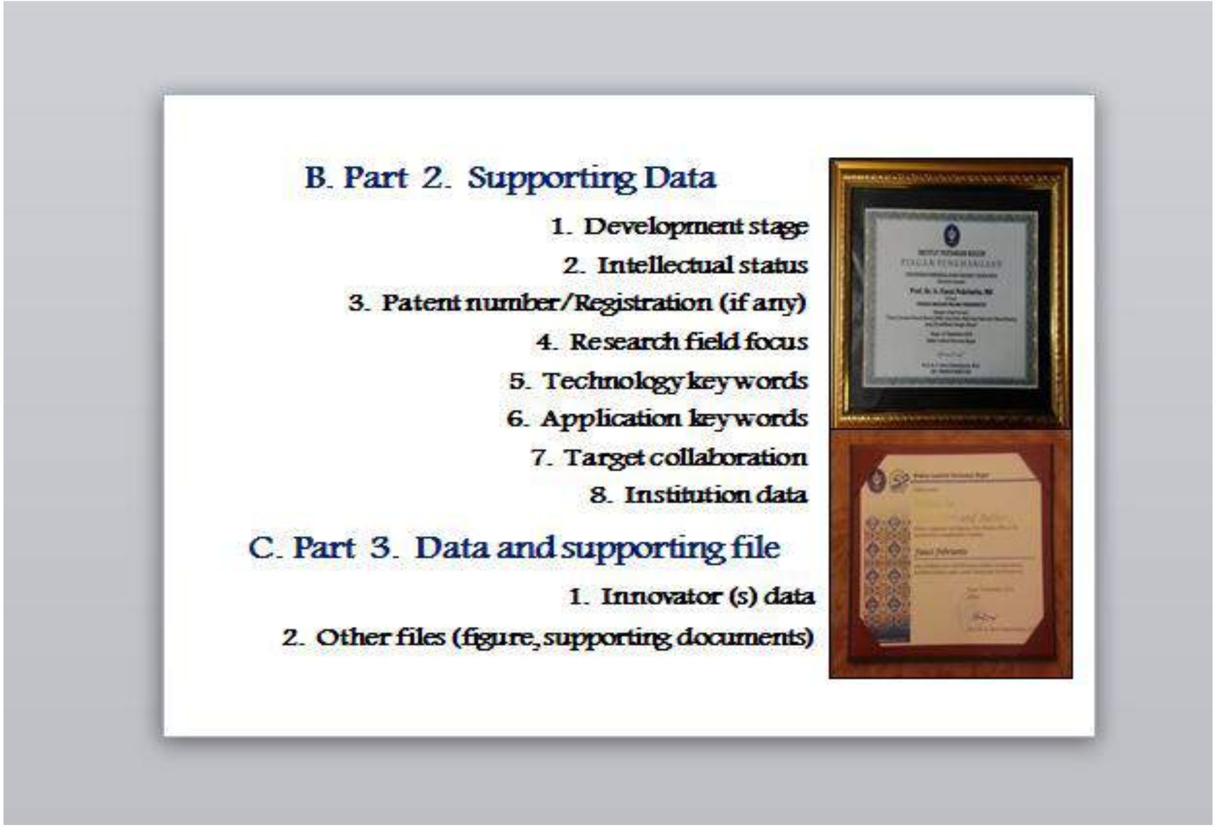
- Building material
- Lignocelluloses material
- Waste utilization
- Natural biocide
- Food
- Adhesive
- Cosmetic
- Medicine etc

Innovation awards and patent

METROPOLIS
RADAR BOGOR

Guru Besar IPB Ungkap Keunggulan Kayu Komposit Plastik

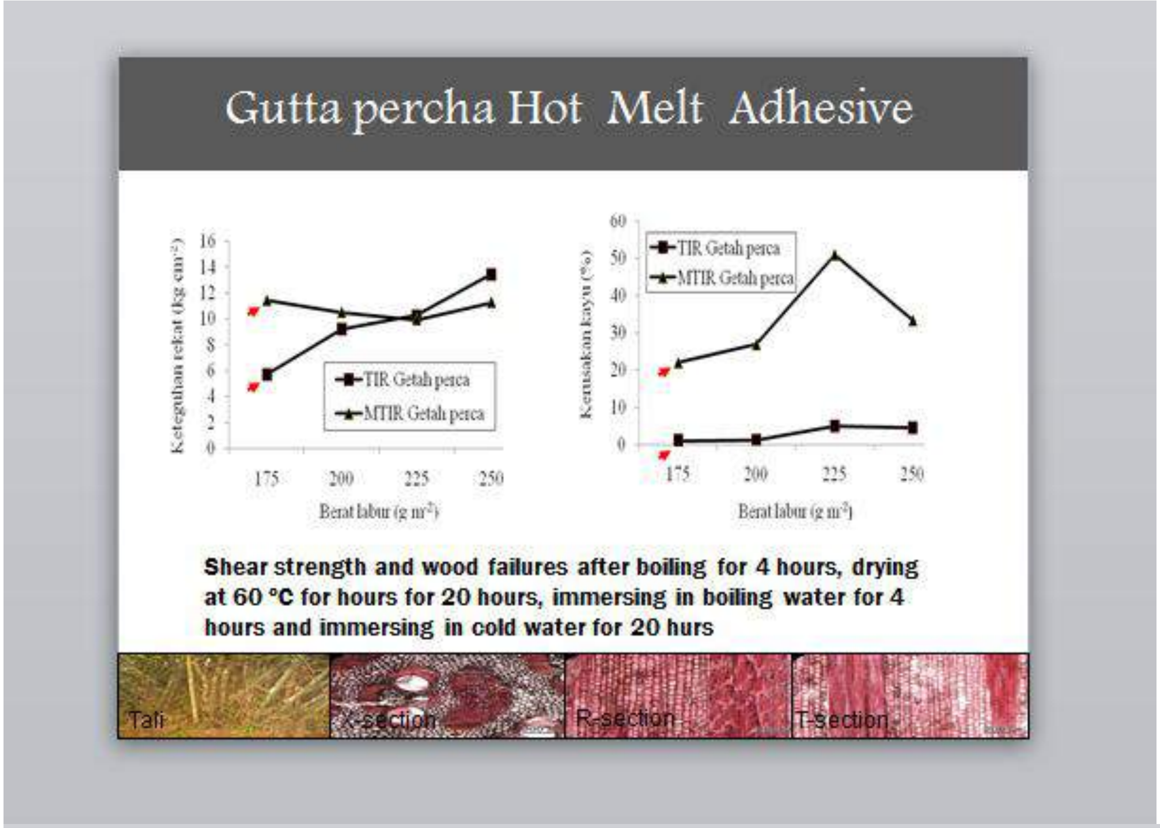


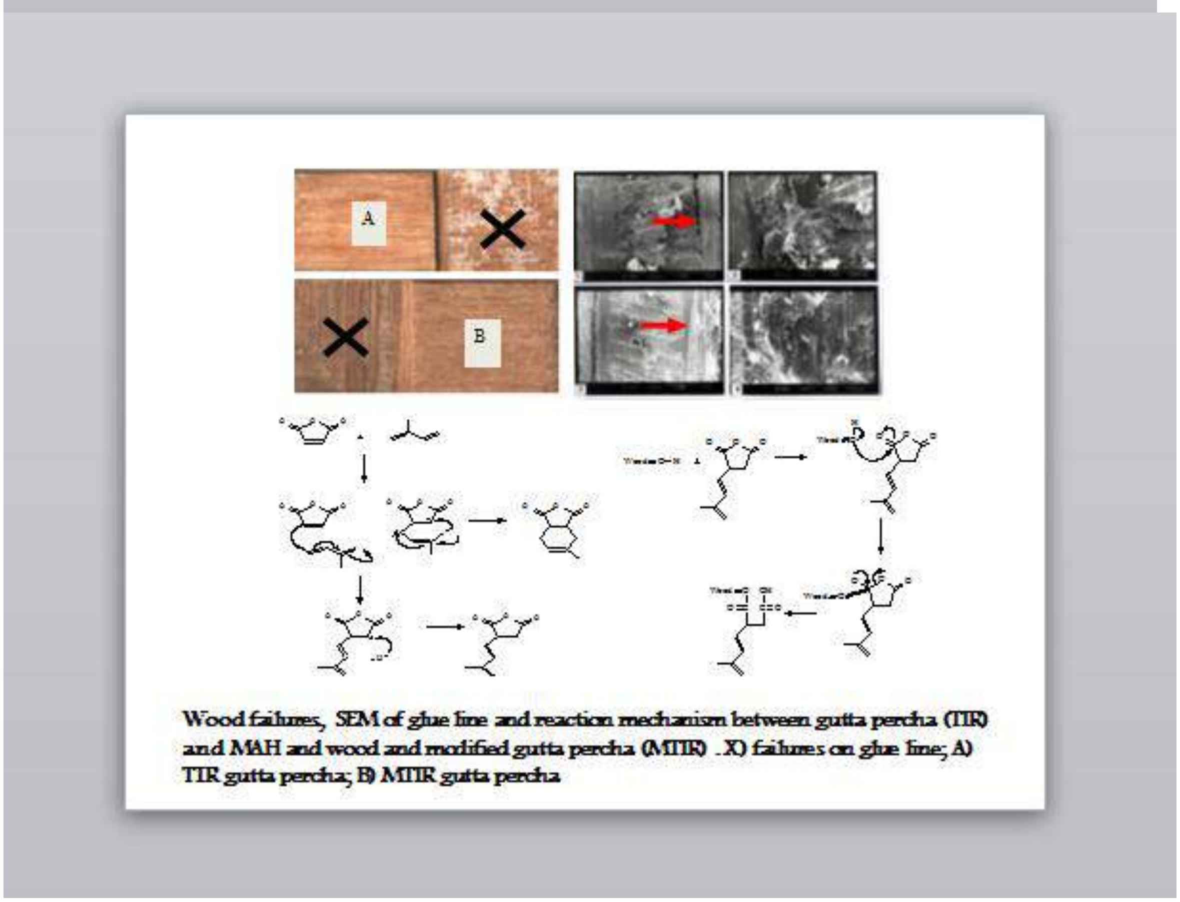

B. Part 2. Supporting Data
1. Development stage
2. Intellectual status
3. Patent number/Registration (if any)
4. Research field focus
5. Technology keywords
6. Application keywords
7. Target collaboration
8. Institution data
C. Part 3. Data and supporting file
1. Innovator (s) data
2. Other files (figure, supporting documents)


Example 1
100 Indonesian Innovation 2008
indonesia
innovations
Super glue made from
biodegradable resources
modified gutta percha


TAHAP I PENGOLAHAN MEKANIS
TAHAP II PENGOLAHAN KIMIA DAN PENGEMASAN
TJIPETIR
Flow chart of gutta percha production from *P. gutta* leaves


Gutta Percha Cold Press Liquide Adhesive
a
b
c
Getah perca padat
Getah perca serbuk
Perekat Getah perca + toluena
Glue line
t = Thickness of sawn lumber
Block shear sample
Klem
Aplikasi perekat
Flow chart of wood lamination manufacturing bonded with gutta percha liquid adhesive


Gutta percha Hot Melt Adhesive
Keteguhan rekat (kg cm-2)
TIR Getah perca
MTIR Getah perca
Berat labur (g m-2)
Kerusakan kayu (%)
TIR Getah perca
MTIR Getah perca
Berat labur (g m-2)
Shear strength and wood failures after boiling for 4 hours, drying at 60 °C for hours for 20 hours, immersing in boiling water for 4 hours and immersing in cold water for 20 hurs
Tali
X-section
R-section
T-section

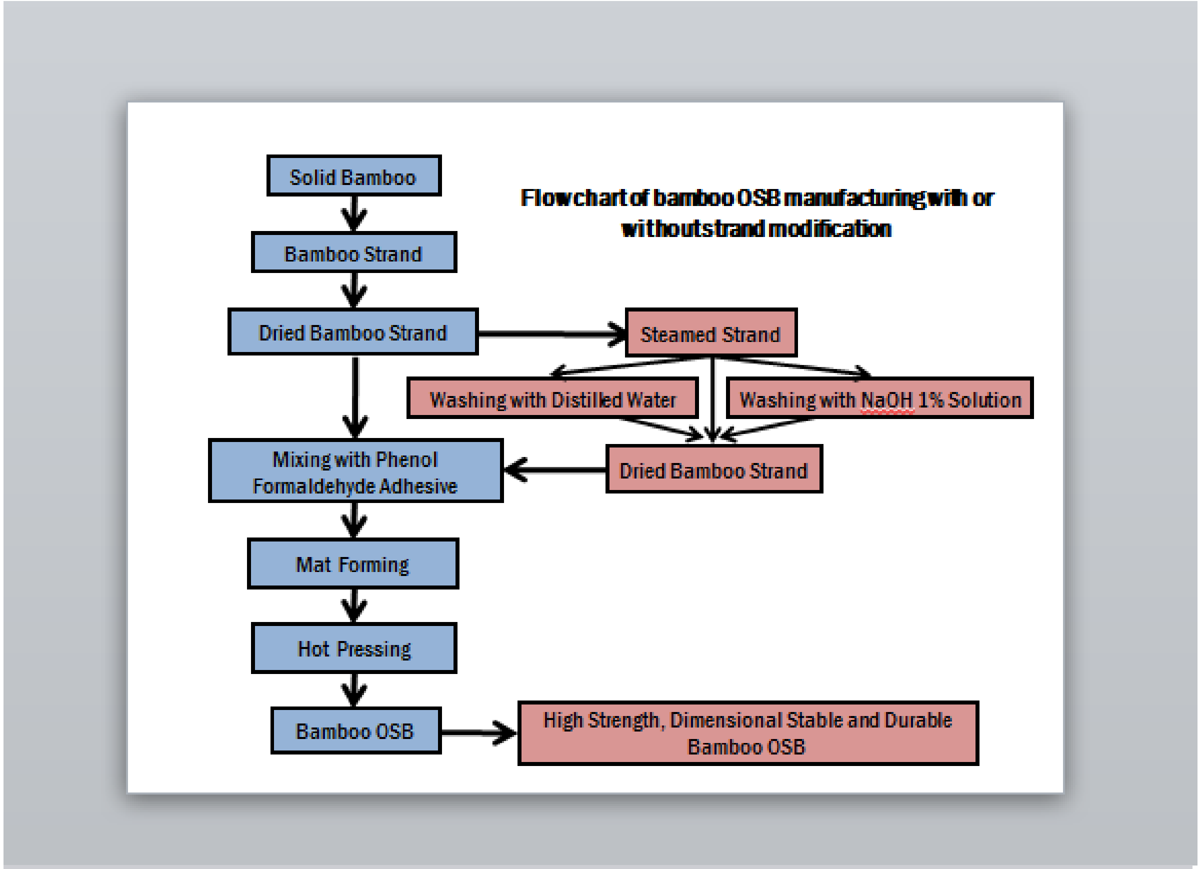

A
B
Wood failures, SEM of glue line and reaction mechanism between gutta percha (TIR) and MAH and wood and modified gutta percha (MTIR) . X) failures on glue line; A) TIR gutta percha; B) MTIR gutta percha

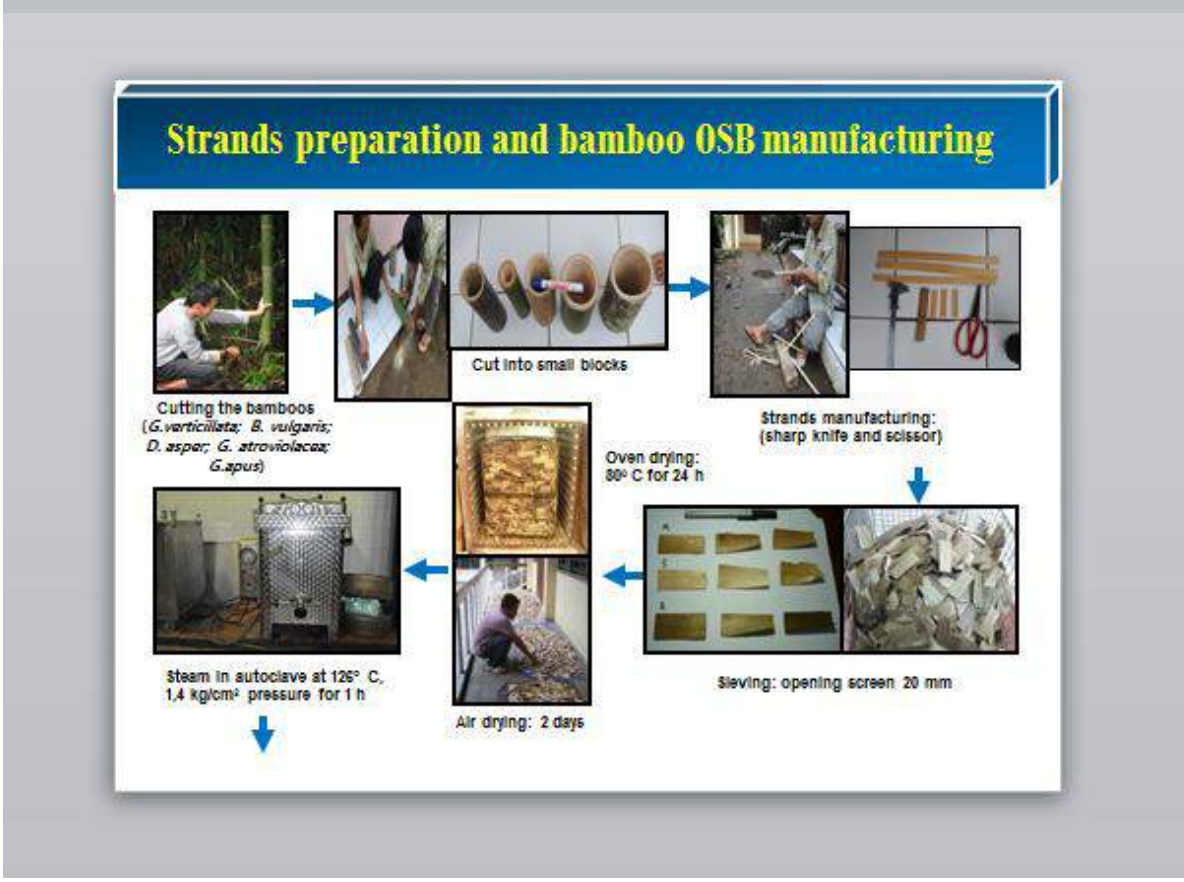

indonesia
innovations
Patent


Example 2
107 Indonesian Innovation 2015
High Strength, dimensional stable and durable oriented strand board (OSB) prepared from steamed treated bamboo strands


OSB Applications


Betung Bamboo and Bamboo OSB
2.6 cm
13.2 cm
Betung
Andong
Tali
Ampel
Betung bamboo
Bamboo OSB


Flowchart of bamboo OSB manufacturing with or without strand modification
Solid Bamboo
Bamboo Strand
Dried Bamboo Strand
Steamed Strand
Washing with Distilled Water
Washing with NaOH 1% Solution
Dried Bamboo Strand
Mixing with Phenol Formaldehyde Adhesive
Mat Forming
Hot Pressing
Bamboo OSB
High Strength, Dimensional Stable and Durable Bamboo OSB


Strands preparation and bamboo OSB manufacturing
Cutting the bamboos (G.verticillata; B. vulgaris; D. asper; G. atroviolacea; G.apus)
Cut into small blocks
Strands manufacturing: (sharp knife and scissor)
Oven drying: 80° C for 24 h
Sieving: opening screen 20 mm
Steam in autoclave at 126° C, 1,4 kg/cm² pressure for 1 h
Air drying: 2 days

Results V

Properties comparison between OSB prepared from bamboo and wood strands

Parameter	Unit	Standard[1]	Bamboo OSB[2]		Wood OSB[3]
			Control	Steam+NaOH 1%	
Density	Kg/cm^3	na	0.72±0.02	0.72±0.01	0.60±0.01
Moisture content	%	na	10.92±0.78	8.84±0.19	8.09±0.33
Water absorption	%	na	45.06±0.85	26.70±1.30	24.00±0.51
Thickness swelling	%	15	7.31±0.65	4.00±0.62	8.48±1.36
MOR parallel	Kg/cm^2	234	519±21	820±14	491±11
MOR perpendicular	Kg/cm^2	96	146±9	231±15	268±18
MOE parallel	Kg/cm^2	45000	86523±10735	124403±3095	57330±979
MOE perpendicular	Kg/cm^2	13000	11965±238	14247±165	18088±156
Internal bond	Kg/cm^2	3.45	3.81±0.31	5.79±0.68	9.10±2.35
[4]Durability Against: Subterranean termite Dry wood termite	Class	I to IV	III-IV II	II I	Na Na

[1]Standar: CSA0437.0 (grade-1); na: not available; [2]Betung bamboo; Adhesive (Fenol Formaldehida 8%); [3]Mangium wood; Adhesive (*Methylene diphenyl diisocyanate* 7%); [4]SNI 01-7207-2014 Standard (BSN 2014).

Results IV

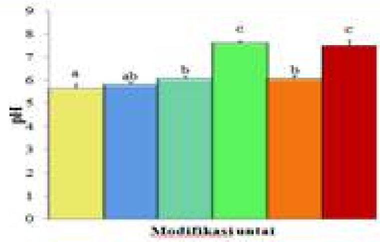
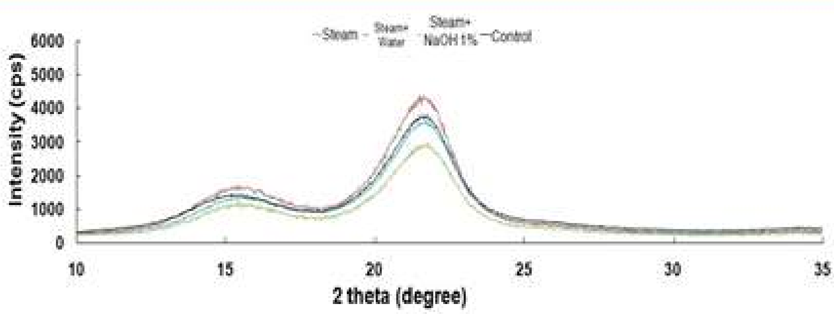


Fig. pH bamboo strands undervarious conditions

Chemical component bamboo under various conditions

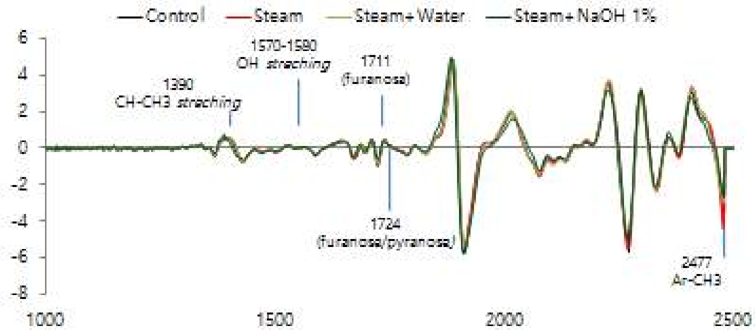
No	Chemical Component	Control	Steamed	Steamed +Dis-tilled water	Steamed+NaOH 1% solution
1	Hollocellulose (%)	70.73	67.74	67.38	67.49
2	Alpha cellulose (%)	56.57	58.40	59.14	60.55
3	Lignin (%)	27.35	26.80	26.88	23.23
4	Acid soluble lignin (%)	1.43	1.36	1.38	1.49
5	Extractive dissolved in cold water (%)	7.75	6.91	6.83	6.80
6	Extractive dissolved in hot water (%)	9.87	9.73	9.28	8.87
7	Extractive dissolved in al-ben (%)	5.72	5.75	4.72	4.49

Results IV



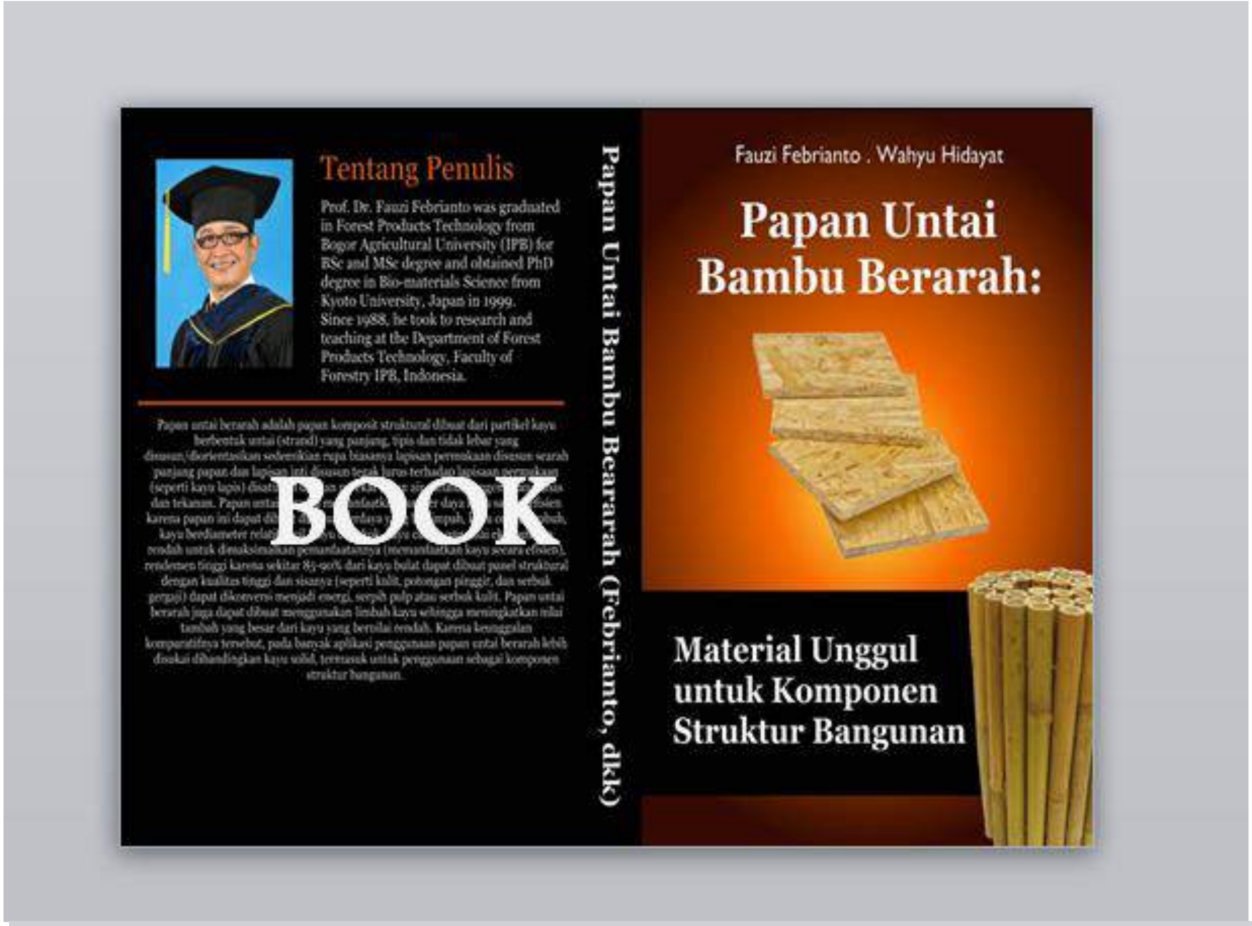
Species	Treatment	k	λ	left	right	β	peak	θ	lam	I200	Crystallinity (%)
Betung	Control	0.9	0.15	20.24	20.70	0.0429	21.46	10.73	1.8	7.1	75.4
	Steam	0.9	0.15	20.28	20.70	0.0422	21.42	10.71	1.7	6.7	74.4
	Steam+Water	0.9	0.15	20.24	20.60	0.0412	21.48	10.74	1.9	8.1	77.2
	Steam+NaOH1%	0.9	0.15	20.20	20.76	0.0446	21.56	10.78	1.4	5.3	73.6

Results IV



Wave Length	2477	1916	1724	1711.16	1580	1570	1390
Functional Group	Ar-CH3	O-H strec	furanose/pyranose Hemicellulose	C-H Hemicellulose	O-H strec	O-H strec	C-H, CH3 Hemicellulose
Control Strands	-4.38	-5.33	-0.98	0.47	-0.20	-0.01245537	0.55
Steamed Strands	-4.38	-5.33	-0.89	0.44	-0.19	-0.01252272	0.48
Steamed+ NaOH 1% Strands	-2.69	-5.3	-0.62	0.37	-0.19	-0.01249499	0.45

Fig. NIR spectra of untreated and treated betung bamboo strands


Tentang Penulis
Prof. Dr. Fauzi Febrianto was graduated in Forest Products Technology from Bogor Agricultural University (IPB) for BSc and MSc degree and obtained PhD degree in Bio-materials Science from Kyoto University, Japan in 1999. Since 1988, he took to research and teaching at the Department of Forest Products Technology, Faculty of Forestry IPB, Indonesia.
BOOK
Papan Untai Bambu Bearah (Febrianto, dkk)
Fauzi Febrianto . Wahyu Hidayat
Papan Untai Bambu Berarah:
Material Unggul untuk Komponen Struktur Bangunan


Example 3
108 Indonesian Innovation 2008
Indonesia
INNOVATIONS
High Performance Cellulose Nano Composite Reinforced with Cellulose Nanocrystal from Sludge

Objectives

The objectives of the research are:

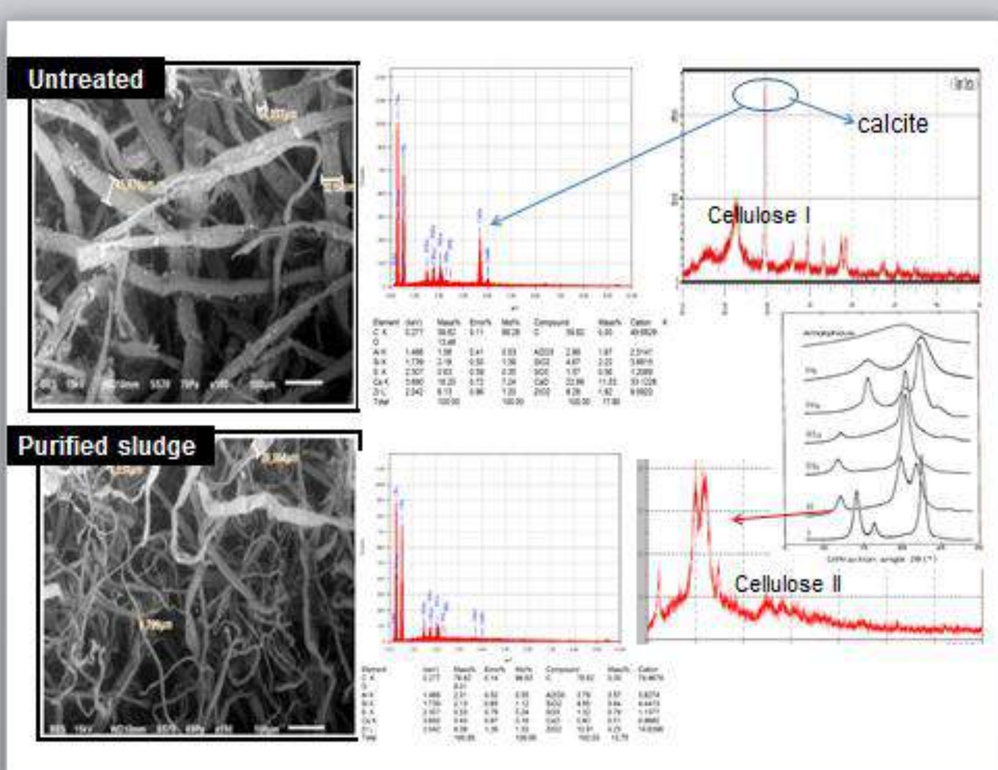
- To characterize the primary sludge;
- To convert chemically treated sludge to become nanocrystal cellulose;
- To develop CNC using nanocrystal cellulose as reinforcing filler

Table Chemical composition of primary sludge after purification

Component	Before purification (%)	After purification (%)
Extractives	4.49	0.61
Hemicellulose	20.49	12.88
Alpha-cellulose	39.87	76.34
Lignin	21.62	2.76
Ash	33.47	4.96

Table. Inorganic materials of primary sludge before and after purification

Element	Before purification		After purification	
	Mass %	Atom %	Mass %	Atom %
C	38.58	50.52	45.00	54.72
O	43.65	42.91,	46.97	42.88
Al	1.11	0.65	1.29	0.70
Si	1.50	0.84	1.32	0.69
S	0.41	0.20	0.31	0.14
Ca	10.68	4.17	0.25	0.09
Zr	4.12	0.71	4.86	0.78



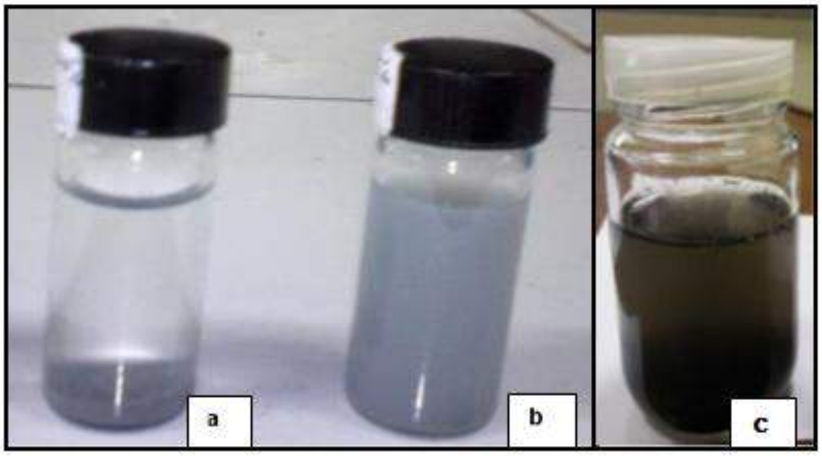


Fig. Slurry sludge fibers from acid hydrolysis 40% (a), 50% (b) and 60% (c)

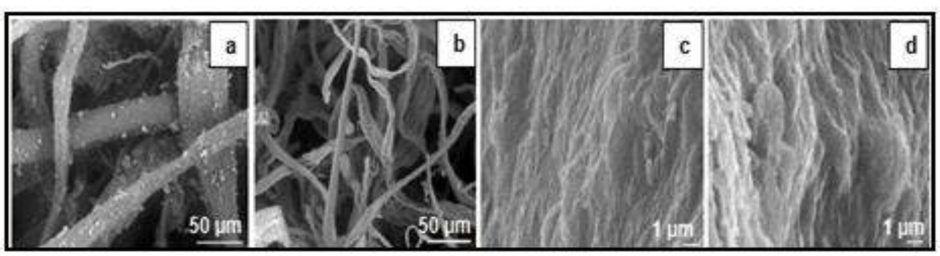


Fig. SEM images of (a) primary sludge, (b) purified primary sludge, (c) cellulose II nanocrystal -30, and (d) cellulose II nanocrystal -60

Fig. Transparency of PVA film, composite of PVA and sludge fibers, and cellulose nano composites of PVA reinforced with nanocrystal cellulose

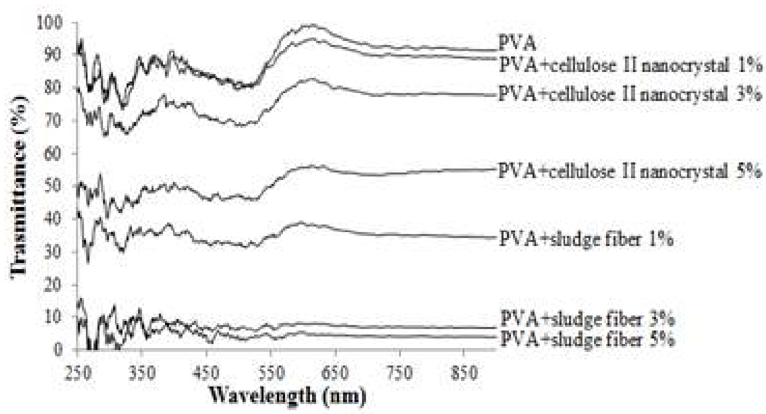


Fig. UV-vis transmittance spectra of PVA film, composites of PVA and sludge fibers, and cellulose nano composites of PVA reinforced with nanocrystal cellulose

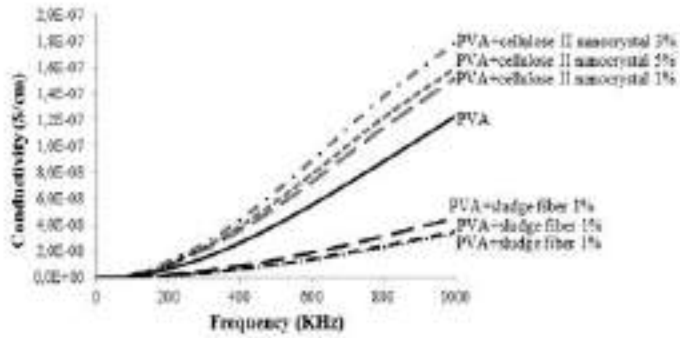


Fig. Conductivity values of PVA film, composites of PVA and sludge fibers, and cellulose nano composites of PVA reinforced with nanocrystal cellulose

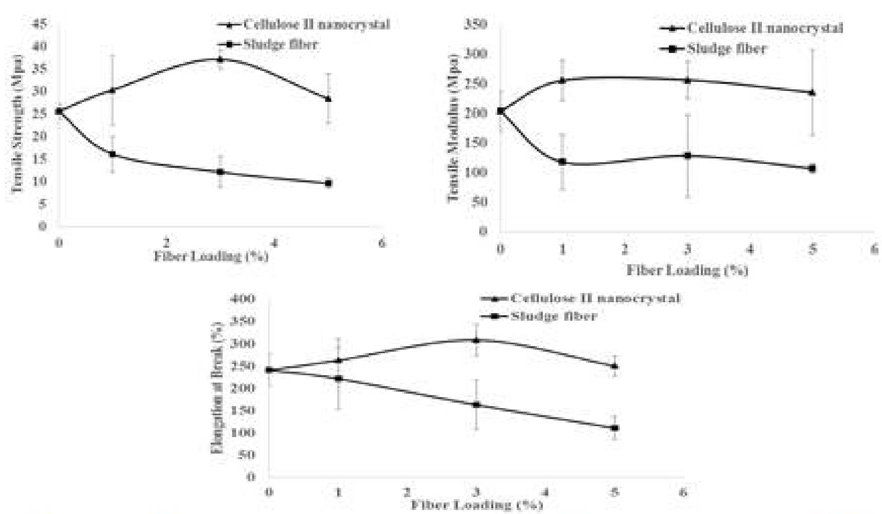


Fig. Tensile strength, tensile modulus and elongation at break of PVA film, composites of PVA and sludge fibers, and cellulose nano composites of PVA reinforced with nanocrystal cellulose

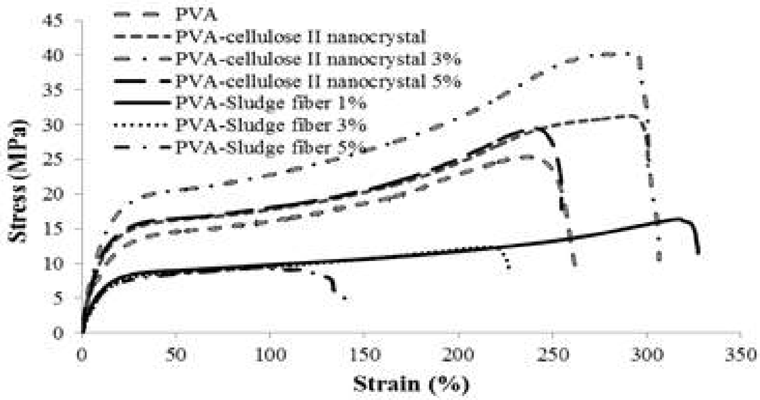
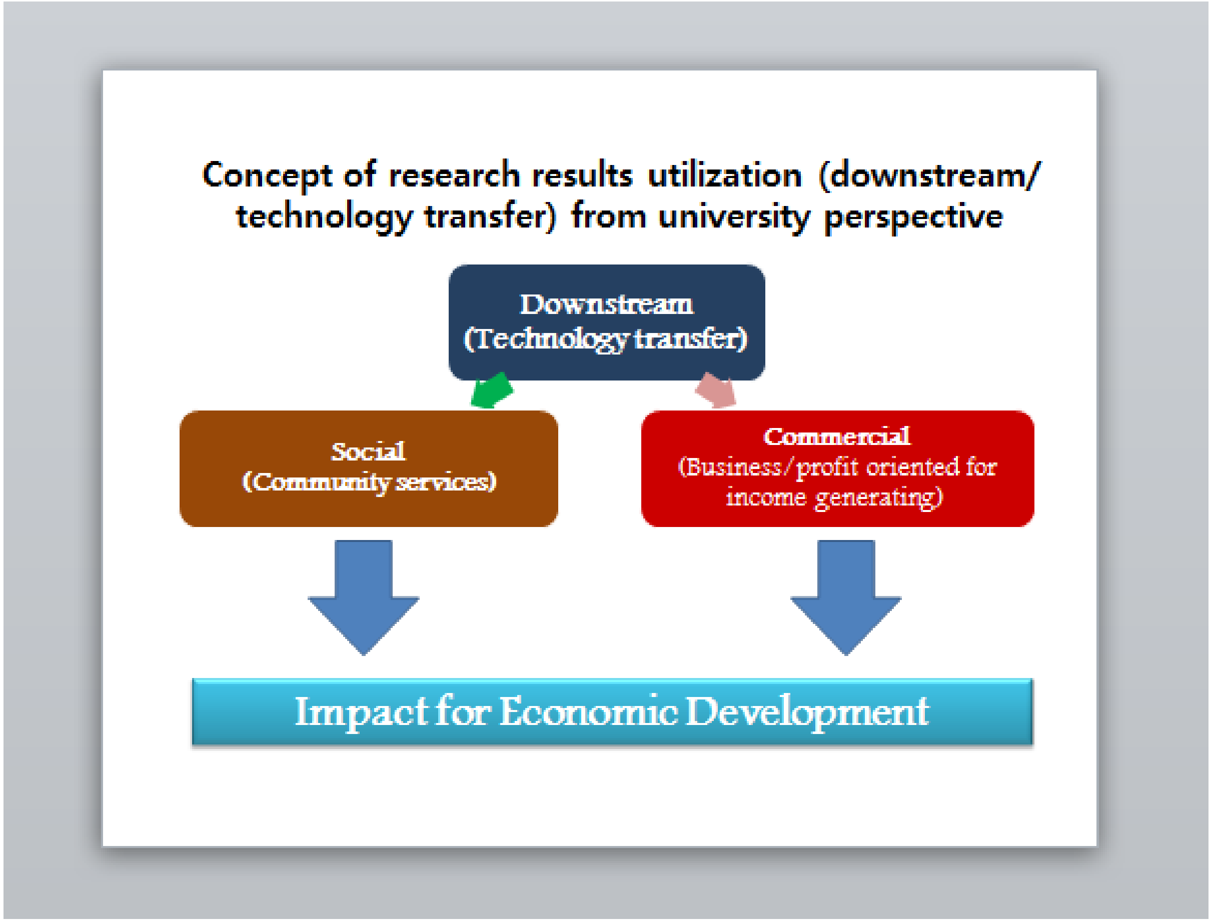
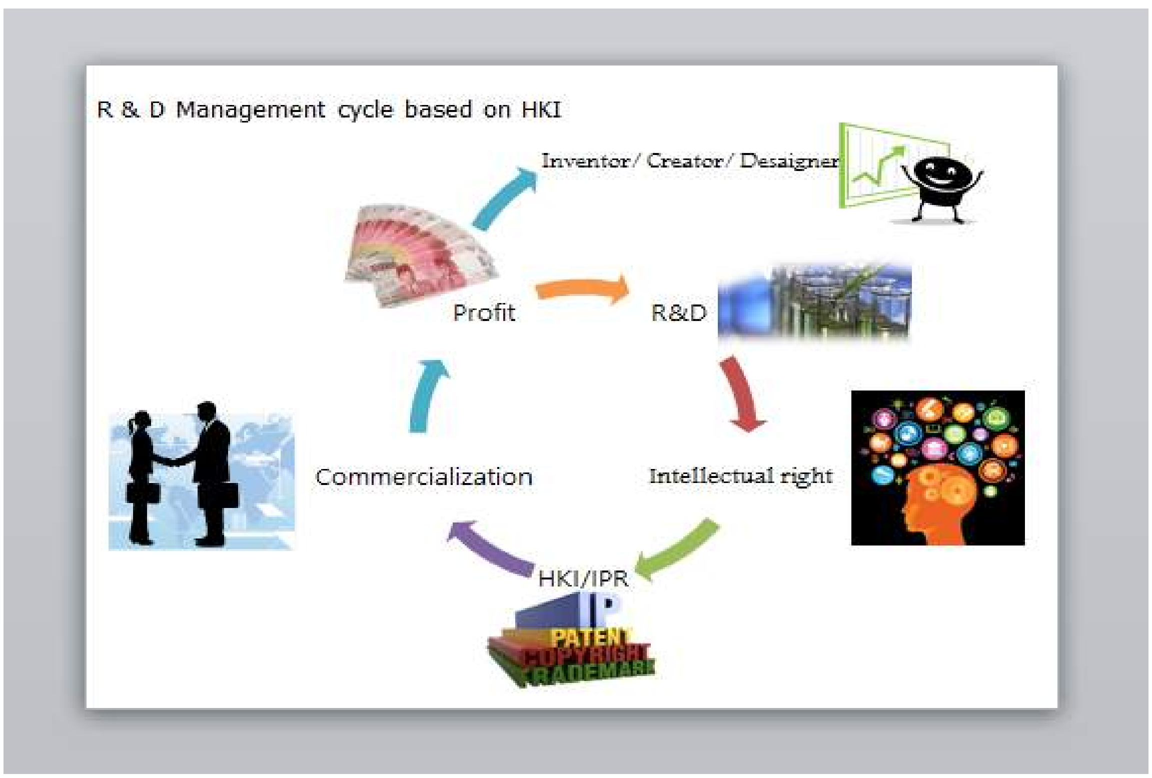


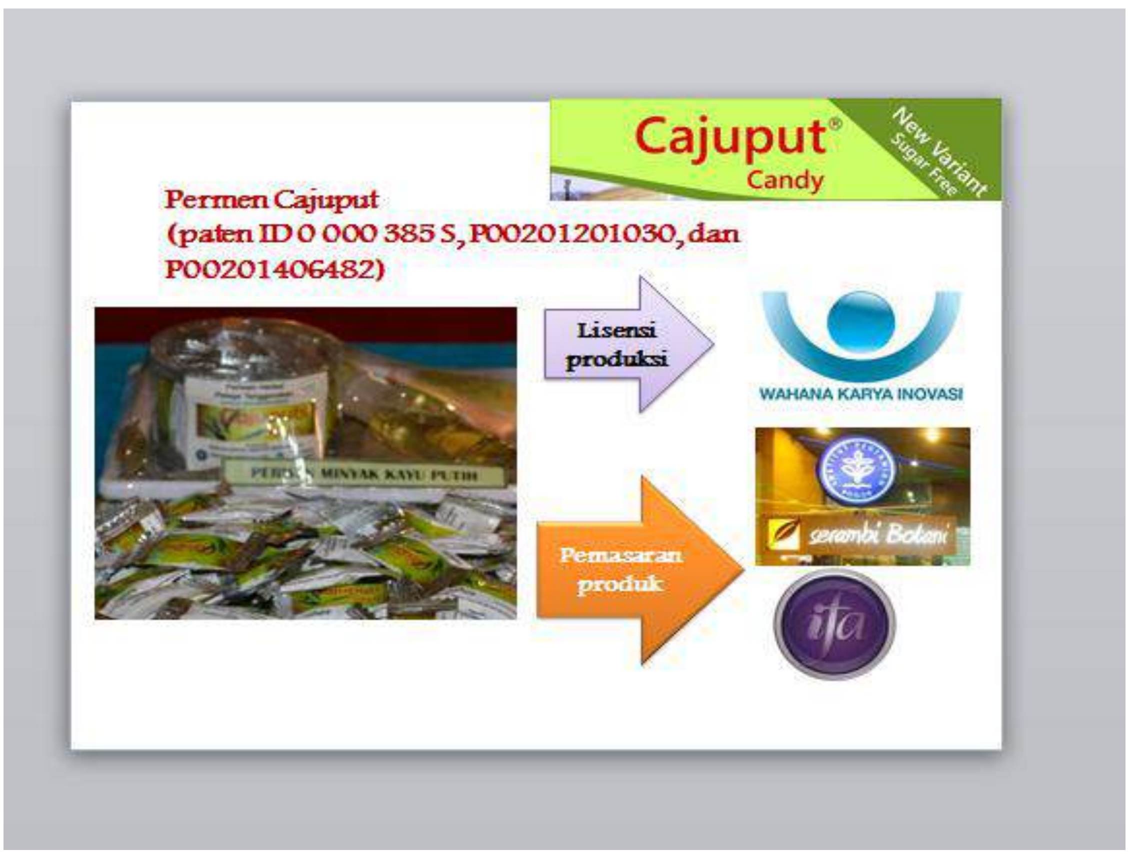
Fig. Typical stress-strain curve of PVA film, sludge fibers reinforced PVA composite, and cellulose nano composites of PVA reinforced with nanocrystal cellulose

4. Innovation Commercialization (Best Practices in IPB)


Concept of research results utilization (downstream/ technology transfer) from university perspective
Downstream
(Technology transfer)
Social
(Community services)
Commercial
(Business/profit oriented for income generating)
Impact for Economic Development


R & D Management cycle based on HKI
Inventor/ Creator/ Desaigner
Profit
R&D
Commercialization
Intellectual right
HKI/IPR


FASTREX ™, transporter handal di lahan perkebunan dan hutan
Permohonan Paten P00201403591
Permohonan Merek FASTREX ™ nomor D002015008084
Pemasaran produk
BLST
PT. Bogor Life Science and Technology
Holding Company of IPB
Produksi
INKA
PT. INDUSTRI KERETA API (Persero)
TMB CT 02
Pengguna
: 100 unit
ASTRA AGRO LESTARI
YANMAR
Kerjasama produksi
beberapa komponen


Cajuput®
Candy
New Variant
Sugar Free
Permen Cajuput
(paten ID 0 000 385 S, P00201201030, dan
P00201406482)
Lisensi
produksi
WAHANA KARYA INOVASI
PERMEN MINYAK KAYU PUTIH
Pemasaran
produk
serambi Botani
ifa

Suplemen Omega-3 untuk produksi telur Super DHA + Omega-3
(Paten IDP 0023652)
Pemasaran produk
BLST
PT. Bogor Life Science and Technology
Holding Company of IPB
serambi Botani
UD Tirta Soeper Teloer
Produksi
Spin off oleh Inventor

Skema Non-Komersial
TEKNOLOGI GULUDAN
(Permohonan paten P00201000635)
Digunakan
pgn
JASAMARGA
mandiri
PERTAMINA
Tanggung Jawab Sosial
dan Lingkungan
JAYA RAYA
Pemerintah Provinsi
Daerah Khusus Ibukota Jakarta


Thank You
INSTITUT PERTANIAN
BOGOR


Riwayat Hidup Singkat
1. Nama Lengkap : Prof.Dr. Fauzi Febrianto; Tempat /Tgl. Lahir: Palembang /9 Februari 1963
Pengalaman Pekerjaan
Jumlah mahasiswa yang telah diluluskan
Pengalaman Penelitian (6 tahun terakhir)
Penghargaan


Sertifikat

KONSORSIUM RISET PENGELOLAAN HUTAN TROPIS BERKELANJUTAN

Pusat Unggulan Iptek

Introduction

- **Non timber forest products (NTFPs) is relatively small ecological impact of their exploitation and high contribution to tropical forest conservation** (Tonen, 2000).
- **NTFPs in the tropics are the main source of livelihood of forest-dweeling communities for their food, medicines and raw material for house, tools and equipments** (Tones, 2000). But impact of income to communities is still low, because it is low innovation and commercial products.

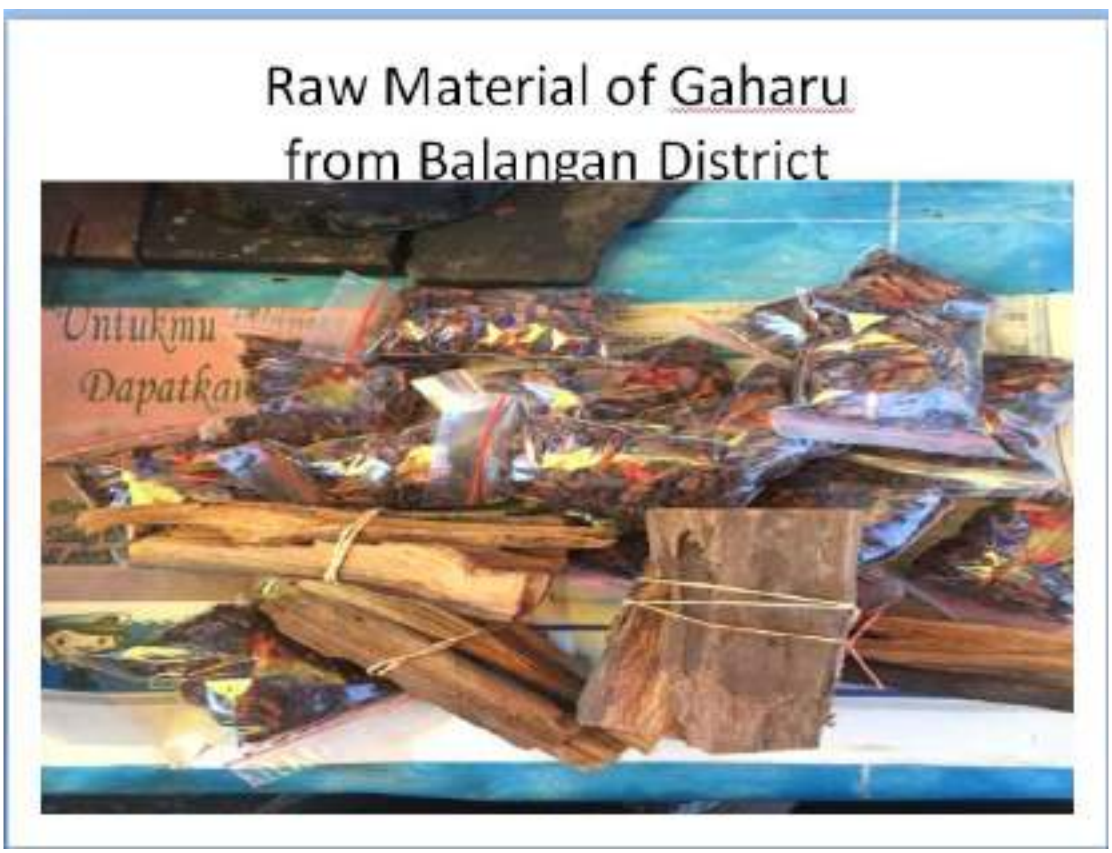
Selling the raw materials

- An important motive for promotion the commercial extraction of NTFPs has been expectation that increased marketing of NTFPs may lead to higher incomes.
- Local communities in South Kalimantan has a variety of excellent products that spread almost throughout the district and the city. The excellent products are the result of local cultural wisdom that carried hereditary until now survive in this era of modernization.

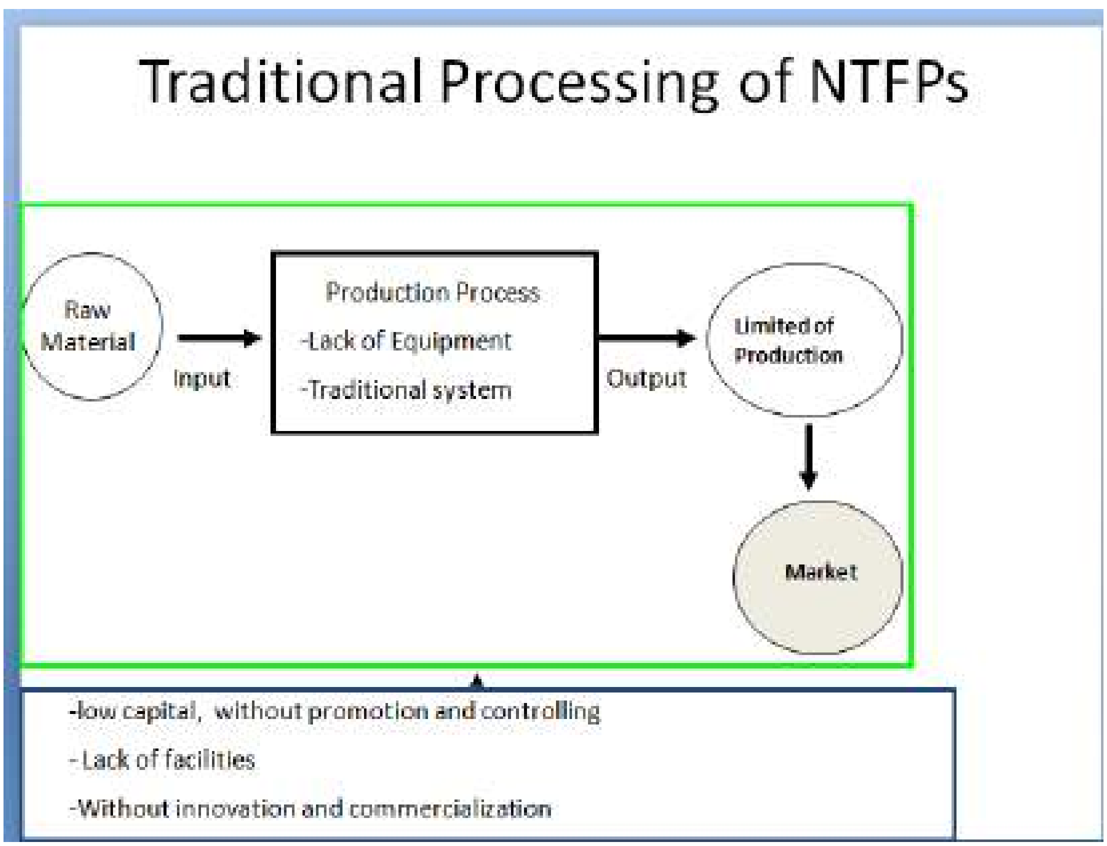

Simple Equipment to process
• Generally, local products are processed or treated by using simple technology in accordance with their capabilities, so that the development is now unable to compete with products which are managed in modern.

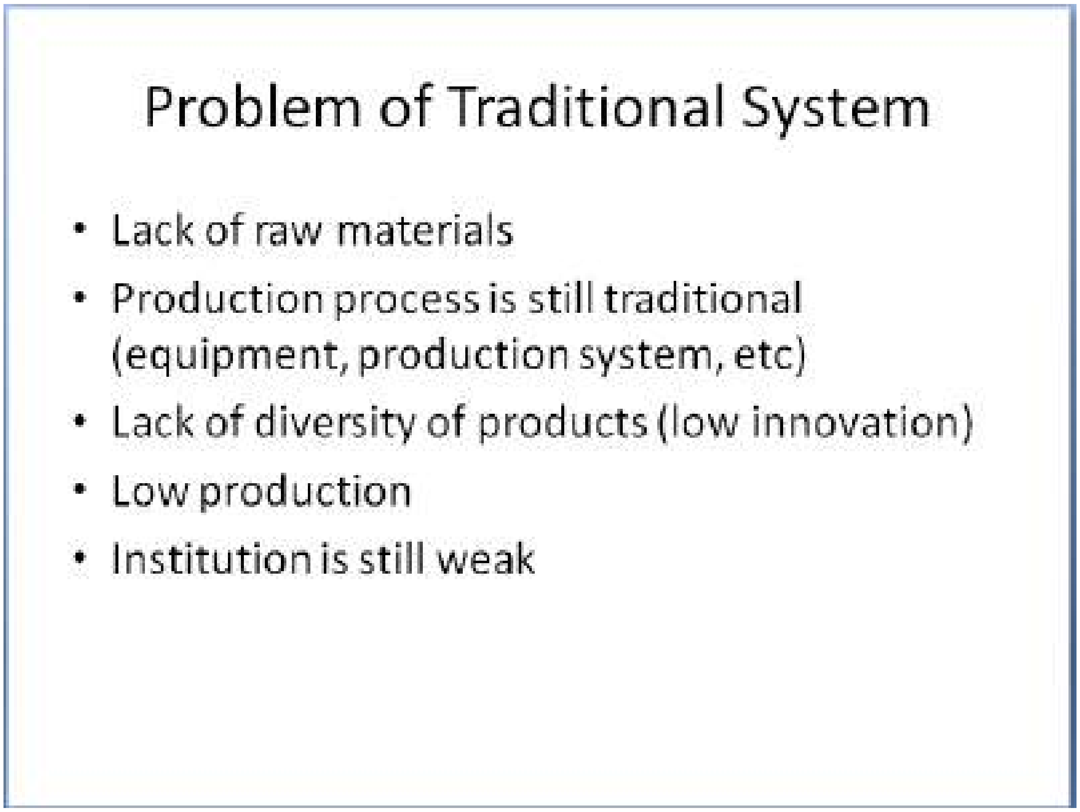

Simple Equipment for Processing to Semi-Finishing Products


Modern equipment for processing


Raw Material of Gaharu
from Balangan District
Untukmu


Honey from Tanah Laut District


Traditional Processing of NTFPs
Raw Material
Input
Production Process
-Lack of Equipment
-Traditional system
Output
Limited of Production
Market
-low capital, without promotion and controlling
- Lack of facilities
-Without innovation and commercialization

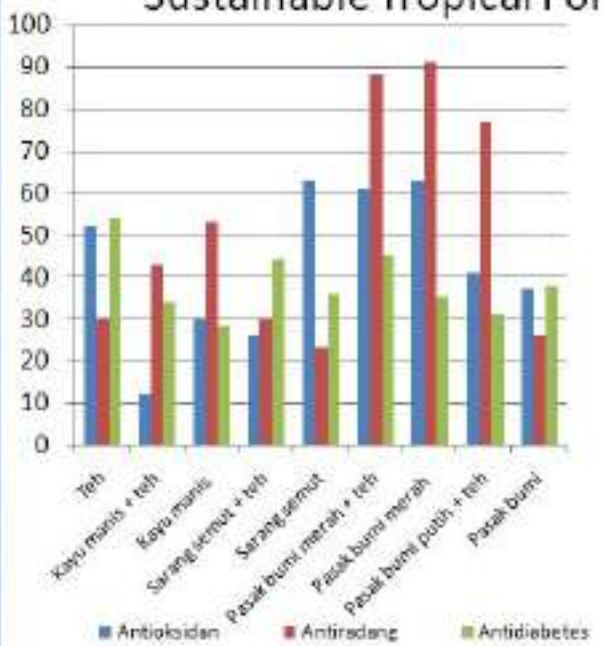

Problem of Traditional System
• Lack of raw materials
• Production process is still traditional (equipment, production system, etc)
• Lack of diversity of products (low innovation)
• Low production
• Institution is still weak

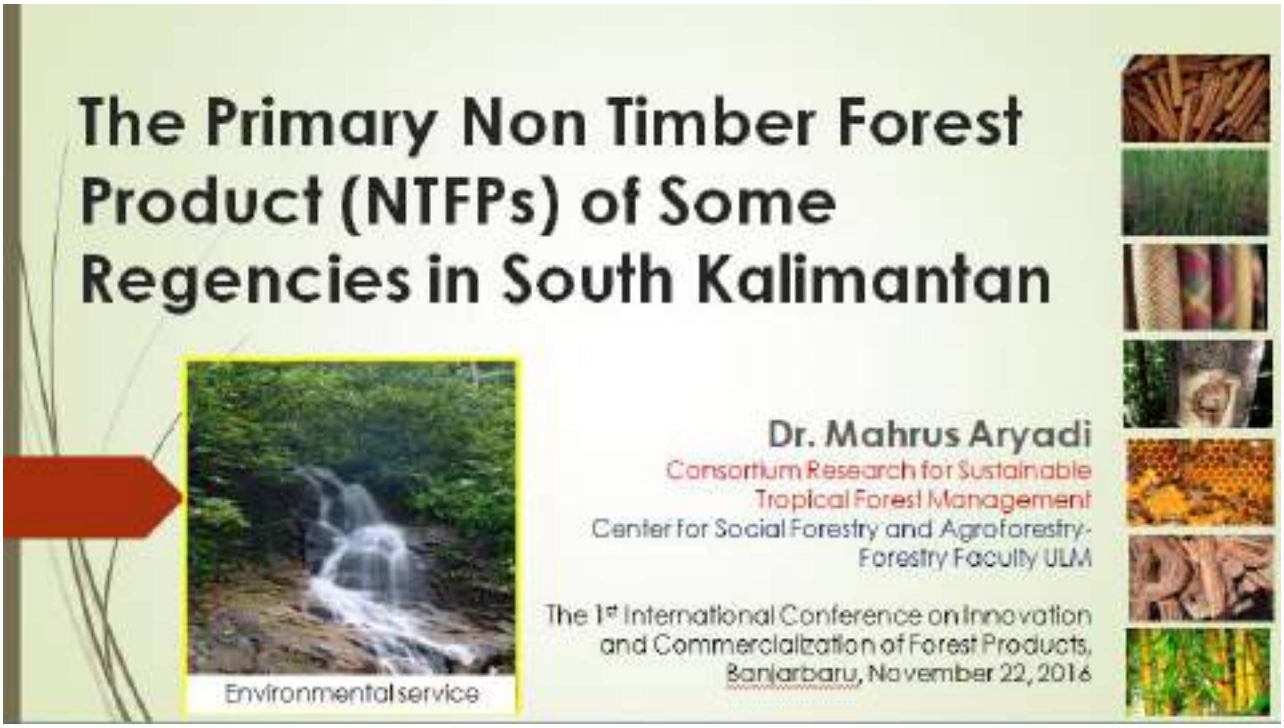

Product Category of NTFPs in South Kalimantan
A. Plant products food
• Medicinal plant: medicinal herbs and plants and plants parts (leaves, barks, etc)
• Construction materials: bamboo, rattan, leaves for roofing, etc.
• Aromatics: perfumes
B. Animal products
• Biochemic: guano

Innovation and Commercialization of NTFPs

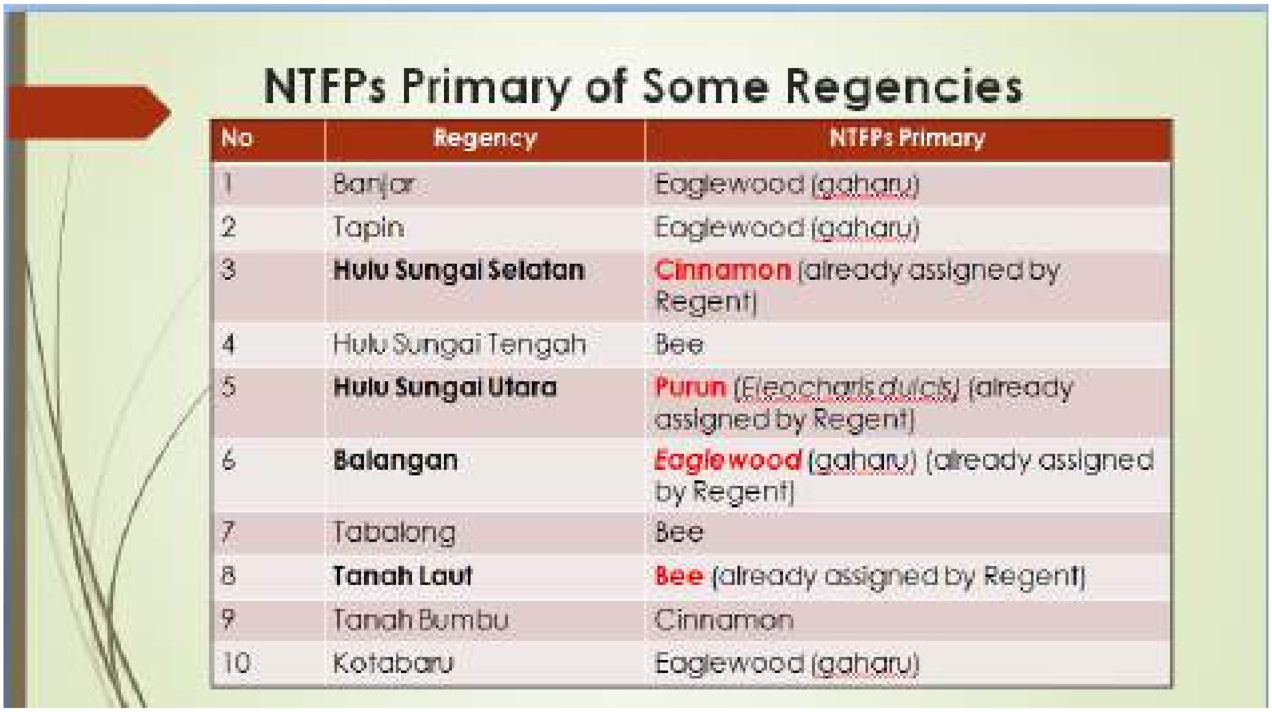
By Research Consortium for Sustainable Tropical Forest Management

Forest Tea produced by Research Consortium for Sustainable Tropical Forest Management



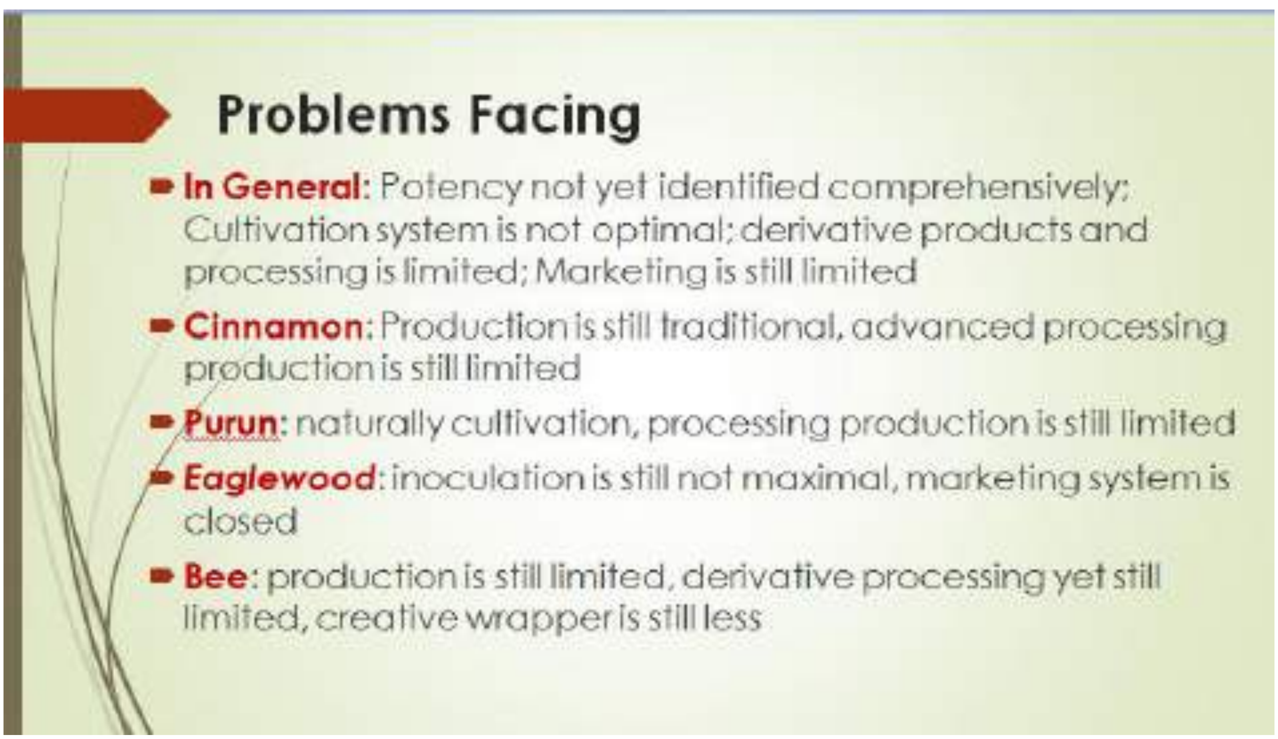

The Primary Non Timber Forest Product (NTFPs) of Some Regencies in South Kalimantan
Environmental service
Dr. Mahrus Aryadi
Consortium Research for Sustainable Tropical Forest Management
Center for Social Forestry and Agroforestry-Forestry Faculty ULM
The 1st International Conference on Innovation and Commercialization of Forest Products, Banjarbaru, November 22, 2016


Legal Standing
Law of Forestry No 41/ 1999
Regulation of Ministry of Forestry P.35/Menhut-II/2007 about NTFPs
Regulation of Ministry of Forestry P.21/Menhut-II/2009 about Criteria and Indicators of Kind of Primary NTFPs
Regulation of Ministry of Environment and Forestry P. 83/ MenLHK/Setjen/KUM.1/10/2016 about Social Forestry
Decree of the Governor Kalsel no. 188.44/0439/KUM/ 2016 about Communication Forum of Non Timber Forest Products of South Kalimantan Province



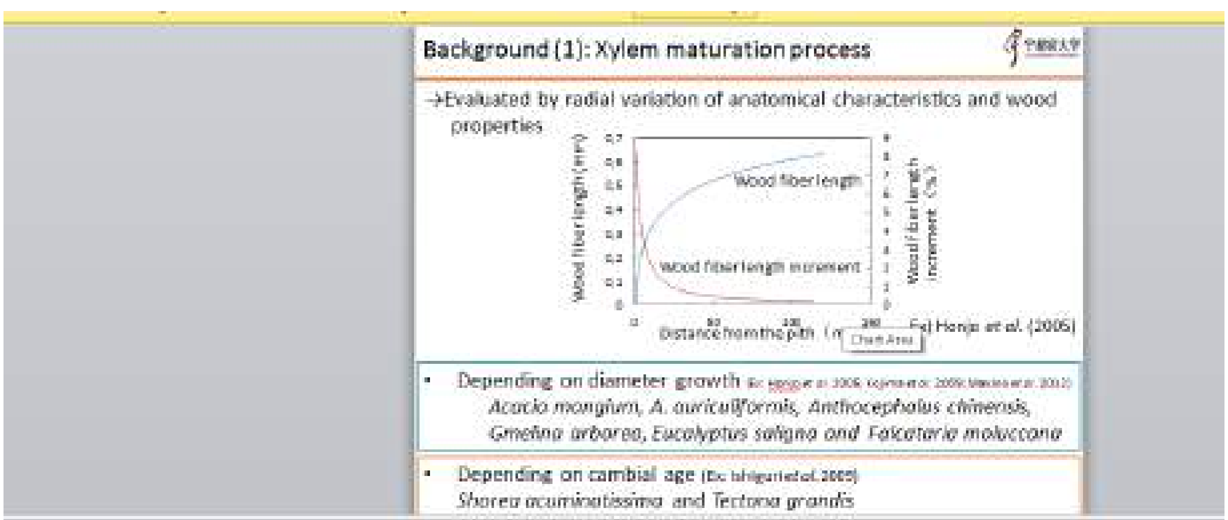
NTFPs Primary of Some Regencies

No	Regency	NTFPs Primary
1	Banjar	Eaglewood (gaharu)
2	Tapin	Eaglewood (gaharu)
3	**Hulu Sungai Selatan**	**Cinnamon** (already assigned by Regent)
4	Hulu Sungai Tengah	Bee
5	**Hulu Sungai Utara**	**Purun** (*Eleocharis dulcis*) (already assigned by Regent)
6	**Balangan**	***Eaglewood*** (gaharu) (already assigned by Regent)
7	Tabalong	Bee
8	**Tanah Laut**	**Bee** (already assigned by Regent)
9	Tanah Bumbu	Cinnamon
10	Kotabaru	Eaglewood (gaharu)

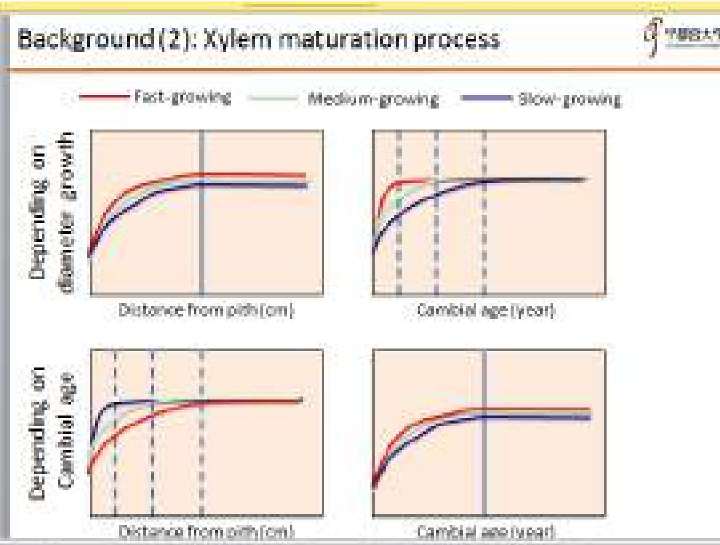



Collaboration among stakeholders
Complete each other
Partner
Mutually reinforcing
Mutual cooperation

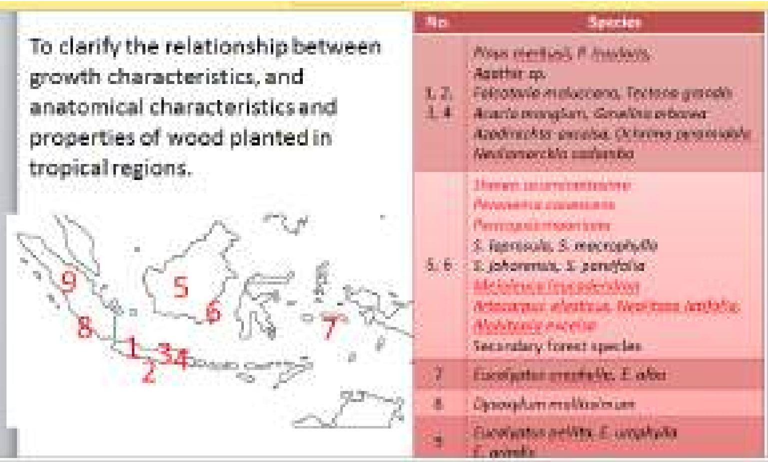

Thank you…
Arigato…
Terima kasih…



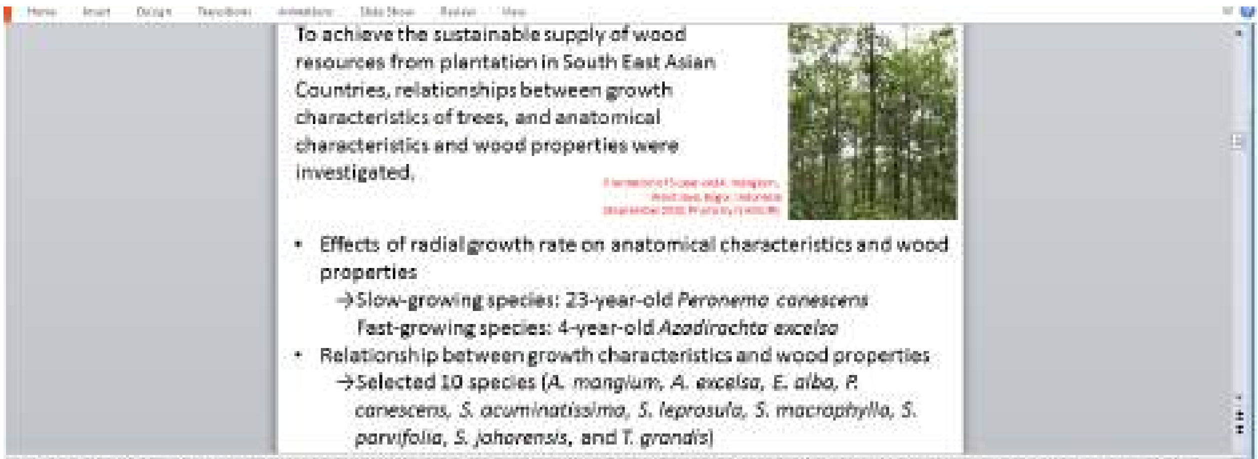
- First of all, I would like to explain the background of this study.
- The background is xylem maturation process in tropical hardwood plantation species.
- Usually, xylem maturation is evaluated by examining radial variation of anatomical characteristics and wood properties.
- For example, maturation process was evaluated by using the wood fiber length and wood fiber length increment.
- As the results, xylem maturation process of tropical hardwood plantation species might be divided into two groups:
- Xylem maturation process of one group is depends on the diameter growth.
- And the other group is depends on the cambial age.



- Red, green, and blue lines indicate radial profiles of some property of fast-, medium-, and slow-growing trees of same age, respectively.
- If xylem maturation process is depends on the diameter growth, xylem maturation is started at a certain distance from the pith.
- In this case, faster-growing tree will make much more volume with stable wood properties, such as mature wood.
- On the other hand, in species that is depends on the cambial age, xylem maturation is started at a certain cambial age.
- In this case, faster-growing tree will make more volume with unstable wood properties, such as juvenile wood.



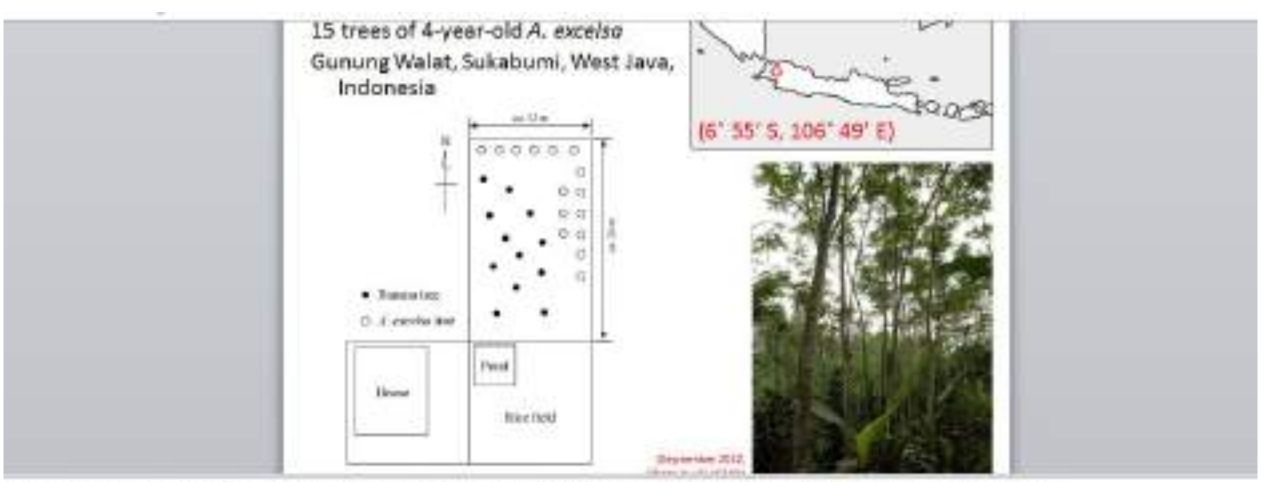
- We has been focused on the relationship between growth characteristics of trees, and anatomical characteristics and wood properties in trees grown in Indonesia.
- Up to date, we collected the data of over 30 species grown in Indonesia.
- These red color species are from South Kalimantan.
- Some species, such as *Eucalyptus camaldulensis, Falcataria moluccana, Acacia mangium, Azadirachta excelsa, Gmelina arborea, Ochroma bicolor, Anthocephalus cadamba*, and *Dysoxylum mollissimum* are considered as fast-growing plantation species.



• In this presentation, to achieve the sustainable supply of wood resources from plantation in South East Countries, relationship between growth characteristics of trees, and anatomical characteristics and wood properties were investigated.

• To clarify the effects of radial growth rate on anatomical characteristics and wood properties, the following two species were used in this study.

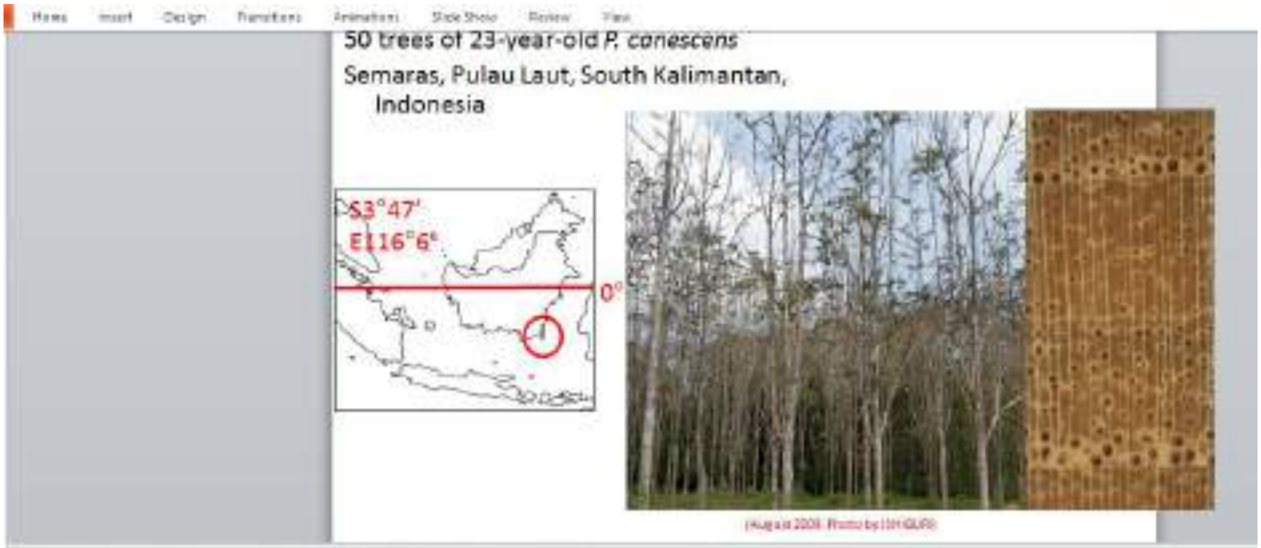
• Furthermore, to clarify the relationships between growth characteristics and wood properties, we used the following 10 species.



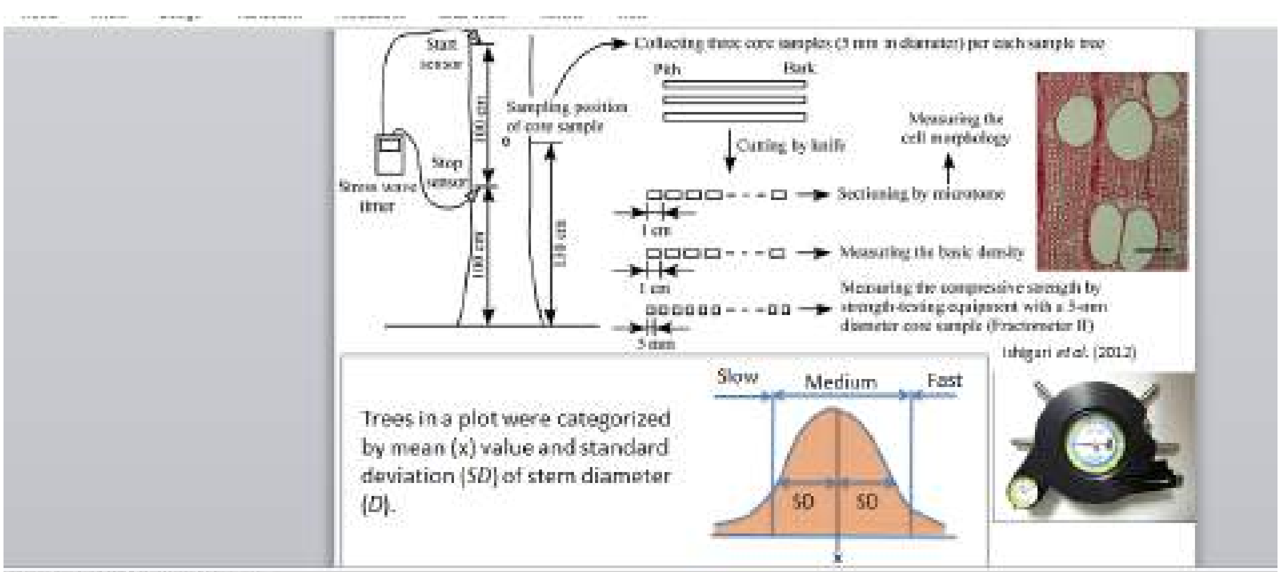
• To clarify the effects of radial growth rate on anatomical characteristics and wood properties, 15 trees of 4-year-old *Azadirachta excelsa* were used.

• This species is one of the fast-growing species in South East Asian countries.

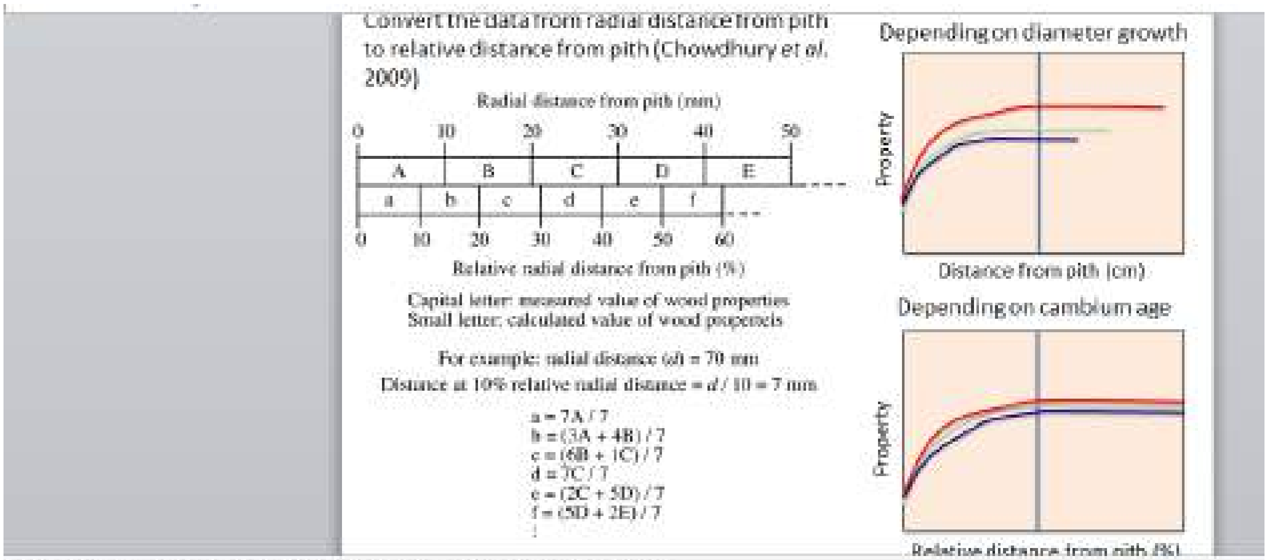
• The wood is diffuse porous wood.



- In addition, *Peronema canescens* was also used as slower-growing plantation tree species.
- In the present study, 50 trees of 23-year-old *Peronema canescens* planted in South Kalimantan, Indonesia were used.
- This tree fall leaves. This photograph was take at August.
- Wood is ring-porous wood and it is very similar to *Tectona grandis* wood.



- This slid shows the methods.
- Fist of all, we set a 10 by 10 to 25 by 25 m plot in plantation.
- And then, we measured stem diameter, tree height and stress wave velocity for all trees in a plot
- We categorized the trees into three groups by using mean and standard deviation of stem diameter.
- We collect the core samples from several trees in each categories.
- Core samples were cut at 1 cm interval from pith to bark for measuring the basic density and cell morphology.
- In addition, core samples were cut at 0.5 cm interval from pith to bark for measuring the compressive strength parallel to grain at green condition.



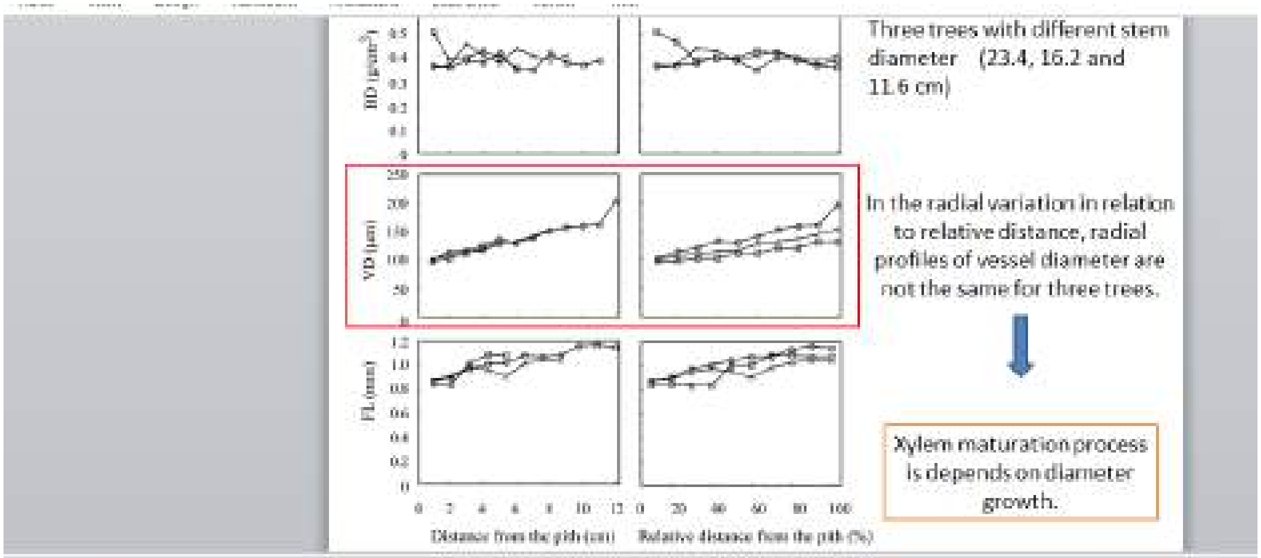
- In case of hardwoods grown in tropical regions, growth ring is very unclear.
- We can not determine the wood properties and cell morphology at each growth ring.
- Thus, we usually measure the properties in relation to distance from pith.
- To asses the xylem maturation process, we also calculate the radial variation in relation to relative distance from pith by using this methods.
- If the tree evenly grow every year, relative distance from pith means cambial age.

Properties (n = 15)	Stem diameter (cm)	Tree height (m)	SWV (km/s)	BD (g/cm³)	CS (MPa)
Mean	16.1	13.9	3.96	0.40	27.3
SD	3.2	2.8	0.18	0.03	2.3

Anatomical characteris-tics (n = 15)	VD (μm)	VF (N/mm²)	FD (μm)	FWT (μm)	VEL (mm)	FL (mm)
Mean	121	8.1	16.4	1.4	0.32	0.97
SD	20	2.0	0.9	0.1	0.02	0.04

Note: n, Number of trees; SWV, stress-wave velocity; BD, basic density; CS, compressive strength parallel to grain; VD, vessel diameter; VF, vessel frequency; FD, wood fiber diameter; FWT, cell wall thickness of wood fiber; VEL, vessel element length; FL, Wood fiber length; SD, standard deviation.

- This slide shows statistical values of growth characteristics, wood properties, and cell morphology in 15 trees of 4-year-old *Azadirachta excelsa*.

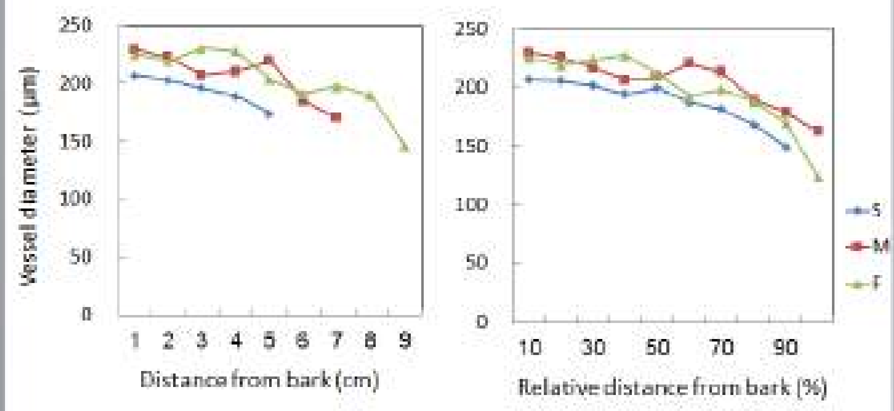


- This slide shows radial variation of basic density, vessel diameter, and wood fiber length in three trees with different stem diameter.
- Left hand side figures are figures in relation to distance from pith and right hand side figures are figures in relation to relative distance from pith.
- In the vessel diameter, radial variation profiles of three trees in relation to distance from pith are almost the same.
- However, its in relation to relative distance from pith is not the same.
- Thus, xylem maturation process in *Azadirachta excelsa* is depends on diameter growth.

Property	Slow-growing	Medium-growing	Fast-growing	Significance among categories
Stem diameter (cm)	13.8 (0.7)	16.6 (1.3)	19.8 (0.9)	-
SWV (km/s)	3.95 (0.15)	3.95 (0.15)	3.91 (0.14)	ns
BD (g/cm³)	0.49 (0.04)	0.48 (0.04)	0.46 (0.04)	ns
CS (MPa)	38.0 (4.7)	38.3 (6.3)	38.9 (5.0)	ns
VD (µm)	195 (16)	207 (5)	202 (9)	ns

Note: SWV, stress-wave velocity; BD, basic density; CS, compressive strength parallel to grain at green condition; VD, vessel diameter; ns, no significant

- This slide shows growth characteristics, wood properties, and cell morphology of *Paronama canescens* in each radial growth category.
- As the results of analysis of variance, we cannot get the significance differences among categories.
- Thus, in this species, radial growth rate is not largely affected on the cell morphology and wood property.



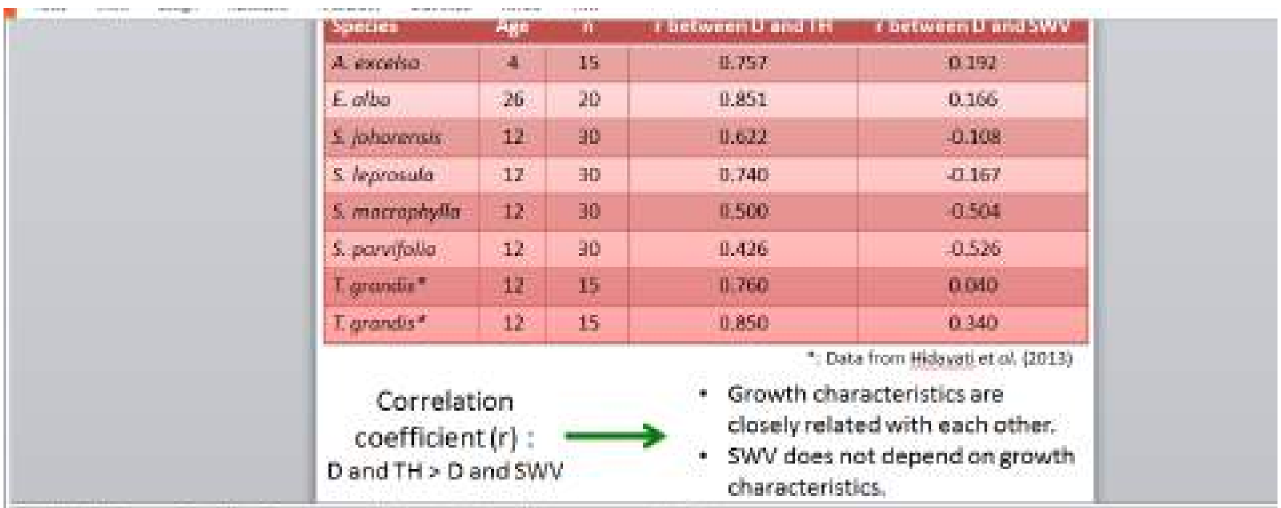
- This slide shows radial variation of vessel diameter from bark to pith in 23-year-old *Peronema canescens* in each radial growth category.
- In contrast to the results obtained in *Azadirachta excelsa*, radial profiles were almost the same in the relative distance from bark.
- Thus, xylem maturation process of this species is depends on the cambial age.

Species	Age	n	D (cm)	Estimated RGR (cm/year)	Xylem maturation process
A. excelsa	4	15	10.1 ± 3.2	2.01	Diameter
A. mangium[1]	7	18	21.9 ± 1.8	1.56	Diameter
A. mangium[1]	5	24	13.1 ± 3.0	1.31	Diameter
S. parvifolia	12	30	26.0 ± 6.3	1.08	?
S. macrophylla	12	30	24.3 ± 7.2	1.01	?
S. leprosula	12	30	22.0 ± 4.8	0.92	?
T. grandis	12	45	21.7 ± 5.2	0.90	Cambium age
S. johorensis	12	30	21.0 ± 4.3	0.88	?
T. grandis[2]	12	45	16.3 ± 3.6	0.68	Cambium age
E. alba	26	20	27.9 ± 5.7	0.54	Cambium age
S. acuminatissima[3]	35	131	32.3 ± 4.7	0.46	Cambium age
P. canescens	23	50	16.8 ± 2.2	0.34	Cambium age

Note: n, number of sample trees; D, stem diameter; RGR, radial growth rate; ?, unknown.

*1, Makino *et al.* (2012); *2, Hidayati *et al.* (2013); *3, Ishiguri *et al.* (2012)

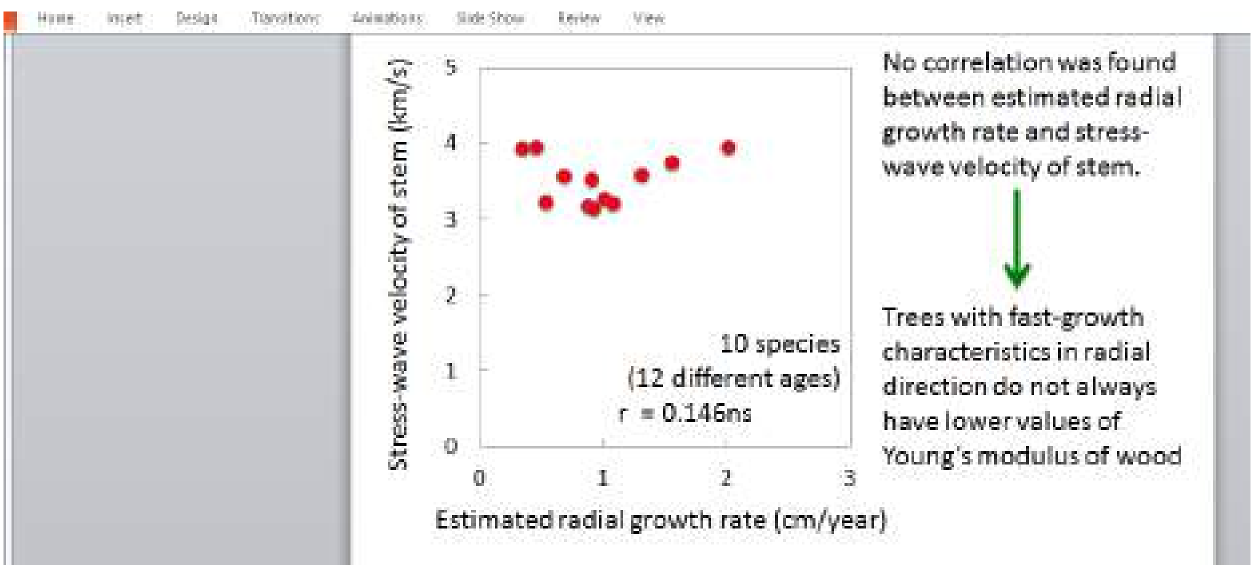
- In the previous slides, we showed the two types of xylem maturation processes.
- What is the difference?
- This slide shows the age, stem diameter, estimated radial growth rate and xylem maturation process.
- Estimated radial growth rate was calculated from stem diameter dividing by age of trees.
- The values were sorted by estimated radial growth. The fastest one is *Azadirachta excelsa*, and the lowest one is *Peronema canescens*.
- In the xylem maturation, fast-growing tree species tended to have the dependence on diameter growth and slow-growing tree species tended to have the dependence of cambial age.
- Thus, radial growth rate might be related to the difference of xylem maturation process in tropical hardwood species.
- However, further research is needed to clarify this phenomena.



Species	Age	n	r between D and TH	r between D and SWV
A. excelsa	4	15	0.757	0.192
E. alba	26	20	0.851	0.166
S. johorensis	12	30	0.622	-0.108
S. leprosula	12	30	0.740	-0.167
S. macrophylla	12	30	0.500	-0.504
S. parvifolia	12	30	0.426	-0.526
*T. grandis**	12	15	0.760	0.040
*T. grandis**	12	15	0.850	0.340

*: Data from Hidayati et al. (2013)

- This slide shows relationship between growth characteristics and stress-wave velocity of stem.
- Stress-wave velocity of stem is positively related with Young's modulus of wood.
- Correlation coefficients between stem diameter and tree height are higher than correlation coefficients between stem diameter and stress-wave velocity of stem.
- Growth characteristics are closely related with each other.
- However, stress-wave velocity of stem, in other words, Young's modulus of wood is not depended on growth characteristics.



- This figure shows relationship between estimated radial growth rate and stress-wave velocity of stem.
- The values were used for mean values obtained in 12 different age trees from 10 different species.
- As you can see, no correlation coefficient was found.
- Thus, tree with fast-growth characteristics in radial direction do not always have lower values of Young's modulus of wood.

- Two xylem maturation processes, dependence on diameter growth and dependence on cambial age, were recognized in tropical hardwood plantation species.
- The difference between these two processes might be related to radial growth rate: Fast- and slow-growing trees show dependence on diameter growth and cambial age, respectively.
- Trees with fast-growth characteristics in radial direction do not always have lower values of Young's modulus of wood.

PRESENTATION ORAL COMMISSION - A

Cultural Ecology of Malaysia's Reducing Emissions from Deforestation and Forest Degradation (Redd+)

Ismi Rajiani and Ahmad Rozelan Yunus

Universitas Lambung Mangkurat Banjarmasin, Indonesia and Universiti Teknikal Malaysia Melaka, Malaysia

E-mail : izmi_rajiani@yahoo.com

ABSTRACT

Since forests have increasingly been considered a critical issue under United Nations Framework Convention for Climate Change, a new approach to mitigating terrestrial emissions associated with climate change called 'REDD+' (Reducing Emissions from Deforestation and forest Degradation) is introduced. REDD+ is a proposed performance-based mechanism in which developed country donors, corporations, non-governmental organizations, and individuals will compensate developing countries for forest emissions reductions. Southeast Asia hosts a number of early REDD+ type projects. However, there have been distinctive differences between countries that have been successful in implementing REDD+. Potraying on frameworks of national culture, this article is exploring the applicability of REDD+ in the developing country of Malaysia which has been cited amongst the highest globally in growth of greenhouse gases (GHG), but the involvement in REDD+ project is so limited. Using Hofstede's construct of national culture, social units in Malaysia are investigated with REDD+ is proposed as a culturally dependent strategy. This study argues that the ability of the sustainable forest management initiative of REDD+ to provide real benefits for sustainable development may ultimately be obstructed by the nature of the society itself. As such it is recommended that the successful implementation of REDD+ demands compliance between the strategies that are adopted and the country's cultural characteristics.

Keywords: REDD+ (Reducing Emissions from Deforestation and forest Degradation), forest, national culture, Malaysia

INTRODUCTION

Two pledges related to environment made by Malaysia indicate high commitment and concern to global emission problem. In the United Nations Climate Change Conference 2009 in Denmark, Malaysia had agreed to voluntary reduction of up to 40% in terms of emissions intensity by the year 2020 compared to 2005 levels. Also, In the Rio Summit, Malaysia has pledged to maintain at least 50% of its total forest covers . Observing the current realms, the question now can this promise be upheld for long-term periods in the future to come? Realizing that high-tech based economy is still long way to go in term of reducing carbon emission, clean agriculture-based as echoed under REDD+ project can be promising alternatives since Malaysia is well positioned amongst the ASEAN countries as a major agricultural commodity producer in the region.

Southeast Asia hosts a number of early REDD+ type projects (as of January 2012): Indonesia (44 projects), Cambodia (4 projects), Malaysia (1 project), Vietnam (7 projects), Thailand (1 project), Papua New Guinea (6 projects), Philippines (4 projects), and Laos (1 project); and several countries in the region have also started national-level preparations to engage with a future REDD+ mechanism where most projects are replacement of swidden agriculture (slash-and-burn or shifting cultivation) to other systems that potentially reduce emissions and/or increase carbon sequestration.

Interesting to note here is that though Malaysia has been cited amongst the highest globally in growth of greenhouse gases (GHG) emissions with a 7.9% compounded average growth rate from 1990 -2006 and is predicted to increase by 74% from 189 million tonnes of $CO2_e$ in 2005 to 328 million tonnes of $CO2_e$ in 2020, the involvement in REDD+ project is so limited compared to neighboring country Indonesia that has become a leader in international efforts to reduce emissions from deforestation and forest degradation in developing countries. Currently, the Ministry of Natural Resources and Environment in collaboration with the United Nations Development Programmed (UNDP) is undertaking the National REDD+ Readiness project with the aim to develop a national REDD+ framework for Malaysia (Niiyama & Ismail, 2013). Although the benefits of REDD+ are deemed to be attractive, they may be difficult to achieve as it depends critically on a country or region's particular circumstances. As REDD+ implementation has three phases: *readiness*, *policy reforms*, and *result-based action* (Brockhaus & Angelsen, 2012), this research will concern with the first phase in terms of REDD+ *architecture* in Malaysia by particular REFERENCES to the national culture of the respective country.

Although Malaysia is a progressive nation in terms of industrialization, Malaysians are conservative in most business dealings and usually governed by concrete past experience. Therefore, a new practice such as introducing green electricity, creating low carbon house, marketing electric car and REDD+ may not provide comfort for decision-makers to commit themselves to until it is proven acceptable.

In explaining the lack of growth , Lim (2001) proposed two schools of thought: the structural hypothesis and the cultural hypothesis. The structural hypothesis blamed the structural impediments erected by the current government, while the cultural hypothesis proposed that values were instrumental in obstructing advancement. Malaysian government actually has carried out some prestigious and sophisticated projects in responding to reduce carbon emission. The effort to overcome the challenge is initiated through the formulation of Economic Transformation Program strategies emphasizing improvement in the area of energy, building, water & waste management and transportation. The progress however has been slow and rather unconvincing despite huge incentives being introduced. At this point, it is obvious that there is limitation in explaining the phenomenon using the structural hypothesis. Conditioned this way, it is time to observe the cultural hypothesis that proposes Malay values are instrumental in obstructing their advancement. The cultural theory approach is seen to be helpful as framing approach for thinking creatively about available forms of organization and in exploring a variety of what-to-do ideas that surround public services and government (Hood, 1998). National culture can be defined as country's shared practices and values. Values define conceptions of the desirable, and guide the way social actors (e.g. organizational leaders, policy makers, individual persons) select actions, and evaluate people and events (Schwartz, 1992). They represent the implicitly or explicitly shared abstract ideas about what is good, right, and desirable in a society.

Despite that most empirical research finds the causal link between national culture and environmental performance for countries, the effect of national culture on firms' environmental proactivity has not been explored so far (Calza , et.al, 2016) and scholars have started to consider the influence of national culture on environmental proactivity (Paulraj, 2009; Bansal and Roth, 2000). Therefore, based on these considerations, cultural values should have a direct influence on environmental proactivity like REDD+ program.

The main purpose of the paper is to analyze how national culture measured by cultural dimensions provided by Hofstede (2007) act as a stimulating driver for a firm's proactive environmental strategy coined in 'REDD+' (Reducing Emissions from Deforestation and forest Degradation) project within Malaysian setting.

LITERATURE REVIEW

The originality of the REDD proposal is its incentives-based mechanism designed to reward the governments of developing countries for their performance in reducing deforestation as measured against a baseline. The REFERENCES to the theory of incentives is implicit that the government is taken as any economic agent who behaves rationally by taking decisions after comparing the relative prices associated to various alternatives. Such an approach ignores the political economy of the state which is often ruled by governments with private agendas fuelling corruption (Karsenty & Ongolo, 2011). However in Malaysia it seems hard to separate economics from politics as the government plays the role of political patron to selected firms (Fraser et al. 2006). For example, the Malaysian government injected substantial cash into the financially distressed Proton, the national car company to reduce firm's bankruptcy risk (Restall, 2000) and bought 29% of Malaysian Air System in December 2000 at a price roughly twice the market price (Johnson and Mitton, 2003), and the most recent Malaysian Development Berhad scandal that brings country to the chaos (Healy, 2016). With this particular condition, the study will apply national culture theory which is recognized as a fundamental determinant of differences among not only individuals but also organizations from different countries (Hofstede, 2001). Also regarding to environmental sustainability, scholars generally refer to Hofstede's cultural dimensions (Ringov and Zollo, 2007; Calza , et.al, 2016).

NATIONAL CULTURAL ECOLOGY

Hofstede's (1980) seminal work on national culture noted several dimensions along which national cultures differ: *individualism vs collectivism*, *power distance (PD), uncertainty avoidance (UA), masculinity versus femininity,* and *time orientation*. Hofstede (2007) maintained that these dimensions reflect 'basic problems that any society has to cope with but solutions differ'. The national culture model (Hofstede, 2001; Hofstede Hofstede & Minkov, 2010) has been widely applied in previous academic research in different fields such as accounting, management, economics and sociology.

Power distance measures "the extent to which a community accepts and endorses authority, power differences, and status privileges" (House et al., 2004). High PD nations are more likely to have employees who obey the orders of their superiors without question. Malaysian public institutions are often characterized as highly centralized, control-oriented public sectors that are accountable to superiors (Alam Siddiquee, N. 2010). Poor governance practices at the lower levels are the consequence of poor practices at the higher levels. In addition, organizations that are high in PD have less employee participation in decision making. Javidan, et.al (2006) contended that teambuilding and participative decision-making are not effective in high PD countries and cultures because employees from the different levels are not comfortable interacting face to face in a group due to the top-down hierarchical structure. This is against the basic principles of REDD+ which is to encourage decision-making partnerships, networks, and interchange among stakeholders (Corbera, E., & Schroeder, H. 2011). Given that high levels of power distance are associated with authoritarianism, polarization, and inequalities (Cohen et al., 1996), we conclude that in high power distance societies, managers are less aware of others' needs and of environmental matters as well. In line with Zollo and Ringov (2007) discovered a negative relationship between power distance and social environmental initiatives, REDD+ environmental initiatives, is more likely to have success in such low PD cultures. On the basis of the above discussion, it is proposed that a country with a higher PD is less likely to implement REDD+ successfully.

The first proposition of this study's formulation is therefore presented as follows:

Proposition 1: Being the Highest Power Distance Country in the world, Malaysia is not Likely to Implement REDD+ Successfully

Uncertainty avoidance measures "the extent to which a society,organization, or group relies on social norms, rules, and procedures to alleviate the unpredictability of future events" (House et al., 2004). In high uncertainty avoidance societies, people tend to be more anxious (Hofstede, 2001;House et al., 2004), take moderate, carefully calculated risks, rely on formalized policies and procedures and show strong resistance to change. They create rules and formalize policies and procedures to ensure standardization and conformity that foster continuity. Schneider and de Meyer (1991) noted that people in high UA cultures tend to respond more forcefully to environmental uncertainty, have a greater concern for stability and security, and desire instruments to control their lives. Parboteeah et al. (2012), indeed, explain that in high uncertainty avoidance societies, individuals will be willing to put in place systems and procedures to ensure the sustainability of the environment by reducing or removing any uncertainty that might have a negative impact on the environment. In so doing, people are likely to remove anxiety that might be associated with uncertain environmental conditions. In contrast, in low uncertainty avoidance societies like in Malaysia, people may not be concerned about uncertainties in the environment since they are more comfortable with ambiguity and uncertainty. People in low UA societes favor well-defined rules and regulations that reduce innovation by public officials. This militates against the reforms initiated under REDD+ that aim to broaden managerial discretion and innovation in the interests of achieving substantive results (Sunderlin, et.al, 2015). Consequently, we develop the following proposition:

Proposition 2: Categorized under Medium Uncertainty Avoidance Societies , Malaysia is not Likely to Implement REDD+ Successfully

Individualism characterizes a society in which the ties between individuals are loose, and everyone is expected to look after himself or herself and his or her immediate family members only. Ho et al. (2012) consider that individualistic communities tend toappreciate freedom and independence and usually prioritize personal interests than the common well-being. Collectivism characterizes a society in which people from birth onward are integrated into strong, cohesive in-groups, which, throughout one's lifetime, continue to protect him or her in exchange for unquestioning loyalty. Therefore, *individualism* refers to the importance of the individuals in the society, and personal rights tend to have much influence. In contrast, *collectivist* societies would exhibit close ties between individuals, extended families, and collectives where everyone takes responsibility for fellow members of their group (Peng & Lin, 2009). According to Husted (2005) and Scholtens & Dam (2007), a society that fosters collectivism tends to have its members integrated in groups early in their lives. Thus, the focus is more on the group than on the individual, the predominant values include cohesion and consensus, thus reducing initiatives for individuals. In this way, Akaah (1990) revealed that workers of individualistic countries were less ethic than those pertaining to collectivist countries. As such, one would expect collectivist societies to emphasize more of a concern about the impact of business on society (Ho et al., 2012). Similarly, Blodgett, Lu, Rose, and Vitell (2001) addressed that collectivist societies are likely to be more sensitive to the stakeholders' interests. This was also confirmed by García-Sánchez, Cuadrado-Ballesteros, and Frias-Aceituno (2016), also revealing that companies from collectivistic countries tend to have greater incentives to disclose social and environmental information to their stakeholders, to favor their decision-making processes. Based on the previous reasoning, the following proposition is proposed :

Proposition 3: As Collective Societies , Malaysia Has Capability to Implement REDD+ Successfully

Cultures with a high degree of *masculinity* often represent a pREFERENCES in society for achievement, heroism, assertiveness, and material rewards for success, while *feminine* cultures stand for a pREFERENCES for cooperation, modesty, caring for the weak, and quality of life (Hofstede, 2007). People from assertive societies are expected to "manage their own affairs" (Chui and Kwok, 2009), suggesting that they may pay less attention to initiatives beyond their own interests, such as environmental protection. Husted, (2005); Orij (2010) and Park et al. (2007) argued that the higher the degree of femininity of a given culture, the higher the degree of sustainability, environmental management, and commitment to sustainable development. These findings were confirmed in later research developed by Peng and Lin (2009). Zollo and Ringov (2007) find a positive relationship between gender egalitarianism and environmental performance. Also Tobey & Yasanthi Perera (2012) find a positive effect of gender egalitarianism on CSR. The positive effect of gender egalitarianism is coherent with the idea that gender egalitarianism is evidence of femininity, that is the inclination to care about the environment, the quality of life, and future generations (Power et al., 2015; Calvelli and Cannavale, 2013). Based on previous discussed research, the following proposition is proposed:

Proposition 4: Trapped between the pole of Masculine and Feminine Societies , Malaysia is Hard to Implement REDD+ Successfully

Normativism/Pragmatism is the fifth dimension which differentiates national cultures In this sense, Hofstede (2001) indicates that normative societies prefer to maintain time-honored traditions mean while viewing societal change with suspicion. On the contrary, pragmatic societies encourage thrift and efforts in modern education as a way to prepare for the future (Hofstede & Minkov, 2010). Pragmatic cultures welcome values such as persistence, saving money, honesty, adaptation, ability, and selfsufficiency and discipline, and companies operating under this scheme mostly focus on accountability principles and on achieving long-term financial and non-financial objectives (Hofstede & Minkov, 2010). On the contrary, in short-term oriented or normative cultures, main work values are freedom, rights, achievement, and thinking for oneself. In fact, Hackert et.al, (2012) revealed that investments in pollution prevention, investments in recycling, and waste reduction were mainly done by companies operating in pragmatic cultures. This consideration is in line with the idea that pragmatic cultures are more committed to environmental preservation and related sustainability issues. Based on these premises, the following proposition is proposed:

Proposition 5: Categorized under Normative Societies , Malaysia is not Likely to Implement REDD+ Successfully

CONCLUSION

Drawing on frameworks of Hofstede's national culture, the cultural ecology presents problem for REDD+ implementation in Malaysia. The five cultural dimensions reveals that Malaysia scores high in PD (the highest in the world), medium in UA, high in collectivism, between the pole of quality of life and quantity of life and belongs to normative societies. The rhetoric of forest protection as expressed in REDD+, cannot be applied universally in the presence of cross-cultural differences. By using Turner's (2002) metaphor, three types of diners are used to illustrate the readiness of implementing REDD+ in Southeast Asia

Countries. Enthusiastic diners are represented by Indonesia (44 projects), cautious diners are represented by Vietnam (7 projects) and Philippines (4 projects) and diners who are unfamiliar with the menu are represented by Malaysia, Thailand, Laos (1 project each). The enthusiastic diners have bureaucracies that are capable of learning and adapting. The cautious diners demonstrate some degree of decentralization and privatization, but with only minimal changes within the centralized state. The unfamiliar diners have yet to build capacity and systemic processes to initiate and sustain reform in forest sustainable management initiatives. Since Malaysia is placed in diners who are unfamiliar with the menu, pragmatic and contextual application and adaptations of REDD+ are required in dealing with the current forest sustainable management initiatives. Empirical insights into REDD+ attempts from national culture insight most clearly indicate that Malaysian's ability to fit into this framework is problematical. However, Malaysia can still learn from the enthusiastic dinners - Indonesia that has cultural proximity but has become a leader in international efforts to reduce emissions from deforestation and forest degradation in developing countries, critically scrutinize the potential benefits and adverse outcomes, and selectively use only those components of such models that are relevant to its own societal contexts and people's need.

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Silvicultural Systems Applied at the Production Forest in Indonesia

Wahyudi

Department of Forestry, Palangka Raya University
Jl. Yos Sudarso, Palangka Raya, Central Kalimantan, Indonesia. 73111
Phone:+62 81521560387

E-mail: wahyudi888@yahoo.com

ABSTRACT

Some silvicultural systems that had been applied at the production forest in Indonesia right now are Indonesian Selective Cutting, Indonesia Selective Cutting and Planting, Selective Cutting and Strips Planting, Gap Cutting, Clear Cutting with Artificial Regeneration, and Indonesia Strips Cutting and Planting. Silvicultural system of Indonesian Selective Cutting is the first silvicultural system that be applied at the production natural forest. It was used 3 diameter limits in each the specific target of forest. At the 1989, the first system was changed with Indonesia Selective Cutting and Planting. The excellence of this system was applying two divisions to manage the natural forest areas, they were production and forest management divisions with added the exact budget for forest management. However there were some weakness for both silvicultural systems like monitoring and controlling the results of enrichment and planting in the fields. The next system is Selective Cutting and Strips Planting. This system was limited use at the 25 forest concessionaries at the logged over forest. This system ameliorated the both previous systems, especially the controlling aspect of enrichment and planting results. The strip areas were for environmental manipulation to increase growth and yield of planted trees, especially the commercial native species. Clear Cutting with Artificial Regeneration system had been used in degraded forest only. Then, Indonesia Strips Cutting and Planting has been applied since 2014 to now, it has been specially applied at the monoculture natural forest of *Duabanga molucana* at the Sumbawa island. More than one or all systems could be applied at the one unit management, this method was called the Multiple Silvicultural System.

Keywords: Clear cutting, gap cutting, selective cutting, strips cutting, strips planting

INTRODUCTION

Large of forest areas in Indonesia are 120.35 million ha or 63.35% of Indonesia continent. Forest areas divided into three groups according to the their functions. First, the protection forest, that functioned to protection of organism life buffer, watersheds, preventing floods, controling erosion, preventing marine intrusion, and conservation of land fertility. Second, the conservation forest, that functioned to the flora and fauna conservation and their ecosystem: especially endemic, scarce species, to biodiversity management and tourism development. Third, the production forest, that functioned to produce forest product (wood and non wood) using a specific silvicultural system.

Managing of production forest areas have been conducted by forest concessionaries (IUPHHK-HA/HPH and IUPHHK-HT) since 1972. Many forestry regulations obliged to apply the principles of sustainable forest management to manage the production forest that conducted by forest concessionaries. Unfortunately, deforestation and forest degradation in Indonesia were very large size every year, ranging from 1.8 to 2.84 million ha per year since 1990's (Forda, 2008). At the same time, large size of natural production forest areas used for the forest concessionaries (IUPHHK/HPH) in 1992 was 61.38 million ha, but in 2008 decreased just 25.9 million ha. The large size of effective forest concession areas at the 1992 was 42.97 million ha, but in the 2008 decreased just 18.13 million ha only. Thereby, the production forest areas that was really used for the forest concessionaries at 2008 just 70% only, their remainder in the form of in-active forest concessionaries or unsuitable for sustained forest management (APHI, 2010).

Forest damage in Indonesia was caused by illegal logging, illegal occupation of land, conversion of forest, developing of non forestry sectors (resettlement, infrastructure, etc), forest fire, shifting cultivation and poor forest concessionaries in the production forest areas. For the moment, forest cover condition of production forest areas were not uniform, comprising virgin forest, logged over forest, low potential forest, bushes-shrub, grassland and critical land so it is similar to mosaic landscape of forest.

According to the Forestry Regulations of Indonesian Government (UU Kehutanan) No. 41/1999 the forest regions in Indonesia can be divided into three regions i.e. conservation forest, protection forest, and production forest. Indonesia has set aside 20.50 million ha as conservation forest; 33.51 million ha as protection forest; 58.24 million ha as production forest, and another, 8.1 million ha as conversion forest to the non forestry regions development. Production forest was classified into three classes according to their precipitation, slope, and soil type, i.e. limited production forest, fixed production forest, and conversion production forest. They were located in the forest regions and except the regions of protection and conservation forest, with score of precipitation, slope, and soil were 125 to 174, smaller than 125, and smaller than 124 respectively (Ministry of Agriculture Regulation Number 837/Kpts/Um/II/1980 and Number 683/Kpts/Um/8/1981).

One of causes of degraded forest on the production natural forest was poor forest concession. In general, the silvicultural systems that were applied in the Indonesian production forests which are operated by forest concessionaries consist of two systems, they are polycyclic system in the form of selective cutting and monocyclic system in the form of clear cutting with natural or artificial regeneration. This paper tried to field analyse some silvicultural systems which had been applied in the Indonesian natural production forest since 1972 until now.

RESULT AND DISCUSSION

Silvicultural System In Indonesian

There were some silvicultural systems which had been used in Indonesian natural production forest since 1972, i.e. Indonesian Selective Cutting (ISC), Indonesian Selective Cutting and Planting (ISCP), Selective Cutting and Strips Planting (SCSP), Gaps Cutting (TR), and Clear Cutting with Artificial Regeneration (CCAR) (Director General of Forestry, 1972; Director General of PH, 1989, 1993, and Director General of BPK, 2009).

There were some others silvicultural systems that were applied in Indonesian production forest, they were the Clear Cutting and Artificial Regeneration (CCAR), Clear Cutting and Natural Regeneration (THPA), Intensified Indonesian Selective Cutting and Planting (ISCPI), Strips Cutting and Conservation Planting (TJTK), Timber Estate-Cutting and Strips Planting (HTI-TTJ) etc. All silvicultural systems applied the principle sustainable forest management through some silvicultural techniques like nursery, planting, tending (weeding, mulching, changes of plant, fertilizing), vertical and horizontal liberation, and thinning. The other activities are research and development, plant protection and forest security.

Indonesian Selective Cutting (ISC) silvicultural system was the first system that was applied in the Indonesian production natural forest. These system has been implemented from 1972 to 1989 based on the Director General of Forestry No. 35/KPTS/DD/1/1972. ISC system includes the polycyclic forest management system, was a combination of logging system with a diameter limit, selective logging, forest enrichment and liberation. The basics of Indonesian Selective Cutting were:

1. The minimum diameter limit of the felled trees was 50 cm
2. Young trees 20-50 cm diameter was a major stage of growth, and felling this trees are not worth the loss in growth
3. Cutting cycle was 35 years based on the diameter growth of young trees of 1 cm per year
4. Annual allowable cut was calculated as follow : AAC =1/CC x EF x SF x SS where: CC: cutting cycle; EF: exploitation factors (0.8); SF: safety factors (0.8); SS: standing stock of commercial trees
5. Not allowed to cut back before reaching the cutting cycle.

While, the principles of Indonesian Selective Cutting system were forest sustainability, utilization of favorable and supervision. Activities of ISC system involves several main stages. First, stand inventory before harvesting. Second, produce seedlings for planting and enrichment. Third, the exploitation of forests (logging). Fourth, residual stands inventory after logging. Finally, residual stands development to improve plant conditions, which consisted of liberation, planting and replanting, erosion prevention, forest security and tending of regeneration.

Forest inventory before harvesting, including the young commercial trees inventory, was aimed to determine the forest composition and its structure that was done before harvesting to know the number and composition of each species of trees which would be harvested and to know the number and composition of forest regeneration. The diameter limit of reaping trees were determined according to their cutting cycle that related with their number of young commercial trees as presented in Table 1

Table 1. Provision of the diameter limit, cutting cycle, number of young trees in ISC silvicultural systems

Diameter limit (cm)	Cutting cycle (years)	Number of young trees (trees per ha)	Diameter of young trees (cm)
50	35	25	35-49
40	45	25	35-39
30	55	40	20-29

Seedlings was produced before harvesting, it was aimed to develop commercial seedlings varieties, such as meranti (*Shorea* spp), keruing (*Dipterocarpus* spp), sengon (*Paraserianthes falcataria*), sungkai (*Peronema canescens*), mangium (*Acacia mangium*) and others. A few months before harvesting, road network was made. Harvesting was done on the trees that meet the provisions, such as diameter limit, commercial species and marked at the time of the previous inventory. Logging and timber skidding damage done by minimizing the residual stand, young trees and other regenerations.

Inventory of residual stand to determine the composition, forest structure and number of forest regeneration and also to know a poor area to be planted, such as ex the log yard, ex yarding road etc. Liberation activities conducted to release the commercial young trees from the contender trees and the strangler crops (liana), to create the optimal growing space for trees growth. Planting using seedlings from the nursery and it was carried out on the poor areas recorded known from the residual stand inventory activities previosly. The planting time was 1 year after logging. Replanting was done if plants died after 6 month age. Erosion prevention was conducted through the vegetative and physical structure method or combination (like planting, natural regeneration, terrace, irrigation channels, dikes) on the logging area and clear area. Forest security are done to protect the forest area from illegal logging, shifting cultivation, illegal occupation of forest area and poor forest management. Tending activities consist of liberation of young trees and thinning that conducted 5 years after logging.

The first evaluation for the ISC sistem carried out in the Seminar on the Reforestation and Afforestation in Gadjah Mada University, Yogyakarta at 23-24 August 1974. The main results of this seminar consisted of two thought. First, if forest's standing stock was low, as 10-30 m^3 per ha, accordingly produced trees were little too, so did not cause severe damage to the forests ecosystem, but it feared over cutting to cover the operational and logging cost. Second, if forest's standing stock was high, probably more than 100 m^3 per ha, then the logging activity caused forest destruction, especially on young trees and natural regeneration destruction. Thereby, ISC system was still difficult to apply the sustained natural forests management.

The second evaluation for the ISC system implemented by Directorate of Reforestation and Rehabilitation at 1980. The result of these evaluation has determined the application requirements of this system in three forest types including mixed natural forest, as written in the following table

Table 2. Evaluation of ISC system by Directorate of Reforestation and Rehabilitation at 1980.

No	Production Forest types	Number of young trees (trees)	Diameter of young trees (cm)	Cutting cycle (years)	Annual allowable Cut (m3)
1.	Mixed Natural Forest	25	20	35	1/35x80%x standing stock
2.	Mixed Diospyros Forest	16*	20	45	1/35x80%x standing stock
3.	Mixed Gonystylus Forest	15*	20	35	1/35x80%x standing stock

**)The number of young trees is 25 per ha, shortcomings can use other trees species*

In 1987, a formed Steering Committee and Organizing Committee of Discussion to completion guidelines of ISC system based on the Forestry Research and Development Agency (Forda) regulation No. 02/1987 dated January 6, 1987 by members of Forda staff, Bogor Agricultural Institute (IPB) and Gadjah Mada University (UGM). These analysis was based on implementation of the ISC system in a few forest concessions such as PT Silvasaki, PT Hatma Santi (Riau), PT Kayu Lapis Indonesia (West Kalimantan), PT Inhutani II, PT Hutan KINTAP (South Kalimantan), PT Inhutani I, PT ITCI and PT BFI (East Kalimantan). Analysis results showed that the logged over forest still contains the number of young trees (20-49 cm in diameter) were adequate and have the appearance of abundant the natural regenerations on the gap of logged-over forest. However, the team and the committee was not used it for the next improvement of ISC system.

In the field, ISC system was not implementing filled the bill. Several stages of ISC system was often overlooked, as inventory before cutting, prepared the young trees in sufficient quantities, residual stand inventory, enrichment planting and tending (Soerianegara and Indrawan, 2000). Some of the causes of this deviation occurs is:

1. Indicators of activity result, especially plantation, were difficult to measure and take a long time
2. Management area was very large size so that management need the high cost and many of labor

3. Still lack of experts and technical staff of forestry, at the time.
4. Event logging was more dominant compared the forest management after logging
5. More difficult to implement because there were several options on diameter limit of reaping trees based on their cutting cycles, and practitioners must be able to determine the diameter limit and their cutting cycles according to the type and condition of forest.

Indonesian Selective Cutting and Planting System

The Indonesian Selective Cutting and Planting (ISCP) was used since year 1989 until now. Implementation of this sistem according to the Ministry of Forestry Regulation number 485/Kpts-II/1989, Director General of Forest Concessionaires (PH) regulations number 564/Kpts/IV-BPHH/1989 and 151/Kpts/IV-BPHH/1993 dated 19 October 1993. This guideline was aimed to ameliorate ISC system that is conducted through the formation each stages, i.e. planning (before cutting), production (logging), and forest management (after cutting). In the ISCP (1993), it has been added the budget of each stages of ISCP.

Basically, ISCP system is similar with ISC system, however in ISCP system it has been determined two divisions to manage the forest area, that is equivalent production division and forest management division. In the revised edition at 1993, it have been added the budget for forest management. ISCP system involves 11 main stages, e.i structuring of forest (it was done at 3 years before cutting=Et-3), forest inventory before cutting (Et-2), road construction (Et-1), cutting (logging), neating (it was done at 1 year after cutting=Et+1), libering I, II, III (Et+1,3,5), nursery (Et+2), forest inventory after cutting (Et+2), enrichment planting (Et+3), tending I, II, III (Et+3,4,5), thinning I, II, III (Et+10,15,20)

ISC system is similar to ISCP system, and the weakness of ISCP system is similar to the weakness of ISC system. The weakness of ISCP systems were in the term of the difficult in controlling the activity result, especially enrichment planting outcome because forest floor is still very closed by stand canopy and many of natural seedling and sapling. On the other hand, the growth and yield of natural seedling and sapling are lowest because of the closing of canopy in the forest floor. If they are under dense forest cover like that, the seedling of *Shorea* spp apt to forming the seedling bank, they are not or very low to next growth (Mc Kinnon *et.al*, 2000).

The other weakness of ISCP is many defact trees as residual trees in the logged over forest, because forest enterpriser is just choosing some good trees to be harvested per ha, meanwhile some defact trees is abandoned in the logged over forest. It is called degraded of trees commercial genetic.

Selective Cutting and Strips Planting System

Selective Cutting and Strips Planting (SCSP) was operated from 2005 until now. Implementation of this system based on Director General of Forest Production Management (BPK) Number 226/VI-BPHA/2005 dated 1 September 2005 and its revised number P.9/VI/BPHA/2009. Basically, this system is a combination between selective cutting and clear cutting system. Plantation is done in the planting strip that lengthwise direction of 1000 m with width of planting strip is 3 m. The distance of each strip is 20 m. The distance of trees on the strip is 2.5 m so that the number of plants are 200 trees per ha. Thereby, the SCSP system involves 2 management areas, they are the strip planting area and strip stand area. The strip planting area is made by clear cutting for plantation and strip stand is made by selective cutting and suitable for conservation area (see Fig.1). Therefore, these system was made to overcome the controling problem, especially enrichmen-plantation outcome in the stand forest.

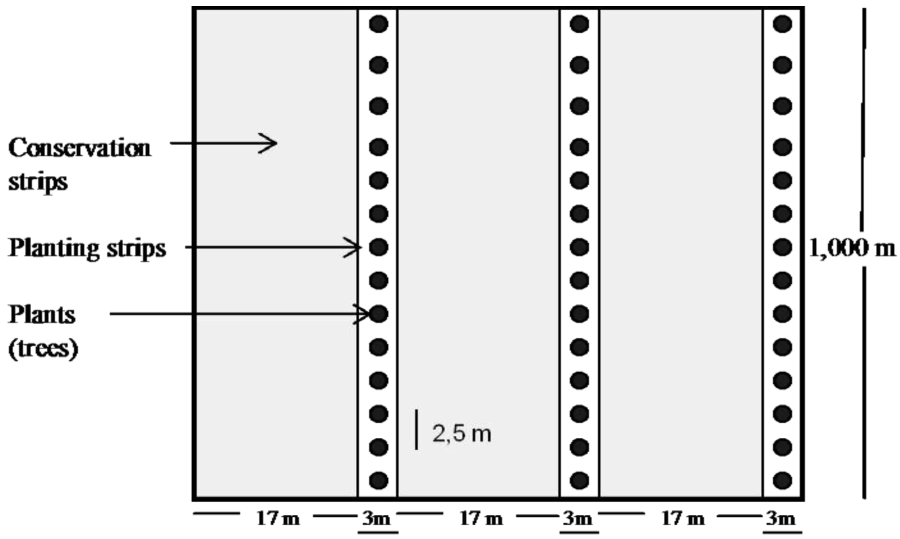

Figure 1: Layout of strips planting on the SCSP system

Strips planting is a technique in the SCSP system that is aimed as environment manipulation to increase growth and yield of artificial regeneration, especially *Shorea* spp, in strips planting. *Shorea* spp are native species and predominating in the production natural forest in west Indonesian forest with high value of wood in the market. *Shorea* spp belong to semi-tolerant species. They could grow better in the site which have optimum of light as in the strips planting with width of 3 to 5 m (Wahyudi, 2009). According to Pamoengkas (2006) , the best width of strip planting is 5 to 8 m. Until 2009, SCSP system has been applied on the 29 unit management (forest concessionaries). Some forest concessionaries have applied two system, i.e. ISCP system and SCSP system, so they called Multiple Silvicultural System.

SCSP is relatively new system that is applied in Indonesian production natural forest. Many forestry experts agree these system is applied in the logged over forest and low potential forest. The advantages of SCSP system, in the strip planting and strip stand, are:

Strips planting:

1. The outcome of activity, especially enrichment planting in the strip planting, is more easy to control and evaluated
2. Tree improvement could be done toward plantation in the strip strip planting
3. There are guarantee to increase forest productivity (Soekotjo, 2010). With ISC and ISCP system, productivity of production natural forest just 0.67 to 0.07 m^3/ha/th (APHI, 2010), meanwhile productivity of production natural forest with SCSP system highly expected until 1.31 m^3/ha/th or increasing 195% to 458.41% (Wahyudi, 2011).

4. In the next cycle, logging operation can be concentrated just in small area, but with relatively large volume of wood, i.e. in strips planting area, therefore the operation is relatively cheaper
5. Structuring of plantation in strip planting is well regulated (distance of plants 2.5 m x 20 m)
6. Artificial regeneration consist of selected species and relatively grow fast, free of competition from older stand
7. Strip planting handling is relatively simple, practical, and easy
8. Plantation in the strip planting is even aged, pure, and regular

Strips stand:
1. It provide protection toward fire because strip stand is still close by vegetation
2. It relatively provide protection toward pest and disease because still many species in strip stand, including predators in the forest
3. It still provide protection on growth site and regeneration, because width of strip planting is just made 3 m or 15% only , and the other is strip stand.
4. It provides vertical crown coverage
5. Natural regeneration of tolerant species is maintained once encouraged, especially Dipterocarp regeneration in the strip stand
6. It still creates uneven forest which is better for wild life
7. Biodiversity in the strip stand is not changed (Pamoengkas, 2006)

Clear Cutting and Artificial Regeneration System

Clear Cutting and Artificial Regeneration System (CCAR) was applied in low potential forest, shrubs and other degraded forests only. These systems can be applied for establishing plantation forest, either for land rehabilitation or industrial plantation forest. There is also conversion of low potential forest or shrubs into pure and even age species. Choise of tree species suitable with site is very important, especially intoleran species which demand full sunlight which are able to grow in open area and in fertile land. The CCAR system can implement intercropping with agricultural crop called agroforestry.

The advantages of clear cutting system are: 1) Logging operation is concentrated in small area, but with relatively large volume of wood. Heavy equipments no need to be moved to the far distance, therefore the operation is relatively cheaper 2) Logging damage toward young stand can be avoided because structuring of plantation is well regulated 3) Young plants consist of intolerant species and grow fast, free of competition from older stand 4) The method is relatively simple, practical, and easy 5) The stand is even aged, pure, and regular 6) Inter cropping with agricultural crops can be done. Local peolpe’s income can be raised 7) Windthrow damage toward young stand can be avoided. The disadvantages of clear cutting system are 1) It destroys ground cover, change the micro climate, expose bareland, stimulate weed growth extensively, deteriorated soil physical properties, the soils become more compact caused by log skidding 2) It reduces protection toward erosion. Soil is erosive especially in sloping area 3) Forest fire danger is increasing due to wind and the scorching sun 4) Clear cutting system harvests all tree but not all trees dimension are demanded by the market. Small dimension wood tend to be difficult to get the market, except if they can be used as woodchips 5) Forest stand which is even aged an pure are less resistant toward disease, pest and fire 6) There will be deficiency of a certain mineral (nutrient) in the next rotation 7) Unit cost of planting per hectare is more expensive 8) Esthetically, it creates scenery which is not so good

Meanwhile, Clear Cutting and Natural Regeneration and Gap Cutting systems were never applied widely in business scale, this system was used only limited at research scale, though it have been given by the umbrella regulation through Ministry of Forestry regulation (examples: P.11/Menhut-II/2009 and so on).

CONCLUSION

There were some silvicultural systems which had been used in Indonesian production natural forest since 1972, i.e. Indonesian Selective Cutting (ISC), Indonesian Selective Cutting and Planting (ISCP), Selective Cutting and Strips Planting (SCSP), Gaps Cutting (TR), and Clear Cutting with Artificial Regeneration (CCAR) (Director General of Forestry, 1972; Director General of PH, 1989, 1993, and Director General of BPK, 2009).

The ISC and ISCP system were selective cutting system that were applied in the production natural forest. ISC system was the first system that had been applied in the Indonesian production natural forest since 1972 to 1989 meanwhile ISCP system had been applied it since 1989 up to now. ISC system was mainly focused in the production aspect than the regeneration and tending aspects and it was more difficult to be applied by manager who was less experienced in the forest, because it applies 3 diameter limits for cutting, i.e. 30 cm, 40 cm, and 50 cm each in the specifict target of forest. ISCP system at determined two divisions to manage the forest area, they are planing division, production division, and forest management division, and also it added the good budget for forest management in the revised edition 1993. SCSP system is a combination system between selective cutting and clear cutting system that was made to ameliorate the controling problem, especially enrichment-plantation outcome in the stand forest. These system can increased forest productivity until 195% to 458,41% than the previous systems.

SUGESTION

A the moment, the production forest condition in the form of mosaic landscape. The suitable silvicultural system to manage them are applying the **multiple silvicultural sytem**. They are Indonesia Selective Cutting and Planting system for virgin forest; Indonesia Selective Cutting and Planting system, Selective Cutting and Strips Planting System and gap system for logged over forest; Selective Cutting and Strips Planting System for low potential forest; Clear Cutting and Artificial Regeneration and agroforestry for low potential forest and shrubs; and reforestation for grassland and occupied land.

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Optimal Condition for the Environmental Balance

Merryana Kiding Allo

Environment and Forestry Research Insitutu of Palembang, Ministry of Environtmental and Forestry, Makasar Indonesia
Jl. Perintis Kemerdekaan km. 16. Makassar, 90243, telp. (0411) 554049, fax. (0411) 554058,

Email: merrymksr@yahoo.co.id ; merrymakassar@gmail.com

ABSTRACT

Tropical forests known as the lungs of the world, in addition to produce oxygen, absorbing Carbondioksida also gave a comfortable atmosphere, cool and noise banish. Most of the roles and functions of forests is now becoming the main requirement in the midst of urban development, namely through the development of the urban forest. Without urban forests, urban environment only develop economically but ecologically decline, marked by an atmosphere that is unconvenient, the rising of temperatures, pollution, carbon dioxide, droughts, floods and smelling environment. Implementation of the urban forest is meant to sustainability, harmony, and balance of urban ecosystems. Structuring plant by forming the structure in accordance with the environmental problems that exist can control pollutants, air temperature, improve soil conditions can also bring aesthetic value through the architecture of trees, crown shape, color of flowers / fruit while turning the aroma of freshness that comes from the bark, leaves, flowers and fruit. By the way of description of the morphology of forest tree species include a rod shape, size rooting fields, canopy trees and plants below will result in the ideal structure that is expected to produce a cozy atmosphere. With harmonize plant in accordance with the optimum extents, several species of trees, shrubs and bushes can be an option to repair and protectdamaged environmentalconditions.

Keywords : Urban forest, type of tree, plant structure.

INTRODUCTION

Environmental problems in urban areas seemed to have no end even growing from year to year. Construction of urban forests mandated in Article 9 of the Forestry Law 41 of 1999, and as a follow-up has been published PP 63 Year 2002 on Forest City. The general objectives of the urban forest is for preservation, rehabilitation of degraded land, mengelimininasi pollutants, and create harmony and balance of urban ecosystems that include elements of environmental, social and cultural.

Urban development tends to minimize green open space. Transformed to enable green open land into residential areas, commercial, industrial estates, transport links, as well as other urban infrastructure and facilities. Urban environment ultimately only economically, but ecologically decreased. The condition causes disruption of the balance of urban ecosystems characterized by increased air temperature, air pollution (increased levels of CO, ozone, carbon dioxide, oxides of nitrogen and sulfur, dust, atmosphere barren, monotonous, noisy and dirty), flooding, salt water intrusion , heavy metal content of the soil increases and decreases in the water table. Town forest can be seen as a conservation area outside the conservation area.

The urban forest is an area of urban land that consists of multiple physical components and vegetation trees, as a whole ecosystem role and serves to improve the quality of the environment. Samsoedin and Waryono (2010), suggests that the green areas in urban services capable of ensuring comfort and environmental balance. Dividing the green area based on the criteria of protected green areas, areas which have natural characteristics that need to be preserved and built green areas, areas of natural protection for the urban aesthetic purposes and control the urban physical environment.

The beginning stage of rehabilitation of land is the main target to restore the role of land use that time it was considered optimal in terms of productive, such as building a green area or the current commonly known as urban forest by cultivating the kinds of fast-growing, medicinal plants and ornamental plants urban, which is building a buffer environment building and campus garden structure and biological conservation and animal. The role of Crown Green among others as a filter to absorb air pollution, oxygen producer, penghalau noise and fatigue pelerai movement of people.

Urban Forest as Balancing Environmental

Germplasm is an important raw material for the construction of the future in the field of food, clothing, shelter, medicine, and industry. The tree is the main constituent of the urban forest vegetation, in addition to the type of vegetation ranging from grasses to shrubs levels. Another element forming an urban forest can be lianas, epiphytes, parasites, and others. Trees as the main plant and the highest pollutant-forming absorbent micro-climate as a green area in the city, so it can not be called urban forest without trees that can serve as a green open space.

Construction and development of the urban forest is one of the urgent needs felt by the government and society. This is related to community needs will be the establishment of green open space (RTH) as a means to support healthy living that is economical, safe, and provide public education in the field of environmental management and conservation of natural resources. The general objectives of the urban forest is for preservation, rehabilitation of degraded land, mengelimininasi pollutants, and create harmony and balance of urban ecosystems that include elements of environmental, social and cultural. In an integrated manner, the main function is to establish an urban forest microclimate in urban areas, the presence of a collection of trees in a dense city atmosphere may affect the local environment.

Appropriate extent and composition of the arrangement structure increasingly widespread effect on the local climate. As an environmental buffer, ie as a regulator of water, air, flora and fauna will also be part of it when the ecosystem has been formed will certainly enhance the aesthetic value and plus the value of the presence of green open space (RTH). Very important to note that the construction of the urban forest, namely the establishment of the welfare of society, not the other way in which the facts are apparent now that in some locations the city forest showed adverse environmental conditions such as damage to the forest ecosystem artificial result of the garbage, waste traders foods that cause odor less savory and trees / walls by graffiti. Ideals for the welfare of society will be achieved if it is supported by a capable policies that also take into account the existence of natural resources including germplasm of trees and environmental services in an urban ecosystem as an economic resource indirectly. Efforts to revitalize urban ecosystems can be done, inter alia, through the development of Urba Forest / Urban Landscape.

In order to get a successful development of green space, the plants should be selected based on several considerations with the aim that the plant can grow well and be able to cope with environmental problems that arise. Horticultural very important aspect to be considered in the selection of plants for RTH (green open space) tackling the environmental problems that arise. In general there is a criterion in the selection of which will be planted include deep root, not easily uprooted, the kind that not prejudice the leaves when dry, its life cycle is long, physical endurance particularly high against the wind, flood and drought, especially in coastal areas that often have problems with abrasion and the intrusion of sea water and has extensive editorial and beautiful as a point of view that lures and some other follow-up criteria. In some studies suggested to use native species, given the nature of the adaptation is easy to grow, inexpensive and plant availability easily obtained facilitate the implementation of development the next maintenance. The use of plants commonly known identifier or key plant is also very important consideration because of the presence of the plant identifier of a city forest ecosystem can be directly known, whether the areas belonging to the coastal urban forest and urban forest covered land.

Structure and Composition of the Ideal Urban Forest Vegetation

Urban forest is an ecosystem, where communities of plants such as trees and associated services that grow on land the city or around the city, shaped paths, spread or clustered (piling up) with a structure resembling natural forests, forming a habitat for life for the animals, making the environment healthy , comfortable, and attractive / aesthetic.

Trees have the ability to absorb carbon dioxide and convert it into oxygen and energy. The ability of trees to recycle gas pollutants into useful substances becomes very important for the survival of the earth, can medaur ie changing the gas pollutants in urban air that can not be absorbed by other crops into solid carbon such as wood, leaves or fruit. Based on these capabilities, the real problems of the city can easily be remedied is to build an urban forest.

The structure of the urban forest is the composition of the vegetation, the number and diversity of plant communities that make up the urban forest vegetation well-shaped trees, bushes, shrubs to grass or other ground cover. The levels can be divided into:

1. Stratified two communities, namely the urban forest vegetation consists of trees and grass or other ground cover.
2. Stratified lot of the community of urban forest vegetation in addition consists of trees and the grass there is also a shrub, herb, lianas, epiphytes, overgrown with saplings and cover a lot of ground, irregular spacing of the meeting, with strata and composition leads imitate vegetation communities natural forests.

In the natural urban forest, such as Jompi'e urban forest and some natural urban forest in Indonesia, where the event development and expansion of urban areas, where they have been held as part of the city in general. The structure and composition of the types of vegetation in it is growing and naturally organized and is a type of tropical moist forests, which are characterized by the growth of tall trees and evergreen. In addition there is types of plants that characterize an ecosystem in which the presence of each of these types have the ability in the habitat. Among other types of Barringtonia the coastal city forest, groves of bamboo plants in the jungle city of enclosed land. Bamboo clumps apart as a silencer is also producing a lot of oxygen so that the ideal can be an example planted in dense residential area.

Irwan (2009), that the forest structure built city should be stratified urban forest lots, thereby building urban forest layered and stratified vertically as well as horizontally as well as natural forests. Such urban forest structure consists of a ground floor cover crops or grasses, shrubs, herb, and trees. Types of diverse constituent with the principle of increasingly able to meet the increasingly diverse forest functions. A stratified urban forest many also the most effective in tackling problems such as the city environmental problem such as lowering air temperature, noise cancellation, reducing dust, keep the air humidity, and air pollution antidote. Furthermore, in Samsul (2010), stated that the function of the urban forest is dependent upon the shape and structure of the urban forest and its design purpose.

Berdasarkan hasil penelitian pada hutan kota Jompi’e di kotamadya Pare-Pare, Provinsi Sulawesi Selatan sesuai dengan kondisi dan letaknya tergolong ke dalam hutan kota pantai. Sekitar 87% dari luas wilayah kota Pare-Pare terletak pada ketinggian 25 m dpl, berada dekat dengan pantai, dan tempat yang tertinggi 500 m dpl. Formasi geologi yang membentuk struktur batuan, antara lain endapan alluvial pantai, kerikil, pasir, lempung dan batu gamping koral. Hutan kota Jompi’e bukan buatan, merupakan ekosistem alami dan struktur vegetasi yang ada mencirikan hutan pantai. Adapun jenis dan tingkat strata pertumbuhan vegetasi di dalamnya adalah pada tingkat strata teratas terdapat 15 spesies pohon yang berasal dari 13 famili. Di antara 13 famili terdapat 3 famili yang cukup mendominasi keragaman jenis yang hidup berkembang di kawasan hutan kota Jompi’e, yaitu famili Sapindaceae, Sterculiaceae dan Moraceae. Jenis yang tertinggi tingkat penguasaan adalah jenis Bayur dengan INP mencapai 91,43%. Kemudian pada stratum di bawahnya dijumpai 5 jenis vegetasi alami, jenis Paliasa laki merupakan jenis yang tertinggi tingkat penguasaannya, yaitu 102,78%. Sebagai kawasan hutan yang berfungsi pelestarian, rekreasi dan estetika, bentuk hutan kota Jompi'e tergolong ke dalam menyebar dengan struktur banyak stratum. Hal tersebut menggambarkan bahwa strata yang terbentuk lengkap, umumnya masih terdiri dari jenis-jenis lokal dengan tipekal (tanaman penciri) hutan pantai, seperti jenis pandan dan langoting. Koleksi jenis tumbuhan asli setempat seperti beberapa jenis Ficus, yang ditunjang oleh beberapa fasilitas fisik, seperti kolam renang, shelter (tempat istirahat), camping ground, gedung pertemuan, saluran drainase dan jalan setapak yang dapat menjangkau setiap sudut kawasan. Menjadi salah satu obyek yang menarik sebagai persyaratan dalam peroleh penghargaan Anugerah Adipura selama 6 tahun berturut-turut (2005-2010) yang tahun ini bertema 'Clean and Green City'. Hingga saat ini hutan kota Jompi'e menjadi salah satu sumber air minum bagi kota Pare-Pare bagian Utara. Selain itu pada beberapa bagian kawasan terdapat jenis-jenis yang bukan jenis lokal, seperti eboni (*Diospyros celebica*), spatodea, jati putih (*Gmelina sp.*), lamtoro gung dan tanaman rumput pada bagian yang terbuka merupakan tanaman hasil pengayaan yang dicanangkan dalam setiap 3 tahun. Hasil pertumbuhan jenis-jenis tanaman penyerta tergolong cukup adaptable.

Based on the results of research on the urban forest Jompi'e in the municipality of Pare-Pare, South Sulawesi province in accordance with the conditions and it is located belong to the coastal town forest. Approximately 87% of the area of the town of Pare-Pare is located at an altitude of 25 m above sea level, is located close to the beach, and the highest point of 500 m above sea level. Geological formations that form the structure of rocks, among other coastal alluvial deposits, gravel, sand, clay and limestone coral. Jompi'e urban forest is not made, the natural ecosystem and vegetation structure characterizes the coastal forest. The type and rate of strata growth of vegetation in it at the level of the top strata there are 15 species of trees that are from 13 families. Among the 13 families there are three families that enough to dominate the diversity of species that thrive in the town forest Jompi'e, namely family Sapindaceae, Sterculiaceae and Moraceae (*Table 1*). Type the highest level of mastery is the kind Bayur with IVI (Intensity of Value Impotance) reached 91.43%. Then in the stratum below it found five types of natural vegetation, species Paliasa male is a type of the highest levels of mastery, which is 102.78%. As the forest area that serves the preservation, recreation and aesthetics, form Jompi'e urban forests belong to the spread with lots stratum structure. This illustrates that the strata which formed a complete, are still largely composed of local species with tipekal (plant identifier) coastal forests, such as the type of pandan and langoting. Collection of native plant species such as some species of Ficus, which is supported by some of the physical facilities, such as swimming pool, shelter (resting place), camping ground, conference hall, drainage and footpaths that can reach every corner of the region. Being one of the objects of interest as a requirement in the award obtained Adipura Award for 6 consecutive years (2005-2010), which this year themed 'Clean and Green City'. Until now the urban forest Jompi'e be one source of drinking water for the town of Pare-Pare the North. In addition, in some parts of the region there are the types that are not local species, such as ebony (*Diospyros celebica*), spatodea, white teak (Gmelina sp.), Lamtoro gung and plant grass in the open is a plant-enriched envisioned in every 3 year. The result of the growth of comorbid types of plants is quite adaptable.

Table 1. The types of habitus shape and plants mainland in the urban forest covered plains at Jompi'e, Pare - Pare

Nu.	Local name	Botanical name	Family	Habitus shape
1.	Jekkong	*Eryglossum rubiginosum* (Roxb.) Blume	Sapindaceae	bush
2.	Campaga	*Elmerillia vrieseana* Dandy	Magnoliaceae	tree
3.	J a t i	*Tectona grandis* L.f	Verbenaceae	tree
4.	Kapok	*Ceiba petandra* Gaertn.	Bombacaceae	tree
5.	Baku-baku	*Mallotus phillipinensis* (Lam) Mull. Arg.	Euphorbiaceae	tree
6.	Gendi-gendi			grass
7.	Kesambi	*Schleichera oleosa* (Lour.) Oken	Sapindaceae	tree
8.	Kayu Jawa	*Lannea grandis*	Anacardiaceae	tree
9.	Kanunang	*Cordia dichotoma* Fost.f.	Boraginaceae	bush
10.	Marabulaeng	*Morinda tinctoria* Roxb	Rubiaceae	bush
11.	Paliasa laki	*Kleinhovia hospital* L.	Sterculiaceae	tree
13.	Mangga	*Mangifera indica* L.	Anacardiaceae	tree
14.	Jambu monyet	*Anacardium occidentale*	Anacardiaceae	tree
15.	A s a m	*Tamarindus indica* L.	Caesalpiniaceae	tree
16.	Johar	*Cassia siamea*	Caesalpiniaceae	tree
17.	Lamtoro gung	*Leucaena leucocephala* (Lam.) de Wit	Mimosaceae	tree
18.	Bayur	*Pterospermum celebicum* Miq	Sterculiaceae	tree
19.	Mata kucing	*Agathis spp.*		tree
20.	Dande			tree
21.	Langoting	*Barringtonia acutangula* (L.) Gaertn	Lecythidaceae	Tree
22.	Angsana	*Pterospermum indicus* Willd.	Sterculiaceae	Tree
23.	Kolasa	*Ficus sp.*	Moraceae	Tree
24.	Bali djedjer	*Arytera littoralis Bl.*	Sapindaceae	Tree
25.	Jambu soga	*Eugenia sp.*	Myrtaceae	Tree

Picture 1. Condition of Urban Forest Jompi'e natural structure and artificial conditions of the urban forest in the town of Pare-Pare

The next few types are some species as species native coastal forests as a REFERENCES for coastal urban forest, as coastal protection from abrasion, among others types Mangrove, Aviciena, Bruguiera and Nipah. While on the mainland cities covered forest Dead End Dondeng as an area located in Enrekang has topography undulating until hilly. Enrekang city located 235 km north of Makassar is in altitude, which is 47-3293 m d p l. Forms region varied topography, ranging from hilly, mountainous, valley and the river has no coast. In general topography is dominated by hills / mountains which is about 84.96% of the total area, while the flat is only 15.04%. The structure of the natural vegetation in the area of Dead End Dondeng, consisting of a kind lamtoro gung (*Leucaena leucocephala*), bitti (*Vitex cofasus*), local teak (*Tectona grandis*), kapok (*Ceiba petandra*), palm (*Arenga pinnata*) and bamboo parrin (*Gigantochloa atter*). Strata lot in this regard because of the type of lamtoro, bitti, palm and local identity have the same strata, but the protective function o each of the different types.

Table 2. The species of plants mainland in urban forest in coastline area and Intencity of Value Importance at Urban forest Jompi'e

Nu.	**Local namel**	**Botanical name**	**DR (%)**	**KR (%)**	**FR (%)**	**IVI (%)**
Trees stage						
1.	Angsana	*Pterospemum indicus*	75,33	50	50	100,75
2.	A s a m	*Tamarindus indica*	24,66	50	50	124,66
3.	Campaga	*Elmerillia vrieseana*	7,14	8,06	4,76	19,97
4.	Cermei		0,45	1,61	4,76	6,83
5.	Dande		6,15	1,61	4,76	12,52
6.	Ficus/Barana	*Ficus drupacea*	10,49	4,83	4,76	20,09

7.	J a t i	*Tectona grandis*	2,47	4,83	4,76	12,76
8.	Kapuk	*Ceiba petandra*	13,91	8,06	9,52	58,17
9.	K. Jawa	*Lannea grandis*	18,08	30,64	9,52	31,50
10.	Kolasa	*Ficus sp.*	4,43	9,67	9,52	58,17
11.	Langoting	*Barringtonia acutangula*	4,43	9,67	9,52	23,63
12.	Mangga	*Mangifera indica*	12,57	11,29	14,28	38,14
13.	Jambu monyet	*Anacardia occidentale*	0,82	1,61	4,76	7,20
14.	Paliasa	*Kleinhovia hospital*	1,40	1,61	4,76	7,78
15.	Bayur	*Pterospermum celebicum*	2,76	1,61	4,76	9,14
Poles stage						
1.	B a r u	*Mallotus philippinensis*	10,19	16,66	25	51,85
2.	Jambu soya		15,94	33,33	25	74,27
3.	Johar	*Schleichera oleosa*	21,18	33,33	25	79,51
4.	Bali nyenyer	*Arytera littoralis*	2,20	28,57	16,66	47,44
5.	Paliasa	*Kleinhovia hospital*	40,87	28,57	33,33	102,78
Saplings stage						
1.	J a t i	*Eryglossum rubiginosum*	19,29	41,66	16,66	77,62
2..	Baku-baku	*Mallotus phillipinensis*	12,44	8,33	16,66	37,44
3.	B a r u		21,68	16,66	16,66	55,02
4.	Bayur	*Pterospermum celebicum*	14,98	16,66	16,66	48,31
5.	Johar	*Schleichera oleosa*	19,73	8,33	16,66	44,74
6.	Mata kucing		11,85	8,33	16,66	36,85
Undergrowth stage						
1.	Bali nyenyer	*Arytera littoralis*				
2.	Jekkong	*Eryglossum rubiginosum*				
3.	Johar	*Schleichera oleosa*				
4.	Lamtoro gung	*Leucaena leucocephala*				
5.	Paliasa	*Kleinhovia hospital*				
6.	NN					

While on the mainland cities covered forest Buntu Dondeng as an area located in Enrekang has undulating, hilly. ± Enrekang city located 235 km north of Makassar is in altitude, which is 47-3293 m d p l. Forms region varied topography, ranging from hilly, mountainous, valley and the river has no coast. In general topography is dominated by hills / mountains which is about 84.96% of the total area, while the flat is only 15.04%. The structure of the natural vegetation in the area of Dead End Dondeng, consisting of a kind lamtoro gung (*Leucaena leucocephala*), bitti (*Vitex cofasus*), local teak (*Tectona grandis*), kapok *(Ceiba petandra*), palm (*Arenga pinnata*) and bamboo parrin (*Gigantochloa atter*). Strata lot in this regard because of the type of lamtoro, bitti, palm and local identity have the same strata, but the protective function of each of the different types.

In general, the urban forest Buntu Dondeng has a function as a conservation area. Wildlife includes the preservation of water resources, soil erosion, flooding and the latter is for the purpose of convenience and aesthetics for Enrekang city. Several types as types of native forest covered plains as a REFERENCES to cope with flooding, among others: *Artocarpus integra* (nangka), *Paraserianthes falcataria* (albizia/sengon), *Acasia vilosa, Indigofera galegoides, Dalbergia spp.* (sono), *Swietenia mahagoni* (mahoni), *Tectona grandis* (jati), *Samanea saman* (kihujan/trembesi) dan *Leucaena glauca* (lamtoro). And species such as *Casuarina equisetifolia* (cemara laut), *Ficus elastica* (ficus), *Hevea brasiliensis* (karet), *Garcinia mangostana* (manggis), *Lagerstroemia speciosa* (bungur), *Fragraea fragrans dan Cocos nucifera* (kelapa).

Some species as species native coastal forests as a REFERENCES for coastal urban forest, as coastal protection from abrasion, among others types Mangrove, Aviciena, Bruguiera and Nipah.

In another part of the city forest are naturally classified as forest land closed andes Dondeng city as a territory located in Enrekang has undulating, hilly. Enrekang city located 235 km north of Makassar is in altitude, which is 47-3293 m d p l. Forms region varied topography, ranging from hilly, mountainous, valley and the river has no coast. In general topography is dominated by hills / mountains which is about 84.96% of the total area, while the flat is only 15.04%. The structure of the natural vegetation in the area of Buntu Dondeng, consisting of a kind lamtoro gung (*Leucaena leucocephala*), bitti (*Vitex cofasus*), local teak (*Tectona grandis*), kapok (*Ceiba petandra),* palm (*Arenga pinnata*) and bamboo parrin (*Gigantochloa atter*). Strata lot in this regard because of the type of lamtoro, bitti, palm and local identity have the same strata, but the protective function of each of the different types (Table 3 and 4).

Table 3. The types of habitus shape and plants mainland in the urban forest covered plains at Buntu Dondeng, Enrekang District.

No.	**Nama lokal**	**Nama Ilmiah**	**Famili**	**Bentuk Habitus**
1.	Lamtoro gung	*Leucaena leucocephala* (Lam.) de Wit	Mimosaceae	Pohon
2.	Bitti	*Vitex cofasus* Reinw.	Verbenaceae	Pohon
3.	Jati lokal	*Tectona grandis* L.f	Verbenaceae	Pohon
4.	Kapuk	*Ceiba petandra* Gaertn.	Bombacaceae	Pohon
5.	Enau	*Arenga pinnata*	Arecaceae	Pohon
6.	Parring	*Gigantochloa atter*	Gramineae	Rumpun

Table 4. The types of species plants mainland cities covered and Intencity of Value Importance of the location Buntu Dondeng, Kab. Enrekang

Nu.	Local name	Botanical name	DR (%)	KR (%)	FR (%)	IVI (%)
Trees stage						
1.	J a t i	*Tectona grandis*	62,91	85,71	50	198,62
2.	Kapok	*Ceiba petandra*	14,93	7,14	25	47,07
3.	Aren	*Arenga pinnata*	22,16	7,14	25	54,30
Poles stage						
1.	J a t i	*Tectona grandis*	100	100	100	300
Saplings stage						
1.	J a t i	*Tectona grandis*	92,63	50	50	192,63
2.	Lamtoro gung	*Leucaena leucocephala*	1,47	25	25	51,47
3.	Bitti	*Vitex cofassus*	5,89	25	25	55,89
Undergrowth stage						
1.	J a t i	*Tectona grandis*		60	50	110
2.	Lamtoro gung	*Leucaena leucocephala*		40	90	130

CONCLUSION

Urban forests can provide comfort and enjoyment, development and construction of urban forest structure, with keanekaragam species of plants and the number of lots and well laid out. The structure of natural vegetation consists of the types of plants that have the ability to lock in accordance with the needs of the ecosystem in the forest habitat stratified city lots (naturally) the most effective in tackling environmental problems in particular micro-climate city. A stratified urban forest provides many surrounding environment is relatively more comfortable than the stratified two, and in the forest we will feel more comfortable environment than the outside of the forest. Importance of plant species typical of the forest area so the city will have specific features and benefits, especially for local community and residents around the forest. Beside that, the types can natively as an icon or mascot for a region.

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Evaluation of Cost Components to Calculation K Index of Pricing Fresh Fruit Bunch (Ffb) Under the Government Regulation (A Case Study)

Muhammad Hudaya, Nur Fatiah, Rawintan Endas Binti, Rifqi Novriyan Dana, Dahniar, Rasidah dan Rano Wijaya

Faculty Of Economics And Business, Lambung Mangkurat University Banjarmasin, Indonesia

E-mail : rnovriyandana@unlam.ac.id

ABSTRACT

This study originated from thinking and growing concerns of researchers associated to the low purchase price of TBS Oil Palm Planters / Smallholders by Big Private Companies in South Kalimantan. This study aimed to evaluate the cost components included in the calculation of TBS Palm Oil which is reviewed by the cost components forming the K index is based on Regulation of 14 / Permentan / OT / .140 / 2/2013.

Methods of data collection (1) The field research, (2) research literature and data collection are qualitative and quantitative. Data analysis techniques: (1) to analyze the components of the costs forming the K index established by the Government of South Kalimantan by Permentan No. 14 / Permentan / OT.140 / 2/2013 and (2) review the results of the analysis, and then interpret based on the principle of cost accounting in the calculation of production price of FFB.

Based on the research results in the K index increase each month just 0.05%. based on the findings it is known that the entire cost components forming the index K is comprised of the cost component processing, component depreciation costs, component costs transporting palm oil to the port, component cost of transporting palm kernel to the port, a component of marketing costs of palm oil, and components of marketing costs palm kernel , the result is approximately more than 50% of a sample of 10 companies that issued the financing are higher than the weighted average cost of each component in these fees. consequently K index has increased very low, resulting in the purchase price of FFB to Planters / Smallholders become incompatible expectations or low purchase price.

Based on the calculation of the South Kalimantan government found that there are significant differences. Calculation of oil palm fresh fruit bunches by the Provincial Government of South Kalimantan comparison between the price of fresh fruit bunches production cost and the selling price of FFB, the benefits obtained by Planters / Farmer oil by 18% / Kg FFB. However, if calculated based on cost accounting theory the actual benefit received by growers / smallholders only 9% / Kg FFB.

Keywords: costs component, the price of FFB, K index, Government Regulation

INTRODUCTION

The potential of the agricultural sector is owned by Indonesia is very large, for South Kalimantan, and the plantation sub-sector is one of the huge potential possessed this area. It is characterized by the many plantations which is located in this area either owned by the people, the state (SOEs) and private national and foreign (FDI and domestic investment). Of the various types of plantations managed by the people in South Kalimantan, oil palm commodity is the most dominant after commodity rubber.

South Kalimantan is part of the island of Borneo which has the potential of natural resources are abundant, where the main economic activity possessed divided into several, namely:

1. Oil and Gas
2. Coal
3. Palm Oil
4. Steel
5. Wood

The area of oil palm plantations in South Kalimantan is growing rapidly, as well as the production and export of palm oil. Oil palm plantation area increased from year to year, the following picture of the distribution of oil palm plantations Indonesia:

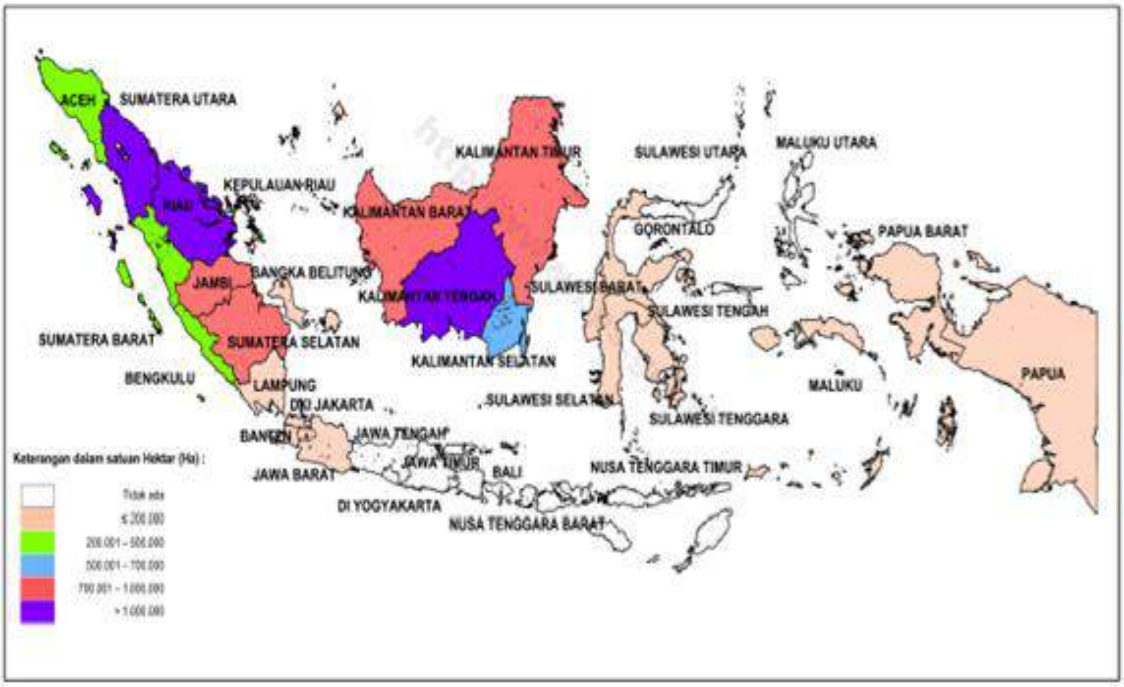

Figure 1. Distribution Map of the Indonesian Palm Oil

In 2015 the total area of oil palm area reached 10.9 million hectares with a production of 29.3 million tons of CPO. Oil and gas acreage by status belongs to the people (Plantations) covering an area of 4.55 million hectares or 41.55% of the total area, the state-owned (PTPN) covering an area of 0.75 million ha, or 6.83% of the total area, private property covering an area of 5.66 million ha, or 51.62%, private divided into two (2) that foreign private area of 0.17 million ha, or 1.54% and the rest local. Distribution of palm oil by province in Indonesia 2015:

Table 1. Distribution of Palm Oil by Province in Indonesia in 2015

No	Province	Area	Production
1	Riau	2.296.849	7.037.636
2	Semutera Utara	1.392.532	4.753.488
3	Kalimantan Tengah	1.156.653	3.312.408
4	Sumatera Selatan	1.111.050	2.852.988
5	Kalimantan Barat	959.226	1.898.871
6	Kalimantan Timur	856.091	1.599.895
7	Jambi	688.810	1.857.260
8	Kalimantan Selatan	499.873	1.316.224
9	Aceh	413.873	853.855
10	Sumatera Barat	381.754	1.082.823
11	Bengkulu	304.339	833.410
12	Kep. Bangka Belitung	211.237	538.724
13	Lampung	165.251	447.978
14	Sulawesi Tengah	147.757	259.361
15	Sulawesi Barat	101.001	300.396
	Jumlah	10.956.231	29.344.479

Source : Ditjen Perkebunan, 2016.

In 2015 also, if viewed from land development businesses large oil palm plantations, consisting of: (1) leasehold area of 346 931 ha, (2) Permission Area (Process HGU) covering an area of 152 942 hectares. There are 10 companies / oil palm plantations in operation South Kalimantan.

In development in Indonesia especially South Kalimantan until 2015 oil palm plantation area reached 499 873 hectares and this value increases over time, more and more people began to look at business in oil palm plantations. Therefore it is the government continue to make efforts to improve the development of the pattern of palm oil plantations are still not considered appropriate in handling.

"Especially for the smallholder, the main objective of development is to raise the dignity of life of farmers and their families by increasing production and farm income through the development of gardens. Another aim wider namely community development planters who are self-employed, peace and harmony with its environment, and embodies a blend of business are supported by a business system by combining a variety of activities production, processing and marketing of products using large estates as a core in a mutually beneficial cooperation "[Mulyana, 2009].

Efforts enhancements are intended to provide protection in the acquisition price is reasonable fruit bunches production planters, and avoid unhealthy competition among mills, increase social welfare estates as well as improving resource yield oil palm plantations in the region of South Kalimantan.

However, in the field obtained information that has been going on things that do not correspond with the expected goals. One problem that is contested is the pricing of fresh fruit bunches (FFB). To provide protection in the acquisition price of FFB production of farmers were reasonable and avoid unhealthy competition among mills (MCC), has led to the relevant technical department and the government in some areas of direct intervention.

The previous study that supports the information from the field at the top, was carried out by researchers [Fatiah, 2002] at an agribusiness company in South Kalimantan show that most companies agribusiness obtain economic value added (economic value added) are constantly increasing, this is evidenced by the increase in corporate profits every year. Value profit obtained were then reduced by the cost of capital to produce value added economy so that growth is always positive value of the company is getting better. In addition the study [Fatiah, 2016] states that the calculation of the cost of production of fresh fruit bunches (FFB) by the farmer covers the costs of preoperative, operating costs during the harvest (after crop yield) as maintenance costs of land, fertilizer costs, and freight, while labor costs direct should be a key component in the calculation of the cost of production. Both of these studies show the costs are taken into account in the formation of FFB price is very important in determining the price farmers FFB.

Literature

Cost

An understanding of the costs important because the application of appropriate charges can be used to assist in the planning, control, and economic decision-making.

"The cost is divided into two, namely fees and costs in a broad sense in the strict sense. In a broader sense is the cost of sacrifice of economic resources is measured in units of money that has occurred and is likely to occur for a particular purpose. Meanwhile, in a narrow sense, the cost is defined as the sacrifice of economic resources to acquire assets.

[Mulyadi. 2007].

From the above understanding can be concluded that the costs as a sacrifice on the economic resources to get something or achieve certain goals that are beneficial at this time or in the future (income).

Classification of Costs

According to [Mulyadi. 2007] there are several ways classification of costs that are often performed, among others classification costs on the basis of the principal function within the company. In manufacturing companies there are three main functions, namely the function of production, marketing functions, and general and administrative functions. Therefore, in a manufacturing company, the cost can be classified into three groups, namely:

1. Production Costs

The production costs are the costs incurred for processing raw materials into finished products ready for sale. This fee includes the cost of raw materials, labor costs and costs overhead factory. The cost of raw materials are processed in the production process. Direct labor costs are labor costs that can be identified directly to a specific product. While manufacturing overhead is the cost of production in addition to the cost of materials and direct labor costs.

2. Marketing Costs

Marketing costs represent costs incurred for product marketing activities, for example, is the cost of advertising, promotional fees, travel expenses, salary costs of marketing managers and others.

3. General and Administrative Costs

A charge to coordinate the activities of production and sales activities. Examples of these costs is the cost of the phone, the cost of office equipment, and others.

Cost of Production

Cost of production or cost of products is an essential element for assessing the success (performance) of a trading company and manufacturing. Elements of cost of production consists of raw material costs, direct labor costs and factory overhead costs.

According to [Hansen, 2000], "Cost of production is the amount of cost of goods that were completed during the period. Fees are only charged for goods that were completed are the production costs of direct materials, direct labor and overhead costs ".

Benefits of the cost of production according to information [Mulyadi. 2007]: 1. Determine the selling price of the product, 2. Monitoring the realization of the production cost, 3. Calculate the periodic income, 4. Determining the cost of inventories of finished products and products in the process presented in the balance sheet.

Pricing System of Fresh Fruit Bunches (FFB) of oil palm

Some form of regulations issued by the government of which is Permentan 395 / Kpts / OT.140 / 11/2005 on Guidelines for Determination of Purchase Price of oil palm fresh fruit bunches production planters. The scope of this regulation includes the purchase price formula

FFB, coaching and sanctions. This regulation is intended as a legal basis for local government in the implementation of the purchase of fresh fruit bunches (FFB) production of oil palm farmers [The Ministry of Agriculture of the Republic of Indonesia, 2005].

FFB determining the selling price is determined by the Pricing System of Fresh Fruit Bunches (FFB) of oil palm are made based Permentan above, as amended by Regulation of the Minister of Agriculture No. 14 / Permentan / OT.140 / 2/2013, concerning Guidelines for Determination of Purchase Price Fresh Fruit bunches (FFB) of oil palm planters production [Departemen of Agriculture of the Republic of Indonesia, 2013].

The FFB Purchase Price formula is:

Price FFB = K {Hms x Rms + His x Ris}

with the understanding**:**

Price FFB	:	FFB price received by growers at the factory level, expressed in US $/ Kg
K	:	index shows the proportion of the share received by planters, expressed as a percentage (%);
Hms	:	price crude palm oil (CPO) sales weighted exports (FOB) and the respective local companies in the previous period, expressed in US $ / Kg;
Rms	:	The yield of crude palm oil (CPO), expressed as a percentage (%);
His	:	price of palm kernel (PK) Weighted realization of export sales (FOB) and the respective local companies in the previous period, expressed in US $ / Kg;
Ris	:	The yield of palm kernel (PK), expressed as a percentage (%).

FFB purchase price is set at less than 1 (one) time each month based on real price weighted average crude palm oil (Crude Palm Oil / CPO) and palm kernel (Palm Kernel / PK) correspond to sales of export (FOB) and the respective local each company. The purchase price is the price Franco FFB palm oil mills.

The magnitude of the index "K" is set at less than 1 (one) time each month by the Governor in the implementation is done by the Head Plantation on behalf of the Governor based on the proposed Team Pricing Purchase fruit bunches that involves the representation of elements of provincial and local governments, relevant government institutions, envoy Farmers Institutional and Corporate Partners.

Technical conditions accompanying formula these prices include: procedures for harvesting, sorting, transport, determination of the weight FFB, sanctions, incentives, purchases and payments, calculation of the Index as well as the magnitude of the yield of crude palm oil (OER = Oil Extraction Ratio) and palm kernel (KER = Kernel Extraction Ratio).

K index, according to Indonesian government policies is the index percentage covered by the planters. The K index contains eight (8) types of fees namely;

1. General costs at the plant and waste treatment costs
2. Salaries and allowances for plant and non-plant staff
3. Direct costs include (equipment and small tools, chemicals and equipment for processing, materials and analysis tools, fuels and lubricants, lighting and water and transport in the plant (forklift)
4. Maintenance regarding maintenance of plant machinery, machine maintenance, installation and other maintenance.
5. Marketing which includes (lease storage tanks, pumping crude palm oil, the production of goods insurance, bank fees, freight from the factory to the port, as well as analysis and certificates).
6. Transport to port from the factory
7. depreciation of plant
8. The operational costs are not directly in the form; cost of money (interest and bank charges, insurance, security remittances), depreciation loss of CPO in the transport, the cost for the Team Pricing FFB, overhead smallholdings.

MATERIALS AND METHODS

Research design

This study design included qualitative descriptive study focuses on identifying activities cost components and the means and processes of pricing of fresh fruit bunches (FFB) by the government.

Method of collecting data

Methods of data collection in this study consisted of: (1) The research literature / documentary (library research) and (2) Research field (field research), through observation and interviews (observation) in the pricing process FFB by the Provincial Government of South Kalimantan.

Data analysis method

The research data collected in this study is qualitative and quantitative. Data were analyzed by means of: (1) to analyze the components of the costs forming the K index set Government Province based Permentan 14 / Permentan / OT.140 / 2/2013 (2) to analyze the causes of in-efficiency is calculated by a partner company palm and (3) review the results of the analysis, and then interpret by rules of cost accounting in the calculation of the price of FFB production.

Population and Sample

The study population was South Kalimantan government, particularly the technical agencies namely the Department of Plantations along with parties related to the pricing process FFB. Determining an object of this research uses consider the deliberations of the researchers themselves, in order to obtain the accuracy and adequacy of the information required in accordance with the purpose or the problem assessed. Determination of the object of research by objective, is "selecting information-rich cases to be studied in depth" [McMillan,2001].

This is understandable because of the strength of qualitative research lies in the wealth of information held by the respondent, of the cases studied, and analytical capabilities of researchers. So sampling in qualitative research adapted to the purpose of research, the problem of research, data collection techniques, and presence information-rich cases (or the adequacy of the information obtained).

Based on the description above, the sampling method in this study is based on the objective (judgment / purposive sampling), and the consideration or the criteria used as a condition to be taken as the sample is:

1. Large Private Companies (PBS) following Team meeting Pricing FFB at Plantation Office of South Kalimantan Province.
2. Large Private Companies (PBS) is a member of the Indonesian Palm Oil Association (GAPKI)

RESULTS AND DISCUSSION

Palm oil products is one of the mainstay export Indonesia experienced a significant price increase. Palm oil prices have historically continues to rise. The increase in the price of crude palm oil (CPO, crude palm oil) have also jacked up the price of oil palm fruit (FFB, fresh fruit bunches). The oil palm farmers to benefit from selling oil palm fruit to the factories processing palm fruits into CPO. Therefore, the price of FFB is one of the important indicators that can affect the supply of oil palm farmers [Maruli, 2014].

However, the pricing policy FFB purchase has not been effectively implemented in all regions manufacturer and still have a shortage of some aspects, on which basis it was issued to Regulation No.14 / Permentan / OT.140 / 2/2013 consummation of the Regulation of 395 / Kpts / OT.140 / 11/2005 on guidelines for the establishment of oil palm FFB prices. The scope of this regulation includes the purchase price formula FFB, coaching and sanctions that have been perfected.

The purpose of the regulation reform is the achievement of a balanced position in the formation of the cost of production of FFB. But still there are significant differences between the prices received by farmers with the people that have been set by the government. This was triggered by the consequent weakening of the price of crude palm oil (CPO) so as to make smallholder farmers in certain regions FFB sell below cost price. You can imagine how many losses borne by the planters.

Various factors influence the formation of FFB price, i.e. the price of CPO and core. In addition to the benchmark price of CPO and core are determined by the government, there is still a core value and a CPO yield that determines the price of FFB. The quality and the yield is determined by the type of seed, plant age and quality of the harvest [Hakim,2004].

Policies regarding the price, for example, the price of FFB, a government authority is derived in the form of regulations and decisions of the competent authorities, such as the ministerial decree (PERMENTAN) or officer (SK) which is authorized for it. Wisdom was taken with the aim to protect farmers and stabilize the economy [Commission Supervision of Business Competition, 2010].

The purpose of setting the price of FFB via Permentan No. 14 / Permentan / OT.140 / 2/2013 Annex 1 is "to provide protection for a reasonable acquisition price of oil palm FFB production of farmers and avoid unhealthy competition among palm oil mills. Article 4 to Regulation No. 14 stipulates that planters sold all fresh fruit bunches to the company and the company bought a whole bunch of fresh fruit to be processed and marketed in accordance with the cooperation agreement. "

Article 5 states that the purchase price of fresh fruit bunches by the company based on the formula of the purchase price of fresh fruit bunches, which contains a variable proportion of the index (in%) showing the portion received by planters (expressed in notation K)

Knowing the issue price of FFB production of farmers, it is necessary to study the factors that influence the discretion of the purchase price of FFB among other factors K, the price of CPO and Kernel, CPO yield and core as well as based on an estimate of working capital credit, seed varieties, plant age, and quality of the harvest. These factors affect the price formation FFB.

FFB price values are formed based on the calculation in the field and policy-based FFB purchase price formula. If the value of the price of FFB based on the calculation in the field according to the value of the policy is based on the formula for FFB purchase price, then the price level did not differ (already relatively high). And if the value of the price of FFB based on the calculation in the field does not match the value of policy-based price formula FFB purchase price, it is necessary to know the cause of the problem.

Calculation of Purchase Price FFB According to Government Regulation (SK Permentan)

Table 2. Calculation of Purchase Price FFB 2016

No	Month	Index K	CPO Price	IS Price	FFB Price
1	January	85,99	6.047,38	3.802,80	1315
2	February	85,92	6.161,99	4.337,45	1359
3	March	86,73	7.082,17	4.486,97	1554
4	April	86,13	7.175,47	5.443,80	1604
5	May	86,46	8.174,41	6.503,80	1847
6	June	86,23	8.255,96	6.426,28	1854

Source: Disbun reprocessed

Within six months, the average CPO price increase of 5.51%; Kernel Oil 9.52%, 0.05% K index and FFB price 6.07%. Although FFB prices rose due to higher CPO and Palm Kernel Oil price increases, but the increase in the index K is very small. This indicates a rise in the cost elements forming (index K) issued by the company was not efficient.

Cost Components That Counts According to Government Regulation (SK Permentan)

The results of the study (recapitulation cost components forming the K index) indicates the inefficiency costs in the oil palm company. This can be explained in the following table:

Table 3. Summary of Cost Components Company (Sample) Forming the K index Month October 2016

No	Part of Cost	Under Average	Out Layer	Over Average	CONCLUSION
1	Processing fees	40	10	50	In efisien
2	Cost of depreciation	40	10	50	In efisien
3	Transportation costs CPO All Ports	40	10	50	In efisien
4	Transportation costs PK Into Port	40	10	50	In efisien
5	CPO Marketing Costs	30	10	60	In efisien
6	PK Marketing Costs	20	0	80	In efisien
	Average	35	8	57	In efisien

Source: Processed

Based on Table 3 above, of the 10 companies sampled only 35% of companies are imposing costs below average costs weighted into cost elements, the outcome of which will form the numbers in the index K, and the remaining 57% of the company, the costs are above weighted average, this will cause the numbers obtained in the K index will be lower. Consequently palm FFB price set by the government to be low, and will cause the farmer / grower cannot enjoy optimal benefits.4.3. Comparison of Cost of Production And Sales Price FFB

Comparison of the cost of FFB with a selling price based on government regulations and company policies and difference. Comparison of the cost and selling price of the tabulated. As for the comparison between the cost price and selling price Oil FFB can be described as follows:

Table 4. Comparison of the Counts Selling Price FFB Planting Age 10 years

Description	Period	Cost of Production (HPP) FFB		Selling prices FFB	
		Theory	Farmer	Farmers Offer Price	Government (SK Governor)
Price of FFB (Rp/Kg)	January	1.756,50	1.341,73	2.037,52	1315
	February	1.756,50	1.341,73	2.040,50	1359
	March	1.756,50	1.341,73	2.131,80	1554
	April	1.756,50	1.341,73	2.214,30	1604
	May	1.756,50	1.341,73	2.180,20	1847
	June	1.756,50	1.341,73	2.024,00	1854

Source: Disbun reprocessed

Based on Table 4 above comparison calculation of the cost of production of farmers FFB if calculated based on the theory shows that farmers count the HPP is lower, because the farmer does not include the cost of salaries and wages. Therefore when comparing HPP farmers and the FFB price determined by the government as if the average farmer profit Rp247 / kg (18%). But if the farmer HPP is calculated based on the theory of calculating the cost of the average profit of farmers per month amounted to only Rp 168 / kg (9.5%). The above condition shows how to calculate the farmers as if profit is sufficient (18%) per kg, whereas if it is based on cost accounting theory, benefit farmers is only an average of 9% / kg. Though based on the offer price average farmer Rp2.105 / kg where the advantage reached 43%.

Review Pricing FFB

The above calculation (Table 10) showed a very weak bargaining position of farmers because they take for granted the price set by the government. A weak bargaining position is also caused by FFB farmers cannot hold much longer, because the quality of the FFB very vulnerable to loss of quality, if not immediately sold within 2x24 hours. It is also caused by some kind of bond and bank loan installment of a contract with the company's core.

The entire cost components included into the price calculation formula FFB is the cost incurred by the company. In a meeting of pricing FFB farmers do not bring their cost calculations. They are also less active correcting costs the companies presented in the meeting pricing FFB. Thus the calculation of the FFB at the time a meeting is one-sided information from the company.

When the researchers followed a meeting of pricing FFB farmer representatives in attendance are generally not independent farmers. They are the investors who are not local people. These investors generally are the owners of capital the size of land of more than 10 ha even in the hundreds. Proceeds from sales of FFB can fulfill their various needs even excessive. Because the pricing for FFB does not matter for them. It is certainly different from the independent farmers who have land area much smaller which is dependent solely on the results of an oil palm plantation which covers less than 10 hectares.

Although in calculating the average formula purchase price of FFB prices and the cost difference is very high (out layer) were not included in the calculation of average, but look at the cost per unit of each company vary widely so it indicates that it is not efficient by the company. Components of costs and prices in the purchase price formula derived from the company's FFB greatly affect the index K. The greater the average cost and the lower the price the less CPO index K. Under these conditions, namely the occurrence of asymmetric information and a weak bargaining position so as not fulfilled win-win solution for farmers / gardeners.

CONCLUSION

1. The calculation of FFB by oil palm growers are not based on the rules of calculation of the cost of production in cost accounting. The selling price of FFB by farmers is not based on the cost of production. FFB purchase price by the company which is calculated based on the Regulation of the Minister of Agriculture No. 14 / Permentan /OT.140 / 2/2013.
2. How FFB purchase price calculation based on the Minister of Agriculture No. 14 / Permentan /OT.140 / 2/2013 wear costs the company to produce CPO and PK, resulting in asymmetric information and the weak bargaining position of farmers.
3. The cost component that goes into the K index components should be made standard calculation reasonable cost, so there is a win-win solution in partnerships between companies and farmers / oil palm planters.

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Contribution Subsector Forestry To Domestic Product Gross Based Environmental Values

Jumri

Departement of Forestry, Faculty Agriculture Palangkaraya University, Palangkaraya Indonesia
Tel: 0536-3227864 / HP. No .: 0811526157

Email: jumridulamin@yahoo.co.id

ABSTRACT

West Kotawaringin presence in Central Kalimantan province which lies on the equator is at $1^0$19' to $3^0$36' South latitude and $110^0$25' to $112^0$50' east longitude. Administratively geographical location bordered by the Kotawaringin Barat District, north Regency Lamandau, south bordering the Java Sea, the east by Seruyan regency and the west bordering the Sukamara. District of Kotawaringin West Central Kalimantan province, geographically has area 10.759 Km^2 area. Forest in western part District of Kotawa- ringin has a very large role to local revenues. Its contribution to the GDP in 2006-2012 reached Rp. 94,33 billion per year equivalent to 2,40% of the total value of PRDB. The research objective was to analyze the contribution of the forestry sub sector by including the economic value of the environment into regional gross domestic product. The methodology used in the research are: a) interview, b) observation / field surveys and c) collecting the documentation (supporting data). Research results show that the contribution of the use of forest resources taking into account the economic value of the environment to GDP reached sebesar 19,61% or Rp.1,23 trillion in 2012.

Keywords: Contributions, Environmental Values, the GDP

INTRODUCTION

In accordance with article 1, paragraph 2 of the law of the Republic of Indonesia 41 of 1999, the forest is an ecosystem unity in the form of landscape biological natural resources dominated by trees in their natural environment, with the other one can not be separated. IBSAP (2003), states that Indonesia included into countries with high biodiversity means that the Indonesian jungle discovered many species of flora and fauna, and was ranked the third in the world after Brazil and Columbia. Indonesia has biodiversity include 515 species of mammals (12% of the world's mammals), reftilia 511 types (7.3% of the world reftilia types), 1,513 types of birds (17% of the world's bird species), 270 species of amphibians, animals do not reinforced 2,827 species and 38,000 plant species. Based on the functions of forests (conservation function, various protection functions and production functions), it should be understood that the forest has a very unique role because of its exceptional ability to meet the needs of humans and other living creatures on earth. In this case the existence of forest should be maintained in order to be able to function so that the forest can be maintained the balance of the forest ecosystem itself. Indonesia has forest resources that have outstanding role, and is not limited and can be updated by way of replanting the forest stand. Therefore we need wisdom in the management of forest resources including through savings on the use of timber forest resources and discipline in utilization. Indonesia's forest management for 32 years (1,968-2,000), there has been a waste of forest resources Indonesia despite the pretext of national income, but on the other hand also left a new problem for Indonesia are increasing critical lands into forests which of course require serious treatment. Viewed from an economic perspective, forests can produce wood, rattan, resin, medicines and other forest products. In addition, the forest as the provision of direct services that can be enjoyed by a man like recreation as a place to relieve boredom in life, where hunting as a source of animal protein, water regulation for water to be obtained throughout the year, flood prevention means forest to absorb the water content came from the sky/rain, erosion means that they can reduce the rate or amount of shift in the ground as a result of surface water runoff and sedimentation means good forest will reduce the attrition rate so that shifting soil surface can be reduced/prevented, flora and fauna means that forests are a place where plants and animals that were once forest and can serve as a source of feed for animals. The research objective was to analyze the contribution of the forestry subsector by including the economic value of the environment into regional gross domestic product.

MATERIALS AND METHODS

The research was carried on in west Kotawaringin province of Central Kalimantan for 3 (three) months, the month of March to May 2012. The material used in this study were: 1. Secondary data taken from local BPS office is in the form of data values forestry subsector contributes to the gross regional domestic product (PDRB) and 2. Map location of the research work is accompanied by field research work chart, compass, measuring books and 1 (one) field work teams that consist of 7 (seven) people. Method research is: 1. Record all data generated by the forestry sub-sectors contained in the local BPS offices. 2. Take note of all the elements of the forest environment including plants under/seedling timber and non-timber products, wildlife, climate, river water conditions. Data analysis tools used are:

1. Calculate the contribution of resource utilization of forest products by incor- porating environmental economic value (NEL) forestry sub-sector to the GDP. The calculations are done using the following formula:

   Value contribution SDH+NEL = (Total value Total Contributions subsector Forestry+NEL)IDR
   Where:

   a. The value of the contribution of forest resources (SDH) is the value of the contribution that the utilization of forest resources (timber, non-timber and industrial) with respect to an increase in PDRB.
   b. The total value of economic environment (NEL) is the total value given to elements of the forest environment includes the value of the air, water value, the value of animals and plants of commercial value contained in the forest.

2. Calculation (valuation) the economic value of the environment, conducted with an approach impacts that occur due to changes in environmental order and deforested land in the study area covering 4,290 hectares. Losses from its economic value is calculated as follows:

   a. Damage to flora/plant (Q1), the formula used: Q1 = pp x P (IDR).
   b. Changes in the color of the water (Q2). the formula used: Q2 = va x pb (IDR).
   c. Changes in the frequency of shipping (Q3), the formula used: Q3 = PFP x tr (IDR).
   d. Reducing the catch of respondents (Q4). the formula used: Q4 = ppi x Pi (IDR).
   e. Extinct/migration of animals (Q5), the formula used: Q5. Sp x Ps (IDR).
   f. Changes in air temperature (Q6), the formula used: Q6 = Q x Pu (IDR).

   Where:

   a. Q1: The economic value of the damaged plants/off (IDR)
      pp: the number of plants were dead/damaged
      P: price of plants according to the local market price (IDR)
   b. Q2: The cost of producing clean water taps (IDR/M^3)
      va: total volume of raw water taps for a year (M^3).
      pb: changes in production costs per M^3
   c. Q3: The value of the cruise frequency changes during the year (IDR)
      pfp: frequency cruise for a year (trip)
      tr: cruise fare per passenger (IDR)
   d. Q4: The value of the catch year (IDR)
      ppi: The decline in the catch during the year (tonnes).
      Pi: price of fish / kg (IDR)
   e. Q5: The value of wildlife loss / migration during the year (IDR)
      Sp: the number of animals lost / migration during the year (tail)

Ps: animals according to the market price (IDR)

f. Q6: Value changes in air temperature (IDR)
Q: the amount of land area degraded over the year (ha)
Pu: The value of air that degraded hectare (IDR).

RESULTS AND DISCUSSION

Results of research conducted by calculating the forestry subsector contributes great value to incorporate the environment into economic value of regional gross domestic product (GDP), are presented in Table 1.

Table 1. Contributions Subsector Forestry Noting Economic Values Against Environment PDRB

No	Description	Contribution	
		Value (IDR)	(%)
1	PDRB of West Kotawaringin in 2011 (data BPS)	5,129,157,960,000	-
2	PDRB forestry sub-sector (BPS data)	86,946,370,000	1.70
3	Values Environmental Economics	932,436,883,910	15.60
4	Contribution of the forestry sub-sector with due regard to environmental economic value	1,019,383,253,910	16.81

Table 1 shows the value of sub-sector contribution to the environmental values is greater than the contribution of the forestry sub sector as well as the economic value of the environment. The value of the contribution resulting from the forestry subsector with environmental values obtained a total score of 16.81% of total GDP, or by IDR.1.20 trillion. The value of these contributions, in the context of economic development that the forest is one of the basic capital in the construction, because of Indonesia's natural forests as timber since the New Order era until now has contributed a lot in the constructor of the Indonesian economy.

In the context of the utilization of the forest resources are many things missing from the thinking of many people, some people think is confined to the timber, while the value of the environmental elements that contain economic values eg plant medicines and other non-timber products forgotten. Therefore, assessment of forest products is not only focused on the wood alone, but the environmental elements of the forest itself that must be considered and taken into account appropriately economically.

Contribution of forest resources and the economic value of the environment on the gross regional domestic product (PDRB) forestry subsector is the added value provided by the forest resources to the development of a region. Nationally forestry subsector contribution to gross domestic product (GDP) for 2,004 to 2,012 last year reached an average of 0.81% (= IDR.38,84 trillion) of total Indonesian GDP, amounting IDR.5,003 trillion. While the agricultural sector broadly, forestry subsector to contribute an annual average of 5.68% of average total agriculture of IDR.723.29 tilyun. That is the role of the forestry subsector also determine the economic development of a region or country. The small contribution of the forestry sub sector to GDP above, due to the acquisition value derived from the forestry sub sector is only counted from primary commodities such as timber, rattan and other forestry services. Calculation based on the value of contributions above major contributory value of reforestation funds (DR = US. \$. 16 per M^3) plus the value of contributions provision of forest resources (PSDH = IDR.60,000 per M^3) amounted to IDR.220,000 per M^3 logs. The research conducted by the authors of the calculation of the value of forest products (NPH) is done with the approach of the theory of economic rent using a formula NPH = {(P-BP) IDR} 0.7, where P is the price of forest products timber and non-timber (IDR), BP is the amount of the production cost of the operational costs and labor costs (IDR) and 0.7 is the number of constants that percentage is calculated after deducting the profit fair company (30%), showed a significant result compared with the calculation of the use of funds reboasasi (DR) and provision of forest resources (PSDH). In the event of exploitation of forest resources in excess would have posed new problems for the environment and human life. Therefore, it is necessary to find the best solution in a forest a forest management system in order to perform its function as a production function, the function of protection and conservation functions. One way to stay awake and sustainable forests, we need to make forest management system with TPTI system is complete and correct and as a legal basis was Law 41 of 1999 on Forestry.

CONCLUSION

Conclusion

From the results of research conducted in West Kotawaringin Central Kalimantan Province, we concluded that the contribution of the forestry sub-sector by including the economic value of the environment into regional gross domestic product (GDP) reached 16.81% of the total value of GDP or of IDR.1.20 trillion .

Suggestions

Referring to the results of research conducted in West Kotawaringin recommended that:

1. Development of forestry Indonesia legally should refer to the Law of the Republic of Indonesia Number. 41 Year 1999 on Forestry. Act, the main REFERENCES in the management of the forestry and aims to guarantee the existence of the forest, the optimization of various functions of forests as well as the distribution of benefits in a fair and sustainable. Therefore, all the rules below it must not conflict with existing law on it. Such harmonization can assist in the implementation of sustainable forest management and economic and ecological perspective can be guaranteed.
2. In calculating the value of the forestry sub-sector contribution to the magnitude of the value of regional gross domestic product, that element of the forest environment are taken into account economically. This means that we can not separate between forests and the environment, because it is a unity in forest ecosystems.

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Negative Impact Toward Deforestation Economic Value of Forest Plant

Sari Mayawati

Forestry Department, Faculty of Agriculture,Palangkaraya University, Palangkaraya Indonesia
Tel: 0536-3227864 / HP. No .: 0811526157

Email : mayajumri@yahoo.co.id

ABSTRACT

Law Number. 41 Year 1999, article 1, paragraph 2 states that the forest is an ecosystem in the form of a field is vast tracts of land containing natural resources typically dominated by trees of timber and non timber in a natural environment, one was with the other can not be separated, By this Decree efforts to achieve the goal of sustainable forest management, required the implementation of logging that based on the concept of sustainability. This is to ensure that its implementation does not cause loss of logging is both money and not in the form of money for the quality and quantity of plant forest timber and non timber products in the future. The purpose of this study is to analyze the economic value of forest plants such as timber and non timber is missing or dead due to the implementation of logging. The research methodology used is by making a boxed track as many as 100 plots with a total area of 4 hectares observations. The results obtained by the amount of the value of crops is missing / dead and has economic value in the form of timber and non timber Rp. 148.698.916,-

Keywords: Negative Impacts, Logging, Crop Value

INTRODUCTION

Sustainable forest management should be guided by the Law of the Republic of Indonesia Number 41 Year 1999 on Forestry. Efforts to reach the goal of sustainable forest management, the necessary steps as follows: 1) implement a system of selective planting Indonesia (TPTI) complete and correct, 2) carry out the fight against their illegal logging activities, 3) implement countermeasures against the forest fires, 4) the rehabilitation of forest and critical land, 5) conducting reboasasi inside and outside the state forest and 6) centralized in forestry. The principle contained in the sustainable forest management is a priority to the sustainability of forest resources and to benefit economically, socially and culturally. To get the goal of sustainable forest management action needs to fully silvicultural systems and sustainable so that the principles of sustainable forest management can be realized. Based on the principles and goal of the forest management, the "sustainable forest" can be defined as a forest can produce volume increment that can be exploited without damaging the forest and the balance of natural ecosystems". Management of forest resources in Indonesia in an effort to achieve forest conservation and sustainable development have been implemented. But in reality until the present moment there are still many shortcomings in its management, which resulted in a setback both the quantity and quality of the forest resource itself. Thus causing environmental damage such as the loss of species is a producer of bioactive substances, oils and fats, secondary metabolic economic value, floods and reduce the ability of forests to tackle the air pollution.

More law number. 41 Year 1999, article 1, paragraph 2 states that the forest is a whole ecosystem in the form of a field of vast tracts of land containing natural resources dominated by trees of timber and non-timber in a natural environment, one with the other can not be separated. Indonesia has a natural forest area of approximately 126.8 million hectares of forest area are included in the production area that can be called by the production forest, which is an area of 57.2 million hectares, which is a source of wealth (asset) countries for the welfare of the people of Indonesia. From the economic aspect that the forests that contain the economic value is not limited to timber products, there is also the potential of nontimber forest products such as pharmaceuticals raw materials, rattan, resin, sap jelutung and so forth. Besides the forest can generate or as a source of food and carbon trading that has a value not less important than the value of wood is economically goal research is to analyze the economic value of plants is lost or dead as a result of forest exploitation.

MATERIALS AND METHODS

The research was conducted at PT. Traders Karda Central Kalimantan for 3 (three) months from the date of March 23, 2012 until June 23, 2012 on logging plots the number of V-11 (primary forest) and F-15 (secondary forest). The materials used are working map, compass, stationery, notebooks, the meter to measuring the diameter of the tree and a list of questions. The research method using terraced path, namely through observations of the example path that is considered to represent the area of research, carried out by dividing into 10 paths logging plots with a total area of 20 hectares path. 1 km paths length, paths width of

20 meters and the distance between paths of 100 meters and one paths consists of 10 sample plots (PU). The distance of the PU (plots) with other PU is 100 meters. The size of the PU adalan 400 M^2 (= 20x20) m, so that amount of PU made of 100 pieces of PU with a total area of 4 ha. Each PU, size 400 M^2 (size 20x20) m is subdivided into four variables that consist of four levels of growth with the following criteria:

1. The size of plot (2.5x2.5) meter to the growth rate of seedling/seedling (from germination to seedling height of 1.5 meters).
2. plot size (5x5) meters to the growth of pancang level/sapling (stands less than 10 cm in diameter that has a height of 1.5 meters).
3. plot size (10x10) meter to the growth rate of pole level (stand has a diameter between 10-19 cm.
4. plot size (20x20) meter to the growth rate of trees level (stand which has a diameter of at least 20 cm).

The analysis tool used to calculate the economic value of the environment of the plant timber and non timber (Nt) who died as a result of forest exploitation is calculated using the formula:

$$Nt = \Sigma\ Fr \times P$$

Where: Nt = Total losses from the plant environment/negative impacts due to the cutting of trees (IDR/plant).
Fr = Total crop loss (stalk/year).
P = Price (IDR)

RESULT AND DISCUSSION

Results of research conducted by using a terraced path method, that is through direct field observation, are presented in Table 1.

Table 1. Values Losses Against Forest Exploitation Plants Worth Economics, covering an area of 4 ha

No	Group Crop Damage/Dying	Value (IDR)
1	Timber plants	148,698,916
2	Non-timber plant	4,635,000
	Total	153,210,256

The negative impact of forest exploitation of the timber plants that have economic value in the study area covering 4 hectares range 10,358-12,430 stems of plants ranging from seedlings to a level equivalent pole or 25-30% of the total plant located in the area of research/primary forest (41,434 stem of the plant). The results showed the total economic value of crops damaged timber/die area of 4 ha reached IDR. 153 210 256. In detail, the timber plants that have economic value based on the results of research, which was broken/dead a lot of going on at the seedling stage (11.041 stems = IDR.113,616,306), saplings (958 stems = IDR.19,386,088), poles (369 stem = IDR.15,696,522). Damaged/dead plants are due to hit the stem up or damaged and broken canopy caused by falling trees exploited. In accordance opinions Johns (1988) and Burgess (1971) that the plants were dead or damaged from the impact caused by the logging or forest exploitation, which ranges from 30% to 40% most of the damage is a plant for seedlings during their activities of withdrawal of logs or skidding timber from the logging site to place a wooden hoarding by using a tractor. While Burgess (1971), Meijer (1974), said that the impact of opening up forest area (PWH) for the manufacture of forest road in the form of main roads and branch roads (road skid) to transport produce from forest exploitation to the forest regeneration more damaged than the damage because of logging. The impact of skidding timber using a tractor to reach the damage as much as 10% to the level of the trees in the area of low land forest, but it also damages the trees for other levels such as sapling level and small trees at least 55% occur as a result of their exploitation Forest. Tinal and Palanewen (1978), Kartawinata (1980), Abdulhadi, *et al*. (1981) states that forest plants that are not affected by the exploitation activities only around 35%. The type of wood plants affected/occur deduction of amount of of plants from forest exploitation consists of Meranti (*Shorea spp*), Bangkirai (*Shorea laevis*), Keruing (*Dipterocarpus spp*), Kempas (*Koompassia malaccensis*), mersawa (*Anisoptera spp*), Bintangur (*Calophyllum spp*).

Ashton (1982) states tree included in the family Dipetrocarpaceae, meranti (*Shorea spp*) in tropical forests is very tall trees and have a wide canopy can reach a diameter of 15 meters, and height of the tree reaches 45-60 meters. Has roots that shaped buttresses serve to help and carry the tree stand that has a wide canopy. When the timber is harvested crop will disappear place to grow other crops such as plant rattan (*Calamus caesius Blume*) because of the way it grows this plant creeping, climbing and a liana plants that cling tightly to a large trees trunk as a parent. A big tree in the forest serves as a host tree for plants to get sunlight wicker, rattan sticks resembling a large rope is usually called liana which can reach 60 meters in length or more. In addition the tree can serve as a place to grow plants of species of orchids/epiphytic plants ant nest, nesting bees produce honey, a wildlife habitat and food resources. For non timber plants that have economic value saga consists of rattan (*Calamus caesius Blume*), bamboo (*Bambuseae*), orchids in (*Phalaenopsis amabilis*), ornamental plants such as the types of orchid (*orcid sp*), pitcher plants (*Nepenthes sp*), crops aromatics such, roses forests (*Rosa sp*), jasmine forest (*Jasminum sp*), cempaka (*Michelia alba*), ornamental plants like waves of love (*Anthurium plowmanii*), hartshorn (*Platycerium*), ferns forest (*Pterodophyta sp*) , plant as pharmaceuticals such as betel forests (*Piper caducibracteum*), pegs the earth (Eurycoma longifolia), Seluang belung (*Luvunga sp*), root yellow (*Fibraurea tinctoria*), anthill (*Myrmecodia*), onions tiwei (*Eleutherina americana* Merr), galinggang (Cassea alata), animal feed crops such as: tassel (*Syzygium*), fruit nyatoh (*Palaquium xanthochymum*), wild banana (*Musa paradisiaca*), Karamunting (*Rhodomyrtus tomentosa*).

While the negative impact of forest exploitation activities where large trees in the forest as the parent tree where the plants grow non-timber species of orchids and so damaged and forest lands into the open so that in the end the plant as a life support non wood is reduced. The non timber plant that has economic value and broken/dead consists of rattan (IDR. 2,400,000), bamboo (IDR. 150,000), ornamental plants (IDR.1,450,000), leaves of ornamental plants (IDR.280,000), plants drugs (IDR.330,000) and animal feed (IDR. 25,000).

CONCLUSION

Conclusion

Rated 4 hectares forest area environmental losses caused by the felling of forest trees above 50 cm in diameter with a total loss of timber plants and non-timber economic value of IDR. 153,210,256 which consists of a timber plant for IDR.148,698,916 and non timber plants IDR. 4,635 million.

Recommendation

1. In the felling of forest trees, so that directional felling of stands which are directed at the area under the crop in small amounts.
2. For the skidding of timber, in order to consider the condition of the plants below. It aims to reduce stand damage caused by skidding mouth.
3. With respect to the logged area or road skid, immediate replanting. It is intended that amount of of crop damage below can be resolved and the negative impact of logging can be minimized.

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Information System Development Based Spatial for Sustainable Forest Management in Fmu

Ahmad Jauhari [1,2] dan Rina Kanti [1]

1)Faculty of Forestry, Lambung Mangkurat University, Banjarbaru Indonesia
2)Center of Excellence Research Consortium for Sustainable Tropical Forest Management, Banjarbaru Indonesia

Email : ajauhari@unlam.ac.id

ABSTRACT

The development of information technology today is very fast and rapidly. Information about sustainable forest management an accurate and fast indispensable for forest managers for the purposes of management, monitoring, decision-making and business performance assessment. Useful information when packaged in a system, which in this case is the information system for sustainable forest management. The information system developed at this time more based on non-spatial and has not been developed based spatial. Based spatial information system with a view form of plots be very easy for users obtain direct information about the content of the plot. The purpose of this study is to inventory parameters for spatial and spatial content of the current parameter values are fixed and not fixed, and build a model information system, as well as building information systems for sustainable forest management in the FMU. The method used is descriptive. This research was conducted in KPHP Tabalong. Data collection methods that are used, among other things: literature studies and field observations. Methods of analysis and interpretation of data are used, among other things: watershed analysis, buffer analysis, tabular analysis, geo-proces and the Normalized Difference Vegetation Index (NDVI). From the results of the study of forest governance, obtained the main variable is the room as the unit of analysis has a fixed value (ptk) is a region, bagian_hutan, wil_kph, das, plot. Variables supporters is the potential contents of the room, which is generally grouped into ecological functions (fe), sos function-oak-bud (fs) and the production function (fp). Variable support has a fixed value (nf) are situs_budaya, jurang_dalam, graveyards, rivers, roads, PUP, plasma_nuftah. Variables that have no fixed value are fp_HHK, fs_HHBK, fe_jasa_lingkungan, anak_petak and zonasi. The main variables and supporters are not in one file, but separate and connected through a pattern of database relationships 'one to many'. Spatial Information System Model Sustainable Forest Management (SIPHB) is a function of space and fill the space, in other words SIPHB = ptk x ((fe + fs + fp)-nf). Sustainable forest management information system that is built is based spatial 'query system' which can directly select the desired plot and display output that is very informative.

Keywords : Information system, FMU, SIPHTB

INTRODUCTION

Nowadays, with the rapid development of information technology, there are many ways of presenting information that looks very interesting. However view, is not only attractive but also with accurate and useful information and is packaged in a system of management information so that it can be used. Implementation of the current management, are generally already need a complex information system. This is done in order to manage the various objects that have many parameters simultaneously. An example is the Sustainable Forest Management. Lots of objects that have various attributes that needs to be managed in the forest in order to provide sustainable benefits for the environment and humans.

Until now, the development of sustainable forest management information system has not specifically required by the rules of the Ministry of Environment and Forestry, while this is still a part of the element in the rules of performance assessment ratings of Sustainable Forest Management (SFM) in accordance with the regulation number P8/VI-BPPHH/2011, and the information systems required by the rules that did not have the technical instructions. In fact, one of the main directions of activity in the preparation of the Forest Management Plan Long Term in Forest Management Unit (RPHJP-KPH) is the preparation of the information system. Julijanti, et al, 2015 suggests that in order to accelerate the FMU development required an enabling condition. One of the enabling conditions is the development of information and monitoring system. Hussey, 1996 identifies that there are eight main parameters during the process of managing an organizations, one of these parameters is an information system.

Many obstacles encountered in the development of sustainable forest management information system. These constraints are processing the data and the type of analysis used to obtain accurate information. The pattern of the structure and relationships between databases corresponding to the information system of Sustainable Forest Management (SFM) is not yet available. During this time also, the development of the information system still seems complicated that requires the involvement of a programmer.

On the basis of the above constraints, the development of the information system that is simple but very helpful and can support the system management SFM overall implementation is needed. SFM information system that will be built has specific characteristics (in other words as a supporting information system of SFM) related only to space / compartment, contents and activities conducted on the accompaniment and its contents. The main parameter is a space or spaces. Parameter support is the potential contents of the plot will be managed through action plans.

The purpose of this study is to identify the data and information needed in the development of Information Systems SFM, build models for SFM information system, and to establish the system simple but very helpful information and does not require a programmer. The information system is urgently needed by the FMU for sustainable forest management.

MATERIALS AND METHODS

The research location is PT Prima MultiBuana with an area of 12,690 ha located in the Watershed (DAS) Riam Kiwa in Banjar regency, South Kalimantan Province as shown in Figure 1.

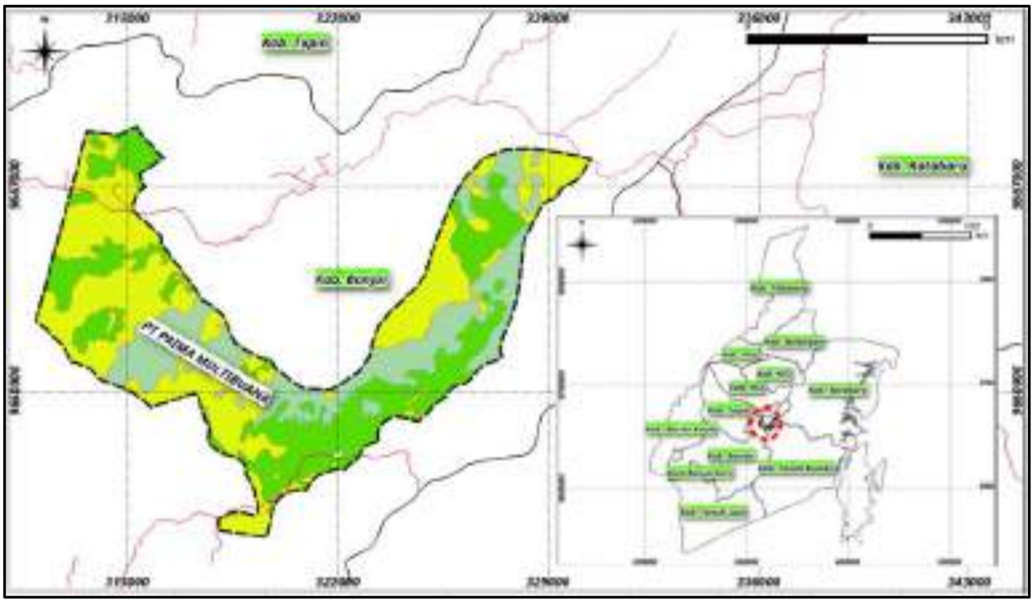


Figure 1. Research area

The method used is applied research. The approach adopted in this research is quantitative. A quantitative approach is data inventory and analysis of Geographic Information Systems (GIS) to the region biophysical conditions, the level of accessibility of roads and forest boundaries. Material or object that is the focus of this research is a stage plan of activities and the realization of sustainable forest management at PT. Prima MultiBuana.

Secondary data collection techniques used is literature studies. The primary data is done through a process of analysis and interpretation of spatial data, such as watershed analysis, buffer analysis, tabular analysis, NDVI and geoprocessing and analysis manual. Preparation of spatial databases into PHL information system fully using the facilities and plugins available on Quantum GIS Software and supported LibreOffice Calc and Processing Web.

RESULTS AND DISCUSSION

Based on the results of the study on government regulation number P8/VI-BPPHH/2011, P.12/Menlhk-II/2012 and Work Plan Reports document PT Prima MultiBuana there are a few attributes required. In general, the parameters on sustainable forest management there are two, namely the main parameters and supporters. The main parameter of the object in the SI-SFM is a room or compartment. Supporting parameters are all potential resources that exist in each of the spaces or compartments. Each object has its own characteristics, expressed as attributes or variables of the object. The relationship between the main parameters and supporters is presented in a model of sustainable forest management as the following equation. Where the Sustainable Forest Management Information System (SIPHB) is a function of the space / compartment as the unit of analysis in which there are areas of productive and unproductive.

SIPHB = ptk x ((fl + fs + fp) -nf)

Description: ptk is compartment / space; fl is the variable of the object that has the function of the environment, fs is the variable of the object that has the function of social-economic-cultural, fp is the variable of the object that has a function of production and nf is an area that is not productive. Many attributes attached to each object in the compartment and its contents. The main attributes/variables that have a fixed value in the space (starting with the letter ptk_) are ptk_region, ptk_bgn_hutan, ptk_wil_kph, ptk_das, ptk_petak, ptk_ket. Variable supporters who have no fixed value on ecological functions (starting with the letter fe_) are fe_no_outlet, fe_sedimen, fe_BOD, fe_kec_aliran, fe_kaw_lindung. Variable support that has value is not fixed on the functioning sos-oak-bud (starts with the letter fs_) are fs_nm_desa, fs_jlh_pddk, fs_nm_kelompok, fs_jlh_angg_kel, fs_fungsi_kel, variable support has no value remains in the production function (starting with the letter fp_) consisting of FP1 (HHK), FP2 (NTFPs), FP3 (UJL). Variables in FP1 are fp1_RKT, fp1_zonasi, fp1_anak_petak, fp1_vol_pohon. Variables in FP2 are fp2_RKT, fp2_zonasi, fp2_anak_petak, fp2_jenis_HHBK, fp2_jenis, fp2_jumlah, fp2_ket. Variables in FP3 are fp3_RKT, fp3_zonasi, fp3_anak_petak, fp3_karbon_atas, fp3_karbon_bwh, fp3_pool_lain, fp3_tot_karbon. Variable support which has which has a fixed value (nf) is nf_situs_budaya, nf_jurang_dalam, nf_kuburan, nf_sungai, nf_jalan, nf_PUP, nf_plasma_nuftah. Forest functions and Resort Ranger (RPH) are described in ptk_ket variable. Variable names are used for connecting the compartment with the contents is kodefikasi. Variable kodefikasi made based on the value of the primary variable. Graphically, the above explanation can be described as shown in Table 1 below.

Table 1. Characteristics Attributes of Sustainable Forest Management Database

Description: N = Numeric, S = String / text

No	Compartemens/forest resources	Explanation	Code/Value	Total Digit	Type data	Annotation	Aspect	Spatial planing	Character Data	Status File
1.	Region	Kalimantan island, South Kalimantan Province, region 3	3	1	N	Encoding of the islands	Ecologi	Compartments	Permanen	Master File
2.	Bagian Hutan	There are 3 part of forest (BH) In South Kalimantan, in BH are KPH Banjar	2	1	N	Results of interviews with experts regarding forestry and forestry agencies in the planning process Teak Forest				
3..	KPH	In 10 KPH, KPH Banjar Unit I, PT PMB IUPHHK-HT number 3	2	2	N	Number 6 accordance with SK 78/Menhut-II/2010 about determination of KPHP/L in South Kalimantan				
4.	DAS/ BLOK	PT PMB is located in Barito river basin.	0363?	5	N	Watershed (DAS) is an ecosystem boundary. DAS numbers corresponding numbering National level				
5..	Petak	PT PMB are in Riam kiwa DAS, PT PMB has 109 Compartment	1-109	3	N	Numbering compartments in accordance with the clockwise direction				

6.	nf_??	All variables that begin with the letter nf_ followed by another name is a compartment that is not productive.	1-10	2	N	The compartments was not as productive as, graves, cultural sites, in a ravine, and others		Contents of Compartements		Non-Master File
7.	Spatial zoning plant	Zoning for the plant room done to set up the management directives of the compartment and its contents with the criteria contained 11 criteria.	1-11	2	N, S	Space zone settings in accordance with the regulations P.12 / Menlhk-II / 2012 on the development of HTI	All		Not Permanen	
8	Sub compart ment	Sub-compartment is done for grouping plants according to similarities silvicultural	1-100	2	N	The sub-compartments were part of the compartment are grouped into one	production			
9.	fp_??	All variables that begin with the letter fp_ followed by another name is a compartment that is production function.	Variative	4-50	N,S	Variables for the production function in detail adapted to the variable conditions SFM. Variables can be numeric or string				
10	fe_??	All variables that begin with the letter fe_ followed by another name is a compartment that is ecology function.	Variative	4-50	N,S	Variabels for ecological functions in detail adapted to the variable performance of watershed. Variables can be numeric or string	ecologi			
11	fs_??	All variables that begin with the letter fs_ followed by another name is a compartment that is social-economy-cultural function.	Variative	4-50	N,S	The variables for the function of socio-economic and cultural variables in detail adapted to the provisions of SFM. Variables can be numeric or string	Sos-eco-culture			

Table 1 presents the characteristics of a spatial database attributes required in sustainable forest management. In general, the table presents the position, aspect, name, size and character of these variables. Kodefikasi variable is a variable that is not presented in the table. However, this variable is the key variable that will connect between different themes of spatial database. With the key variable that serves as a connection between the themes of the database, it can be built relational database. The pattern of relationships between the databases used in the SFM information system is 'One to Many'. Graphically, the relationship patterns can be seen in Figure 2 below.

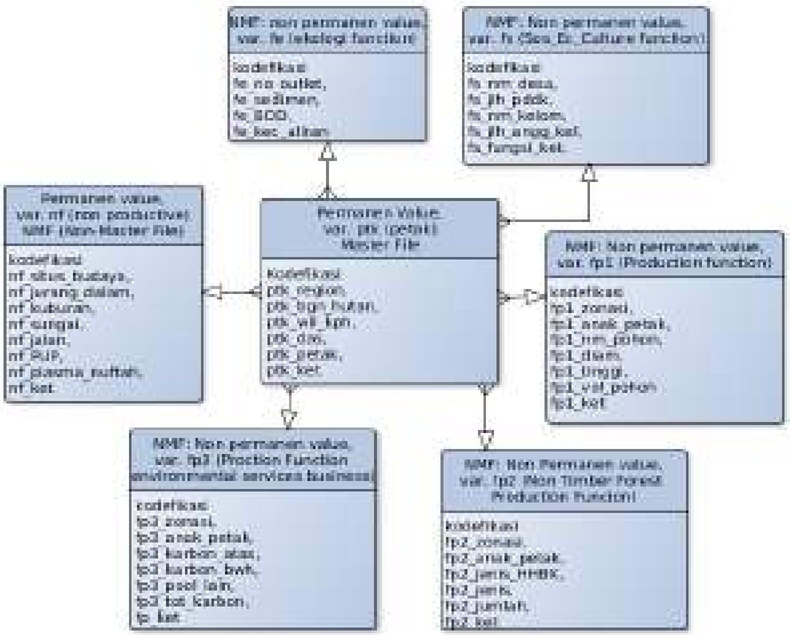


Figure 2. Relational Database between Master File with sub-master File on Sustainable Forest Management Information System.

Figure 2 presents the relationship between the parent as primary database file that has a permanent value to the child files that have permanent value and are not permanent. Variables children generally have no permanent value. Almost all the variable values in the resource potential of the compartment have a value that changes often. These variables are those that have the initials fe (variable associated ecological functions), fp (variable associated production function), and fs (variable related functions of social-economic-cultural). Development of the variables of this system is still very possible, especially related to the function of ecological, production and social-economic-cultural. If the outside of the above functions means that these variables associated with administrative functions.

One of the most important parts of the information system is a system question (query system) for information provided. In this study, the system used is the question presented in the form of a picture or list space/compartment that would be addressed. Users are free to choose space/compartment that it has been provided. If the room / compartment have been selected, then all the variable value of the object in the compartment will be presented. Value of the object in space/compartment is information related to the function of ecological, production and social-economic-cultural. Graphically, the pattern system questions and the results can be seen in Figures 3 and 4 below.

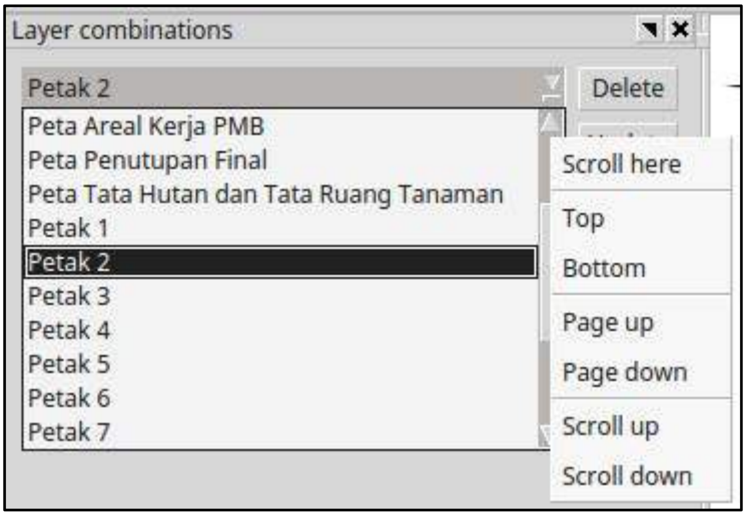


Figure 3. Display Menu for System Query Based Box List

Figure 3 is made using existing plugins in QGIS software, namely Layer Combinations. These plugins can be used to instantly display a predetermined menu and named according to the contents of the existing themes. On the menu the user can scroll up, scroll down, page up, page down, bottom and up to the selection of the desired information.

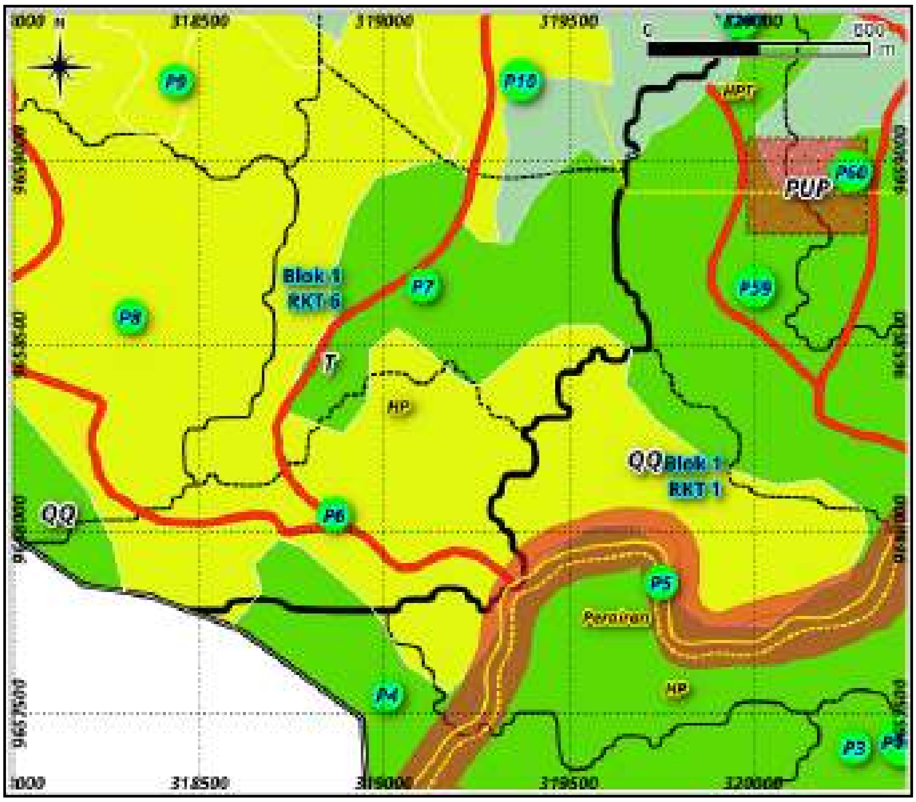
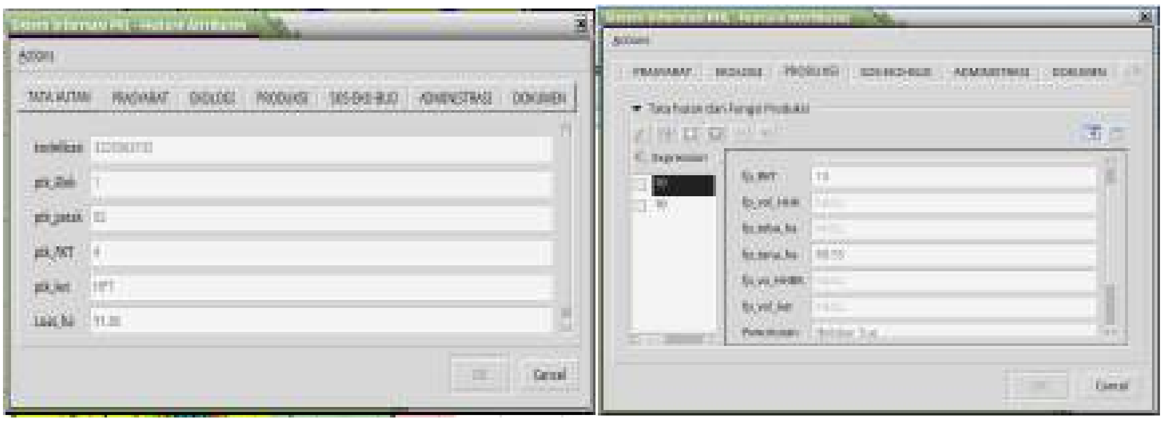


Figure 4. Display Menu in System Questions Image-Based.

Figure 4 presents a compartment which can be selected directly. To select the desired compartment, the user can bring the cursor to the compartment which would have, and instantly 'click' to get the info you want. If you have been in a 'click' it will get the necessary information. In Figure 5 are presented the results.



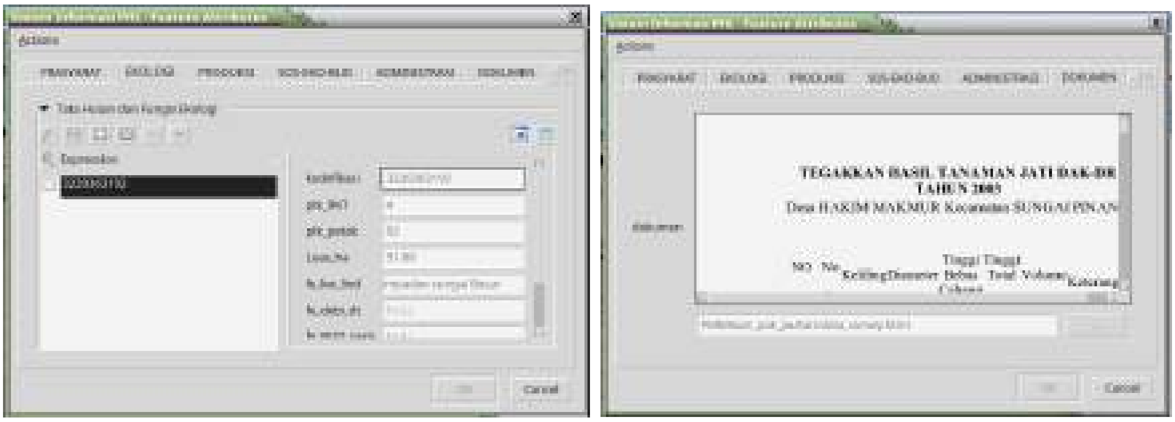


Figure 5. Final View of SFM-IS

Figure 5 presents the results of the selection made by the user. The results presented in PHL information system consists of forest governance, sustainable forest planning materials (prerequisite, ecological, production and social-economic-cultural) and its supporters, such as administration and documentation. In detail, the items related to sustainable forest planning is presented at each 'TAB' of the final display. Furthermore, on the menu can still improve if the wrong data.

CONCLUSION

1. Variables used quite a lot. Variables used there being the main variable and supporters, besides that, the variable value is permanent and not permanent.
2. The model used for the preparation of PHL Information System is a model approach in the form of space SIPHB = PTK x ((fl + fs + fp) -nf).
3. Relation between the databases used is one to many.

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Policy Analyze to People Forest in Balangan Regency

Hamdani Fauzi [1,2]

[1)] *Faculty of Forestry, Lambung Mangkurat University, Banjarbaru Indonesia*
[2)] *Center of Excelletnce Research Consortium For Sustainable Tropical Forest Management ,Banjarbaru Indonesia*

Email : hamdani.fauzi@unlam.ac.id

ABSTRACT

The Implementation of PermenLHK No 21/2015 deal with the administration of forest product in government forest area as legal procedure in forest product administration caused by the administration procedure. The study was conducted by the evaluation of existing regulation, especially related to administration procedure in wood product from people forest. The result of the research showed that the implementation of Permen LHK No 21/2015 generallay, the implementation has not optimum and in some cases has to be revised such as the quality of the main resources, transportation letten/document "SKAU", the condition for wood species, especially if the species unlisted in Permen LHK No 55/2006 , monitoring for the staff which are responsible for the administration process. In order to solve those problems, the local forestry service has been given the authority to set the special regulation of forest product from people forest. The economic approach on sustainability approach was one of the choice in the administration of forest product from people forest. Therefore the administration for wood product from people forest become affective and efficient.

Keywords: people forest, policy, administraton

INTRODUCTION

Article 1, paragraph (22) Government Regulation No. 6/2007, states that “Private Forest is forest situated in land charged with land title”, and in Article 1 (a) of Forestry Minister’s Regulation No. P.33/2007, states that “Private Forest is forest situated in land charged with land title situated outside the forest areas and proved with land title”, meaning that the forest products produced by private forest land such as community wood and the like are the forest products obtained from their own land, then the management and exploitation are fully the owner’s private, while government only serves in making development to ensure the forest conservation and protecting the smooth distribution of forest products through the administration of forest products in accordance with article 117 Government Regulation No. 6/2007. When the administration of forest products is still guided by Forestry Minister’s Decree No. 126/2003, the articles regulating the administration of forest products from the private/community forest are still listed and has been implemented, although some provisions or articles in the decree have yet to be perfected. However, with the enactment of Forestry Minister’s Regulation No. P.55/2006, the administration of forest products in private/community forest becomes unclear, because the articles contained in the Forestry Minister’s Regulation dominantly more regulate the administration of forest products obtained from state forest areas.

If we look at the Government Regulation No. 6 Year 2007 on Forest Arrangement and Formulation of Forest Management as well as Forest Exploitation, Article 100 paragraph (1) states that “Private forest can be stipulated as forest having the following functions: conservation, protection, or production”, in paragraph (2) states that “Private forest is exploited by holders of right to the land in accordance with the function”, so it does not become a legal vacuum in the administration of forest products in the private/community forest. Then, paragraph 3 states that “The exploitation of private forest as meant in paragraph (1) aims at contributing optimal benefits to the right holders without reducing the function”. Moreover, paragraph 4 states that “Further provisions on the exploitation of private forest as meant in paragraph (2) are ruled by a regulaton of the Minister”. The four verses suggest that there must be a procedure/basics of reference in private/community forest management and exploitation, so that the administration of forest products in private/community forest can run well.

Government Regulation No. 6/2007, Article 117, paragraph (1) states that “In the framework of protecting the state right to forest products and forest conservation, the marketing of forest products is controlled through administration of forest products”. Based on the statement, to protect the state right to forest products and forest conservation, there must be an administration of forest products. If we look at the intent and purpose of the administration itself, it states that “administration of forest products is intended to provide legal certainty and procedures to all those who do businesses or activities in forestry, so the administration is running well and smoothly so that the forest conservation, state revenue and exploitation of forest products can be achieved optimally” (Article 2, paragraph (1), P.55/2006). Regarding on private/community forest exploitation and looking at the provisions of the articles mentioned above, the administration of forest products in private/community forest is very necessary. Therefore, the purposes of this study, were: (1) To determine the extent of the importance of forest products administration in private/community forest, and (2) To determine the efforts undertaken by the governments (central, provincial, and municipal governments) to arrange a simple, safe, orderly, smooth administration of private/community forest products in accordance with the development of local autonomy.

While the targets were: (i) Creating an orderly, smooth, efficient, and accountable administration of private/community forest products, and (ii) Creating protection to various state interests, such as forest conservation and protecting state rights to forest products in community forest.

MATERIALS AND METHOD

Conceptual Framework

Community wood is one commodity that can provide income for the community and has a considerable contribution in fulfilling the raw material of wood processing industry and households. In Forestry Minister's Regulation No. P.26/menhut-II/2005, on the Procedures of Private/Community Forest Exploitation, article 12 paragraph (1) stating that, private forest is exploited by holders of right to the land in accordance with the function. Paragraph (2) states that the exploitation of private forest as meant in paragraph (1) aims at contributing optimal benefits to the right holders without reducing the function. Then Article 18 states that municipal government further sets operational manual of private forest exploitation referring to the applicable rule and legislation. With the enactment of Forestry Minister's Regulation No. P.55/2006, the administration of forest products in private/community forest becomes unclear or has no basis of reference in practice, for example in the administration of tree removal permit, proof of ownership and so forth. Legal vacuum in the implementation of the administration of forest products in the private/community forest has become an obstacle to the smooth distribution of community wood in the field. Therefore, to anticipate, Provincial and Municipal Governments are expected to create rules or to issue basis of reference in the administration of forest products in private/community forest referring to Government Regulation No. 6/2007, Forestry Minister's Regulation No. P.26/2005, P.51/2006, P.62/2006 and P.33/2007. The conceptual framework of the study is as follows:

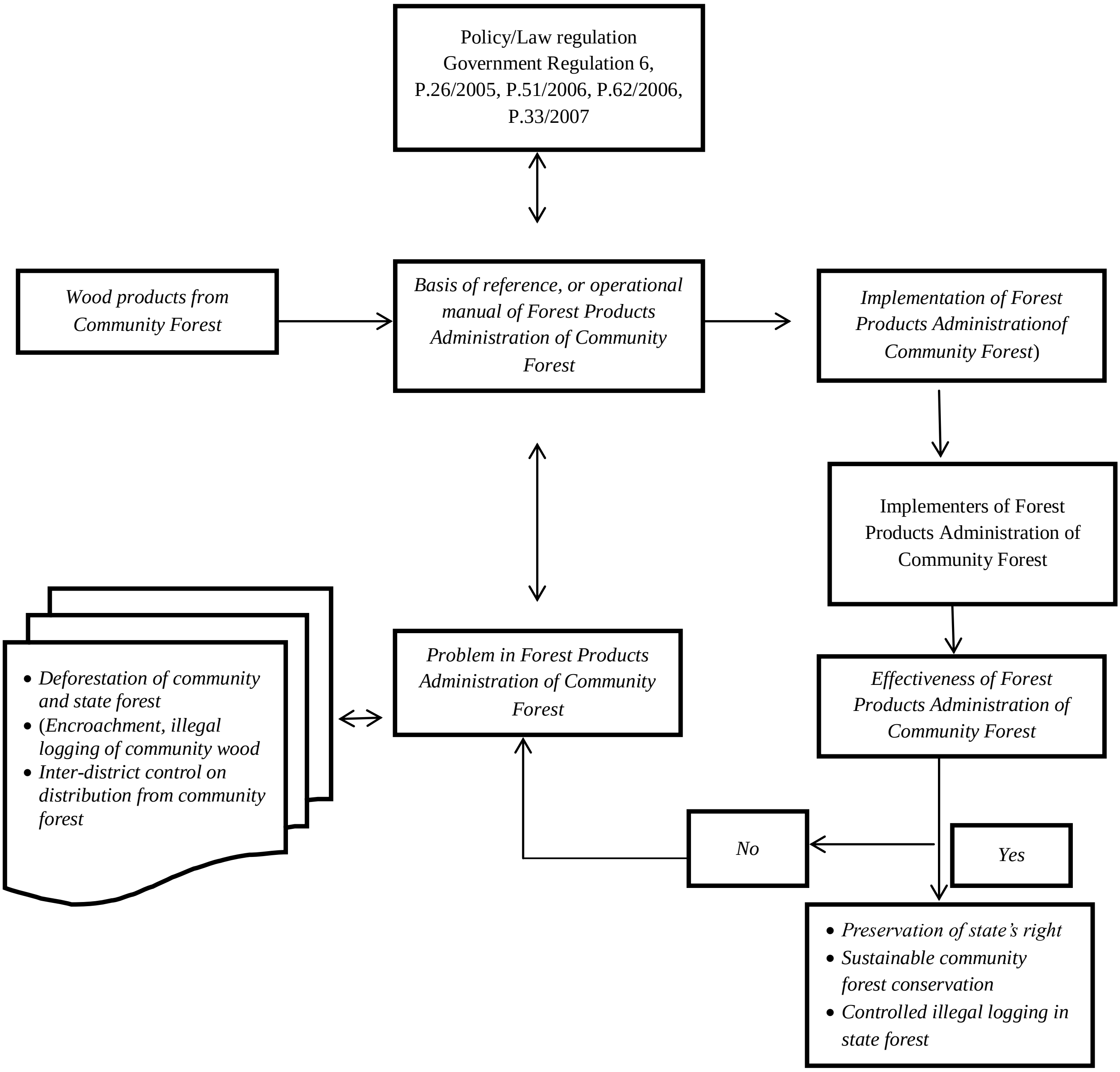

Figure 1. Conceptual Framework

Figure 1 above shows that the effectiveness of the implementation of forest products administration in private/community forest may be indicated by the achievement of three (3) important aspects of the administration itself, i.e.: (1) preservation of the state's rights on forest products, (2) sustainable forest conservation, and (3) controlled illegal logging in state forest. The implementation offorest products administration in private/community forest can be said to be ineffective if it still causes problems of administration in the field.

Data Collection and Reference

The data collected were primary and secondary data. The primary data were obtained by observations and interviews with forestry officials in different regions, enterprise and community wood producers conducting forest products processing. The data obtained were implementation of community wood administration, implementation gaps and job descriptions in the permits, approval, and issuance of the document of forest products administration. The secondary data were obtained from the forestry office, companies, and library such as potential of community forest (community forest areas, potential of stands), realization of round wood production.

The references of forest products in private/community forest are as follow:

1. Government Regulation of Republic of Indonesia No. 6 of 2007, on Forest Arrangement and Formulation of Forest Management as well as Forest Exploitation.
2. Forestry Minister's Decree No. 126/Kpts-II/2003, on Forest Products Administration.
3. Forestry Minister's Regulation No. P.18/Menhut-II/2005, on the Third Amendment to Forestry Minister's Decree No. 126/Kpts-II/2003, on Forest Products Administration.
4. Forestry Minister's Regulation No. P.55/Menhut-II/2006, on Forest Products Administration from State Forest.
5. Forestry Minister's Regulation No. P.51/Menhut-II/2006, on the Use of Certificate of Origin for Timber Transportation from Private Forest.
6. Forestry Minister's Regulation No. P.62/Menhut-II/2006, on the Amendment to Forestry Minister's Regulation No. P.51/Menhut-II/2006 on the Use of Certificate of Origin for Timber Transportation from Private Forest.
7. Forestry Minister's Regulation No. P.63/Menhut-II/2006, on the Amendment to Forestry Minister's Regulation No. P.63/Menhut-II/2006 on Forest Products Administration from State Forest.
8. Forestry Minister's Regulation No. P.33/Menhut-II/2007, on the Second Amendment to Forestry Minister's Regulation No. P.51/Menhut-II/2006 on the Use of Certificate of Origin for Timber Transportation from Private Forest.

Analysis Method

In this study, the analysis method used was descriptive analysis method, in which to determine the extent of the importance of forest products administration in private/community forest, i.e. by reviewing the contents of Forestry Minister's Regulation

P.55/2006, P.26/2005, P.51/2006, P.62/2006 and P.33/2007 then comparing the results of interview with local forestry officials, users (community forest farmers), officers (*P3HH, P2SKSKB,* and *P2LHP*) and so forth on the basis of the information obtained, then the efforts must be conducted by the Central, Provincial and Municipal Governments to fill the legal vacuum/basis of reference in forest products administration in private/community forest. To determine the extent to which the effectiveness, Forestry Minister's Regulation No. P.51/2006, P.62/2006, P.33/2007, and Government Regulation No. 6/2007 can be used as basis of references and can be implemented in the field by several indicators, including the readiness of human resources, transport documents, the type of wood transported, and other things related.

RESULTS AND DISCUSSION

The Importance of Forest Products Administration in Private/Community Forest

Government Regulation No. 6 of 2007 stipulates that in the framework of protecting the state right to forest products and forest conservation, the marketing of forest products is controlled through administration of forest products. (Article 117, paragraph 1). Administration of forest products is intended to provide procedures to all those who do businesses or activities in forestry, so that the administration is running well and smoothly to achieve forest conservation, state revenue and exploitation of forest products optimally. Then, Law No. 41/1999 states that: Private/community forest is any forest situated on land charged with land title, or the forest growing on land that is not forest areas and has a clear ownership, and if we look at Article 15, paragraph (2), Forestry Minister's Regulation No. P.26/2005 stating that private/community forest exploitation that serves as production can be:

1. Exploitation of timber;
2. Exploitation of non-timber;
3. Utilization of environmental services.

Then, Article 16 states that the procedures for community forest exploitation are regulated in Regent/Mayor regulations, furthermore Article 18 states that Municipal Government further stipulates operational manual on private forest exploitation referring to the applicable rule and legislation. With the enactment of Forestry Minister's Regulation No. P.55/2006, the administration of forest products in private/community forest becomes unclear, because P.55/2006 only applies to forest products from state forest areas, and not from private/community forest. Legal vacuum in the implementation of forest products administration in community forests becomes an obstacle to the smooth distribution of community wood in the field. Therefore, to anticipate the legal vacuum in forest products administration in private/community forest, Provincial and Municipal Governments are expected to make rules or to issue a basis of reference in forest products administration in private/community forest referring to Government Regulation No. 6/2007, Forestry Minister's Regulation No. P26/2005, P.51/2006, P.62/2006 and P.33/2007.

Problems in the Implementation of Forestry Minister's Regulation No. P.51/Menhut-II/2006

In the implementation of Forestry Minister's Regulation No. P.51/2006, Central, Provincial and Municipal Governments need to anticipate the potential of new problems, such as: 1) the readiness of Human Resources, 2) the transport documents used, 3) the type of wood transported.

Article 17, paragraph (1) Forestry Minister's Regulation No. P.26/2006 states that all timbers and non-timbers like rattans and aloes from private forest areas to be used and/or transported to other areas is equipped with Certificate of Origin issued by the Village Head or equivalent official. Then, if we look at the Forestry Minister's Regulation No. P.51/2006 article 1, letter (b), it states that the Certificate of Origin is the legal documentation of forest products used for wood transportation from private forests, and subsequently article 5, paragraph (1) states that Certificate of Origin is issued by the Village Head or equivalent official with the Village Head where the timber will be transported. Of the three statements above, Certificate of Origin issued by the Village Head or equivalent official to Village Head is a very important letter document that should be owned by the owners of community wood if the wood will be traded or for any other purposes because Certificate of Origin is a document in proof of the validity of the ownership of community wood and as a valid transport document.

The making of Certificate of Origin must be carried out by personnel who have the capacity to both technical and non-technical about forest products, especially in private/community forest, and must be implemented in accordance with applicable provisions. This needs to be done, because if we look to the Government Regulation No. 6 of 2007 which stipulates that in the framework of protecting the state right to forest products and forest conservation, the marketing of forest products is controlled through administration of forest products (Article 117, Paragraph 1). Administration of forest products is intended to provide procedures to all those who do businesses or activities in forestry, so that the administration is running well and smoothly to achieve forest conservation, state revenue and exploitation of forest products optimally (anonymous, 2006). The statement above shows that there is a message that cannot be negotiated in the implementation of forest products administration, especially in community forest, i.e. : "*preservation on forest sustainability and state right to forest products*", and the target in the implementation of forest products administration is "*All those who do businesses or activities in forestry*", means that either officers who have the authority to issue the Certificate of Origin, in this case is Village Head or elected officials must have sufficient capacity and capability both technical and non-technical on forest products. The applicants of Certificate of Origin or community wood farmers also should be concerned to sustainability.

Article 7, paragraph (1) Forestry Minister's Regulation No. P.51/2006 states that the format of form is made according to the example in the appendix of this rule, then paragraph (2) states that the procurement of the forms of Certificate of Origin is performed by each of the Provincial Service, through the general printing. Looking at the example of form attached in Forestry Minister's Regulation No. P.51/2006, it is considered less precise in term of legality/validity of the document and it is legally questionable, because when we see the form sample, letterhead and logo of the form is said Provincial Forestry Service, while the person signed is the local Village Head where the wood is located. Therefore, based on the above-mentioned reason to the extent to which a form of Certificate of Origin can be used, in the presence of Regional Autonomy, it is less appropriate to be implemented because legally, Provincial Service is an institution under the coordination of the Governor, while the Village Head is under the coordination of the Regent/Mayor.

At first, there are only three (3) types of wood that can use Certificate of Origin(Forestry Minister's Regulation Number P.51/2006). However, with the issuance of new provision, namely Forestry Minister's Regulation No. P.33/2007 on the Second Amendment to Forestry Minister's Regulation No. P.33/2007 on the Second Amendment to Forestry Minister's Regulation No. P.51/Menhut-II/2006 on the Use of the Certificate of Origin for Wood Transportation from private forest, the types of wood that can use Certificate of Origin became 21 types. Although the types of wood covered already more, the activity or wood distribution activity from private/community forest not included into the types of wood arranged in Forestry Minister's Regulation mentioned above will be a problem and cause worries to the farmers of community wood in carrying out the wood transportation. If the types of wood being transported are varied, it will increase the time and costs incurred since the document that should be taken care of is more than one.

The Effectiveness of the Implementation of Forest Products Administration in Community Forest

In the administration of forest products from private/community forest, Forestry Minister's Regulation No. P.51/2006 on the Use of Certificate of Origin as transport document of forest products from private forest has been enacted. The contents of the Forestry Minister's Regulation have been amended for two (2) times (P.62/2006, and P.33/2007). Nevertheless, there are still some restrictions on the types of wood that can use Certificate of Origin transport document. Community wood excluding the types of wood stipulated in Forestry Minister's Regulation No. P.33/2007 uses Transporting Document for Round Wood with *KR* stamp, in accordance with Article 11, paragraph (2) of Forestry Minister's Regulation No. P.62/2006.

The results of the study on the contents of Forestry Minister's Regulation No. P.51/Menhut-II/2006 on the Use of Certificate of Origin for Wood Transportation from private forests shows that the implementation of the Forestry Minister's Regulation is not effective, because there are many things that must be considered in the implementation, such as the readiness of human resources, document alignment and transportation stage, in addition, the types of wood covered in the Certificate of Origin must be re-inventoried and set as soon as possible with the inputs from the region. The amendment of basis of reference in forest products administration, i.e. from Forestry Minister's Decree No. 126/2003 and Forestry Minister's Regulation No. P.18/2005 into Forestry Minister's Regulation No. P.55/Menhut-II/2006 stating that Forestry Minister's Decree No. 126/Menhut-II/2004 and

Forestry Minister's Regulation No. P.18/Menhut-II/2005 on forest products administration and Forestry Minister's Decree No. 127/Kpts-II/2003 were declared invalid. This poses new problems in term of legal basis or basis of reference for the implementation of forest products administration from community forest. One way/effort to lighten the burden of the central government in resolving the problems of forest products administration particularly from private/community forest is by delegating authority in regulating the administration to the Provincial Forestry Service.

To measure the effectiveness of forest products administration from private/community forest, the Provincial Forestry Service issued operational manual to regulate the distribution of community wood by distinguishing the colors of wood document for each district/city, or by creating custom code for each region of the timber for each district/city, and so forth.

The Efforts Required.

Delegation of authority

In growing private/community forest and successful implementation of forest products administration in private/community forest, Provincial Forestry Service has a considerable contribution, participation, and moral and material responsibility. Therefore, the delegation of authority is one of the efforts of central and provincial governments in solving one of many problems in forest products administration encountered, and this delegation does not violate the provisions of the government in accordance with Law No. 32 of 2004 on Local Government. In the era of recognition of hierarchical relationship among the Central Government, Provincial Government, and the Municipal Government. The statement above shows that delegation of authority to regulate the implementation of forest products administration from private/community forest can be implemented, for example: the central government in this case the Ministry of Forestry issued general reference. Then, based on the general reference, of Forestry Service issued general reference. Then, based on the general reference, Provincial Forestry Service issued the Operational Manual to be followed up by Municipal Forestry Service. Then, the follow-up conducted by Municipal Forestry Service, is by issuing a Technical Manual as a basis for the implementation of forest products administration in the field. With the delegation of authority implemented, the problems that arise in forest products administration from private/community forests are expected to be anticipated.

The approach in the administration of forest products in private/community forest

The aim and purpose of forest products administration is "Providing legal certainty and reference to all those who do businesses or activities in forestry, so that the administration runs orderly and smoothly to achieve forests sustainability, state revenue and exploitation of forest products optimally", according to article 2, paragraph (1), P.55/2006. Based on the statement above, there are two (2) approaches that can be conducted in the administration of forest products in private/community forest, i.e.:

a. Economic Approach

Economic approach is the approach taken by the Central, Provincial and Municipal

Governments by more emphasizing on the acceptance of state's right to forest products in private/community and the farmers/community of community wood are not burdened by costs in the arrangement of transporting document, and the smooth trade of community wood. The references of economic approach are P.51/2006, P.26/2005, P.62/2006 and P.33/2007. As explained above, one purpose of forest products administration is "to protect the state's right to forest products". The statement shows a demand from the government to the forest products to give contribution at least to the local government. It needs regulations of forest products administration from private/community forest to realize. However, the implementer of the administration is in accordance with article 5 paragraph (1 and 2) P.33/2007. Article 12 (1) P.26/2005 states that "All timbers and non-timbers like rattans and aloes from private forest areas to be used and/or transported to other areas is equipped with Certificate of Origin issued by the Village Head or equivalent official". Then, article 1 letter (g) P.33/2007 states that "Certificate of Origin is a letter stating the validity of transportation, control or ownership of timber from private forest or community land". The two statements show that the Certificate of Origin is an important document that should be owned by the farmers of community wood if the woods will be traded or used for other purposes.

The potential problems in economic approach are:

1) Control. Article 9, paragraph (3) Forestry Minister's Regulation No. P.51/2006 states that "In the framework of the orderly administration of forest products from private forest, Provincial Service is obliged to carry out the monitoring, supervision and control of the distribution". Based on the statement, the extent of monitoring, supervision, or control of forest products distribution in private/community forest can be conducted by Provincial Forestry Service, given the very broad region of the province which consists of several districts/cities, sub-districts, villages and so on. Therefore, the control can be conducted by the Municipal Service given in autonomy and legal hierarchy, Municipal Service is more appropriate to conduct monitoring, supervision, and control of forest products distribution in private/community forest.
2) Data and information. The absence of authority to conduct the monitoring, supervision, and control of forest products distribution from private/community forest affects the difficulty of obtaining data and information on the production of community wood and community wood potential from the villages where the Certificate of Origin issued, despite the Village Head is mandatory to report the issuance of Certificate of Origin in accordance with article 9, paragraph (1) Forestry Minister's Regulation No. P.51/2006. One reason for concern is the readiness of human resources for forest products administration in the region.
3) The types of wood, although the number of types of wood that can use Certificate of Origin is already more, i.e. 21 types in accordance with Forestry Minister's Regulation No. P.33/2007, but there are still many concerns from the farmers of community wood, given the extent of the validity or legality of Certificate of Origin may be recognized, because when we see the example of Certificate of Origin in Forestry Minister's Regulation No. P.51/2006, the letterhead used the logo of Provincial Forest Service with the signature of the Village Head, as previously described, both are under the different

coordination. In addition, there are many types of wood not included in the list in the appendix of Forestry Minister's Regulation No. P.33/2007 planted or growing on private/community forest land. So, there are some concerns in the arrangement of transporting document when the wood will be traded, because many cases found like the woods obtained from private/community forest are always questioned by agencies beyond the Department of Forestry.

b. Sustainability Approach

Sustainability approach is an approach conducted by the Central, Provincial and Municipal Governments by more emphasizing on forest sustainability, obtaining data and information on production potential of community forest and other data related to the exploitation of forest products in private/community forest. As explained, the purpose of forest products administration is also "the maintenance of forest sustainability" (article 117 (1) Government Regulation 6/2007). The statement suggests that we have liability to maintain forest sustainability. It is not an excessive demand, but it is an obligation that must be carried out. Moreover, the forest zone is a forest that has functions for public interest, such as: water source for the community, water absorption or *catchment area*, and so on. Thus, sustainability approach is an effort that must be conducted by all parties. The legal basis in the implementation of the sustainability approach is Forestry Minister's Regulation No. P.26/2005 on the Reference of Private Forest Exploitation. The implementers are the Department of Forestry, Provincial and Municipal Forestry Services, and the whole community. With the implementation of the approach, data, and information on potential and products of community forest are expected to be obtained, and the main thing is the preservation of nature. Nevertheless, there must be constraints/problems encountered from any activities carried out, as well as in the implementation of sustainability approach, the problems on concern are:

1) Coordination

Regional autonomy makes a strong bureaucracy, affecting the difficulty of coordination among the Central, Provincial and Municipal Governments. Even though it does not have to occur, because in accordance with Law No. 32 of 2004 on Local Government in the era of regional autonomy, the implementation of government affairs in the region is carried out based on the broadest principle of regional autonomy with the recognition of the existence of a hierarchical relationship among the Central, Provincial and Municipal Governments.

2) Implementation

The implementation of rehabilitation or conservation program often crashes with the work program of the local area. For example, in the management of national park according to the Urban Planning of Department of Forestry, national park is included in the conservation area, but in autonomy, it is included in the area of a district/city in which it has a target in achieving Locally-Generated Revenue, so that the implementation has a different concept of management.

3) Socialization, lack of field extension worker in the regions resulted in delays in delivery or program socialization that has been planned by Central, Provincial and Municipal Governments regarding to community development in the village.

Figure 2 below shows the systematics of forest products administration in private/community forest.

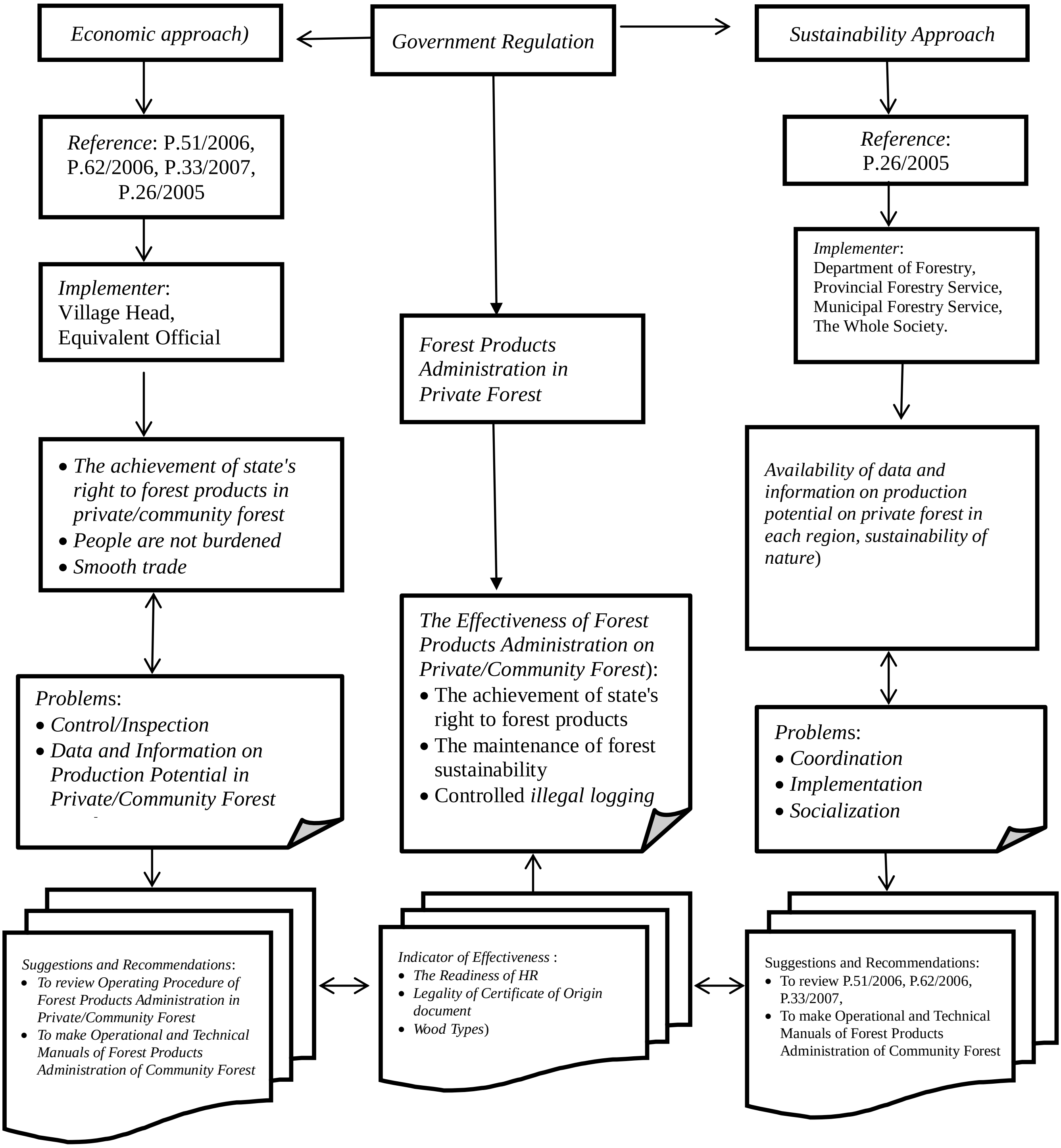

Figure 2. The systematics of Forest Products Administration in Private/Community Forest

CONCLUSION AND SUGGESTIONS

Conclusion

Private/community forest has essential functions for national development but are not well ordered yet. In addition, forest products of private/community forest have considerable potential and contribution in fulfilling the requirements of raw material of wood processing industries in Indonesia.

The amendment of basis of reference on forest products administration from Forestry Minister's Decree No. 126/2003 into Forestry Minister's Regulation No. P.55/2006 has an impact in which forest products administration in community forests becomes unclear and does not have a basis of reference, since in the preamble of Forestry Minister's Regulation No. P.55/2006, it is declared the forest products administration from state forest.

Certificate of Origin is used for round wood transportation from private/community forest, the types of wood that can be transported using the new Certificate of Origin are limited to 21 (twenty-one) types of wood, whereas the other types excluding the types of wood set in Forestry Minister's Regulation No. P.33/2007 use Transporting Document for Round Logs with "*KR*" stamp. While the processed wood of primary wood products industry of timber which the raw materials are obtained from private forest and/or community land uses FAKO Processed Wood Transportation Invoice issued by the industry.

Article 117 paragraph (1) Government Regulation No. 6/2007 states that in the framework of protecting the state right to forest products and forest conservation, the marketing of forest products is controlled through administration of forest products. The statement shows that the administration of forest products in natural forest, plantation and private/community forest should be conducted by all parties(*stakeholders*): central, provincial, local governments and communities, so that state's right to forest products can be accepted, and forest sustainability can be maintained.

Suggestions

A review of Forestry Minister's Regulation No. P.55/Menhut-II/2006 on Forest Products Administration from state forest needs to be done, because the Forestry Minister's Regulation only sets and assigns the forest products administration from the state forest areas, and its implementation affects the forest products administration from private/community forest, in which the legal basis becomes unclear or does not have a basis of reference in the implementation.

Transporting document of community wood that uses the new Certificate of Origin is only limited to 21 (twenty-one) types of wood. The other types excluding the 21 types of wood as stipulated in Forestry Minister's Regulation No. P.33/Menhut-II/2007 to be stipulated by the Minister of Forestry as soon as possible, because in the realization of the implementation in the field, the wood transportation from private/community forest is always considered problematic and be detained.

The delegation of authority by the Department of Forestry to the Provincial Forestry Service to regulate the administration of forest products from private/community forest is in accordance with Law No. 32 of 2004 on Local Government, Article 13 letters (O and P), in which the Provincial Service is an institution that has the authority to coordinate the Municipal Services in a Province. Therefore, Provincial Service in charge of forestry is expected to make rules or references concerning on forest products administration in private/community forest as an anticipation to the enactment of Forestry Minister's Regulation No. P.55/Menhut-II/2006 which affects the lack of clarity in the implementation of forest products administration from community forest.

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The Total Economic Value of Catchment Forest Ecosystem Services of Baubau Wonco Watershed in Southeast Sulawesi, Indonesia

Safril Kasim[1], Aminuddin Mane Kandari[2], La Ode Midi[3]

[1]*Spesifications Environmental Science, Department of Environmental Science, Faculty of Forestry and Environmental Science, Halu Oleo University, Southeast Sulawesi, Indonesia*
[2]*Spesifications Agroclimatology, Department of Environmental Science, Faculty of Forestry and Environmental Science, Halu Oleo University, Southeast Sulawesi, Indonesia*
[3]*Spesifications Agrohidrology, Department of Environmental Science, Faculty of Forestry and Environmental Science, Halu Oleo University, Southeast Sulawesi, Indonesia*

Email : safrilkasim1970@gmail.com (S. Kasim), manekandaria@yahoo.com (A. M. Kandari), laodemidi@gmail.com (L. O. Midi),

ABSTRACT

The valuation of ecosystem services is becoming an increasingly important contribution to policy and decision making at scales from the local to the global. A clear understanding of the linkages between final values, benefits and ecosystem services is needed to allow the decision makers to integrate the ecosystem services into mainstream decision making processes. Catchment forests ecosystem within watershed have significant roles to increase availability and quality of water, to minimize the rate of erosion and sedimentation as well as to decrease a potential risk of landslide hazard. These hydrological environmental services provided are maintained by local communities. While the beneficiaries of these are vary and can be ranged from local actors to international stakeholders. This research was intended to develop a model than can facilitate a downstream-upstream incentive mechanism for forest conservation funds within the watershed. The research has been conducted for two years. The study employed various methods of data analysis. Those are as follow: (i) Hedonic Price was used to estimate economic value of water for domestic and industrial use; (ii) Productivity approach used to analyze economic value of water for agricultural use; (iii) Willingness to Pay (WTP) was used to calculate economic value of catchment forests to prevent from erosion, flooding and landslide hazards, and (iv) Institutional development approach was used to develop institutional model of Payment for Environmental Services. The results of the research showed that economic value of water for domestic and agricultural uses achieved Rp. 19.772.271.147,72/y and Rp.22.563.520,90/y respectively, whereas economic value for industrial use obtained Rp. 8.670.549,88/y. Economic value of catchment forest to minimize erosion and flooding achieved Rp.22.018.980, 12/y, while economic value to prevent landslide hazard obtained Rp. 18.638.034,00/y. Total Economic Value achieved Rp.42.660.519.336/y.

Keywords: Total Economic Value, Payment for Environmental Services, Catchment Forest, Ecosystem Services

INTRODUCTION

There are many academic evidences that in the future we will encounter such environmental problems as large–scale conversion of ecosystem and biodiversity loss; increasing number of poor community and decreasing water availability and quality [Rosegrant, 2003] and global climate change [Schneider, S. H. 2001]. A comprehensive understanding of these problems is needed to minimize their impacts to human welfare. Ecosystem services concepts have recently been developed to link between human welfare and ecological sustainability for policy, development and conservation initiatives ([4], [5]). There are some attempts have been made to involve the value of ecosystem services into land use decision making process and policy development [Schneider, S. H. 2001 and Turner, 2003]. It is therefore important to map, measure and valuing ecosystem services in order to increase stakeholders' awareness for using natural resources in sustainable ways.

Catchment forests within Baubau Wonco watershed offer both tangible and intangible benefits of which some are perceived as environmental services. Forest ecosystem plays critical roles in delivering clean water to the public. Forests provide a number of ecosystem services that are essential to water quality and overall watershed health. Most importantly forests protect and enhance water supplies for domestic, agricultural, and industrial uses. Forests absorb rainfall, helping to minimizing floods, slow storm runoff reducing soil erosion and improving water, infiltration rates, and recharged to aquifer. Forests also have functions to filter pollutants such as sediments, fertilizers and pesticides from agricultural and urban runoff and to provide fish and wildlife habitat and help maintain aquatic diversity. However, catchment forests in Baubau Wonco Watershed face serious degradation due to rapid land use change. These changes, combine with population growth have brought about changes to river discharged and increase in erosion hazard and sedimentation rates [Kasim, S, 2012].

Integrated watershed management planning has been made as a guideline of water, land and forest resources management within Baubau Wonco watershed area. However, there are still obstacles in the implementation phase including lack of funds [Kasim, S, 2007]. Catchment forests within the watershed have provided many ecological and economic benefits for long generation. While the beneficiaries of these are vary and can be ranged from local to international stakeholders. To this point, there is a new believe proposed by neo-market natural resources economists that new methods and institutional frameworks need to be developed to facilitate a downstream-upstream incentive model or mechanism. It is therefore, financial incentives have to be made available by international, national, regional and local stakeholders to compensate environmental services of the watershed area. To some extents, these are refer to as Payment for Environmental Services (PES). A downstream and upstream model can become a policy umbrella to facilitate the PES as financial compensations to the local actors for forest conservation efforts. The PES describe financial arrangements or mechanisms to pay a certain practice that will protect or restore some function or process of ecosystem.

Total Economic Value (TEV) of the hydrological ecosystem services of Baubau Wonco Watershed needs to be calculated in order to determine the PES that will be arranged for forest conservation funds. The TEV of the hydrological ecosystem services on this research refers to an economic value of water provided by catchment forests of Baubau Wonco watershed for (i) domestic water use; (ii) agricultural use; (iii) industrial use, and the ecological roles of catchment forests to prevent from (iv) erosion and flooding and (v) landslide hazards. As mentioned earlier that this research has been conducted for two years. The result of the first year study showed that economic value of water for domestic and agricultural uses achieved Rp. 19.772.271.147,72/y and Rp.22.563.520,90/y respectively, whereas economic value for industrial use obtained Rp. 8.670.549,88/y [Kasim, S, 2015]. **The result of this first year study has been published in Agriculture, Forestry and Fisheries Journal, November 2015; 4(6):275-283.**

MATERIALS AND METHODS

This study was conducted within Baubau Watershed area. Total area of Baubau Watershed is 9999, 75 Ha and it consist of four subwatersheds namely Wamoose Subwatershed, Wasamporona, Sigari and Wancuawu., Baubau Watershed is administeratively located in two districts, Baubau City and Buton District, in which 8634,01 Ha is situated in Baubau City and 1365,74 ha in Buton District [Kasim, S, 2012]. This watershed is geographically located in 5º27´8″ and 5º32´33″ South Latitude and 122º33´5″ and 122º 42´ 34´ East Longitude.

The soil types are dominated by litosol patch (51,30%) and Mediteran Types (41,77 %), while Latosol only occupy 6,93 of total watershed land. The watershed area receives rainfall 1785, 2 mm in average/year with 147 rainy days. The highest monthly averages of raifall happens in December (272,00 mm with 20 rainy days) whereas the lowest occurs in September (9,5 mm with 2 rainy days) [Kasim S, 2014].

There are four subdistricts belong to Baubau City and two others belong to Buton Regency. For the purposes of this study, data collected is only to be carried out in the four subdistricts of Baubau City namely : Sorawolio, Wolio, Murhum and Betoambari. The study employs various methods in valuation of hydrological environmental services of the watershed, namely : Hedonic Price for estimating economic value of water for domestic and industrial use, productivity approach used for analyzing economic value of water for agricultural use, while Willingness to Pay (WTP) approach using for the valuation of catchment forest reserves for preventing from erosion, flooding and landslide hazards. Primary data was collected through observation and deep interview with respondents in each sub district. This is included : (i) number of households who are using clean water for domestic and agricultural uses from the catchment forests; of the Baubau Wonco Watershed, (ii) number of industries that are using clean water from the catchment forests of the watershed, (iii) The water volumes that are consumed for domestic use, agricultural and industrial uses, (iv) Spent costs for water consumption, (v) Spent costs for agricultural activities (paddys field), (vi) Paddys Fields Total Areas, (vii) Paddys Field Production/Year, (viii) An intensity of Crop Season/Year. Whereas secondary data was collected through documenting such sources of data as: reports of previous study, government documents, especially related to the government policies and statistical reports that are relevant with the purposes of the study.

RESULT AND DISCUSSION

Valuing forest ecosystem services for preventing from erosion and flooding hazards

Economic valuation of forest ecosystem within Baubau Wonco Watershed for preventing from erosion and flooding hazards using **Contingency Valuation Method** (CVM). CVM method is an approach to valuing ecosystem services with giving direct questions to the communities who get benefits from ecosystem services. This approach is conducted through direct and deep interview with beneficiaries. This method is intended to explore beneficiaries' pREFERENCES by mentioning their Willingness to Pay to the certain ecosystem services (Bishop, 1999). Economic Value of catchment forest within Baubau Wonco Watershed to prevent erosion and flooding hazards can be seen in table 1.

Table 1. Economic Value of Catchment Forest within Baubau Wonco to Prevent Erosion and Flooding Hazards.

District	Number of Inhabitant	Number of Respondent	WTP (Rp/Mo)	Economic Value (Rp/y)
Betomri	17.286	17	21.588	4.478.042.016
Murhum	22.447	22	21.000	5.664.204,000
Wolio	40.312	30	20.566	9.948.679.104
Sorawlio	7.561	8	21.250	1.928.055.000
Total	87.606	77	4,404	22.018.980.120

(Source : Data analysis, 2016)

Tabel 1 showed that WTP of respondents for forest ecosystem services to prevent from erosion and flooding hazards in 4 districts ranged from Rp. 21.000 – 21.588/month. Wolio District which is the biggest population numbers has the highest WTP, achieved Rp. 9.948.679.104/year, whereas Sorawolio district as the smallest in population number has the lowest WTP, obtained 1.928.055.000/tahun. However, local community in Sorawolio District has a greater WTP than other districts which is in average about Rp.21.000/month. A total WTP of the local communities surrounding watershed achieved Rp. 22.018.980.120/year. This total numbers expressed local community appreciation to the ecosystem services provided by catchment forest within the watershed area in preventing from erosion and flooding hazards.

Catchment forest ecosystem has strategic roles in sustaining hydrological functions of the watershed such as increasing in infiltration rates and water availability during the rainy season, decreasing in run off and erosion rates and flooding hazards.

Economic Value of Catchment Forest to Prevent Land Slide Hazard

Economic valuation of forest ecosystem services to prevent from landslide hazards is intended to explore loss of economic value when landslide happen. A high erosion rate combines with a steepness of topography within the watershed area can lead to landslide hazard. Based on upon interview with local communities surrounding watershed, landslide hazards has happened in Wolio and Murhum Districts which has topography steepness about 40%. Landslide hazard has brought about economic loss of the local community. Using a WTP approach, economic value of forest ecosystem services to prevent from landslide hazard can be seen in table 2.

Table.2. Economic Value of forest ecosystem services to prevent from landslide hazard

District	Number of Inhabitant	Number of Respndnt	WTP (Rp/Mo)	Economic Value (Rp/Y)
Murhum	22.447	10	22.500	6.060.690.000
Wolio	40.312	10	26.000	12.577.344.000
Total	62,759	20	48.500	18.638.034.000

(Source: Data analysis 2016)

Table 2 showed that a WTP of respondents ranges from Rp. 22.500 to Rp. 26.000 each month. The economic value of forest ecosystem to prevent from landslide hazard obtained Rp.18.638.034.000/year.

Total Economic Value of Catchment Forest Ecosystem Services

As mentioned earlier that this research has been conducted for two years. The first year study attempted to explore the economic value of hydrological services of catchment forest to provide water for domestic, agricultural and industrial uses. Thus, the Total Economic Value (TEV) refers to the accumulated economic value of catchment forest ecosystem services to provide water for domestic, agricultural and industrial use, to prevent from erosion, flooding and landslide hazards. The total economic value of the catchment forest within the watershed can be seen in table 3.

Tabel 3. TEV of catchment forest ecosystem services of Baubau Wonco Watershed

Kinds of Ecosystem Services	Economic Value (Rp/y)
Water for Domestic Use	19.772.271.147
Water for Agricultural Use	22.563.520
Water for Industrial Use	8.670.549
Preventing from Erosion and Flooding	22.018.980.120
Preventing from Landslides hazard	18.638.034.000
Total	42.660.519.336

(Source, Data analysis, 2016)

Table 3 showed that the TEV of catchment forest within Baubau Wonco Watershed obtained R**p.42.660.519.336/year.** Willingness to Pay of local community surrounding the area has the highest contribution to the TEV which achieved Rp. **22.018.980.120/year.** This data reveals that local community has been realized that catchment forest ecosystem within the watershed plays critical roles in protecting the area from erosion and flooding hazard. High rate erosion hazard, combined with high intensity of rainfall during the rainy season leads to high intensity of flooding occurrence in Baubau City. [Kasim S, 2012] stated that almost 90% of the total area of Baubau Wonco Watershed has high rate of erosion hazard. Soil loss from erosion will be transported and becomes sediment to the Baubau river. Accumulation of material transported due to erosion over years will decrease in river capacity to retain flowing water from the upland area of the watershed. Furthermore, rapid land use change which forested land has been altered to dryland plantation, infrastructure and housing has exaggerated impacts of erosion. As a result, flooding hazard frequently occurs during the rainy season and has led to the economic loss of the community. Therefore, local community has high willingness to provide funds for conservation efforts of upland catchment forest ecosystem.

Economic value of water for domestic use contributes **Rp. 19.772.271.147/year.** This economic value was calculated using hedonic price approach by counting total clean water consumptions of the local community multiplies by water price that has been decided by local government of Baubau City. This economic value will be more highest since the calculated value is only considering consumption of water at the 4 districts belong to the watershed area.

The third contributor of the TEV of catchment forest ecosystem services comes from the economic value of water to prevent from landslisde hazard whch obtained **Rp.18.638.034.000/year.** Landslide hazard rarely occurs within the area of Baubau Wonco Watershed. There has been 2 times occurrence of landslide hazard during 10 years period (2005-2015). It has only occurred in Wolio and Murhum district. Although the hazard rarely occurs, but it caused serious damage of community and public assets and led to economic advantages both for the local community and the city as general. It is therefore, almost all inhabitants who live around landslide area are willing to pay their contribution for conservation fund of catchment forest ecosystem within the watershed.

Hydrological role of catchment forest to provide water for agricultural use has economic value about **Rp.22.563.520/year.** This value was calculated using production function approach of paddy field plantation around the watershed area. This approach considering how irrigated water improves paddy crop yield and therefore the incomes of the farmers. Valuation of irrigated water will be meaningful to the local farmers for the future since they are assuming that irrigated water is given facility from the government, thus they tend to have no attention to the maintenance of the facility. Valuing the hydrological role of catchment forest ecosystem to provide water for agricultural use can be a trigger for the development of mutual collaboration between the local farmers and government to conduct efforts both for maintaining irrigation facility and conserving the catchment forest ecosystem within the watershed area

The smallest economic value of catchment forest ecosystem services is the value to provide industrial water which obtained **Rp.8.670.549/year.** This is due to small numbers of medium industries and the absence of big industries that consume large volumes of water. There are several home and small industries that consume small amount of water. Limitation time and fund during research process can also be limited factors to conduct interview with more respondents of the owners of small industries across the city of Baubau.

CONCLUSION

1. Domestic Water consumption within Baubau Wonco Watershed achieved **3.034.195, 56 m^3/year** and has economic value **Rp.19.722.271.147,72/year**.
2. Economic value of agricultural water obtained **Rp. 22.563.520,90/year** that was calculated using Production Method with influenced factors are paddy field area, unhulled paddy production/hectare, Consumption of Irrigated Water Volumes and Paddy Field Farmer Incomes.
3. Water Industrial consumption obtained **1.333.930,75 m^3/year** with the economic value obtained **Rp.8.670.549,88/year**. Driven factors of economic value of industrial water are numbers of small and medium industries in Baubau City and water demand for industrial activities.
4. Economic value of ecosystem forest to prevent from erosion and flooding hazard achieved **Rp. 22.018.980.120/year**, which influenced by willingness to pay of the community as compensation for ecosystem services.
5. Economic value of ecosystem forest to prevent from landslide hazard achieved **Rp. 18.638.034.000/year**, which influenced by willingness to pay of the community as compensation for ecosystem services.
6. The Total Economic Value of catchment forest ecosystem services achieved 42.660.519.336/year.
7. It is strongly recommended to develop institutional model that can facilitate an implementation of Payment for Environmental Services to sustain watershed functions.

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The Use of Moral Dilemma Worksheet on the Issue of Forest Ecosystem Through Science/Ipa Learning at Smpn 6 Banjarmasin

Aminuddin Prahatamaputra

Lambung Mangkurat University, Faculty of Teacher Training and Education Science,
Jl. Hasan Basry Banjarmasin, South Kalimantan, Indonesia

Email: aminuddinpatra@unlam.ac.id

ABSTRACT

The ability to solve problems associated with the consequences of one's morals in general can be said to be vary according to the differences in personality, the way of thinking, and behavior. The difference in thinking skills of the students have prompted the authors to conduct a research to develop a moral dilemma worksheet in problems of forest ecosystem to train the students' critical thinking skills at SMP Negeri 6 Banjarmasin. This study used one group pretest-posttest design. The data of the research results showed that: (1) The developed worksheet, otherwise, was valid in overall by academician and practitioners, (2) The developed Worksheet has fulfilled the practical criteria based on the implementation of the lesson plan with good categories, (3) The worksheet is declared to be effective by achieving the score gain ie 0 , 66 with the medium category, and (4) Science process skills of students considered as good. Therefore, worksheet of moral dilemmas in problems of forest ecosystems were declared feasible (valid, practical, and effective) use to train students' critical thinking skills at SMP Negeri 6 Banjarmasin.

Keywords : woksheet, dilemmad, problem, forest ecosystem

INTRODUCTION

Today, the moral problems that occur are far more numerous and more complex than the moral issues that occur at earlier ages (Budiningsih, 2008). According Kemendikbud (2013b), although there are no scientific studies that the breach the order were started from education, but some education experts and community leaders stated that one of the root of the problem is the implementation of learning materials that overly emphasized cognitive aspects and the shackle of students in his study with their activities are less challenging for the students. According to Prahatamaputra (2016) on MGMPs IPA-biologi SMP kota Banjarmasin in 2013, 87% of teachers were still using a worksheet that haven't apply a scientific approach to train problem solving skill in comple way or to train a critical thinking skills.

It certainly raises the question, can the student of elementary or secondary education understand the moral and social problems, for example discrimination and inequalities in life that related with IPA-Biology (life sience-biology) issues? Probably not, if we ask those terms directly. When learning IPA-biology that ongoing, teachers were often try to ask their opinion on the various situations of pollution, damage to natural resources, forests that were cleared or erosion problem that happens everywhere. Similarly, situations that involved conflict, socio-economic inequalities, the impact of coal mining, and drugs in various areas.

As an example of the conflict, when the teacher asked what should be done by a student in the context of gold mining in a forest area in which the public must do so the food and clothing needs are met. Some cases such as shifting cultivation, protected animals hunting, or the clearing of ironwood because of the economic circumstances forced his family who got the rejection of some students is a moral conflict that must be resolved by students.

Students in elementary education turned out to see the problems of injustice and were sometimes able to provide an attractive solutions to the problems that were faced (Piaget, 2013). Children in particular are very responsive to the issues of inequality that occurred in their neighborhood (Santrock, 2007). Such conditions are generally more massive happens to students who do not have access to many kinds of social problems around them (Hakam, 2011).

Renstra Ditjen Dikmen 2010-2014 (Kemendikbud, 2012) states, a policy to solve many kinds of problems that faced by young middle-class students related moral concerns, one of them is to put moral education that integrates the value of religion, character, pride of the citizens, hygiene care, care for the environment and care in education's providing.

Science/IPA learnig (including biology) has a large social and moral implications, which means no longer moral free, but rather tied to the moral (Fraenkel, 1977). Science education (including biology) has contributed to train an aspect and objective of critical thinking skills of students. Up till now, with various changes, science education continued to plant the values of honesty, discipline, respect of human means, caring, humility, protect human life and other values through learning activities that conducted in schools (Ma-Kellams, 2013) , Biology can not get away from things that are related to the power of God and moral both the environment and fellow human beings. Biology tought, how do we behave towards ourselves and others. Biology plant these values without patronizing, these values were consciously obtained by students through a process, which can add power to receive and store those information (Kemendikbud, 2013b).

The purpose of this study was to produce a worksheet (LKS) of moral dilemma on the issue of forest ecosystems that proper (valid, practical, and effective) to train critical thinking skills of students at SMP Negeri 6 Banjarmasin.

MATERIALS AND METHODS

This research is a research and development (R & D) research on aim to produce a moral dilemma worksheet on the issue of forest ecosystem to train the critical thinking skill of the students.

Research Design

This study used a development model by the ASSURE that developed by Heinich, Molenda, Russell and Smaldino (Clymer, 2007). In general, this study was conducted in two parts of a series activities. The process of developing a worksheet was conducted in FKIP Unlam Banjarmasin campus. The testing and implementation of learning was done at class VII of SMPN 6 Banjarmasin. The subjects were the students in grade VII B of SMP Negeri 6 Banjarmasin. Total sample was 29 students consisted of 10 boys and 19 girls.

The Feasibility of The Worksheet

The feasibility of the worksheet that was developed in this study was viewed from the level of validity, practicality, and effectiveness of the worksheet. The worksheet's data validity were obtained by study from academics and practitioners. The practicality of the worksheets were obtained from observations of RPP (lesson plan) implementation. Furthermore, the effectiveness of the work sheet were obtained from the test results of written test before and after treatment which is expressed by the value of normalized gain score.

Data Analysis

The technique of daya analysis used in this study is descriptive qualitative and quantitative. The score of the worksheet by practitioners and academics were averaged for every aspect and also categorized as criteria on Table 1.

Same thing were also done for the realization of the RPP (lesson plan) by two oberver.

Table 1. Worksheet Validity

No.	Validity Criteria	Validity Level
1.	$4 \leq P < 5$	Very Feasible/Valid
2.	$3 \leq P < 4$	Feasible/Valid
3.	$2 \leq P < 3$	Average
4.	$1 \leq P < 2$	Less

Addapted from Khabibah (2006)

Special case for the effectiveness data of worksheet that is based on the results of the pretest and posttest, the calculation of normalized gain score value was done. To calculate the N gain score was used an equation (Hake, 1999):

$$< g >= \frac{\% postest - \% pretest}{100\% - \% pretest}$$

N-Gain criteria according to Hake (1999) were divided into three levels : (1) high gain, if $<g> \geq 0.7$; (2) Average gain, if $0.7 > <g> \geq 0.3$; and (3) low gain, if $<g> \leq 0.3$.

RESULT AND DISCUSSION

Result

Product result of the development of the moral dilemma worksheet on the issue of forest ecosystem to train the critical thinking skill of the students, are presented as followed:

Validity of the Worksheet

The developed worksheets were consists of three different topics, that used for three meetings. The results of assessment of the worksheet was conducted by academics and practitioners for each developed worksheet. Figure 1 summarizes the results of the assessment and used as the basis for determining the feasibility of a developed worksheet. The results of the validation worksheet by fifth validator shown in Figure 1.

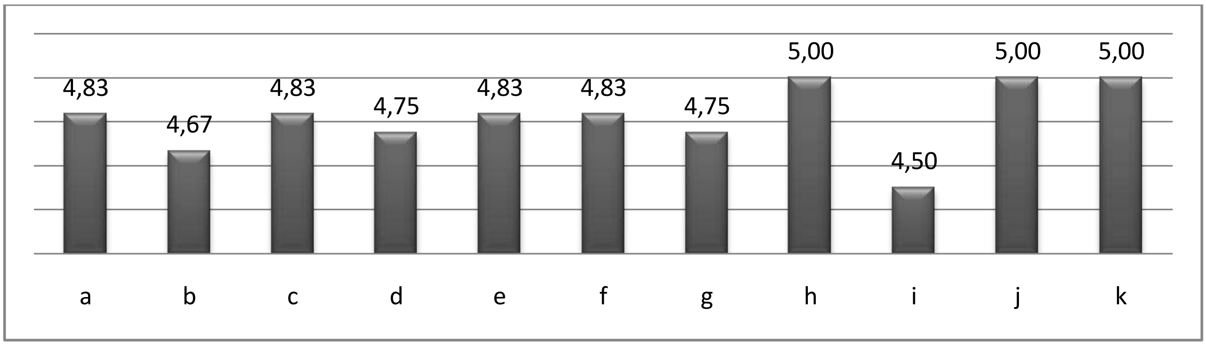

Figure 1. LKS Validation Chart

Aspects of assessment description:

1. Aplication problem
2. Related with daily life
3. Chance to plan
4. Need a solution
5. Did not cause a double meaning
6. More than one concept
7. More than one solution
8. Suitable with understanding level

9. Easy to understand
10. Suitable with language rules
11. Did not cause a double interpretation

Overall of the average aspect of assessment score from every developed teaching material above 4,0 that were a lower limit for valid category.

Worksheet Practicallity

The recapitulation from observations of the implementation of the worksheet in the form an average score of observing activities using worksheets consists of INTRODUCTION, core activities, and closing also covered learning atmosphere were shown in diagram in Figure 2.

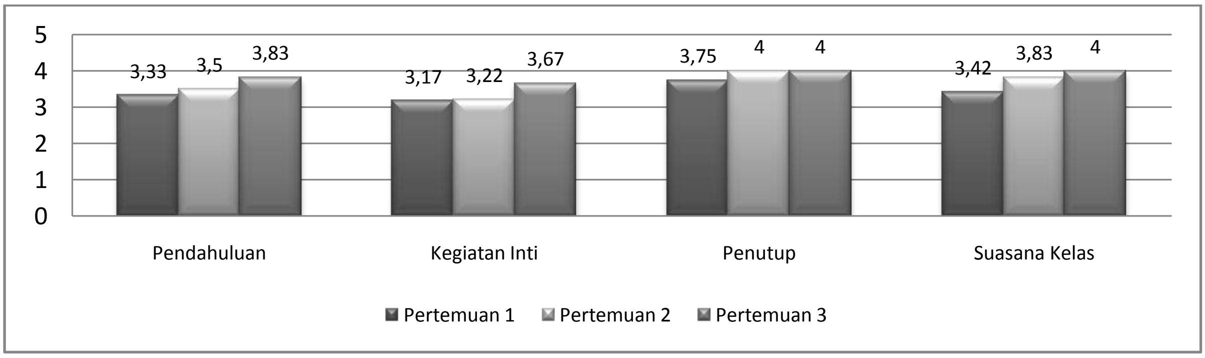

Figure 2. Average Implementation of RPP Diagram

Based on Figure 2 above, the implementation of the worksheet on average are got good value with a reliability of over 3.5 (75%). This showed that the use of the worksheet can be done well and reliably so that the learning activities also categorized as the same.

The Worksheet Effectiveness

The results of the completeness of indicator analysis can be seen briefly in Table 2 to 4

Table 2 Result of the Completeness and Items Analysis First Meeting

Num.	Learning Indicators	Item number	Item proportion		Sensi-tivity	Exp.
			U1	U2		
1.	Students are able to explain constituent of biotic and abiotic components in forest ecosystems	1-7	0,43	0,85	0,41	T
2.	Students are able to relate deforestation and the impacts and the efforts to overcome it.	8-13	0,43	0,93	0,49	T
3.	Doing a problem soving towards the issues of forests ecosystem destruction	14-15	0,53	0,90	0,36	T

4.	Enhance the development of moral in solving the issues of forest ecosystem	16-18	0,40	0,78	0,36	T
5.	Using internet to indentify deforestation	19-20	0,38	0,69	0,31	T

Table 3 Result of the Completeness and Items Analysis Second Meeting

Num	Learning Indicators	Item number	Item Proportion		Sensittivity	Exp.
			U1	U2		
1.	Students are able to explain the balance of forest ecosystems (succession)	1-6	0,50	0,91	0,41	T
2.	Students are able to explain the excessive logging can disrupt ecosystems	7-9	0,61	0,97	0,97	T
3.	Students are able to explain about the forest fire is a disturbance for forest ecosystem that can not be recovered immediately	10-13	0,47	0,92	0,92	T
4.	Doing a problem solving of the issues of the destruction of forest ecosystems	14-15	0,48	0,81	0,33	T
5.	Enhance the development of moral in solving problem of forest ecosystems	16-18	0,46	0,83	0,37	T
6.	Determining the differences between ecosystems of the tropics and subtropics forest using picture	19-20	0,41	0,69	0,28	T

Table 4. Result of the Completeness and Items Analysis Third Meeting

Num-ber	Learning Indocators	Item Number	Item Proportion		Sensitivity	Exp.
			U1	U2		
1.	Students are able to indentify the characteristics of rainforest	1-5	0,45	0,86	0,41	T
2.	Students are able to explain the characteristics of tundra biome	6-9	0,38	0,94	0,56	T
3.	Students are able to explain the diversity of species in the desert biome	10-13	0,43	0,86	0,43	T
4.	Doing a problem solving towards forest conservation issues in Indonesia	14-15	0,26	0,86	0,60	T

5.	Enhance the development of moral in solving problem of forest conservation	16-18	0,37	0,82	0,45	T
6.	Collecting pictures and information from the internet media about desert biomes, wet forests, meadows, deciduous forests, taiga, and tund	19-20	0,38	0,78	0,40	T

Table 2 till 4 above showed that the proportion of learning indicator item from the result of post-test learning is at above of 0,70. It showed that the learning indocators of three meetings considered as good with sensitivity above 0,30. It means that the score showed that all of the items are sensitive to the effect of learning.

Classically, the obtained gain score is at 0.67 which is on the medium category. If it is observed individually, the acquisition of student's gain score is categorized in Figure 3.

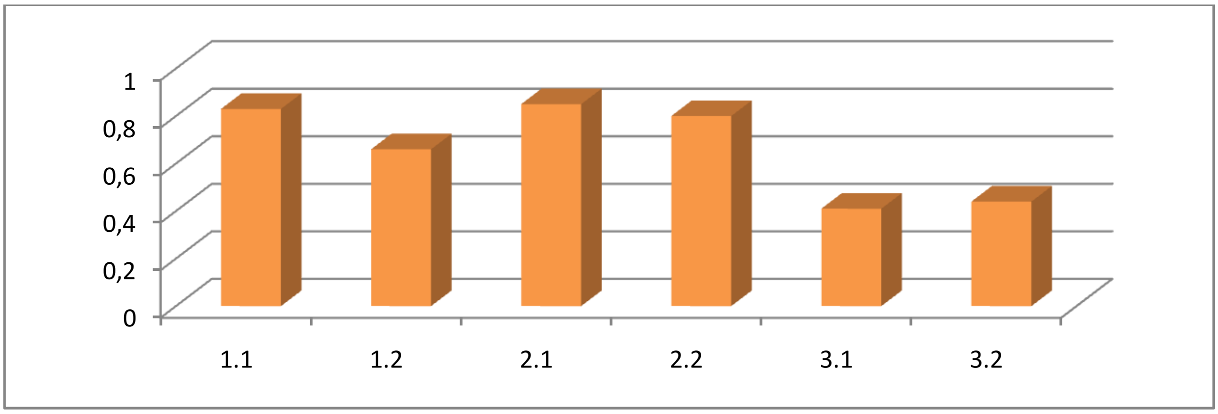

Figure 3. The acquisition of student's gain score

After the learning was on the run, the researcher gave a quistionnaire to know how far the student's respond towards the teaching and learning activity, with the presentation of data in Figure 4.

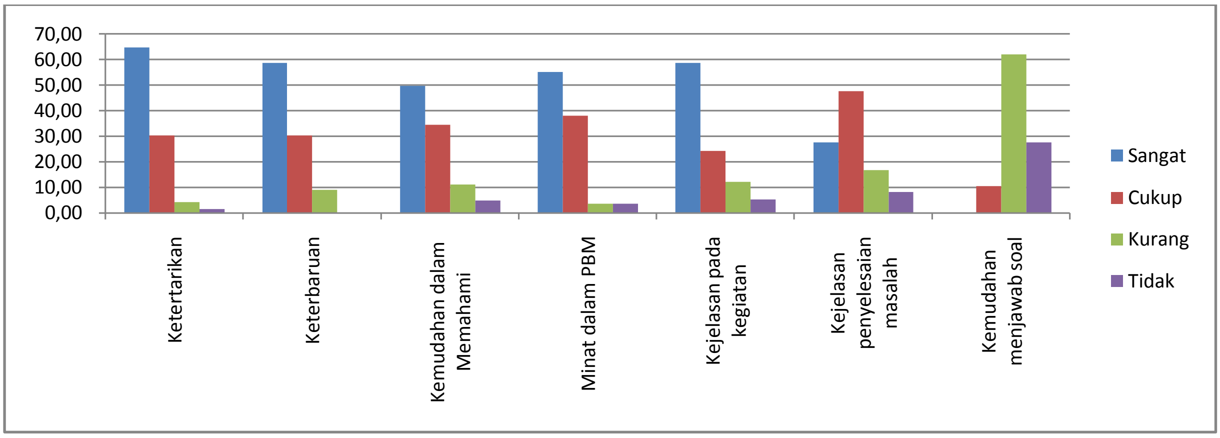

Figure 4. Students' respond

Based on figure 4 the summary of students' respond showed that the created worsheet of moral dilemma may facilitate the teacher to train the critical thinking skills based on moral dilemma in learning process.

The Achievement of Critical Thinking Skills

Table 5 shows the average achievement of students' critical thinking skills acquisition are in very good category. This is demonstrated by the acquisition of a score that greater than 3.20.

Table 5. The Achievement of Critical Thinking Skills

Number	Critical Thinking Skills Component	Score	Category
1	Identify Variable	3,40	Very Good
2	Formulating Problems	3,40	Very Good
3	Hypothesize	3,53	Very Good
4	Designing Settlement	3,93	Very Good
5	Problem Solving	3,53	Very Good
6	Analyzing Data	3,27	Very Good
7	Concluding	3,07	Good
8	Communicating	3,13	Good

Source: Prahatamaputra (2016)

Discussion

The result showed that the designed worsheet was theoritically very valid, it means that it is suitable with the ways of the researchers' thought to counstruct it can be acceptable. According to Sarbaini (2011), moral value conflict on the task that was done by the students will encourage the process of thinking, stimulate changes in the development of childs' cognitive structure towards the position and problem solving that he will do. Moral development of someone may be influenced by various of factors that is made through many kinds of model/patterns, namely cognitive, affective and behaviouristic. All of these are developed in an integrated manner. (Sulhan, 2010; Olson, 2011). Thus the content and construct validity of the worksheet is sufficient to meet, so that it can be implemented and verified in the field.

The development of worksheets were customized to the material and lessons that have been used. Worksheets are used as a guide for problem solving procedures step by step, through the discourse of moral dilemmas. For its implementation, the students discuss the worksheet that contains the discourse of moral dilemmas be discussed group to strengthen the material being studied.

The use of the discourse of moral dilemmas in this worksheet refers to the statement of Kohlberg (1977) who developed a systematic tool to uncover reasonings of children by developing a set of stories, which incorporate people into a moral dilemma. Then compiled the questions regarding with these dilemmas, which are intended to explore reasonings subject that is concerned, what is the reason so the children will perform certain actions in such situations.

The capability test for problem solving is an instrument for measuring problem solving ability of students related to the material components of the ecosystem, ecosystem balance, and the importance of preserving the forest. The measurement capability refers to the model of problem solving by Polya (1973) with an indicator that consists of understanding the problem, problem-solving plan, carry out troubleshooting, and recheck the results of the settlement were made. Number of problem solving ability test each basic competency have 7 items so that the total number is 21 items.

The cognitive achievement test were made in the form of multiple choices questions, and problem solving ability test is made in the form of a matter of description. The results of the validation from the experts on both kinds of the tests showed that the validity of the content to get the average valid category without any conditions.

Based on the acquisition of validation scores above means that the cognitive achievement test products and test the ability of solving problems created can be used in science (IPA)-biology teaching of SMP grade VII in subconcepts components of the ecosystem, ecosystem balance, and the importance of conserving forests in valid category. According Sarbaini (2011), the implementation of learning test to the learning process implemented refer to the objectives and learning materials that contain aspects of cognitive ability, psychomotor, and affective. Those aspects are humans' characteristics including a distinctive way of thinking associated with the cognitive, do relate to psychomotor, and feelings associated with the affective domain.

Based on data of learning outcomes as a measurement/indicator of the effectiveness of developed worksheets also yielded a positive results. The acquisition gain score of 0.67 (medium category) showed that worksheet of moral dilemmas in the problem of forest ecosystems through science (IPA) learning was effectively improve the students' learning outcomes at baseline (pretest) obtained 30.7 becomes 77.0 in the posttest. This is supported empirically by numerous studies including Prahatamaputra (2016).

Through the worksheets that based of moral dilemmas in this forest ecosystem issues, students are directed at problem that was close to their environment, then solve it through direct activities in class using the tools and materials such as textbooks, internet, and relevant images.

The ability of moral development of students in the biological field practice discourse (KD 1.4), an increase of N-Gain obtained was 0.83 with a high category. The ability of moral development of students in the discourse of the components of the ecosystem (KD 1.5), an increases of N-Gain obtained was 0.66 with medium category. In the discourse of the components of the forest ecosystem (KD 1.6), an increase of N-Gain obtained was 0.85 with a high category. The ability of moral development of students in the discourse of the balance of the ecosystem (KD 2.1), an increases of N-Gain obtained was 0.80 with a category is also high. While the discourse of the importance of preserving the ecosystem (KD 3.1), an increases of N-Gain obtained is 0.41 in the medium category. Similarly, the ability of moral development of students in the discourse of the importance of conserving forests (KD 3.2), an increases of N-Gain obtained was 0.44 with medium category.

Based on the average of N-gain above, among the students in facing and solving the problems of the forest ecosystem through a moral dilemma, do not close the possibility of different opinions. If this continues, it can cause problems in communication and cooperation, thus may slow the problem resolution work in groups respectively. One way to solve the ethical problem is to conduct some discussions with the direction of the teacher. This discussion is not focused to resolve the dilemma that is being faced but to make suggestions openly about the possibilities of the problems and the solutions. This has become one of the factors so that students have the rising ability in moral development after the stage of resolving of issue has passed in each group. This was suitable with the research CONCLUSIONs Walker (1982, in Santrok, 2007), that a child who accepts the argument was a little above on level of moral reasoning that will motivate them to restructure their moral thought. Almost all the higher stages of discussion, in any time period, seems to increased the progress in moral reasoning. Findings (Malti et al, 2013, and Daniel et al., 2014) show that moral reasoning is still substantially evolved from childhood to early adolescence.

Kohlberg (1995) states that the development of moral reasoning is a process over the role, which is a process of development towards a more comprehensive structure, more differentiated and more balanced than the previous structure. Similarly, statements from Wolcott (2000) that the moral dilemma requires careful consideration of the various problems of a moral dimension, and solved problems will exercise creativity in finding potential moral solution. Still according to Wolcott (2000) on the other part, that the resolved problems can modify both the quantity and quality of effort applied to perform the analysis. Pranoto (2011) suggest children do not passively download an information or a message that is delivered to them, the child is active in the interaction and interpretation, the child can choose or reject the presented ideas. Children experience active externalization process through alternative viewpoints offered by their peers, the media, schools and their own testing.

Students' response to the interest in the use of moral dilemmas worksheet is applied to the next subject and other subjects are very interested in 55.17%, 37.93% quite interested, 3.45% less and are not interested. The responses indicate that the use of moral dilemmas are very much interested in the worksheet for students. According to Suyanto (2010), there are several strategies that can be applied in order to create a learning system that develops the nation's morale through biology, including to use the issue of Indonesian life such as poverty, disease, lack of food and malnutrition, high population growth, environmental pollution, destruction of forests, the extinction of flora and fauna, and so on. These problems should be raised in learning for students to solved. So that the concern of students to social issues will rise and they will try to find solutions to the problem.

Based on the results of the assessment of validator which consists of an academic and a practitioner, the data showed that the developed worksheet has been categorized good. The assessment for a worksheet to see the content of it and its relevance to improve hte students' critical thinking skills. Based on these assessments, the development of a worksheet results declared as valid.

The implementation of worksheets from the development that were done on a trial class is going well. It can be seen from the implementation of the uses of the workseets on there meetings where all of them showed a very good result. Every stage/phase of the learning can be well implemented based on the scenario that has been planned. Those condition were strongly supported by the presence/usafe of the valid worsheet so it will lead the student’s classroom activity, so that the learning process can be smootly be done. Thus the developmented worksheet can be said practical.

However, it was also realized that for the implementation of the learning especially with problem solving morall dilemma based will lead students to do a problem solving, the acquired score are relatively low form other phases. It was mainly caused by the students’ leaning experience factor. The lack of students’ experience in doing an experiment gave effect to the slow down the process of data collection. It created a domino effect to the next phases. In addition, because of the rarely doing an experiment then the student's ability to predict something based on the symptoms studied are still relatively low. Thus, the pattern of based hands activity on in the classroom should be improved.

CONCLUSION

Based on data from the research and discussion, we can conclude that (1) Worksheets of moral dilemmas forest ecosystem based were classified as valid based on an assessment of academics and practitioners that cetegorized good. (2) Worksheets of moral dilemmas forest ecosystem based were classified as based practical enforceability of the worksheet that categorized good. (3) Worksheet of moral dilemmas forest ecosystem based were classified effective based on the acquisition of normalized gain score of 0.67 is categorized medium/average. (4) Achievement of critical thinking skills of the students who are taught using the developed worksheet were considered good.

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Development of Role Model : Empowerment for Capital Expenditure in Planning "Kua" And Determination "Dpa" Work Unit of Government Regional

Syaiful Hifni

Lecturer at Economics and Business Faculty, Lambung Mangkurat University, Banjarmasin Indonesia

Email : shifni@yahoo.com

ABSTRACT

Based on the title "Is There Any Role of Theory of Agency and Institutional In the Planning and Realization for Capital Expenditures of Local Government (A Study on City and Districts Government in South Kalimantan), which the idea with this title, has been presented previously in The 1st Interntional Conference on Economics, Education, Business, and Accounting (ICEEBA 2016), October 18th-19th in Semarang 2016. The capital expenditures are part of direct expenditure in the regional budget. Elements other of capital expenditures are personnel expenditure, and spending on goods and services. Planning and realization for capital expenditure in the regional budget for each Work Unit of Government Regional is a part of policy regional financial management in fiscal decentralization policy which need be increased to achieve value significantly over time. Empowerment in planning and realization of capital expenditures is directly related not only to the amount of capital expenditure element, but also to relevant decision that strengthens physical infrastructure which would strengthen economic growth for social welfare, but also, refering to the Priority Integrating Sector in AEC (2015-2025), objectives number 7 and 8 of of MDGs (2015), and with objective number 15 of SDGs (2015-2030). This study has examined the role of agency theory and institutional theory in relation with planning and realization of capital expenditures of 82 (Eighty Two) Government Regional Work Units from 3 (Three) regional government, namely Banjarmasin City, Banjar District, and Tanah Laut District in South Kalimantan Province. This study contributes to the accounting literature to justify role of conceptual framework with agency theory and institutional theory, in relation with planning and realization for capital expenditure which support to achieve social welfare and for strengthening regional competitiveness in an era of ASEAN Economic Community (AEC). Appropriate review, and in accordance with the development of Role Model for Empowerment for Capital expenditure in planning "KUA" and Determination "DPA" Work Unit of Government Regional has been described with combination of regulatory framework, budget framework and conceptual framework which can empower the budget committe to take their relevant decision in capital expenditure refering to development for trade of Agro-Based products, Rubber Based products, Wood base products; Ensure environmental sustainability, and Develop a global partnership for development, and "Protection, restoring and promoting the sustainable use of ecosystems on land, sustainable forest management, fight against global warming, and to stop the decline of soil and prevent the loss of biodiversity".

Keywords: Capital expenditure, Agency Theory , Institutional Theory , Social Welfare, ASEAN Economi Community (AEC)

INTRODUCTION

Refering to Article 2 of Law No. 17 of 2003 on State Finance, stated one of the country's financial scope is regional expenditure/regional spending. In this Act states, that government expenditure and regional expenditure was detailed down to organizational units, functions, programs, activities and types of expenditure. Spending classified into 2 (two) categories, namely: (i) Direct expenditure, and (ii) Indirect expenditure. Sidik (2007) argue that financial responsibility is a core component of decentralization. Fiscal decentralization means setting limits for decision making at the sub-national level by strengthening the power and responsibilities of lower tiers of public administration in providing and financing public goods and services. Government expenditure comprises three broad kinds of expenditure: (i) Transfer or benefiit, (ii) provisison of public services, and (iii) administration.The first category consists mainly of welfare and super payments, where the crown distributes money to people without expectation of a service of any kind to be provided. Public services include both direct government provision of services such as health and education as well as funding others to provide these services. Public administration which includes spending to provide policy advice, construct and enforce regulation, standard setting, and other administration related to the core functions of governmennt (NZIER, 2013: 4).

According to Law on State Finance, and Government Regulation No. 58 year of 2005 about Management of Regional Finance, showed that decision plans and budgeting as well as decision of capital expenditures realization are part of a system of financial management. As part of determination for local budgets instrument, this process includes a number of phases, where each phase requires the activity of decision-making in meeting planning management output namely Budget Work Plan (BWP) and Document of realization of direct expenditure in the Budget Execution Document (BED). Planning and realization of capital expenditure which referring to program/activities in local government is part of the participation process of budgeting, the establishment of the project or activity as an activity that involves many aspects through the attitude of managerial Budget Team for the performance of decision, as the way in which projects are planned and carried out follows a sequence beginning with an agreed strategy. Project management is the process of developing substantive, systematic data about each parameter in order to maximize the effectiveness of the decision. (Govindarajan, 1986, EC, 2002; HBS, 2002). Starting from the aspect of regulation as the primary basis for the policy to determine Budget Work Plan of GWUs and Budget Execution List of GWUs for capital expenditure/spending activity in the regional budget instrument.

Perspective of planning decisions and realization of capital expenditures is as contingency (Otley, 1980), because the result of this process be determined with many different aspects in every decision-making environment. This perspective describing that no information system that is universally applicable to all circumstances and at all locations of its application. This theory explains there are other situational factors that interact in influencing certain situations. Brownell (1982), and Govindarajan (1986), describes classification aspects of contingency and individual and organizational attributes as a variable that is contingency. The variables are expressed as contingency factors that influence the planning and control systems within the organization.

In policy making was needed the conceptual framework approach for relevant strengthening of regulatory formal as REFERENCES in the decision of the planning and realization of capital expenditure. As the implementation of the decisions related to public policy, the explanations can be taken through the agency theory (Jensen and Meckling, 1976), and as well as institutional theory (DiMaggio and Powell, 1983, 1992). Perspective of agency theory put forward in accordance with the description that: "... CONCLUSION drawn from formal economic models (i.e. agency theory) that ignored the behavioral factor should be interpreted cautiously" (Kren, 1997: 4). Meanwhile, DiMaggio and Powell (1983), put forward the concept of isomorphic mechanisme which described as competitive isomorphism and institutional isomorphism. The concept of competitive isomorphism with regard to the description of the organization's efficiency and economic survival of the organization, while the institutional isomorphism with regard to the strength of their social environment that gives rise to a certain pressure for organizations to be able to develop certain practices that can be accepted in the organizational environment.

The combination of the regulation framework and theoretical framework is required for the suitable of planning and realization of capital expenditures. For process which involves many parties in planning and determining of capital expenditure will cause conflicts of interest. Appropriate Agency Theory (Jensen and Meckling, 1976), explains the key points related to "agency relationship" which describes the contractual relationship between the agent and the principal or the stakeholders, the "divergent interests" and goals. In balancing the relationship with the "principal", whether the agent has acted appropriate and in-appropriate, because the agent has managerial opportunism. This concept describes the tendency of the attitude of behavior in specific actions to meet their own interests. Managerial opportunism inhibit prosperity principal on the main objective to be achieved organization. To explain the phenomenon of self-interest in the public budgeting, agency theory can be used as a theoretical basis (Johnson, 1994; Smith & Bertozzi, 1998).

Institutional theory has explanation tool in the form of the concept of isomorphism. This concept is a tool or a trigger that explains how and why the organization will ultimately have a tendency to move from diversity (diversity) to the level of equalization or similarity (similarity). Di Maggio and Powell (1983) suggested a mechanism isomorpik among others in the form of Competitive isomorphism, as a REFERENCES for the practice of the organization's efficiency and survival of economically from the organization, and Institutional isomorphism as the strength of the social environment which gave specific pressure for institutions / organizations to be able to develop organizational practice which accepted by the organization (DiMaggio & W. Powell, 1983). This theory as a complement of the economic theory that has the common meaning (in general), and the special significance (particular) is Expressed as a resource dependency theory (Carpenter and Feroz, 2001: 565). Appropriate description of this theory, the integration of institutional theory and the theory of resources dependency is to develop a theoretical framework that helps explain an election process in planning decisions and decision taking in realization. This referring to the accountability of economic resource allocation for organization.

Appropriate mechanism refers to the regulation (Government Regulation No. 25 of 2004) describes the stages in the planning and realization of capital expenditure as part of the forming projected value of direct expenditure in Budget Work Plan of Governmental Work Units (GWUs) and determination of its realization in Budget Execution Document (BED) of GWUs. This stage shall refer to the stages of the activity: (i) the stage of determination Budget General Policy (BGP), which based on (Regional development plan in medium term / Government Work plan, aspirations of stakeholders, the performance of the previous period, the basic assumptions in economic, and policy development related to the development priorities). BGP containing program / activities with indicative ceiling value. (ii) the determination "Priorities and Ceiling Budget While" which was discussed between the executive and parliament. This stage as fulfilment a planning process which produces documents Work Plan Budget of GWUs. (Iii) determination of the realization budget as evaluation process stage to determine the Budget Execution/Realization Document of GWUs. Fulfillment for the stages above involve various aspects which into consideration for decision-making based on compliance with regulatory aspects.

Relevance of capital expenditure planning and its realization has implications for the achievement of good governance for local governments. This thing related with regard to efforts to suppress errors in the implementation of financial management procedures. This is related to the phenomenon (Garamfalvi (1997), which states that corruption can occur at all levels of budgeting, from planning to the payment of public funds. The phenomenon of corruption is politically (political corruption) can occur in the phase of planning and budgeting, as at this stage a political decision is dominant, there is a way to redirect the allocation of public resources. Then, the context of corruption occurring in the implementation of the budget is administrative corruption (administrative corruption), in this case due to the administrative decisions which are predominant. the phenomenon develops where there is a potential political corruption will lead to administrative corruption. Context of accountability described in accordance Peters (2007: 16) which suggests the simplest form of accountability as a prerequisite for the administrative of organization that to show responsibility for what has been done.

Therefore, future research ought to focus more on the idea-based endogenous growth models to check the robustness of Policy Recommendations. Moreover, the inclusion of hitherto unexplored types of government expenditure, e. g., on the rule of law ", would be desirable (Andreas and Johanna, 2008). Various studies related to the planning and realization of capital expenditure on the organization has been done. Rating in percentage of the existing of spending on investment to serve the public to the expected of spending on investment to serve the public as a public service quality level of macro-level (Widojono, and Muzakar, 2013). Planning and realization of capital expenditure in terms of physical infrastructure spending which effectively became the basis for the development goals of social welfare and regional competitiveness in an era of MEA. It is as one component in economic growth in the global environment, namely the accumulation of capital which includes capital expenditure and investment in physical (Todaro, 2006). Econometric analysis of the results of research showed that in the short term, construction spending and employee spending are not significantly influence economic growth, but in the long term development spending significant effect on economic growth statistics, while the labor force has no effect on economic growth (Handoko, 2013: 179). Other studies previously, showed significantly, that there was a relationship between regional economic growth, spending and development expenditure (Adi, 2006, Nworji, 2012). Capital expenditure perspective gives a role to the achievement of development objectives for social welfare and even meet the requirements related to competitiveness in the era of the MEA. In accordance Adi Hari (2006) showed a CR value to the relationship between Spending for Development and Economic Growth amounted to 8.417. It can be concluded that the regional development spending has a positive and significant impact on economic growth.

In this case the role of regulation would guide for decision of plans and realization program/activity referring to capital expenditure projection. Capital expenditures be determined in planning and realization referring to Budget General Policy and "Priorities and Ceiling Budget While " which needs to strengthened with the perspective of agency theory and institutional theory. It will bring and enhance management to achieve relevan decision in order to meet social welfare and also to achieve regional competitiveness in the ASEAN region. the perspective of management in the planning and realization of capital expenditures was needed to achieve objectives the social welfare and in relation to the challenges and implementation of ASEAN Economic Community (AEC) 2015. Indeed, the whole point of a universal welfare policy is not to discriminate between citizens, not to separate "the needy" and "the poor" from other citizens and to treat them differently (Rothstein 1998). Social policy should seek instead a moral obligation to furnish all citizens with, in Amarty Sen's words, basic capabilities (Sen 1982). This stands in contrast to the situation under a selective and a conservative (mixed) system (Esping Andersen 1990, 1999), as the public discourse about social policy in a universal system cannot be conducted in the terms indicated by the question: "what shall we do about these deviant groups/individuals?" (Bo and Dietlind, 2001: p. 12).

Last of relevant of other Research result showed that: This study examines the role of agency theory and institutional theory in relation with planning and realization of capital expenditures of 82 (Eighty Two) Government Work Units of 3 (Three) regional government, namely Banjarmasin City, Banjar District, and Tanah Laut District in South Kalimantan Province. This study contributes to the accounting literature to assess role of conceptual framework with agency theory and institutional theory. The result of study showed : there are differences in the implementation of capital expenditure to meet AEC pillars and social welfare purposes by increasing capital expenditure through the role of the agency theory, and institutional theory. Relationship of agency theory and institutional theory with social welfare and AEC with the amount of C Contingency coefficient 0,313 and Cramer Coefficient of Association 0.191 indicates there are "Moderate correlation: substantial relationship" and "Small correlation; Lower relationship association (Syaiful, 2016)

Based on the description in background, research previouly, the research problem formulation raised is, how does Role model can be developed for Empowerment for Capital expenditure in planning "KUA" and Determination "DPA" Work Unit of Government Regional. Based on difference and relationship of planning and realization of capital expenditure with the role of the agency theory aspect, the institutional theory aspects, and objectives of social welfare for Regional Competitiveness in AEC, content of model will include ”regulatory framework, budget frame work and strengthen of conceptual framework. This role model will enhance budget committee of regional government to explain and to predict the phenomenon in decision making process for planning and realization capital expenditure regional governments. Role model built public policy in RKA and DPA SKPD to develop trade of Agro-Based products, Rubber Based products, Wood base products; environmental sustainability, and a global partnership for development, and ”protection, restoring and promoting the sustainable use of ecosystems on land, sustainable forest management, fight against global warming, and to stop the decline of soil and prevent the loss of biodiversity”.

MATERIALS AND METHODS

Research Design

This research is a qualitative research with informational analysis for data.

Research methods

Subject and Object Research

Subjects of research are Government Work units (GWUs) in Banjarmasin City, Banjar District, and Tanah Laut District Government. Characteristics of the subjects be selected for each GWU which have Budget Work Plan and Budget execution Document for regional budget yearly. The object of study is the agency theory, and institutional theory, aspects of Social Welfare, and the implementation of AEC.

Data analysis

Data were analyzed by analysis of informational for data using descriptive statistics and descriptive model.

RESULT AND DISCUSSION

Result and Analysis

Role of Theoritical aspects:

Table 1. Number Frequency of responses (Fo): Aspects of the agency theory

Frequency of Scores	1	2	3	4	5	Total
Responses of GWUs	1	1	4	22	53	81

(Sources, Primary Data, 2016)

Scores 4 and 5 has achieved with a relatively large up to 92.59 percent. It showing a High effectiveness and a positive response in the ranks GWUs to accept aspects of agency theory.

Table 2.Responses for Role of Theory of Agency

No	*Indicators to be considered*	Fulfilled	Not Fulfilled
1	Determination of capital expenditure carried out on the basis of the effectiveness of the performance of public services	77	5
2	Determination of capital expenditure can be realized fully in the relevant budget yearly;	58	24
3	Capital expenditures carried out according to the needs of society-private (principals);	74	8
4	Capital expenditure on education with information held accountable meet fairness in the assessment of the auditor;	80	2
5	Capital expenditure on education set requires rationality for development	79	3

(Sources, Primary Data, 2016)

Determination of capital expenditure which can be realized related to the budget yearly is lower than the indicators others of theory of agency. This AECn that in stages after determination of budget work plan be stated many aspects to be considered. Regional government face the contingency aspects with the environment in line with their duty to take policy action. In this policy, management of GWUs in Regional government should take and anticipate regulation "ex ante" or "ex post" for decision in planning and to realize capital expenditure in Budget execution document for regional budget yearly.

Table 3.Number Frequency of responses (Fo): Aspects of the Institutional theory

Frequency of Scores	1	2	3	4	5	Total
Responses of GWUs	0	1	6	22	52	81

(Sources, Primary Data, 2016)

Scores 4 and 5 has achieved with a relatively large up to 91.36 percent. It showing a High effectiveness and a positive response in the ranks GWUs to accept aspects of institutional theory.

Table 4. Responses for Role of Institutional Theory

No	*Indicators to be considered*	Fulfilled	Not Fulfilled
1	Capital expenditures are set in considertion of the limited funds available	79	3
2	In 3 years final, capital expenditure has increased	56	26
3	Direct Expenditure on Government Work Unit (GWU) considering the aspects of efficiency and economical	80	2
4	Capital expenditure as a budget framework in accordance with the REFERENCES regulations	80	2
5	Capital expenditures on Government Work Unit (GWU) to support the economic activities of society – private;	73	79

(Sources, Primary Data, 2016)

Based on AECsurement indicator the increasing of capital expenditure in 3 years showed low achievement of positive responses from GWUs in line with institutional theory. Nominal growth of plan for direct expenditure and regional expenditure of Sampling unit of Regional Government:

Year	Direct Expenditure	Regional Expenditure
2011	397.954.817.291,00	924.607.371.591,00
2012	552.430.995.879,00	1.130.039.190.774,00
2013	769.127.801.254,00	1.444.700.363.596,00
2014	798.087.181.790,00	1.468.054.133.839,00
2015	767.583.763.845,00	1.764.174.168.887,00
2016	774.036.073.572,00	1.800.319.581.272,00

(Source: Financial Affair of Regional Government, 2016)

- The ratio of the growth in planning of "direct spending" (2011-2016): 39.04% (2012); 39.31% (2013); 3.77% (2014); -3.88% (2015); 0.91% (2016)
- The ratio of "capital expenditure" to the amount of direct expenditure (Personnel expenditure, spending on goods and services, and capital expenditure) in the years 2011 to 2015: 48.11% (2011); 55, 98% (2012); 57.09% (2013); 47.99% (2014); 41.59% (2015)
  The ratio of capital expenditures to the regional expenditure (consisting of indirect expenditures and direct spending) (2011-2016): 20.67% (2011); 27.34% (2012); 30.40% (2013); 26.09% (2014); 18.08% (2015); 17.38% (2016)
- The ratio of capital expenditures to capital expenditure plan (2011-2014): 79.58% (2011); 75.08% (2012); 68.56% (2013); 86.42% (2014)

- The realization ratio of direct expenditures of the plan (2010-2015): 31.54% (2011); 61.78% (2012); 42.07% (2013); -12.76% (2014); -16.71% (2015).

Growth in direct spending of local government is not always grow up or progressive and even in fact has negative growth due to various conditions. One important thing is the tight expenditure requirements directly related to capital expenditure to meet the suitability for good project and accountable. Because a project is bounded by its results, time, and resources, it is often necessary to make tradeoffs among results, time, and resources, the three elements (or "parameters") by which a project is bound. *Thus, project management is the process of developing substantive, systematic data about each parameter in order to maximize the effectiveness of the tradeoff decision.* The project management process is itself a series of steps typically represented by a "project management process model." (HBS, 2002:4).

As author and Harvard Business School professor Robert Austin has stated:"Conventional project management methodologies work best when the chances are really good that the project will unfold as anticipated during its planning stages, when there is little that can happen during the project that planners can't see coming, when you can formulate responses to contingencies in advance. In other words: when there is not much genuine discovery going on." He points to building construction as an example, where the range of potential problems often can be anticipated and solutions planned in advance. The traditional tools of project management, however, are less useful when uncertainty is high. Something more is required: adaptability. (HBS, 2012:3). Referring to theory of agency, we can refer for the "Note, however, that some companies separate the role of the project "owner" from that of project manager. The owner takes care of meeting the business needs, and the manager is responsible for timely delivery. Yet even in this case, you cannot remove the team and its leader from their responsibility to make sure that their day-to-day work leads to the longterm success of the end result. (*Aaron J. Shenhar, Dov Dvir, 2007:4).*

Table 5. Number Frequency of responses (Fo): Aspects of Social Welfare

Frequency of Scores	1	2	3	4	5	Total
Responses of GWUs	2	10	13	16	39	80

(Sources, Primary Data, 2016)

Scores 4 and 5 has achieved with a relatively large up to 68,75 percent. It showing a effectiveness enough and has a positive response in the ranks GWUs to accept aspects of social welfare.

Table 6.Responses for Role of Social Welfare

No	*Indicators to be considered*	Fulfilled	Not Fulfilled
1	Capital expenditure on GWUs can fulfill the facilitation of sectoral development for basic services	74	8
2	Facilitating the GWU can meet growing business / leading sector in the regions	63	19
3	Facilitate GWU in the development of cross-sector basic services District / City	53	29

4	Capital expenditure on GWU meets the constraints of handling basic services	63	19
5	Capital expenditure on GWU related to the provision of facilities and infrastructure sectors;	67	15

(Sources, Primary Data, 2016)

Medium Term Development Plan (MTDP) is a description of the Vision, Mission, Regional Header programme by referring to the region and noticed Long Term Development Plan (LTDP) National. Contents of MTDP consists of :

1. The Regional Development Strategy

2. Public Policy

3. Direction of Regional Financial Policy

4. Programme of GWUs, Cross- GWUs, territorial, and cross-regional which includes activities in: Regulatory framework and Budget framework

The low achievement of development with the facilitation of cross-regional direct spending, requires the support and strengthening of capital expenditures of GWUs in the Regional Government. This is necessary for the implementation of the budget can be effectively towards social welfare achievement. The relevance of planning decisions and realization of capital expenditure has implications for good governance to achieve the purpose of social welfare by empowering role of the budget towards social welfare. This is spelled out through programs and activities to enhance (i) economic growth, (ii) employment, (iii) reduce poverty, and (iv) environmental protection. Direct spending, both capital expenditures for personnel, goods and services, and for capital goods should be fulfilled government in fulfillment for social welfare. Regional government need to enhance social welfare achievement with planning and realization for capital expenditure. This context in line with (Thomas et al, 2016: 218) in new approach to management theory and social welfare : themes and contributions (Thomas et al, 2016) they stated : “ two themes emerge, First, fairness and justice are argued.

Table 7. Number Frequency of responses (Fo): ASEAN Economic Community (AEC)

Frequency of Scores	1	2	3	4	5	Total
Responses of GWUs	3	8	16	12	38	77

(Sources, Primary Data, 2016)

Scores 4 and 5 has achieved with a relatively large up to 64.94 percent. It showing a effectiveness enough and “cukup memenuhi” a positive response in the ranks GWUs to accept aspects of ASEAN Economic Community (AEC).

Table 8. Responses for ASEAN Economic Community (AEC)

No	*Indicators to be considered*	Fulfilled	Not Fulfilled
1	Policy-related capital expenditure budget for the empowerment of human resources quality basic service sector competition.	70	12
2	Framework for capital expenditure budget to support the empowerment of single market competition	41	41
3	Framework for capital expenditure budget to support the empowerment of competition production base	57	25
4	Policies capital expenditure to support the strengthening of physical infrastructure	67	15
5	Policies capital spending supported the strengthening of the system infrastructure.	65	17

(Sources, Primary Data, 2016)

Strategies for capital expenditure as part of direct expenditure is related to the strengthening of regional competitiveness in AEC. Determination of Budget Work Plan and for Budget Execution Document as budget strategy for :

(i) Strategic Program / Administrative / Socio / Technical to support private sector in region referring to compete in single market and production base that includes five (5) core elements, namely: (i) free flow of goods; (Ii) free flow of services; (Iii) the free flow of investment; (Iv) the free flow of capital; and (v) free flow of skilled labor. The agreement also includes two important components, namely: the priority integration sectors, food, agriculture and forestry,

(ii) for Strategic program / Administration / Socio / Technical for strengthening of regions as Competitive Economic Region of AEC.

(iii) Implementation of Pillar 3 through relevance BWP and BED as Strategic program / Administration / Socio / Technical for strengthening Regions towards Equitable Economic Development, such as to: SME development; Initiative for ASEAN Integration, and

(iv) Implementation of Pillar 4 with BWP and BED asStrategic program / Administration / Socio / Technical for strengthening regions towards Integration into the Global Economy

Related research describes that: ”Each countries has different result. Moreover, the situation of foreign direct investment in every contries at the time before AEC starts also shown the difference. The research emphasizes on one of the main objectives of the AEC itself the single market and production base..., it can be seen we predicted FDI towards the implementation of the AEC has increased, despite the fact that before we know the AEC, ASEAN contries themselves have imposed the name Regional Economic Integration (REI). Where AEC is the sustainability of the REI so can we assume the effects before and after the AEC is FDI will continue to increase in the countries that joined in ASEAN” (Darma and Achmad, 2013: 108).

Role of Regulation dan Budget Framework

Based on concept, determining a planning and budgeting is as the clarity of the process and the purpose of establishing the programs and activities which described by the stage set financial value on the aspect of "shopping" at every program and activity. A direct expenditure such as capital expenditure considered appropriate to be stated in Plan document and in budget execution document when can meet the regulation framework and budget framework. Referring to perspective changes to performance-based budgeting system, the government has reponse on globalization in the environment (AEC), to implement the quality of spending, with "Capital Expenditures".. This function will take by government which will do for: (i) the budget framework and (ii) regulatory framework. Capital expenditures, is important part of direct expenditure and part of regional expenditures (note: others items of direct expenditure are: goods and services expenditure, and personnel expenditure.

Budget framework is a perspective of a program / activity which is accepted as an investment or as a general and special services through by the government (central / local) to stakeholders. Budget framework can be identified , such as by the criteria, where: (a) Not all of the goods and services needed can be generated by the community itself; (b) An example is the defense and security; public road; bridge; to built of waste treatment facility; subsidized education, health and social security; (c) Budget framework is a perspective of a program / activity which is accepted as an investment or as a general and special services through by the government (central / local) to stakeholders. Budget framework can be identified , such as by the criteria, where: (a) Not all of the goods and services needed can be generated by the community itself; (b) An example is the defense and security; public road; bridge; to built of waste treatment facility; subsidized education, health and social security; (c) For goods and services as it was, the government must provide it.

Regulatory framework can be designed because although called as the Program or as Work Plan of government, actually be understood that the development activities financed and implemented by the community itself remains the most important. The Government has the limitation that has been stated is in Article 33 Paragraph (4) Constitution of 1945, the development activities through the society must also be run in accordance with the principles of solidarity, justice, environmental friendliness, independence, and berkeseimbangan. Therefore, the be needed regulation through by the government. The government is also obliged to facilitate and encourage the activities of the community can always evolving. Government activities in regulating, facilitating and encouraging the community is called the government's activities in the "regulatory framework". Forms of Regulation, consists of ex ante regulation and ex post regulation.

Planning of “Budget Work Plan (BWP), and determination of Budget Execution Document (BED) of Government Work Units is referring to programme or project or activity. A project is bounded by its results, time, and resources, it is often necessary to make tradeoffs among results, time, and resources, the three elements (or “parameters”) by which a project is bound. Thus, project management is the process of developing substantive, systematic data about each parameter in order to maximize the effectiveness of the tradeoffs decision. The project management process is itself a series of steps typically represented by a "project management process model." (HBS, 2002:4).

Implementation of the planning and realization of capital expenditure as part of direct expenditures for administratively will requires completeness which to be filled as integrative system or as the intergrated approach (EC, 2002). Referring to PCM, be stated The Project Cycle and Key PCM Principles, as: "The way in which projects are planned and carried out follows a sequence beginning with an agreed strategy, which leads to an idea for a specific action, oriented towards achieving a set of objectives, which then is formulated, implemented, and evaluated with a view to improving the strategy and further action. The project cycle provides a structure to ensure that stakeholders are consulted and relevant information is available, so that informed decisions can be made at key stages in the life of a project". (EC, 2002:3).

As integrated approach, this Project Cycle Management (PCM), consists of : major documents and decisions which is the need for organizations to be accountable in achieving the goal of good governance. Phases Project Cycle Management include: Identification, Appraisal, finacing, implementation, evaluation, and programming. Identification referring to: Pre-feasibility study and Project Identification Sheet with Decision which options to study further. Appraisal consist of: Feasibility study, draft financing proposal with decision whether to draw up a formal financing proposal. Financing referring to: financing proposal, financing agreement with decision to fund. Implementation is fulfillment : Progress and Monitoring Reports with Decision to continue as planned or to re-orient project (mid-term evaluation), Decision about the need for extension. Evaluation as stages : Evaluation study with Decision how to use results in future programming, and Programming referring to: Country Strategy Paper with Priority areas, sectors, timetable. (Sources, EC, 2002:4).

The Government's efforts to meet GGG one of which is done through the financial management of the region/ Regional Budget (APBD), has the principle of management for accountable financial management is required in the country / region. This appropriate of financial fiscal decentralization in Indonesia in setting Regional Budget (APBD) based on performance is fiscal policy strategies to support the achievement of development goals through 4 (four) strategic pillars: Sustainable Economic growth, Job Creation, Poverty Reduction, and sustainable Environment. The relevance of planning decisions and realization of capital expenditure has implications for good governance to achieve the purpose of social welfare by empowering role of the regulatory framework and budget framework towards social welfare.

Globalization has made the government can amend its budget to meet the relevance of the Development objectives in line with the aim of local, national and global. Globalization in development with AEC, MDGs, SDGs, can be realized through programs and activities to enhance engagement of management of natural resources of sub forestry. Hence, the determination of planning decision and capital expenditure for the empowerment of sub forestry in the region to be part of government policy in the implementation of the construction of sustainable environment.

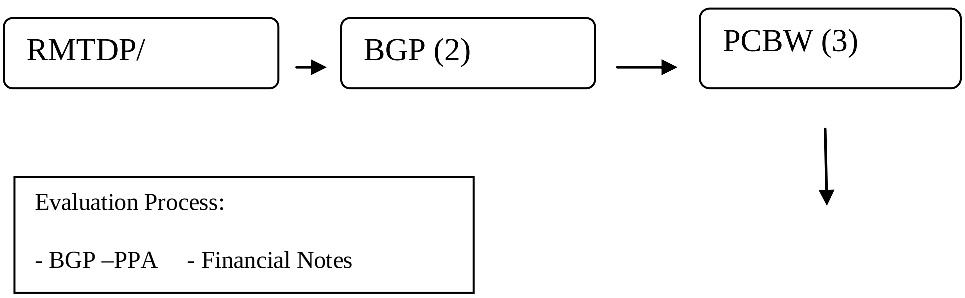
Based on relation in "A Principal-Agent Theory Approach" to Public Expenditure Management in Developing Countries, be stated A well-functioning public expenditure management (PEM) system is considered a critical pillar of government efficiency, (Luc and Elisabeth, 2006). Meanwhile, Shantayana et al, (1996), has showed: “Using data from 43 developing contries over 20 years we show that an increase in the share of current expenditure has positive and statistically significant growth effects. By contrast, the relationship between the capital component of public expenditure and per capita growth is negative. Thus, seemingly productive expenditure when used in excess could become unpredictive. These results imply that developing contry government have been misallocating public expenditures in favor of capital expenditures at the expense of current expenditures (Shantayana et al, P. 313).

The existence of the phenomenon of self-interest in budget planning and realization of capital expenditures related to the public interest between agent and principlas can be described in the context of agency theory and can be used as a theoretical basis (Johnson, 1994; Smith & Bertozzi, 1998). Perspective of agency theory put forward in accordance with the description that: "... CONCLUSION drawn from formal economic models (i.e. agency theory) that ignored the behavioral factor should be interpreted cautiously" (Kren, 1997: 4). In context, the use of economic theories like the theory of agency, will require behavioral aspects that should be interpreted with caution. This theory explains for relationship between agent (management) with stakeholdres (principalls) which is described in the relations among the parties who have different interest (divergent interests). Perspective of agency theory and principal agent relationship can be explained and is rooted in economic theory, decision theory, sociology, and organizational theory. Agency theory explains the main ideas related to " relationship", which is a contractual relationship between the agent and the principal, the conflict within the organization, and communication of information which valuable in economic and legal (Jensen and Meckling, 1976; Jackson, 1982; Eisenhardt, 1989). Accountability has two (2) aspects of the analysis, namely (1) the fulfillment of the availability of information about the activities and the justification for the truth, and (2) a strengthening of the relevant aspects of the punishment imposed on the failure of the implementation as well as the rationality for improvement (Jenkins, 2007).

To Built a Role Model:

Based on regulation and referring to the result of research and relevant theoretical framework, can be formed the role model below:

(1) Model of Regulatory Framework & Budget Framework



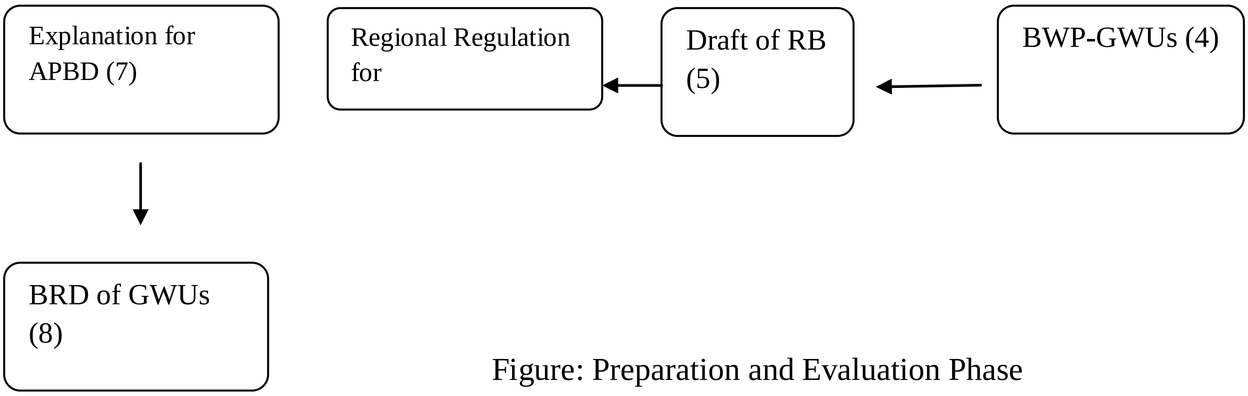


Figure: Preparation and Evaluation Phase

(Sources: Directorate General of Regional Financial Administrative Ministry of Domestic affairs, 2007)

Phase 1: Regional Medium Term Development Plan; Local /Regional Government Work Plan; Regional Development Plan Meeting; Previous year's performance; Basic assumptions (macro economics); Government policy (development priorities).

Phase 2: Budget General Policy (BGP): Substance: program / activities per business & organization, targets / performance targets, indicative budget ceiling, macroeconomic assumptions and fiscal policy issues.The inclusion of a clause that states "In the event of a shift in the assumptions underlying the formulation BGP result of Government policy, to do the addition or subtraction of programs and activities as well as the indicative budget ceiling that has not been accommodated in the MoU BGP".Addition or subtraction is done when the discussion process PPAS without making changes to the Memorandum of Understanding Budget General Policy (BGP).

Phase 3: Priorities and Budget Ceiling Temporary (PBCT) Substance: the order of priority programs / activities, objectives / performance targets that are based on the BGP and definitive budget ceiling.The inclusion of the clause "if there is a shift in assumptions underlying the establishment of PBC as a result of: Government policy or the Province;The addition / subtraction local revenue sources (fund balance) after PBC agreed. So do the addition or reduction of programs and activities and the budget ceiling definitive if not accommodated in the Memorandum of Understanding PBC, which is done when the discussion of budgets, without changing the MoU PBC.

BGP changes and changes PBC

Do mechanisms Regional budget changes as a result of:

The development is not in accordance with the assumption;

the circumstances that led to do a shift in the budget;

the circumstances that led to budget balance over the previous year should be used;

emergency state; and exceptional circumstances.

Note: for interchangeable make changes based on the change BGP and PBC.

BGP & PBC changes agreed between the Chairman of Parliament and Head of Region (outlined in a memorandum of understanding).

Phase 4: Determination of Budget Work Plan of Regional Government Work Unit (as output from planning process)

Phase 5: Determination Draft Budget Revenue and Expenditure

Phase 6 and 7: Regional regulations Budget Revenue and Expenditure and Explanation for Budget Revenue and Expenditure

Phase 8: List Determination budget within the budget implementation document

(as realization for Program /project with capital expenditure)

The Model describing and explain the function and role of budget committee who will take a policy in decision making. The model is an integrative approach in budgeting planning and realization of capital expenditure (capital expenditure through Government for forestry development programme/activity/project) referring PCM with The basic format or structure of project and programme documents.

Model 2: "A basic 'format' is applied for all documents to be produced during the project cycle.

It follows the core logic of the Logical Framework Approach.

This model as REFERENCES which can be stated consists of:

1. Summary

2. Background: Overall of Budget Committee's role and Government policy objectives, and refering to the planning and determination programme or strategy, commitment of Government to over-arching policy objectives of the social welfare such as respect of "forestry development"

3. Sectoral and problem analysis, including stakeholder analysis and their potentials

4. Project / programme description, objectives, and the strategy to attain the aim Including lessons learned from past experience, and linkage with other sources of funding, activities description of the intervention (objectives, and strategy to reach the aim, including project purpose, results and activities and main Indicators)

5. Assumptions, Risks

6. Implementation arrangements

Physical and non-physical means : Organisation and implementation procedures

Timetable (work plan), Estimated cost and financing plan, Special conditions and accompanying measures by Government / partners, Monitoring and Evaluation

7. Quality factors

Participation and ownership by beneficiaries, Policy support, Appropriate technology, Socio-cultural aspects, Gender equality, Environmental protection

Institutional and management capacities, Financial and economic viability

Annex: Logframe (completed or outline, depending on the phase) "(Adapted from EC,2002:5).

Model 3: Filtering and Priority for Programmes/Projects/Activities

Table 9. Framework Budget: Direct Expenditure on Local Government to Strengthen Social Welfare & AEC, MDG, and SDGs (Referring to Forestry Development Programme/Activity/Project)

No	Part of the Aims : Social Welfare	Part of the Aims: AEC
1	-Planning and control of development; -Planning, utilization and control layout; - The conduct of public order and public tranquility; - Provision of facilities and general infrastructure; - Handling the field of health; - Implementation of education and allocation of human resources potential; - handling social problems; - Services field of employment ; -Facilitate the development of cooperatives and small and medium enterprises; - Control of the environment*) - Service for land; - Population Services, and civil; - Administrative services general government; -Investment administration services; - Other basic services.	Pillar 1: single market and production base: (i) free flow of goods; … 2 (two) importance elements: priority integration sectoral , and food, agriculture and forestry products; (i) Free flow of goods: 7 (seven) product sectors, namely: (1) Agricultural products, (2) Fisheries, (3) Rubber, (4) Wood, (5) Automotive (6) Electronics, and (7) Textiles (ii) Food, Agriculture and Forestry: Achieving intra and extra ASEAN trade and competition in the long term on ASEAN's food, agriculture and commodities / products of forestry. *Pillar 3:* *Equitable Economic Development* -SME development; Initiative for ASEAN Integration
2	Part of the Aims : MDGs	Part of the Aims: SDGs
	-Ensuring environmental sustainability -To develop a global partnership for development	- Ecosystems on land, sustainable forests, global warming and land subsidence and loss of biodiversity. -Peace and an inclusive society for development, providing access to justice for all and build effective, inclusive and accountable institutions at all levels; -Strengthening how the implementation and revitalization of the global partnership for sustainable development.

Model 3: "A basic 'content' of programmes/Projects/Ativities (content of policy)

To decide the capital expenditure refering to duties and functions of government through leading sector, such as for : patterning Forest's Inventory & Mapping, Conservation & Stewardship Forest, and Utilization of Forest Area. Forestry Production Development & Production levy for forest products, forest product processing, and Distribution of Forest. Field of Forest and Land Rehabilitation for Land Rehabilitation & Soil Conservation, Social Forestry, Forest Plantation Development & Hatchery. Field of Protection and Conservation of Forest Resources for Securing Forest, Forest Fire Control & Land Stewardship, Conservation Area & Nature and biodiversity,duties and functions

CONCLUSION

Development Role model as REFERENCES in Planning and Realization of capital expenditure has relations with Implementation of the budget framework and the regulatory framework of the local government. This Role Model as Empowerment for Capital expenditure in planning "KUA" and Determination "DPA" Work Unit of Government Regional.

Planning and Realization of capital expenditure has relations with Implementation of the budget framework and the regulatory framework of the local government. This implementation as a compliance toward regional budget's function, and also as a response toward the effects of globalization, such as AEC. Planning capital expenditures in the document Budget Work Plan (BWP) and realization of capital expenditures in the Budget Execution Document (BED) should be met with clarity of purpose (goal clarity) and fulfill a clear process (process clarity) in decision making process that implemented. Effectivity of this planning and realization in meeting compliance with: (i) Functions (ii) - Affairs (iii) - Program and (iv) - Activities of GWUs not only be determided by amounth of accounting number in budget plan dan realization based on regulation, but also should consider with many factors namely for every aspects in agency and institutional view.

Based on referring to regulation combines with agency and institutional perspective Implementation of capital expenditures related to Challenges and implementation of AEC and especially on the main objective of development in achieving for Social welfare.

Attribution of programs and activities of capital expenditure as an investment in autonomous region can give positif impact for regional competitiveness. Referring to capital expenditure in GWUs as leading sector, will support autonomous region to achieve the agreement with 4 (four) pillar MEA. Four (4) pillars of MEA related to: (i) Single market and production base with 5 (five) elements: (i) the free flow of goods (free flow of goods), (ii) the free flow of services (free flow of services), (iii) the free flow of investment (free flow of investmet), (iv) the free flow of skilled labor (free flow of skilled labor), and (v) the free flow of capital (free flow of capital), (ii) Competitive Economic Region, (iii) Equitable Economic Development, (iv) Integration of ASEAN in the global economy. Related research describes that: "Each countries has different result. Moreover, the situation of foreign direct investment in every contries at the time before AEC starts also shown the difference. The research emphasizes on one of the main objectives of the AEC itself the single market and production base..., it can be seen we predicted FDI towards the implementation of the AEC has increased, despite the fact that before we know the AEC, ASEAN contries themselves have imposed the name Regional Economic Integration (REI). Where AEC is the sustainability of the REI so can we assume the effects before and after the AEC is FDI will continue to increase in the countries that joined in ASEAN" (Darma and Achmad, 2013: 108).

Implementation for planning and realization for capital expenditures as regional investment which has done by regional government for social welfare and support facilitation of regional competitiveness in an era of AEA, reached via the main tasks and functions of each GWU. The function and role in the implementation unit to manage aspects of the development towards social welfare to citizens is appropriate with Development Plan for Long Term / Development Plan for Mid Term, Pillars of AEC, and even with the implications for the MDGs, SDGs as a global issue of development. This includes the implementation of capital expenditure through Principal task and function of GWUs , namely for services or functions: (i) Planning and control of development; (ii) Planning, utilization and control layout; (iii) The conduct of public order and public tranquility; (iv). Provision of facilities and general infrastructure; (v) Handling the field of health; (vi) Implementation of education and allocation of human resources potential; (vii) handling social problems; (viii) Services field of employment ;(ix) Facilitate the development of cooperatives and small and medium enterprises; (x) Control of the environment; (xi) Service for land; (xii) Population Services, and civil; (xiii) Administrative services general government; (xiv) investment administration services; (xv) Other basic services.

Role model gives benefit for committee budget in government to implement the investment as needs which be managed in the pattern: (i) the fulfillment of capital expenditure which fulfill return of economic benefits and social benefits of capital goods in the construction (ii) scaling up of development services for the changes and demands of development, such as globalization, the competitiveness of regions other than the basics in social development and economic development (iii) the need of improvement, innovation, invention and breakthrough in enhancing the value of life in development that requires the fulfillment of direct expenditure with capital expenditure. (iv) In control of planning and controlling administrative expenditure management expenditure referring to capital expenditure in compliance with the inventory value of capital expenditure and capacity services for development.

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Hancing the Role of Community in Managing Village Forests Through the Development of Non Timber Forest Products

Sri Lestari[1], Bambang T. Premono[2]

[1,2] Environment and Forestry Research Institute of Palembang, Ministry of Environment and Forestry
Jl. Kol. H. Burlian Km 6.5 Puntikayu Palembang, South Sumatra, Indonesia

Email : [1] lestari@iuj.ac.jp [2] btejoprem80@gmail.com

ABSTRACT

Village forests is managed by the village and used for the welfare of the people in it. Granting access and security of rights for forest communities through village forest can increase empowerment and community participation in forest management. This paper analyzed the land management of village forest and the development of non timber forest product by the communities in this area. The study was conducted in Jambi Province. Field observation and interview methods were applied to collect the data. Moreover, the data was analyzed descriptively and qualitatively. The research revealed that village forest plays a crucial role in local livelihoods. Communities received some benefit from planting agricultural crops, planting and also collecting and selling of NTFP. In conducting these activities, people have to comply with the rules that exist in the village forest. NTFPs products which have been developed by the community were agarwood, rattan, and jernang. These commodities were developed by people in the village forest area with agroforestry system. The development of non-timber forest products can be a source of livelihood through employment and rising people's income so that society welfare increases. In addition, the sustainability of village forest was also better because communities were no longer compelled to cut down the trees and they had more eagerness to protect the forest.

Keywords: Agroforestry system, NTFP, village forest

INTRODUCTION

Community life in and around the forests depend on the potency and management of forest resources. The main problem experienced in forest management was poverty; deforestation and land degradation; low capacity, skills and capability of the communities; and also less access to forest resources including land and capital. Deforestation and forest degradation caused by the conversion of forests for other purposes such as agriculture, mining, farming, forest encroachment and illegal logging. More than 17 million people were living in rural Indonesia with job retention in the agricultural sector and the majority of the rural poor were living in and around the forests. For the people, especially those who living in and around forest areas, forests play an important role in the livelihoods, both in term of timber and non-timber (Angelsen & Wunder, 2003; Sunderlin & Ba, 2003). Moreover, Non Timber Forest Products (NTFPs) also has an important role in the economy of households nearby the forest, especially if there is limited agricultural land and industrial activities (Ghosal, 2011).

One solution that can be done by the government through the Ministry of Forestry to solve the problem of social welfare and environmental destruction is Social Forestry program. It was because Ministry of Forestry has the authority to regulate the forestry sector resources that had great influence to the community life. One of the social forestry program launched by The Ministry of Forestry was village forest. Village forest is defined as a state forest that have no a license/rights, which are managed by the village and used for the welfare of the village. Furthermore, in the Ministry of Forestry Regulation Number P.89/ Menhut-II/2014 on Village Forest, stated that the organization of village forest is intended to provide access to rural communities through village organizations in utilizing forest resources in a sustainable manner and aimed at improving the welfare of the community.

Implementation of Village Forest program is one of the real forms of rural development programs based on the utilization of natural resources and local human resources as a priority in national development. Act number 6 of 2014 about the village mandates that rural development aimed at improving the welfare of rural communities and the quality of life and reduce poverty through the fulfillment of basic needs, infrastructure development for the village, the development of potential local economic, as well as the use of natural resources and environment in a sustainable manner. Government Regulation number 43 year of 2014, concerning the implementation of regulations of the village law mentioned that in the framework of rural development, the government, provincial government, local government district/city, and village government, have to empower rural communities, one of them by developing programs and activities of rural development in a sustainable manner by utilizing human resources and natural resources in the village. Implementation of village forest program is one obvious form of village-based development programs and the utilization of human resources and natural resources of the village.

Community participation in forest management is very important because they have a higher intensity of interactions to the forests. Therefore, this study aimed to see how is the implementation of village forest that has been done in Merangin Regency, what are the obstacles and the opportunities that exists in the village forest program, and finally how is community participation in the research area so that the village forest can run well.

MATERIALS AND METHODS

Time and Location

This research was conducted on November 2016 in Merangin Regency, Jambi Province. In this area, there were some Village Forests that managed by communities in which they planted non timber forest products in order to earn cash income and also to keep the sustainability of forest resources.

Data Collection and Analysis

Data used in this research is primary and secondary data. Primary data was collected through field observation and interview to key persons that relate to the development and management of village forests in Merangin Regency such as the officer of Forest Department in Merangin Regency, head of the village and also head of village forest. Secondary data were came from the documents and literature related to village forests. Data analyzed by using descriptive qualitatif method to explain how was the management of village forest in Merangin Regency and also the role of community to manage the forest through the development of non timber forest products. These products not only gave benefits to the community but also the existence of natural resources in the forests.

RESULTS AND DISCUSSION

Study Site

Merangin Regency is one of 11 districts/cities in East Jambi Province. There were 211 of villages that scattered in 24 districts. Geographically, Merangin Regency boundaries are: in the north, there was Regency of Bungo; in the south, there was Lebong Regency; east part was bordered by Sarolangun; and the west was bordered by Kerinci regency. Based on the river basin, Merangin Regency were located in the subzone Merangin Tembesi which is part of Batang Hari river basin. Climatic conditions based on the data from BMG and Screening Study of Watershed, Merangin Regency had tropical climate that influenced by monsoon winds, the average rainfall was 2,485 mm/year, in which the lowest was 1,448 mm/year while the highest was 3,580 mm/year.

The types of soil and geological surface in Merangin Regency, based on a map of Screening Study of Batanghari river basin and Soil Map Review of the Soil Research Institute in Bogor, was in the form of young volcanic rock that spread throughout subzone of Merangin Tembesi, while the rest of the alluvial deposits spread on the partly of subzone Merangin Tembesi. Therefore, on a steep slope, it was prone to landslide and easily eroded. This will affect the acceleration of run-off, and the absorption of water into the ground cannot be optimal. Alluvial deposits mostly spreads in the area of <8%. In this area, water absorption was very good. However, in certain areas with a slope >25% can occur disturbance of soil stabilization and cliffs erosion during heavy current. Therefore, in order to avoid erosion problems, it is necessary to grow some kinds of plants that was a combination of fast-growing tree species, plant species that quickly covers the ground and also able to produce a high economic value (Triwanto, 2012).

Topography of Merangin Regency was greatly varies from flat to mountainous with the lowest elevation ± 51 m above the sea level (in Pamenang District) up to ± 1,035 m above the sea level (in Jangkat District). The potency and also the problems of hydrologic conditions in Merangin Regency were reflected by the soil type condition, topography, river, rainfall and land cover conditions. In the Subzone of Merangin Tembesi, the hydrological conditions were very bad and potentially arised problems such as flooding and drought. These conditions were resulted from the potential factors, slope, type of soil, the river conditions, and the degradation of land cover that very broad. The use of land in the Merangin Regency based on the analysis of BPDAS Batanghari can be seen in Table 1.

Tabel 1. Land use of forest in Merangin Regency

Forest area	**In hectares**	**Percentage %**
Limited Production Forest	33,630	4.50
Production Forest	110,708	14.8
Protection Forest	35,127	4.70
Kerinci Sebelat National Park	163,701	21.89
Forest for other Purposes	404,644	54.11

Source: Plantations and Forestry Department of Merangin Regency, 2014

Based on the above conditions, the potential development of non timber forest products such as agarwood, manau and jernang in the Merangin Regency is high because the availability of land was relatively extensive.

The population of Merangin Regency in 2013 were 358.530 people, the women was 174.872 while the man was 183.658. In the last three years, the number of people in Merangin Regency increased more than 40% every year. This means that the need for employment also increased. Non timber forest products development is expected to be one of solutions of the limited employment opportunities. Employment opportunities can be obtained either in the cultivation, processing products, and marketing. Moreover, rural communities in Merangin Regency were formed farmers' groups to increase their life condition. There were some fastener elements, namely:

1. he existence of common interests among its members;
2. heir farming region needs a shared of responsibility among its members;
3. he existence of a dedicated farmer that have eagerness to improve farmers life and their leadership was accepted by other fellow farmers;
4. he activities that can be beneficial for a majority of its members; and
5. he encouragement or motivation of the local community leaders to support programs that have been determined.

Rural communities in Merangin Regency have formed farmers' groups for their needs as mentioned above. Especially for the area around the forest, the community formed a group through Forest Village Community Institution (LMDH).

Profile of Village Forest in Merangin Regency

The legal basis for the establishment of village forest in Merangin Regency, Jambi Province was:

1. Regulation of the Minister of Forestry Number P.14/Menhut-II/2010 on Amendments to the Forestry Minister Regulation No. P.49/ Menhut-II/2008 on Village Forest.
2. Regulation of the Minister of Forestry Number P.53/Menhut-II/2011 regarding the Second Amendment to the Regulation of the Minister of Forestry Number. P.49/Menhut-II/2008 on Village Forest.
3. Regulation of the Minister of Forestry Number P.43/Menhut-II/2012 on Procedures of Working Relationship between the Central and Regional Forestry Agency in the Framework of the Implementation of Community Forestry and Village Forest.
4. Regulation of the Director General of Land Rehabilitation and Social Forestry Number P.11/V-SET/2010 on Procedures for the Implementation of Village Forest.
5. Regulation of the Minister of Forestry Number P.89/Menhut-II/2014 on Village Forest.

Based on the Minister of Forestry regulation number P.89/Menhut-II/2014 on Forest Village defines that village forest as a state forest not encumbered by previous rights and managed by a village to improve general village welfare (Moeliono *et al.*, 2015). In the village forest, the community can take advantages of growing space in order to obtain environmental benefits, social benefits and optimal economic benefits, without prejudice to the main function of the forest.

In the case of Merangin Regency, village forest proposal was motivated by the refusal of the society to the expansion of industrial plantation forest company, PT. Duta Alam Makmur, and the encroachment of production forest around Nilo Dingin Village, Lembah Masurai District. Mentoring of village forest was done by some NGOs in Jambi Province since 2009. Through Merangin Regent decree number 522/350/PH/Disbunhut/2010, May 17, 2010, the village forest was proposed to the Minister of Forestry with an area ± 49,514 hectares consisting of 17 villages in 5 districts. From that proposal, ± 44,128 hectares of village forest management was approved by the Minister of Forestry and the community got a decree of village forest management.

Following the issuance of the Minister of Forestry decree, village forest working area cannot be directly followed by the proposal to get the village forest management rights (HPHD) from the minister through the governor. There were still some issues that were quite specific in the field level (villages). Plantation and Forestry Department of the Regency, together with the Non Governmental Organization (NGO) were engaged in problem solving at this village level. The aims were to ensure that the process of village forest management rights can be soon proposed to the Minister of Forestry through the Governor of Jambi Province. From 17 villages only 12 villages were eligible to earn the village forest management rights (HPHD) with a total area of ± 29 895 hectares. List of villages which gained HPHD decree from the Governor of Jambi are listed in Table 2. With the issuance of village forest management rights (HPHD) decree, the villages have to prepare a work plan of village forest (RKHD). When RKHD was approved by the Governor, the village can draw up the annual plant of village forest (RTHD) and propose utilization license of timber forest products (IUPHHK).

Table 2. Village forests which have HPHD in Merangin Regency, Jambi Province

NO	Villages	SubDistricts	Minister of Forestry Decree	Date	Area (Ha)	Status of the ares
1	Talang Tembago	Sungai Tenang	SK.126/Menhut-II/2011	21-03-2011	2,707	HPT
2	Pematang Pauh	Sungai Tenang	SK.440/Menhut-II/2011	01-08-2011	2,957	HPT
3	Koto Baru	Sungai Tenang	SK.443/Menhut-II/2011	01-08-2011	762	HPT
4	Gedang	Sungai Tenang	SK.442/Menhut-II/2011	01-08-2011	1,766	HPT
5	Jangkat	Sungai Tenang	SK.125/Menhut-II/2011	21-03-2011	4,467	HPT
6.	Beringin Tinggi	Sungai Tenang	SK.445/Menhut-II/2011	01-08-2011	2,038	HPT
7	Tanjung Mudo	Sungai Tenang	SK.444/Menhut-II/2011	01-08-2011	1,058	HPT
8	Tanjung Alam	Sungai Tenang	SK.42/Menhut-II/2011	17-02-2011	912	HPT
9	Tanjung Benuang	Sungai Tenang	SK.441/Menhut-II/2011	01-08-2011	1,254	HPT
10	Muara Madras	Jangkat	SK.439/Menhut-II/2011	01-08-2011	5,330	HPT
11	Tanjung Dalam	Lembah Masurai	SK.437/Menhut-II/2011	01-08-2011	2,160	HPT
12	Durian Rambun	Muara Siau	SK.361/Menhut-II/2011	07-07-2011	4,484	HP
J U M L A H					**29,895**	

Notes : HP = Production Forest; HPT = Limited Production Forest

Source: Plantation and Forestry Department of Merangin Regency, 2015

Opportunities and Challenges in the Development of Non Timber Forest Products

A paradigm shift of forest resources utilization from timber forest products became timber + non timber forest products (NTFPs) + environmental services was raising public awareness that the benefits to be derived from the forests was not only timber. The utilization of natural resources was directed to ensure the functionality and sustainability of the forest and also enhancing the welfare of society. Therefore, the development of NTFPs that have economic value was needed by integrating these products in productive business activities.

The eagerness of farmers to develop NTFPs in their area was increased because people began to realize that NTFP has a higher economic value. Furthermore, NTFPs can also be used as an alternative to increase revenues in order to meet the needs of daily life. In case of Khepong Damar in Krui, Lampung Province, people were motivated to plant damar trees because the economic value of damar and also the existence of social and ecology benefit (Simon, 2010). The motivation of the community in Merangin Regency to develop NTFP supported by the existence of village forest, because in this area there was utilization zones that can be utilized by the villagers. This utilization zones can be used to grow agricultural crops and also forestry plants, namely agroforestry system. Agroforestry systems provide opportunities for people to get an income from agricultural crops, as well as investments in the form of trees that can be harvested when they needed. . NTFP forestry plants such as agarwood, manau, jernang, and cinnamon can be planted among the main crops. Its presence does not interfere the production of agricultural crops when it was done with proper plant spacing.

In Merangin Regency, community livelihood crop is coffee and most of the community members develop these crops in the village forest area, which is in the utilization zone. Some members of the communities were also develops rubber on their own land. Communities develop NTFP between agricultural crops because NTFP prices were generally more stable and tends to rise from year to year compared with the prices of agricultural crops that were always fluctuating. Besides developed in the utilization zone, NTFPs such manau and jernang also still available in the protected zones in the village forest area. Villagers were forbidden to take NTFP in this zone. In some cases people were allowed to take the NTFP but under the rules and certain conditions, such as harvesting time and the amount that can be harvested. The existence of a rule in the area of village forest is expected to ensure the sustainability of NTFP. Coupled with the development efforts by the community, the existence of NTFP is expected to be maintained, can provide benefits to the community, and ultimately increase the income and welfare of the community.

Figure 2: Discussion with the head of village

Figure 3. Land condition in the study site

The challenges and the condition of NTFPs management in Merangin Regency were:

1. The development of NTFPs was not focus on superior type
2. Cross-sectoral policies and programs were not yet integrated
3. Data and information that was actual and complete about the NTFPs were not yet available (potency, distribution, markets, etc.)
4. The development of NTFP was still on a small scale (farmers level) and difficult to obtain venture capital
5. The convergence of upstream downstream has not run
6. Technologies of cultivation and processing were still low
7. Permits for the utilization of forest area regarding the development of NTFPs were still on progress
8. There is still lack of applied research support that can encourage NTFPs industry.

The absence of official market, the absence of price control at farmers level because the government has not set an official price for some NTFPs, and also the habits of farmers who sell NTFPs products when they have an urgent need were also became problems in the development of NTFPs in Merangin Regency.

Community Participation in Managing Village Forest

Village forest management rights were given to the public so that people can use it to grow subsistence crops, such as agricultural crops, as well as forestry plants, both timber and non timber. With the involvement of communities in forest management and their customary rules that govern the interaction of people with forests is expected to ensure the sustainability of forests and the results.

Each member of the village community was given the rights to manage the land in a particular area. They were allowed to open and grow some agricultural crops. In addition, people also planted forestry plants for long-term savings. If necessary, villlage members were also allowed to add more acreage to be planted, as long as they were able to treat and manage the land. This additional land was only allowed to fulfill the needs of their daily lives. The availability of village forest rules may limit landlord's ambition to control the land. Members of the communities were also forbidden to trade the land. When they break the rule, they will be penalized.

By accessing the land on a regular basis, indirectly every member of the community participated in the guarding of the forest. They will manage the land that was rightfully their management. After having the rights to manage the land in forest areas, people can increase their income and welfare. The development of NTFPs had significant role on poverty reduction and sustainable forest Management because the products were very important component for the household livelihood and income options (Ros-Tonen & Wiersum, 2005; Giliba *et al.*, 2010; Ghosal, 2011; Angelsen, *et al.*, 2014; Galabuzi *et al*., 2014). In addition, they also no longer carry out illegal activities inside the protected area. At this time, all members of the village have the land to be managed so that they are able to meet their daily needs. Some community members were also able to bring their children to get school outside the village. It was appropriate that the villages around the forest area gain access to forest resources in their area, in order to improve the welfare of the community (Prasetyo, 2016). Community control of natural resources was really important because it can create new livelihood opportunities for people who live near to the forest (Thoms, 2008).

CONCLUSION

The main problem experienced in forest management was poverty; deforestation and land degradation; low capacity, skills and capability of the communities; and also less access to forest resources including land and capital. Granting access and security of rights for forest communities through village forest can increase empowerment and community participation in forest management. In Merangin Regency, village forest plays a crucial role in local livelihoods. Communities received some benefit from planting agricultural crops, planting and also collecting and selling of NTFP. In conducting these activities, people have to comply with the rules that exist in the village forest. NTFPs products which have been developed by the community were agarwood, rattan, jernang, and cinnamon. These commodities were developed by people in the village forest area with agroforestry system.

The challenges and the condition of NTFPs management in Merangin Regency were: (1) The development of NTFPs was not focus on superior type, (2) Cross-sectoral policies and programs were not yet integrated, (3) Data and information that was actual and complete about the NTFPs were not yet available (potency, distribution, markets, etc.), (4) The development of NTFP was still on a small scale (farmers level) and difficult to obtain venture capital, (5) The convergence of upstream downstream has not run, (6) Technologies of cultivation and processing were still low, (7) Permits for the utilization of forest area regarding the development of NTFPs were still on progress, and (8) There is still lack of applied research support that can encourage NTFPs industry. Moreover, The absence of official market, the absence of price control at farmers level because the government has not set an official price for some NTFPs, and also the habits of farmers who sell NTFPs products when they have an urgent need were also became problems in the development of NTFPs in Merangin Regency

Despite these challenges, the development of non-timber forest products can be a source of livelihood through employment and rising people's income so that society welfare increases. In addition, the sustainability of village forest was also better because communities were no longer compelled to cut down the trees and they had more eagerness to protect the forest.

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Non-Timber Forest Products That Are Potentially Developed in South Sulawesi

Suhartati[1] and Basir[2]

[1]*Forest Research Institute of Makassar*
[2]*Faculty of Forestry, Lambung Mangkurat University, Banjarbaru Indonesia*

E-mail : basir.achmad@unlam.ac.id

ABSTRACT

Non-Timber Forest Products (NTFPs) are products from forests which are non-timber/wood that consists of flora and fauna groups. NTFPs have been utilized by communities around the forests, and have economic values so that they can supply food, medicines, etc. The communities that utilize the forest products are hoped to be aware about the maintenance of the forests in order that they provide optimal and sustainable yields. Developing the NTFPs can be done in and outside of the forests, either which are cultivated or directly harvested from the forests. The species of the NTFPs that are potentially developed in South Sulawesi are candlenut/kemiri (*Aleurites moluccana* Willd), gaharu (*Aquilaria spp*.), and honeybees (*Apis sp*.). The NTFPs can be developed in agroforestry models. Now, the forestry sector has changed to a paradigm based on ecology, economy, and social aspects. With the ideas above, it is expected that forest management is done based on sustainable forest resource management.

Keywords: NTFP, candlenut, honeybee, gaharu, South Sulawesi

INTRODUCTION

Indonesia is rich with natural resources in high diversity. Around 40.000 plant species spread out in tropical forests. About 5% of them are from wood and the rests are from NTFPs. The NTFPs are the non-wood products from the forests that consist of flora and fauna.

The NTFPs have been utilized by communities around the forests either direct or indirect uses. They are sometimes obtained easily or even gratis. Most of the NTFPs have economic values so their existence is useful for the communities around the forests especially in supplying food, medicine, etc. The communities that utilize the NTFPs are expected to aware of the forest area maintenance in order that the forests provide optimum and sustainable yields for the communities. For implementing sustainable forest management and respecting to the community conditions around the forests, the NTFPs development program is necessary to prioritize. The existence of the NTFPs is highly supporting the prosperity of the communities around the forests, and is one of livelihoods.

Development of the NTFPs can be done in and outside the forest areas, either which are cultivated or are directly harvested. The NTFPs that are potentially developed in Sulawesi among others are candlenuts (*Aleurites moluccana* Willd), gaharu (*Aquilaria spp*.) and honey bees (*Apis sp*.). The NTFPs can be cultivated as one of agroforestry models. Nair (1993) stated that the agroforestry pattern can increase yield diversity, efficient laborer, and enhance income. I addition, Satjapraja dan Sukardi (1992) explained forest plantations with agroforestry systems are the method for utilizing lands optimally, which combine forest plantations and agricultural crops, and livestock fodder on the sustainable basis, and finally increase the community's prosperity.

NTFPs Groups

Forestry sectors now have changed to a paradigm based on ecology aspect for sustaining the forest resources, economic aspects including commodity and services (timber and non-timber), and social aspects including human beings as decision makers regarding forest management. With the ideas above, it is expected that forest management will be conducted based on sustainable forest resource management.

The NTFPS can increase the community's income around the forests and contribute to foreign exchange. According to the Minister of Forestry Regulation No. 35 year 2007, the NTFPs were divided into two big groups, i.e. flora product groups (±565 kinds of products) and fauna product groups ((±75 kinds of products).

Flora Product Groups;

A). Resin (damar, gaharu, incense),

B). Essential oil (sandalwood, maleleuca, cananga),

C). Fat oil, starch, fruits (red fruits, bamboo sprouts, durian, candlenut, pangi),

D).Tannin, dye and latex (yellow wood, jelutung, gutta-percha).

E). Medicinal plants, decorative plants (akar wangi, brotowali, wild orchids),

F). Palmae and bamboos (manau rattan, tohiti rattan),

G). Alkaloid (kina),

H). Other groups (nipah, pandan, purun).

Fauna Product Groups;

A). Hunted animals (boars, rabbits, mouse deer, deer, crocodiles),

B). Animal breeding (arwana, butterfly, deer, crocodile),

C). Animal products (wallet bird nest, lac insect, bee wax, silk caterpillar, honey bee).

Development of the NTFP commodities has been stipulated based on the Minister of Forestry Regulation No. 19 year 2009, concerning the development strategy of the National NTFPs and the Minister of Forestry Regulation No.21 year 2009, regarding criteria and indicators for determining the NTFP superiority.

The Potential NTFPs In South Sulawesi

Biodiversity in the forest ecosystems of Indonesia is only produces 5% timber products and 95% NTFPs. Management of NTFPs involving community enforcements can benefit the communities and sustain the forest resources. Initial steps of developing the NTFPs are to inventory and map the NTFPs potentially to develop in an administrative region. The NTFPs potentially to develop in South Sulawesi are candlenuts, gaharu, and honey bees. The NTFPs can be developed in agroforestry models.

Candlenut *(Aleurites moluccana* Willd*)*

Candlenut trees are plants that originated from Pacific Asia (India, China, Southeast Asia, and Polinesia). Initially, candlenut trees were cultivated by Chinese for Tung Oil in the 18 century. The oil was for wood preservation of Phinisi ships. At that time, candlenut tree population has spread to some regions in Indonesia. Initially, candlenut trees were cultivated for reforestation and afforestation because they can be cultivated on various soils. Based on the Statistics Bureau (2011), candlenut production in Indonesia reached 1,059 tons. This volume was 60% for local consumption and 40% for export. Now, export destinations of the candlenuts are the USA, Saudi Arabia, Australia, and Hongkong. It is estimated around 50-100 tons of the world demand were still not fulfilled.

Candlenut tree development has been being prioritized for social forestry program since 1980s. Particularly South Sulawesi province has introduced a program called “Pola Sul-Sel,” that is agricultural systems that utilize forest areas. This program allows agricultural activities in the forest areas if they are combined with useful tree plantations like candlenut trees (Tanakan, 2002 in Rahman & Endri, 2013).

Growth Requirements

Candlenut trees spread to most parts of Indonesia. The trees grow on the sites with altitude of 0 - 800 m over seal level, climates A – C. They grow on flat to steep lands, sandy and podzolic soils. Tree height reaches 35 - 40 m, bole (10 - 14 m), diameter (100 cm). They have gray bark with shallow grooves without peeling off.

Fig.1. Candlenut tree

Fig.2 . Candlenut fruit

Candlenut trees bear fruits all year, but fruit seasons differ depending on site and climate conditions. Candlenut trees start bearing fruits in the age of 4 - 5 years. The trees produce around 30 kg - 80 kg peeled seeds/tree/harvest period. The products are equivalent to 15%- 20% of candlenut oil.

Candlenut Uses

Candlenut seed can be utilized for spices, oil, and medicines. The processed candlenut seed can be used for spices or flavor, and the kernel of the seed contains 60 - 66% oil. Chemical contents of the seed are glycerides, linoleic acid, palmitic, stearic, myristic, acid oil, while the nutritional contents of the seed are protein, fat, carbohydrates, vitamins B1, folate, as well as phytosterols. These substances can hamper cholesterol formation.

Candlenut wood is classified as light wood, not durable for building wood. The average specific gravity is 0.31, strength class IV and class V, the wood can be used for boards, house walls, plywood, crates, matches, handicrafts, and furniture.

Fig 3. Candlenut wood board

Fig 4. Candlenut wood furniture

Some parts of candlenut trees can be used for traditional medicine. Candlenut oil can be used for hair treatment, and cosmetics. Burned seeds for diarrhea cure, while the bark is for dysentery and tumor cures (Heyne, 1987).

Fig.3. Candlenut seed.

Fig.4. Kernel of seed.

Candlenut oil can be processed to be a variety of products including hair care, cosmetics, and shampoo. Other uses of candlenut oil are to preserve wood, varnish or paint, waterproof paper coating, insulation, rubber substitution.

Fig.5. Candlenut oil products.

Candlenut tree cultivation

1. Seed

Good seeds can be collected from healthy trees with dense fruits and the tree age of 10 - 30 years.

Candlenut seed criteria are;

- Physiologically ripe fruit, marked with brown skin partially,
- The fruits contain 2-3 seeds with flat shapes.
- Fresh seeds or stored for a maximum of 20 days
- Intact seeds with weights about 110 seeds/kg.

2. Seeding

Candlenut seeds have a short dormant period. The maximum period is 20 days after harvesting. Germination media are mix of soils and sand with a ratio of 2:1. In germination process, they need shading 10-30%. Seeding can also be directly done in polybags. Seedling media are mix of soil, sand and compost with a ratio of 3:1:1. Seedling tending duration in the nursery is 3 months, and they can reach ± 50 cm high with diameter ± 15 mm.

3. Planting tending

Candlenut trees are planted with spacing depending on the plantation purposes. Plantations for producing seeds use a space of 10 m x 10 m, while spacing for producing timber is 4 m x 4 m. Tending for young trees is done by weeding, fertilizing with organic fertilizer every year for 3 years with a dosage of 2 kg/tree. For plantations that have been producing fruits are fertilized with organic fertilizer as amount of 10-30 kg/tree.

4. Financial Values

The price of candlenut seeds is Rp5,000 - Rp10,000/kg, the price of kernel seeds is Rp20,000 - Rp27,000/kg, while the price of broken kernel seeds is Rp15,000 – 19,000/kg. If assumed that candlenut trees at the age of 5 years produce 30 kg kernel seeds/tree/year on average with the mean price is Rp25,000, it is earned money as amount of Rp750,000/tree/year. If the farmers have candlenut trees 1 ha with a space of 5 x 5 m, there will be 400 trees/ha, candlenut trees at the age of 5 years will yield income as amount of 400 trees x Rp750,000 = Rp30,000,000/ha/year.

Honey Bees

Honey bees are very useful social insects because all their products are good for health. Honeybee species that have been known are *Apis dorsata, A. laboriosa, A. mellifera, A. florea, A. andreniformis, A. Cerana, and A. Koschevnikovi*, but the most well known species are *A. dorsata* and *A. cerana* .

A. dorsata species has local names: *lebah raksasa, tawon gung, odeng, madu sialang.* This species is wild and therefore it is very aggressive and fierce. The beehives are often found hanging from a tree branch, attic, or a steep rock.

Fig 8. Inside part of Beehive.

Fig 9. Beehive hanging on a branch.

Normally one tree has 5 - 10 colonies, and one colony mostly occupies one comb. Honey production is 10 - 20 kg/colony/harvest on average, even a big beehive produces honey as amount of 30 kg. Honey from *A. dorsata* called '*madu hutan'* has high quality because they obtain nectar from flowers of various plants, so called honey *Multiflora.* Forest honey has blackish brown color because it contains many minerals, enzymes, and various useful substances that are more complete than the honey with a bright color.

A. cerana species is a local honeybee called '*oriental honeybees*.' The local names are tawon madu (Java), and nyiruan (Sunda). This species is very famous to communities because is often found in gardens or yards around the houses. Sometimes the bees establish hives on a house roof, and they can be kept. This kind of honeybee can produce honey ± 10 kg/colony/year depending on nectar availability. If the nectar is not available enough, the production decreases, and vice versa.

Honey from species *Apis cerana* has very distinctive taste, but it is just not a lot of honey production. The bees produce pollen, while the larvae of the bees can be consumed or made as bee larva soup. If this type of bees is cultivated by breeding colony of about 50 boxes, and if assumed production of honey 5-10 kg/box/year, the yields of honey can reach 250-500 kg/year.

Honey is the best drink in the world because it has a high nutrient content, and produces several other products including, Royal Jelly, Bee Pollen, bionetic substance (a substance that can actively stimulate the growth).

Fig.10. Honey products for medicines.

Fig.11. Honey products for fresh drink.

Fig. 11. Kept honeybees.

The main benefits of honey are the drink for health because it improves stamina; treats osteoporosis, digestive disorders, migraines, treating insomnia, burns, heart disease, cough, and reduces stomach cramps.

Based on laboratory tests, it was found that 1,000 grams of honey worth 3,280 calories, the equivalent of 50 eggs calories or 5,575 liters of milk, or 1.68 million ounces of meat. Honey calorie comes from 41% fructose, 35% glucose and sucrose 1.9%. Honey also contains vitamins A, B1, B2, B3, B5, B6, C, D, E, K, uric acid and nicotinic. In addition, honey contains minerals and salts such as iron, sulfur, magnesium, calcium, potassium and sodium, antibiotics and digestive enzymes. Honey sugar can be directly processed by the body into energy, while granulated sugar or other foodstuffs to be energy must be processed first by digestive enzymes.

Gaharu

The Trees Producing Gaharu

Gaharu products are classified as non-timber forest products (NTFPs) that have economic values. Therefore, the development of gaharu supports forest conservation programs promoted by the government. People sometimes can not distinguish the term of gaharu as products with a tree as a producer of gaharu. Based on SNI 01-5009.1-1999, gaharu is defined as a kind of wood with a distinctive shape and color, and contains mastic coming from gaharu-producing trees and so-called gubal gaharu.

Gaharu-producing trees are woody plants, of the genus Aquilaria, Gyrinops, and Gonystilus included in the family of Thymelaeaceae. Aquilaria genus consists of 15 species, distributed in tropical Asia from India, Pakistan, Myanmar, Laos, Thailand, Cambodia, South China, Malaysia, the Philippines and Indonesia. Species that produce gaharu of good quality as well as classified as commercial and potential are Aquilaria malacensis (local name; pohon keras, alim, garu) and *Grinops sp*., this type is suitable for the conditions of Sulawesi (Afifi, 1995).

Gaharu is a part of wood at a tree producing gaharu, which contains resin that is scented or fragrant. The formation of gaharu can be naturally, but along with the development of technology, the formation of gaharu can be manipulated. Gaharu formation process begins with the occurrence of infections due to fungi attack the tree. The infected part undergo a process of chemical and physical changes due to injuries by a type of fungi such as *Fusarium sp*. Indicators of gaharu formation are when the host tree leaves fall and slowly the host tree will die. The formed gubal gaharu has different quality on any type of host tree. This difference is seen in the form, characteristics, properties and aroma. The fragrance can be known if the sapwood/gubal is burned.

Hervesting gaharu traditionally are cutting down the tree that is estimated to contain gubal gaharu. Naturally not all trees produce gaharu, and natural gaharu formation process usually yield gubal gaharu ± 30%, and the formation of a relatively longer time ± 15 years. The formation of the gubal gaharu naturally can reach 0.3 to 14 kg/tree, usually the larger the diameter of the trees the more gaharu they produce.

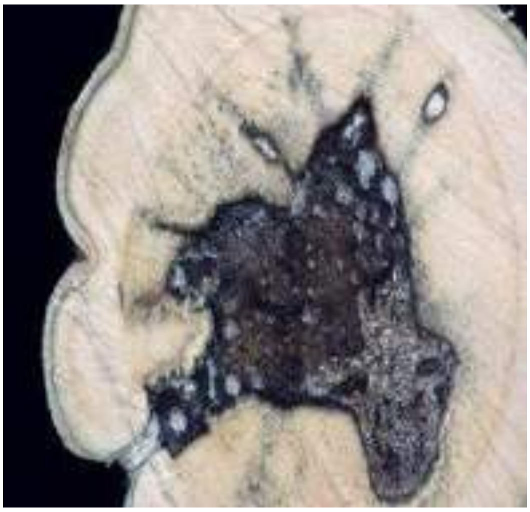

Fig.12. The tree producing gaharu and formation process of gubal gaharu.

Fig.16. Gubal gaharu.

Source: www.indonesiafinancetoday.com

Manipulating the formation of gaharu

Cultivation of gaharu-producing plants is being developed by the company and the community, in the community forest, oil palm plantations, and tree rubber plantations. Gaharu-producing trees grow at an altitude of 0-750 m osl. with the rainfall ± 2000 cm/year, air temperature 27°C-32°C with a light intensity of ± 70%. The type of suitable soil is loose and sandy clay soil with a pH 4-6. Gaharu-producing plants are semi-tolerant (need shade at seedling stage), making it suitable to be developed in agroforestry systems.

Fig.17. Gaharu trees. Fig.18. Gaharu in palm oil plantations. Fig.19.Gaharu seedlings.

Along with the development of technology, the process of the formation of gaharu can be manipulated with fungal inoculation. Inoculation manipulation is the formation of gaharu using fungal isolates of *Fusarium sp*., in order to speed up the contamination of the fungus on the gaharu tree. This fungus serves as inoculant disease-causing infection of the tissue gaharu wood. Total gubal gaharu that can be generated through the manipulation, is determined by the number of cuts or holes are inoculated, while the quality is dependent on period of harvest. Formation of gubal gaharu has been successful, if the trees infected by fungi lead to sick that are marked with tree leaves yellowing and falling and subsequently slowly the trees will die.

Fig.19. Inoculation on gaharu trees.

Fig.20. Gaharu from inoculation.

Fig.21. Formation process of gubal baharu after inoculation.

Source: https://bibitgaharuku.wordpress.com/inokulasi-gaharu/

Reaction formation of gaharu is influenced by the host's resistance against fungal induction and environmental conditions. The host response is characterized with the host turn to brown after several months of inoculation (fungus induction). The more holes and inoculums are made, the faster formation of gaharu occurs. Inoculation process can fail if the injection technique (induction) does not comply with procedures.

Gaharu harvesting can be carried out at one year after inoculation. If we want to get a good gaharu production in terms of quality and quantity, then the process of harvesting can take 2-3 years after the induction of the fungus.

Source: http://wahanagaharu.blogspot.com/

Gaharu trees can be harvested at the age of 5-7 years, for one hectare of land area planted gaharu, costs Rp125 million. Gaharu trees aged 5-7 years ± 7 m tree high and trunk diameter of ± 20 cm, after inoculation for ± 24 months, they can produce 20 kg of gubal gaharu with quality (grade) Medang D for Rp200,000/kg.

Source:https://www.merdeka.com/uang/produksi-gaharu-indonesia-meningkat-edcstlo.html

Gaharu has a price of Rp100,000-30 million/kg depending on the origin and quality gaharu tree species. Gaharu oil that is distilled from gaharu is the gaharu with low grade (kemedangan) that has a price of Rp50,000-100,000/ml. The price of gaharu at kemendangan class is Rp2-5 million/kg, even the price for a super type and double super reachs Rp18 million/kg.
(*https://www.merdeka.com/uang/produksi-gaharu -indonesia-meningkat-edcstlo.html).*

Usefulness of gaharu

A study released by the POM agency mentioned that 65% of developed countries follow the changes treatment paradigms that utilize organic matter from plants (herbs) primarily gaharu. Based on research results supported by the plant chemistry sciences as well as industrial and medical technology, gaharu has pharmacology values as traditional materials for treatment of diseases. Gaharu now started to be used for the treatment of diseases such as stress, asthma, liver, kidney, stomach ulcers, intestinal, rheumatic, tumor and cancer.

(https://www.merdeka.com/uang/produksi-gaharu-indonesia-meningkat-edcstlo.html)

Gaharu is used in rituals of Hinduism, Buddhism and Confucianism. The leaves can be made as green tea useful for health drinks. The price of gaharu with good quality is very high, while low-quality gaharu can be extracted for the production of gaharu oil. Gaharu can be used for perfuming rooms, raw material of perfume industry, cosmetic industry, and raw material medicines.

Demand of gaharu products ± 70% is supplied by Indonesia and 30% by the countries in Southeast Asia. Derivation of gaharu products is increasingly varied such as soaps, perfumes, and souvenirs. Currently, gaharu export destination countries namely Saudi Arabia, Taiwan, Singapore, Hong Kong, United States and the European Union.

The population of gaharu trees is decreasing in the forest, so the cultivation of gaharu plants is an alternative to support the needs of the world community in a sustainable manner.

Fig. 21. Derivative products of gaharu

Fig. 22. Derivative products of gaharu

(*http://ehsanmughni.blogspot.co.id/2011/09/produk-gaharu-cendana.htm*)

Prices of gubal gaharu vary depending on grade or quality, super quality gubal gaharu prices in the local market Rp25,000,000/kg, while gaharu that does not contain resin has a price of ± Rp50, 000/kg. Gaharu trees aged 5-7 years, ± 7 m tree high and trunk diameter of ± 20 cm, if manipulated ± 24 months after inoculation, it can produce 20 kg of gubal gaharu with quality (grade) Medang D for Rp200,000/kg (Harvest yield of PT. GS).

CONCLUSION

Non-timber forest product resources have the potential to be developed in Indonesia. In order to achieve sustainable forest management and attention to the social conditions of forest communities, the NTFP development programs need to be prioritized. The existence of NTFPs is supporting the welfare of communities around the forest, and is one source of livelihoods. NTFP development can be done in forest areas and outside the forest areas, either cultivated or collected directly.

NTFP development has been stipulated by the the Minister of Forestry Regulation No.19 of 2009 on the National Development Strategy of NTFPs and the Minister of Forestry Regulation No. 21 of 2009 on Criteria and Indicators of Determining the superior NTFPs. The NTFPs that are potentially to be developed, especially in South Sulawesi, i.e. candlenut trees, gaharu, and honey bees. The NTFPs can be developed in agroforestry systems.

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Measurement of Arsenic (As) and Nickel (Ni) in the Mangrove Shellfish (*Polymesoda bengalensis*) at the Estuary of Asam-Asam River in Tanah Laut Regency

By Bunda Halang, Ika Purnama Sari, St. Wahidah Arsyad

Departement of Biological Education, FKIP-Lambung Mangkurat University, Banjarmasin Indonesia

E-mail : dahlan.unlam@gmail.com

ABSTRACT

Estuary of Asam-Asam River is a river that be supporting the mobility of residents. In the Estuary of Asam-Asam River is also found mangrove shellfish consumed by residents. The purpose of this research was to find how many concentrations of arsenic (As) and nickel (Ni) in mangrove shellfish (***Polymesoda bengalensis***) in the Estuary of Asam-Asam River. The method of this research was descriptive method with sampling by observation, namely sampling to the field with three points of the samples. The three points of these samples, namely : 1) In the Estuary of Asam-Asam River near the Java' Sea and coal stockpile PT.Arutmin, around 600 m from the coal stockpile, 2) The medium density of palm vegetation, around 1000 m from the first sampling, and 3) The rare density of palm vegetation, around 1000 m from the second sampling. Examine of As and Ni contents used *Inductively Coupled Plasma* (ICP) method. The results of this research showed that the As contents in the mangrove shellfish of the first sample, second sample, and the third sample were <0.01 ppm-s. While Ni contents in the mangrove shellfish of the first sample, second sample, and third sample respectively were < 0.2000 ppm, < 0.3609 ppm, and < 0.1 ppm. The As and Ni contents in the mangrove shellfish were below the threshold of quality standards based on the regulation of director general POM No. 03725/B/SK/VII/1989 and FDA of Guidance of Document, Chapter II, 2007 Although the results were still below the threshold of quality standards, we should be carefull to consume mangrove shellfish because of their contents will be accumulate in the future.

Keywords : Arsenic, Nickel, Estuary of Asam-Asam River, Mangrove Shellfish

INTRODUCTION

Estuary of Asam-Asam river which is located at Village Estuary of Asam-Asam immediately adjacent with Java’s sea and near an activity of coal stockpile PT. Arutmin. Suharto’s (2011) said that the activity of coal stockpile generate waste in the form of fly ash and bottom ash. Coal dust (fly ash) contain heavy metals. Two of them are Arsenic (As) and Nickel (Ni).

Content of the As of coal dust was 0,5 to 933 ppm while Ni in the coal dust was 3 to 80 ppm. (Ruch *et al*, 1974). Resource of As are from metal smelting activities, domestic effluents, pesticides (Palar, 1994), fungicides, and wood preservative (Sellers, 1999). While resources of Ni are from coal and domestic effluents (Connell and Miller, 1983).

Fly ash from coals in high concentrations can disturb the balance of biotas in river ecosystem, including mangrove shellfishs thoes live in estuary of Asam-Asam river. Mangrove shellfishs (*Polymesoda bengalensis*) can be used by local residents to be consumed because of its high nutrients and it can help their economic. When the mangrove shellfish which contains arsenic and nickel are consumed by humans in a long time, these metals are able to accumulate in the human bodies. When the concentrations of the As and Ni are high, it can disturb or be dangerous to human health.

The purpose of this research was to determine how many concentrations of As and Ni in the meat of mangrove shellfish at the north side of estuarin Asam-Asam River and to determine whether As and Ni concentrations in the meat of mangrove shellfish are still below the threshold of quality standards or above the threshold of quality standards according to Regulation of Director Manager of POM No. 03725/B/SK/VII/1989 for As and FDA of Guidance of Document, Chapter II, 2007 for Ni.

The benefits of this research are as an information for the people of estuary of Asam-Asam River which consume mangrove shellfish and as an input material (preliminary data) of local government for managing of Asam-Asam River in the future.

MATERIALS AND METHODS

This research used a descriptive method. Sampling was done by observation, namely direct observed to the field. This research was located at Estuary of Asam-Asam River in Estuary of Asm-Asam Village, Tanah Laut Regency. The research procedure was done to observe the research of area. Prepared tools and materials, established the three sampling points. The three sampling points were : 1) In the estuary of Asam-Asm River near the Java’ Sea and coal stockple PT.Arutmin, around 600 m from the coal stockpile, 2) The medium density of palm vegetation, around 1000 m from the first sampling, and 3) The rare density of palm vegetation, around 1000 m from the second sampling. Location of three point sampling can be seen in the picture below, namely :

Catched the mangrove shellfishs by using a shovel or wood to dig substrate. Entered samples of mangrove shellfish into sterile stoppered glass and gived the label for every sample. Furthermore, those samples entered into the cool box. The next steps were to measure environmental parameters and then to examine the As and Ni contents in the meat of mangrove shellfish in the laboratory. Last step was to compare the As and Ni concentrations with the threshold of quality standard according to Director Manger of POM No. 03725/B/SK/VII/198 for As and the FDA of Guidance of Document, Chapter II, 2007 for Ni.

RESULTS AND DISCUSSION

Result

The result of the As and Ni contents in the meat of mangrove shellfis can be shown in Table 1 below, namely:

Table 1. The As and Ni contents in meat of mangrove shellfish (*Polymesoda bengalensis)*

Metal	Metal concentration (mg/Kg)			Thresold of Quality standards (mg/Kg)
	Sampling 1	Sampling 2	Sampling 3	
As	< 0,10	< 0,10	< 0,10	1,0*
Ni	< 0,2000	< 0,3609	< 0,10	80**

Resource : Laboratory Health of South Kalimantan , 2015

Note :

Sampling1 : Estuary of Asam-Asam River around 600 m from coal stockpile PT.Arutmin
Sampling 2 : Medium density of mangrove, around 1000 m from the first' sampling point
Sampling 3 : Rare density of mangrove, around 1000 m from the second' sampling point
* : Regulation of Director Manager POM No. 03725/SK/VII/1989
** : FDA of Guidance Document, Chapter II, 2007

Based on this resulted, We saw that all concentrations of the sampling points of As and Ni metals on the meat of mangrove shellfish were below the threshold of quality standards based on Regulation of Director Manager POM Number 03725/SK/VII/1989 for As and FDA guidance of dokument, Chapter II, 2007 for Ni.

Result measured of the environmental parameters at the three sampling points can be shown at table 2, namely :

Table 2. Physic and chemical parameters of water at research area

Parameters	Unit	Sampling			Range	Maximum-Threshold
		I	II	III		
Water temperature	^{O}C	28	30	34	28-34	25-35*
Degree of acidity (pH)	-	7,1	7,5	7,6	7,1-7,6	6 - 9*****
Current velocity	m/s	0,054	0,066	0,051	0,051-0,066	0,01-1****
BOD_5	mg/L	9,70	14,40	6,30	6,30-14,40	2*****
COD	mg/L	24,33	36,16	15,83	15,83-36,16	10*****

Source : *) Laboratory Health of South Kalimantan, 2015

Note :

Sampling 1 : Estuary of Asam-Asam River around 600 m from coal stockpile PT.Arutmin
Sampling 2 : Medium density of mangrove, around 1000 m from the first' sampling point
Sampling 3 : Rare density of mangrove, around 1000 m from the second' sampling point
* : Komala (2011)
*** : (Kep.-02/MENKLH/I 1988)
**** : Atmaja (2014)
***** : PerGub Kal-Sel no. 5 2007

Based on table 2, It can be seen that the temperature (range 28 - 34^{o}C) was suitable for marine life or mangrove shellfish based on Komala' statement (2011). The pH (range 7,1 to 7,6) was suitable based on Regulating of South K Kalimantan' Governor Number 05, 2007. Measurement of current velocity (range 0.05.066) was still approprianve for tolerance range of mangrove shellfish according to Atmaja statement (2014), unless the BOD_5 (range 6,30 – 14,40 mg/l) and COD (range 15,83 – 36,16 mg/l) were above of quality standards. Based on the result of measurment of BOD (range 6.30-4.40) and COD (15.83-36.16) are slightly above the quality standards base on Regulation of South Kalimantan Governor Number 5 of 2007.

Discussion

Base on this research obtained that the results of the three sample points were below threshold of quality standards which had established. As a result, the mangrove shellfish were still safe for eating. The As and Ni contents were caused some reasons, namely : 1) The concentrations of As and Ni in the water of Estuary of Asam-Asam River were very low, namely < 0,002 mg/l (Sari, 2015) so the concentration which has absorbed into mangrove shellfish body was still low, 2) The distance of the three point samplings were a little away or far from resource of activities which can produce As and Ni, especially the coal stockpile PT.Arutmin and the resident settlements, and 3) There were many mangrove plants in this area which the mangrove plants could absorb As and Ni so they were estimated a few contentration of As and Ni absorbed into a mangrove shellfish body.

The mangrove plants capable of accumulating metal with a high concentration in the their roots (Hidayati, 2004). The other statement, Panjaitan (2009) said that the palm plants were a part of mangrove forests. Palm zones or palm plants were the barrier between land and sea, there are fresh water that flow on this zones (stream) into the sea.

Accumulation of the As and Ni in the human body due to consumed the mangrove shellfish continuously need to be warned in future, especially for residents which live on Estuary of Asam-Asam Village. When concentrations of As and Ni are high in the human body, they can disturb the health or can poison to the health because they cause some diseases and they cause a death. Some of the diseases which be caused by the high concentration of As were queasy, vomit, diarhea, abdominal pain, and the others. The concentration of As can cause a death. Whereas a high concentration of Ni in the human body, especially in pituitary gland, can cause a depression so it can decrease secretion of prolactin hormone under the normal concentration. Accumulation of Ni at the pancreas can disturb the secretion of insulin hormone (Widowati, *et al.*, 2008).

Two of the possibility of the mangrove shellfish attached the metal (As and Ni). First, the metals in the form of ions, it can occur accumulation in the mangrove shellfish body. Second, The exposure to the As and Ni on the mangrove shellfish could occur because the As and Ni ions could form an attachment with the other elements in the mangrove shellfish body (Darmono, 2001). Further, he said that the heavy metals on each compartments were varied depend on the location, kind of compartment, and the level of the pollution.

There are two ways of the mangrove shellfish to attach a metal.The first, when the mangrove shellfish is eating phytoplankton, the heavy metals in the water can enter to the mangrove shellfish body. The second, leucocyte cell in the mangrove shellfish body will attachs heavy metal which enter to its body. Leucocyte cell plays a role in the translocation and detoxification system of metal. (Suyanto, *et al*, 2010).

Based on the results of this research can be found that all of the environmental parameters were suitable with the mangrove shellfish life, unless BOD_5 and COD values. BOD_5 and COD concentrations were above the threshold of quality standards which be established. The concentrations of BOD_5 and COD which were high, it can reduce oxygen concentration in the water because the oxygen which was dissolved in the water was absorbed by microorganisms to breaks or degrades material complex to material more simple (Wardhana, 2004).

CONCLUSION

1. As metal contents of all sampling points on the meat mangrove shellfish were < 0.10 mg/kg and Ni metal content of all sampling points respectively were the meat of mangrove shellfish were <0.20, < 0,3609, and < 0,10 mg/kg.
2. The contents of As and Ni metals on the meat mangrove shellfish were still below the threshold of quality standards based on Regulation of Director Manager POM No 03725/SK/VII/1989 for As and based on FDA of Guidance of Document, Chapter II, 2007

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PRESENTATION ORAL COMMISSION - B

Packaging Techniques of Forest Tree Seedlings to Maintain Their Viability During Conveyance

Naning Yuniarti, Dida Syamsuwida dan Rina Kurnianty

[1] *Forest Tree Seed Technology Research & Development Centre, Bogor Indonesia*

Email : naningbtp@yahoo.co.id

ABSTRACT

The procurement of forest tree seedlings for plantation requires an activity of carriage from nurseries to plantation sites. The study was aimed to find out an appropriate technique to sustain the viability of seedlings during conveyance. There were nine species of forest tree seedlings which had been invesigated. The treatments were using various containers, ages and duration of transport. The results revealed that the roots and leave of *Agathis sp, Aquilaria malaccensis* and *Styrax benzoin* seedlings should be cut partly, meanwhile *Azadirachta indica, Shorea pinanga, S.stenoptera, S.selanica, Rhizophora apiculata,* and *Calophyllum inophyllum* were not necessarily. The first three species used plastic bags for their packaging containers which media of either moist paper or coconut peat was given. Meanwhile *A.indica, S. pinanga, S.stenoptera, R. Apiculata* were put into a styrofoam box which previously the seedlings were wrapped with a banana midrib. The container for *S. selanica* and *C. inophyllum* seedlings used a woody box that has been filled with a moist coconut peat. The age of the seedlings was around one to two months old. The duration of transport was ranging from couple hours to several days by using either an aeroplane or bus or freight service.

Keywords : forest tree species, packaging containers, seedling, transportation.

The Propertis of Particleboard Made of Bambo Mayan (*Gigantochoa robusta*) and Wood Waste Galam (*Melaleuca cajuputi*)

Siti Hamidah[1,2], Yudi Firmanul Arifin[1,2], Lusita Wardani[1], Darni Subari[1]& I.M. Sulastiningsih[3]

1) Faculty of Forestry, Lambung Mangkurat University, Banjarbaru Indonesia
2) Center of Excellence Research Consortium for Sustainable Tropical Forest Management, Banjarbaru Indonesia
3) Centre for Research and Development of Forest Products, Bogor Indonesia

E-mail : reylitahadi@gmail.com

ABSTRACT

Galam (*Melaleuca cajuputi*) is a typical wood on wetland. Galam wood waste is selten produced in housing construction. Galam wood is commonly used as materials to support buildings, and afterwards simply discarded as waste. This wood waste still has the potential to be used, ie as a raw material mixture for making particle board. This study aims to determine the quality particle board from bamboo mayan mixed with Galam wood waste at various levels of gluten. Bamboo manyan (*Gigantochloa robusta*) have characteristics that are very suitable as a raw material bamboo composite particle board made including regular particle board with a thickness of 12 mm, Type U (adhesive UF), with a density of 0.7 g / cm3. The results showed that the addition of sawdust Galam and UF adhesive levels do not affect the value of Modulus of Elasticity (MOE) and the Internal Bonding (IB) or internal bonding strength, and only affects the value of Modulus of Rupture (MOR) and density particle board made from bamboo. However in general the addition of sawdust Galam degrade the quality particle board from bamboo manyan, so the addition of wood flour Galam recommended maximum of 20%, on the contrary increased levels of adhesive improve the quality of particle board, so it is advisable to use adhesive levels of 10%. Value MOE, MOR, IB and the average density of particle board made from a mixture of bamboo and wood waste manyan Galam is: 31.274 kg / cm2; 180.48 kg / cm2; 5.3 kg / cm2 and 0.776 g / cm3. By the standards of SNI 03-2105-2006, then all the parameters comply with those standards.

Keywords: Galam (*Melaleuca cajuputi*), bamboo manyan (*Gigantochloa robusta*), particle board, urea formaldehyde, physical and mechanical properties

Potency and Characterristic of Fast Growing Tree Species in Indonesia

Wiwin Tyas Istikowati[1]), Futoshi Ishiguri[2], Shinso Yokota[2]

[1)]Faculty of Forestry, LambungMangkurat University, Banjarbaru, Indonesia
[2)]Faculty of Agriculture, Utsunomiya University, Utsunomiya 321-8505, Japan

Email : wien.tyas@gmail.com

ABSTRACT

Fast-growing tree species are considered as the tree species which reach at least 10 m^3 per ha of amean annual increment (MAI) in plantation under favorable site conditions with suitable silviculatural managements. It is used for a variety of purposes, such as lumber, panel products, plywood, particleboard, veneer, furniture, and light construction. Wood resources of fast-growing tree plantation in Indonesia can be harvested at 7 years intervalsand their productivity reach to 100 m^3/ha. Majority, fast-growing tree species have high holocellulose andα-cellulose contents and showed Runkel ratio value bellow than 1. Chemical and derived wood properties are good indicators to predict pulp and paper properties. Based of that result, fast-growing tree species are indicated as suitable wood for pulp and paper raw material.Therefore, growing fast-growing tree species for plantation can be an efficient way for producing pulpwood.

Keywords: fast-growing tree species, plantation, mean annual increment

INTRODUCTION

Indonesia is a significant producer for wood and wood-related products, such as log, lumber, plywood, board, and pulp. However, Indonesian forestry sector is in deep crisis (Smith *et al*. 2003). One of the crises for past several decades is supply-demand imbalance of wood resources due to reduction of natural forest area (Smith *et al*. 2003; Obidzinski and Chaudhury 2009). The major cause of deforestation in natural forests is forest harvesting, including legal and illegal land clearance for rubber and palm oil plantation establishments (FAO 2002). The increase in population in Indonesia has also resulted in a steady increase in the consumption of wood and wood-related products. As the results of these factors, the area of Indonesian natural forests has diminished much more rapidly than expected. In addition, the production of wood resources has tended to decrease due to the reduction of natural forest areas (Obidzinski and Dermawan 2012).

Raw materials for wood and wood-related products in Indonesia have been supplied from natural forests mainly composed of mixed hardwood species, secondary forests as well as plantations managed by community or companies.However, Indonesian wood industry sector has dilemma, derived from the long-standing disparity between high production capacity of wood industry and the limited supply of raw material (Pirard and Irland 2007; Obidzinski and Chaudhury 2009). To resolve the disparity, fast-growing tree species have become major plantation species in Indonesia as well as other Southeast Asian countries (Malinen*et al*. 2006; Alamsyah*et al*. 2007; Ishiguri*et al*. 2007; Hasegawa *et al*. 2009; Yahya*et al*. 2010; Chong *et al*. 2013). On the other hand, the increasing concentration on the atmosphere is creating difficulty to biological entities which needs to be minimized, where fast-growing tree are playing role in decreasing carbon concentration (Bijalwan*et al*. 2014).Therefore, the aim of this paper is to discuss the potency and characteristics of fast-growing tree species especially for their function as pulp and paper raw material.

DISCUSSION

Significance of fast-growing tree species in Indonesia

Area of plantation for fast-growing tree species has expanded, because these species can rapidly grow, widely adapt to degraded land, and produce acceptable quality of wood for pulp and paper material (Hegde*et al*. 2013).Comparing with longer-rotation plantation, fast-wood plantation can produce one and a half to two times more wood per hectare per year, and reach maturity two to three times faster (Cossalter and Pye-Smith 2003). The most obvious advantage of fast-growing tree species is their rapid growth. Approximately, fast-growing tree species take the 7-year rotation cycle of timber plantations in Indonesia and their productivity reach to 100 m^3/ha (Pirard and Cosalter 2006).

Table 1 shows a list of major fast-growing tree species planted in Indonesia and their rotation age and uses. The rotation age ranges from 5 to 17 years. *Neolamarckiacadamba* has the shortest rotation age. All fast-growing tree species listed in Table 1 are suitable for pulp production, and some of them can be used for construction and furniture. Mostly, location of fast-growing tree species plantation is in Java, Sumatra, and Kalimantan Islands, Indonesia. For developing countries such as Indonesia, established fast-growing plantation gives benefits in economic sectors. The example is in quantity matter, especially in the case of producing pulpwood, or wood that can be chipped or flaked to provide materials for reconstituted products. The higher the yield is the lower the cost of the raw material. Less land is needed to produce the same amount of wood, and this helps to reduce the cost of land, production, and transport (Cossalter and Pye-Smith 2003). With the cheap land, low labor costs, and potential for higher tree growth rates, developing counties located in the tropics and subtropics have a competitive advantage over cooler, temperate regions in terms of plantation wood production.

Table 1. The rotation age and uses of some fast-growing species planted in Indonesia

Species	Location [1)]	Rotation age (year) [2)]	Uses [3-5)]
Acacia auriculiformis	Java, Sumatra, Kalimantan, Sulawesi	8 – 17	Poles for house building, furniture, veneer, pulp, and firewood
Acacia mangium	Java, Sumatra, Kalimantan	9	Construction, boat building, furniture, cabinet making, veneer, particle board, and pulp
Falcatariamoluccana	Java, Sumatra, Kalimantan, Sulawesi, Nusa Tenggara, Moluccas	15	Furniture, lightweight packing materials, veneer, pulp, and light construction materials
Neolamarckia cadamba	Java, North Sumatra, Riau, Central Kalimantan	5 – 10	Light construction, beams and rafters, boxes, packing cases, ceiling board, toys, carvings, matches, chopsticks, pencil, plywood, particle board, and pulp and paper
Eucalyptus camaldulensis	Aceh, North Sumatra, Jambi, Kalimantan	9	General purpose timber, pulp, veneer, plywood, particle board, and wood-wool board
Gmelinaarborea	Sumatra (Riau, West Sumatra, Jambi, South Sumatra, Lampung), Kalimantan	7	Light construction, general carpentry, packaging, carving, furniture, decorative veneers, flooring, musical instruments, matches, particle board, pulp, and canoe making
Pinus merkusii	Aceh, North Sumatra, West, Central, and East Java	7	Light construction, light flooring, fruit boxes, toys, pulp, and fiberboard

Note: [1)], Nair and Sumardi (2000); [2)], Ministry of Forestry (2009); [3)], Lemmens*et al*. (1995); [4)], Soerianegara and Lemmens (1994); [5)], Sosef*et al*. (1998).

Chemical Properties

Table 2 shows chemical and pulp properties of some fast-growing tree species. The lowest extractives and lignin contents were found in *Artocarpuselasticus* and *E. camaldulensis*, respectively. Meanwhile, the highest holocellulose content was found in *N.cadamba*. Chemical properties of wood are very important factors for pulp and paper production. Wood with low extractives and lignin contents, and high holocellulose and α-cellulose contents is more desirable as pulpwood (Pereira 1988; Ona*et al*. 1997; Jahan*et al*. 2011). It is known that chemical properties influence pulp and paper quality especially for pulping process, pulp yield, Kappa number and the quality of end product (Ona*et al*. 1997; Yahya*et al*. 2010; Jahan*et al*. 2011; Santos *et al*. 2012; Chong *et al*. 2013). Yahya*et al*. (2010) reported the relationships between chemical properties and fiber length or wood density on three *Acacia* species. The fiber length was strongly correlated with holocellulose (r = 0.92), α-cellulose (r = 0.82), and lignin (r = –0.70) contents. Meanwhile, wood density was strongly correlated with holocellulose (r = 0.92) and α-cellulose (r = 0.82) contents. Moreover, wood density was not correlated with lignin and extractives contents. The relationships between various extracted and wood chemical component contents have been reported in *E.camaldulensis* (Ona*et al*. 1997, 1998). Amidon (1981) mentioned that pulp yield is positively correlated with holocellulose and α-cellulose contents. Therefore, chemical properties could be used as predictors for suitable utilization of fast-growing tree species. Fast-growing tree species are utilized as wood resources because these combined fast tree growth and stem quality with suitable wood anatomical and chemical properties make valuable raw-material for production of pulpwood (Ona*et al*. 2001; Malinen*et al*. 2006; Santos *et al*. 2012; Chong *et al*. 2013; Pirralho*et al*. 2014).

Pulp properties

Fast-growing tree species have become more promising as alternative wood sources to solve the disparity between wood demand and supply for pulp and paper sector (Malinen*et al*. 2006; Yahya*et al*. 2011; Istikowati*et al*. 2016). Those species have good pulp traits with high pulp yield, and produce paper with good optical, physical, and surface properties (Yahya*et al*. 2010; Hegde*et al*. 2013). The pulping and papermaking potential of fast-growing tree species has been studied by many researchers (Ona*et al*. 2001; Santos *et al*. 2012; Istikowati*et al*. 2016). One of the important factors influencing pulp and paper properties is an anatomical characteristic of wood (Ona*et al*. 2001). Longer wood fiber is expected to produce stronger paper (Dinwoodie 1965; Ona*et al*. 2001). Zobel and van Buijtenen (1989) mentioned that the cell length of 2 mm makes Kraft paper with an acceptable tear strength.

Derived-wood properties calculated from anatomical characteristics (cell length and cell morphology) can be used to predict pulp and paper properties (Ona*et al*. 2001). Wood with low Runkel ratio and high slenderness ratio will produce well-bound and flexible paper (Ona*et al*. 2001; Istikowati*et al*. 2016). Derived-wood properties of some fast-growing tree species are shown in Table 3. All woods from species listed in Table 3 showed Runkel ratio below 1, except *E.camaldulensis*. Generally, favorable pulp strength properties are obtained when the Runkel ratio bellow 1 (Ashori and Nourbakhsh 2009).

Santos *et al*. (2012) reported that the pulp yield and Kappa number were not correlated with wood density in *A. melanoxilon*. Therefore, it is possible to select the wood with high density, providing Kraft pulp with low Kappa number. The preferred raw material for pulpwood is the wood that produces high pulp yield and low Kappa number, which are influenced by chemical properties of wood (Amidon 1981; Santos *et al*. 2012). The wood with high lignin content results in lower pulp yield and higher Kappa number (Santos *et al*. 2012). Some researchers have reported that the wood producing higher pulp yield has lower Kappa number (Santos *et al*. 2012; Chong *et al*. 2013; Istikowati*et al*. 2016). Holocellulose content of wood also influences pulp yield: the wood with higher holocellulose content produces higher pulp yield (Amidon 1981; Istikowati*et al*. 2016). Higher pulp yield is associated with lower Kappa number and alkali consumption, indicating the important role of chemical composition of wood in Kraft cooking (Santos *et al*. 2012). Acceptable pulp properties of fast-growing tree species have been reported by many researchers (Malinen*et al*. 2006; Santos *et al*. 2012; Istikowati*et al*. 2016).

Recently, many studies have indicated that fast-growing tree species also have potential for other wood products, such as lumber, panel products, plywood, particle board, veneer, furniture, and light construction, because of their rapid growth rate, availability, renewable nature, high productivity, and multiple uses (Cossalter and Pye-Smith 2003; Alamsyah*et al*. 2007). Therefore, new alternative potential should be found for fast-growing tree species.

Table 2 Chemical characteristics and pulp properties of some fast-growing tree species

Species	Age (year)	Extractives (%)	Lignin (%)	Holocellulose (%)	α-Cellulose (%)	Pulp yield (%)	Kappa number
Acacia auriculiformis[1,2)]	7	5.96	34.1	71.3	40.6	48.6– 53.8	15.4– 26.2
Acacia mangium[1,3)]	7 & 12	5.38	31.3	80.4	45.7	49.2	20.9
Falcatariamoluccana [4)]	13	3.40	27.0	–	49.0	–	–
Neolamarckiacadamba[5)]	–	2.24 – 2.58	24.6– 30.9	82.1 – 84.8	–	–	–
Eucalyptus camaldulensis[6)]	14	3.40– 13.70	20.5 – 23.9	79.8 – 85.0	41.8 – 47.8	34.6 – 40.0	13.9 – 25.9
Gmelinaarborea [4)]	8	5.00	27.0	67.0– 81.0	–	–	–
Artocarpuselasticus[7)]	11	1.50	29.7	78.0	50.7	50.3	38.1
Neolitsealatifolia[7)]	11	2.10	25.0	81.0	55.2	53.6	14.6
Alphitonia excels [7)]	11	3.00	24.6	80.8	50.8	54.1	22.0

Note: [1)], Yahya*et al*. (2010); [2)], Malinen*et al*. (2006); [3)], Clark *et al*. (1991); [4)], Soerianegara and Lemmens (1994); [5)], Latib*et al*. (2014); [6)], Ona*et al*. (2001); [7)], Istikowati*et al*. (2016).

Table 3 Derived-wood properties of some fast-growing tree species

Species	Age (year)	RR	SR	CR	FC	LF	SF ($\times 10^3\ \mu m^3$)
Acacia auriculiformis[1)]	7	0.55	52.7	0.17	0.67	–	–
Acacia mangium[1)]	7	0.37	51.3	0.13	0.73	–	–
Falcatariamoluccana[2)]	7	0.08 – 0.17	–	0.04 – 0.07	0.85	–	–
Neolamarckiacadamba[2)]	7	0.18 – 0.33	–	0.07 – 0.12	0.73 – 0.90	–	–
Eucalyptus camaldulensis[3,4)]	4 & 14	0.58 – 1.00	31.7 – 47.1	–	0.50 – 0.62	0.66– 0.82	91.2– 26.6
Gmelinaarborea	–	–	–	–	–	–	–
Artocarpuselasticus[5)]	11	0.16	66.2	0.07	0.86	0.15	219.5
Neolitsealatifolia[5)]	11	0.45	68.6	0.15	0.67	0.38	208.9
Alphitoniaexcelsa[5)]	11	0.14	67.0	0.06	0.87	0.14	84.3

Note: RR, Runkel ratio; SR, slenderness ratio; CR, coefficient of rigidity; FC, flexibility coefficient; LF, Luce's shape factor; SF, solid factor; [1)], Yahya*et al*. (2010); [2)], Fajriani*et al*. (2013); [3)], Ona*et al.* (2001); [4)], Pirralho*et al*. (2014); [5)], Istikowati*et al*. (2016).

CONCLUSION

Favorable properties for pulpwood are wood with high holocellulose and α-cellulose contents. Derived wood properties are also good indicator to predict pulp and paper properties. Both from chemical and derived wood properties, fast-growing tree species are suitable for pulpwood. Therefore, growing these species can be an efficient way for producing pulpwood, and a plantation of fast-growing tree species can be a profitable investment.

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The Effect of Site to Potension of Gelam Stands

Alpian and Wahyu Supriyati

Department of Forestry Faculty of Agriculture, University of Palangkaraya Indonesia

E-mail : alpianmeran@yahoo.com

ABSTRACT

Stands of gelam grow clusting in peat swamp forests and tides in South Kalimantan and Kalimantan Tengah.The aim of studies is to investigate the effect of site to potential stands of gelam. The research method was analyze site conditions : A location depth of peat is 51-100 cm (only submerged at high tide), post fire, and B location depth of peat is101-200 cm (not submerged on high tide but the depth of ground water in tide is < 50 cm) to the potential gelam stand (amounth of trees per hectare and the biomass per hectare). The results showed that post-fire on B location cause to more ash and charcoal, perhaps cause higher level of fertility of the soil (especially K available qualify is high) than the A location (K available is medium); grow space more open wide, the weeds die, and at the same time the thinning process occurs because some seedlings and saplings die. The growth of stand of Gelam in B location is higher than the location A (B= tree height average is 10.90 m and tree diameter average is 10.9 cm ; A= tree height average is 9.97 m and tree diameter average is 10.3 cm). Factors ash, charcoal and grow space more wide after the fire is perhaps to cause the potential of biomass at the B location (147.223 tons / ha) greater than the location A (131.578 tons / ha).

Keywords: Gelam, site, potential, biomass

INTRODUCTION

Intensive use of peatlands for transmigration project began in 1973. Government in 1995 to implement the program new paddy fields on a large scale in the peatlands of Central Kalimantan province, known as the Peatland Project (PLG) million hectares, but the project failed. Unproductive land have become neglected and overgrown stands gelam (Poniman et al, 2006). Gelam ((*Maleleuca sp.*) is common and growing on peat land area (Ulya, 2007), Gelam wood is found abundantly in peatswamp forest area in Kalimantan (Supriyati et al, 2015). Kinnon et al (1996) explains that the tree gelam ecologically is a pioneer species. This is confirmed Suyanto et al (2004) explains that gelam is a fast growing species. Daryono (2005) also suggested that the tree gelam tree species that grow in habitats that contain pyrite with natural regeneration especially well on the typology of the land of acid sulfate, shallow peat and peat being. Data BPDAS Kahayan explained that the dominant gelam tree growing in the area of former block D PLG live in groups as a constituent of forest vegetation with a wide area at a specific location (BPDAS Kahayan, 2007). Research sites where growth stands gelam divided into two locations, namely locations A shallow peat (51-100 cm) with a pool of type B (only inundated at high tide) and the location of the B peat medium (101-200cm) with a pool of type C (not inundated by tidal but the depth of ground water in tide <50 cm). Observations in the field have seen both locations there is a difference, especially the condition of growing space and height of the tree.

The purpose of this study aims to determine the effect of a growing location A that was type B riptide swamp (affected by high tide) with shallow peat thickness and the location B was type C riptide swamp, tide unaffected shallow soil (50 cm) with medium peat thickness to the potential gelam stand (number of trees per hectare and biomass per hectare).

MATERIALS AND METHODS

Materials and Equipment Research

Materials used in the study consisted of: tree gelam from two locations (location A and location B) are divided into four classes, namely the seedling stage (sedling), stage of saplings (sapling), stage mast (pole) and the stages of the tree. The equipment used for inventory locations, sampling, manufacturing test sample such as a compass, GPS, rope, nails, hammers, zinc plate, machetes, sacks, plastic bags, hand saws, axes, chainsaws, meter rolls, calipers, diameter tape, camera , water pumps, hoses, habegge force 3 ton, steel wire, boats, small boats, cameras, chain saws and stationary.

Research procedure

Survey : The inventory of cajuput stand potential in the A and B locations was carried out using the method of single plot in the D block of the former PLG project. The area of every location of the A and B was 5 ha. The diameter and number of tree were the measured variables.

Sample Soil : Soil samples were taken from the location A and location A by the depth of the tree roots gelam as supporting data to determine the level of soil fertility in both locations. Sampling was taken at 3 levels of soil depth, which is 25 cm, 75 cm and 125 cm. Soil samples are put into sealed plastic bottles so awake corresponding original condition.

Sample trees: The sample of trees was selected based on its growing stage, i.e. seedling (plant with < 1.5 cm in height), sapling (tree with > 1.5 cm in height and < 10 cm in diameter), pole (tree with the diameter of >10 cm ≤ 20 cm) and tree (tree with the diameter of > 20 cm) (Soerianegara & Indrawan 2005). The number of seedling collected was 4 samples and 5 samples each for sapling, pole and tree. Samples from the locations of A and B were the same in number, measured tree diameter and stem appearance (tree with relatively upright stem).

Samples procurement**:** Seedling and sapling were acquired by destructive sampling method. Sampling area was cleared and the soil around the base of the samples was carefully excavated in order not to break the root. Seedling and sapling were then carefully pulled out. At first the leaves, fruits and flowers were procured, accumulated and weighed. The branch and the stem was cut with knife or handsaw, accumulated and weighed. In the A location, the root was cleaned and washed with water pump, and in the B location root was just carefully cleaned and then both groups of samples were cut, accumulated and weighed. The samples of pole and tree were procured in similar methods to these of seedling and sapling, except that they were fell down by the use of steel wire pulled out by a 3 tons capacity habegge that fastened in a big and sturdy adjacent tree. After felling of the trees, leaves, fruits, flowers, branches, stem and root were procured, accumulated and weighed. The root was pulled out by the use of the 3 tons capacity habegge. The nature of peat structure was found very helpful in pulling out the roots. The roots from the A location were cleaned and washed with water pump and the root from the B location were just carefully cleaned before cutting, procuring and weighing. Total weight of biomass samples were measured based on their fresh/green weight.

Site Description : The location of research activities carried out at the former district PLG acreage in block D (BPDAS Kahayan, 2007). The site was distinguished into two (2) locations, i.e. location A that was type B riptide swamp (affected by high tide) with shallow peat thickness positioned at S $02^0$50,355'– S $02^0$50,520'; E 114^0 20,383'– E $114^0$20,544', and location B was type C riptide swamp, tide unaffected shallow soil (< 50 cm) with medium peat thickness positioned at S $02^0$49,369'–S $02^0$49,627' ; E $114^0$17,462'–E $114^0$18,109'. These locations were preferred due to the area was dominated by cajuput stand and it was in accordance with the proposed research criteria.

Laboratory samples preparation: Samples for laboratory measurements were grouped based on the growing stage of tree, i.e. the stage of seedling, sapling, pole and tree. Samples were collected in the form of leaves, flowers, fruits, chips and wood disc. Figure 2 exemplify the method of samples procurement for laboratory testing. The green weight of every sample type was weighed in the felling site. The green weight is used to determine the moisture content of samples. Air dry moisture content was determined after exposing the samples indoor at 22.3 ^oC–33.6 ^oC for a month (Pemerintah Provinsi Kalimantan

Tengah, 2006). Air dry and oven dry moisture content of samples was calculated based on ASTM D2016 standard procedure.

Calculation Model Equation: Making allometric equation model of sample trees connected by tree diameter is applied to the data of the inventory stands gelam for calculation of biomass tons per hectare. Surveys assess potential gelam tree by taking measurements (number of trees and tree diameter) in the area by means of single plots randomly placed on natural forests gelam.

Data analysis

Soil samples from location A and location B were analyzed fertility in laboratory Department of Soil Science, Faculty of Agriculture, University of Gadjah Mada. The parameters analyzed were pH (H_2O), carbon (%), total N (%), available P (ppm), K available (me / 100g), and CEC (me / 100g) using a procedure soil chemical analysis (Eviati and Sulaiman 2009) and organic matter (%) using the procedure soil chemical analysis (Yuwono, 2003).

The Moisture content of the sample used formula of Bowyer, et al (2003) as follows:

$\% \ MC_G = GW – ODW / ODW \ x \ 100$

$\% \ MC_{AD} = ADW –ODW / ODW \ x \ 100$

Oven and air dried weight of biomass was calculated based on the following equation (Bowyer *et al.* 2003):

$ODW = GW/(1 + MC_G/100)$

$ADW = ODW \ x \ (1 + MC_{AD}/100)$

In which: ODW = oven dried weight; ADW = air dried weight; GW = green weight; MC_G = green moisture content; MC_{AD} = air dried moisture.

Estimation of biomass in the three conditions (green, air and oven dried) gelam tree using allometric equations using SPSS 12 as follows:

$$Y = a \ X^{b}$$

Y = Biomass tree gelam ; X = Diameter at breast height (Dbh) for sapling, poles and tree - Diameter at 30 cm above the ground of seedling ; a, b = Coefficient.

The next steps include the results of the calculation of surveys into the equation to calculate the biomass (goven dried) using Microsoft Office Excel 2007 program.

RESULT AND DISCUSSION

Table 1 is an analysis of data based on the depth of soil fertility gelam tree roots that grow at the location A and location B. Soil samples were taken divided into 3 levels of soil depth (25 cm, 75 cm and 125 cm). Table 2 shows the data calculation of the number of trees and large diameter trees at location A and location B which have been inventoried on two sites in the area of the former PLG in block D with an area of 5 ha respectively. Data from gelam inventory stands at the location A and location B measured the diameter of the base (seedlings) and diameter at breast height (stakes, poles, and trees). Table 3 describes the sample data selected tree at the location A and location B.Data Table 3 shows the Gelam tree which grows in location B has a tree height and trunk length greater than gelam tree that grows on the location A. The average value of canopy height, crown diameter, the diameter of roots and root have the same relative value (the difference is not great) between the two locations.

Table 1. Data Analysis Results of Soil Fertility in A and B location

Depth	repetition	pH (H_2O)	Karbon (%)	Organic Material (%)	N Total (%)	P available (ppm)	K available (me/100 g)	CEC (me/100 g)
Location A								
25	1	3.88	3.43	5.92	0.19	2.08	0.34	12.54
25	2	3.81	3.45	5.94	0.19	2.12	0.35	11.98
75	1	3.81	3.16	5.45	0.21	1.99	0.37	11.71
75	2	3.78	3.48	6.00	0.19	2.00	0.36	11.83
125	1	3.91	4.26	7.34	0.20	2.17	0.40	8.65
125	2	3.80	4.25	7.33	0.20	2.17	0.37	9.00
Average		3.83	3.67	6.33	0.20	2.09	0.37	10.95
Criteria *		very sour	High		Moderate	Moderate	Moderate	Low
Location B								
25	1	3.63	3.40	5.86	0.17	1.49	0.48	9.87
25	2	3.75	3.20	5.52	0.16	1.57	0.48	10.01
75	1	3.32	2.99	5.16	0.14	1.36	0.65	15.09
75	2	3.34	2.97	5.13	0.15	1.32	0.68	14.87
125	1	3.40	3.80	6.70	0.16	1.59	0.57	13.25
125	2	3.36	3.86	6.66	0.17	1.59	0.59	13.22
Average		3.47	3.37	5.84	0.16	1.49	0.58	12.72
Criteria *		very sour	High		Moderate	Moderate	High	Low

* Source : Eviati dan Sulaiman (2009)

Table 2. Distribution of stands Gelam based to Inventarisation of the A and B location

Stage of growth	The average number of stems single plot^{-1}	The average diameter of trees single plot^{-1} (cm)	An area measuring single plot^{-1} (m^2)	Wide conversion factor ha^{-1}	Average number of stems ha^{-1}
A Location					
Seedling	144.0	0.5	100	100	14400
Sapling	442.6	4.1	625	16	7082
Poles	257.2	12.6	2.500	4	1029
Tree	65.0	23.9	10.000	1	65
Total	-	-	-	-	22,575
Average		10.3			
B Location					
Seedling	239.0	0.4	100	100	23900
Sapling	114.8	6.0	625	16	1837
Poles	236.0	13.4	2.500	4	944
Tree	70.0	23.7	10.000	1	70
Total	-	-	-	-	26,751
Average		10.9			

Description : inventory A A and B location each area of 5 ha.

Table 3. Data Sample Gelam selected from A and B location

A Location							
Stage of growth	KP (cm)	ØP (cm)	TP (cm)	TT (cm)	ØT (cm)	DA (cm)	ØA (cm)
Seedling	0.63	0.20	70.00	32.83	9.85	9.97	9.37
	1.26	0.40	112.00	38.57	12.67	12.90	11.58
	1.89	0.60	129.00	39.67	13.62	14.80	14.23
	2.51	0.80	146.00	49.53	16.47	19.23	18.13
	4.50	1.43	288.63	134.50	59.50	42.50	65.00
Poles	9.50	3.02	715.00	250.00	100.00	40.00	80.00
	13.00	4.14	872.00	300.00	150.00	55.00	90.00
	19.00	6.05	1020.00	400.00	170.00	75.00	110.00
	26.00	8.28	1050.00	400.00	180.00	80.00	150.00
	32.00	10.19	1071.00	406.00	238.00	85.00	180.00
Saplings	38.00	12.10	1173.00	553.00	243.00	90.00	200.00
	44.00	14.01	1289.00	570.00	250.00	95.00	215.00
	50.00	15.92	1341.00	575.00	332.00	98.00	240.00
	56.00	17.83	1343.00	600.00	358.00	99.00	248.00
	63.00	20.05	1347.00	634.00	379.00	100.00	270.00
Tree	75.00	23.87	1490.00	800.00	386.00	115.00	275.00
	83.00	26.42	1750.00	820.00	570.00	118.00	304.00
	94.00	29.92	1850.00	850.00	600.00	133.00	327.00
	100.00	31.83	1880.00	800.00	600.00	139.00	353.00
Total	713.29	227.06	18936.63	8253.10	4668.11	1421.40	3160.31
Average	37.54	11.95	996.67	434.37	245.69	74.81	166.33

B Location							
Stage of growth	KP (cm)	ØP (cm)	TP (cm)	TT (cm)	ØT (cm)	DA (cm)	ØA (cm)
	0.63	0.20	62.00	29.08	8.07	9.05	7.97
Seedling	1.26	0.40	106.00	43.33	12.17	15.50	11.83
	1.89	0.60	131.00	51.30	15.37	19.33	14.52
	2.51	0.80	144.00	53.67	18.90	21.73	18.90
	4.50	1.43	331.75	136.00	62.00	54.00	61.25
Poles	9.50	3.02	622.00	250.00	90.00	70.00	100.00
	13.00	4.14	780.00	270.00	100.00	80.00	110.00
	19.00	6.05	1100.00	300.00	120.00	80.00	120.00
	26.00	8.28	1190.00	350.00	155.00	80.00	130.00
	32.00	10.19	1370.00	530.00	220.00	90.00	170.00
Sapling	38.00	12.10	1430.00	550.00	250.00	90.00	200.00
	44.00	14.01	1450.00	560.00	300.00	100.00	220.00
	50.00	15.92	1460.00	580.00	330.00	100.00	230.00
	56.00	17.83	1620.00	660.00	340.00	110.00	235.00
	63.00	20.05	1650.00	670.00	350.00	110.00	250.00
Tree	75.00	23.87	1720.00	690.00	400.00	130.00	250.00
	83.00	26.42	1740.00	720.00	430.00	135.00	260.00
	94.00	29.92	1850.00	770.00	450.00	140.00	300.00
	100.00	31.83	1945.00	795.00	450.00	140.00	320.00
Total	713.29	227.06	20701.75	8008.38	4101.51	1574.61	3009.47
Average	37.54	11.95	1089.57	421.49	215.87	82.87	158.39

Notation :

KP : Tree's perimeter ; ØP: Diameter at breast height (Dbh) for sapling, poles and tree - Diameter at 30 cm above the ground of seedling ; TP : The height of tree (cm) ; PB : the length of free branch stem; TT : The height of crown ; ØT : the diameter of crown ; DA : the depth of root ; ØA : the diameter of root.

Samples selected tree from location A and location B with the same large-diameter trees are weighed so as to obtain a total weight of biomass (wet, air dry and oven dry) in Table 4 below.

Table 4. Weight Biomass (wet, air dry , and oven dry) Gelam per stem samples selected from A and B location

Stage of growth	ØP (cm)	A Location			B Location		
		GW (kg stem-1)	ADW (kg stem-1)	ODW (kg stem-1)	GW (kg stem-1)	ADW (kg	ODW (kg stem-1)
Seedling	0.2	0.016	0.006	0.006	0.007	0.003	0.003
	0.4	0.034	0.014	0.012	0.025	0.010	0.009
	0.6	0.060	0.025	0.022	0.051	0.021	0.019
	0.8	0.105	0.044	0.038	0.093	0.040	0.035
Sapling	1.4	0.892	0.394	0.346	0.980	0.462	0.406
	3.0	6.250	2.830	2.482	5.600	2.834	2.475
	4.1	9.930	4.814	4.218	10.890	5.738	5.010
	6.1	25.210	12.294	10.733	30.660	17.407	15.045
	8.3	48.980	24.332	21.174	61.920	35.408	30.562
Poles	10.2	70.940	35.373	30.764	93.060	53.321	46.189
	12.1	128.900	64.351	55.723	143.670	80.886	69.956
	14.0	132.110	67.899	58.889	200.360	114.428	98.955
	15.9	236.590	121.735	105.351	320.040	188.334	163.257
	17.8	269.450	140.188	121.212	332.460	197.840	170.199
Tree	20.0	321.160	167.995	145.955	412.710	247.882	214.562
	23.9	631.350	340.959	295.821	616.080	375.923	324.977
	26.4	912.950	508.988	440.388	920.180	575.799	497.731
	29.9	1116.020	620.458	539.036	1122.050	705.389	611.691
	31.8	1089.760	622.972	540.138	1265.820	825.646	708.424

Notation :
ØP = Diameter at breast height (Dbh) for sapling, poles and tree - Diameter at 30 cm above the ground of seedling ; GW = green weight ; ADW = air dried weight ; ODW = oven dried weight

Data biomass (dry tanur) per tree in Table 4 into the main data to make gelam biomass allometric equations presented in Table 5 below. Krisnawati et al (2012) explains that the tree biomass allometric models that have been developed in Indonesia generally presented in the form of the rank function, namely $Y = aX^b$. Y is variable dependent (Biomass), X is the independent variable (dbh or a combination of dbh and height), a is the allometric model coefficients, and b is the allometric exponent models.

Table 5. Allometric Equation for Expected of Biomass in A and B Location

Forms Relationships	Location	Coefficient of Determination	allometric equations
Diameter at base – Seedling biomass	A	$R^2 = 0.979$	$B=0.045Dp^{1.31}$
Diameter of trees – Sapling, poles and tree biomass		$R^2 = 0.996$	$B=0.153D^{2.36}$
Diameter at base – Seedling biomass	B	$R^2 = 0.996$	$B=0.048Dp^{1.76}$
Diameter of trees – Sapling, poles and tree biomass		$R^2 = 0.999$	$B=0.183D^{2.39}$

Notation :
KP : Tree's perimeter ; ØP: Diameter at breast height (Dbh) for sapling, poles and tree - Diameter at 30 cm above the ground of seedling; R^2 = Coefficient of Determination ; B = Biomass.

This equation is applied to the data of the inventory to calculate the potential Biomass stand gelam in tonnes / hektar.Persamaan allometric in Table 5 was applied to the data of the inventory at the location A and location b to heavy calculations Biomass stand gelam on location A and location B based on the rate of growth (seedlings, saplings, poles and trees). Data from biomass calculation based on the rate of growth in tonnes / hectare are presented in Table 6

Table 6. Biomass Potential Growth Rate Gelam based on Location A and Location B.

Stage of growth	Biomass ton ha^{-1}	Percentage (%)
A Location		
Seedling	0,280	0,213
Sapling	49,780	37,833
Poles	63,344	48,142
Tree	18,173	13,812
Total	131,578	100,000
B Location		
Seedling	0,252	0,171
Sapling	31,931	21,689
Poles	89,031	60,473
Tree	26,010	17,667
Total	147,223	100,000

Table 6 is a reference base for the calculation of the biomass weight gelam stands at the location A and location B with an area of 5 ha respectively in tonnes / ha are presented in Table 7.

Table 7. Potential Biomass Gelam stands at location A and location B

Location	Biomass ton ha^{-1}
A	131,578
B	147,223

Data calculation of the potential of biomass (Table 7) show that that the results of the calculation biomass stand gelam that grow in the location B is greater than gelam stands that grow in the location A. The results of analyzes of soil fertility between the two locations is relatively the same when viewed from the criteria of soil fertility (pH , carbon, organic matter, total N, P available, and CEC) in Table 1. The content of K-available on site B > site A. Post-fire gelam grow well (getting bigger height and diameter of trees) at the location B is caused at their ash and charcoal that is formed during forest fires. Many contain silicate ash has positive effects on the growth of stands gelam on the location B. This is confirmed by Najiyati et al (2005) which explains that the ash is the waste products of combustion of organic materials such as wood, garbage, weeds, and the remains of agricultural produce such as rice husk and litter. Excess ash contains all the nutrients in full both micro and macro, high pH (8.5 to 10), is not easily leached, bases containing cations such as K, Ca, Mg, and Na are relatively high. This is evident from the data analysis of the soil at the site B contains K higher than the A site because due to the ash formed after the fire. It is also stated by Komarayati et al (2004) that litter charcoal ash content of 13.70% is high enough, then charcoal excellent litter is used as fertilizer on the plants, both perennials and annuals. Post-fire form of biomass burning charcoal allegedly enrich the soil at the site B. Gusmailina et al (2003) explains that the charcoal has a good and important role in cultivating the soil, including raise the pH of the soil, improve soil structure and texture, build and improve the condition of soil microorganisms value content cation exchange (CEC) of the soil. Ogawa (1989) states that charcoal has many pores which can improve the circulation of water and air in the soil, so that it can extend the root system of the plant.

Post-fire that occurred in the study site (location B) causing the death of some stands gelam. Tree growth in location B is better than A locations allegedly caused the death of some seedlings and saplings, and weeding due to fire. Post-fire on the location and space to grow into a more open, nuisance weeds to die, and at the same thinning process occurs because some seedlings and saplings die. Fires do not turn off the stand gelam poles and trees that stand gelam can grow better as Figure 2. Table 3 shows the tree of 19 samples taken from both locations showed that the location B had an average height of trees (1089,6cm = 10, 90 m), the average bole height (820.0 cm = 8.20 m) and the average tree diameter (10.9 cm)> A location average tree height (996.7 cm = 9.97 m), the average bole height (707.9 cm = 7.08 m) and the average tree diameter (10.3 cm). Table 2 shows that the post-fire seedlings grown on site and more, and still young because of the smaller diameter of the seedlings at the location A. Stand gelam growing on location A is not flammable because although the dry season, which commemorate the great tide location A moisten the area so there is no fire. Gelam stand growth in location A slower due to the dense undergrowth in the form of shrubs that interfere with growth and merabat to cover gelam stands that grow in the area such as Kalakai (Stenochlaena palustris) as Figure 1. The room grew less well due to the growing stands of meeting causing impaired tree growth. This is according to the results of research conducted by Nilsen and Strand (2008) stands of spruce dijarangi gradually from 2070 trees / ha to 1100 trees / ha, then be left only 820 trees / ha. The average diameter pine trunk consecutive results of these studies was 6.4 cm (n = 2070), 6.5 cm (n = 1100) and 7.5 cm (n = 820). It is the same as the results of research conducted by Susila (2010) that stands Duabanga before dijarangi be as many as 508 trees / ha with an average diameter of 20,30cm tree, the average tree height of 12.64 m with a volume of 181.36 m3 / ha. After thinning the remaining 172 trees per ha on average tree diameter to the size of 32.88 cm, the average tree height of 19.69 m with a volume of 250 m^3 / ha.

Figure 1. Space Growing Stand Gelam in A Location

Figure 2. Space Growing Stand Gelam in B Location

Besides post-fire will speed up the ripening process of peat. Peat maturing will improve soil fertility. This is confirmed Kurnain (2005), which explained that the fires in peatlands increase reshuffle materials peat so that materials peat precocious. Effect of water level that flooded areas did not affect the growth of gelam. Yamanoshita et al (2001) who studied the growth response Melaleuca cajuputi with the higher propensity puddles on the ground, the greater the high-growth Melaleuca cajuputi.

The above explanation is the result of the analysis and the facts on the ground to stand gelam that grow naturally. Wildfires are certainly generated a lot of losses and should be avoided for the preservation of forests. The above results made reference to farming activities that gelam can grow well if it has a good growing space by thinning, deadly weed, and maintenance (fertilization).

CONCLUSION

1. After the fire at the location and cause of ash and charcoal suspected of causing soil fertility levels at the site B (K available high entry criteria) to be better than the location A (K available entry criteria being).
2. The room grew after the fire at the location B became more open, nuisance weeds to die, and at the same thinning process occurs because some seedlings and saplings die so that the stand growth Gelam in location B (the average tree height of 10.90 m and the mean average tree diameter 10.9 cm) higher than the location A (the average tree height of 9.97 m and an average tree diameter 10.3 cm).

3. After the fire at the location and cause the formation of ash, charcoal and space to grow better, causing the potential of biomass at the location B (147.223 tons / ha) greater than the location A (131.578 tons / ha).

Suggestion

The results of this study is the result of the analysis and the facts on the ground to stand gelam that grow naturally. Wildfires are certainly generated a lot of losses and should be avoided for the preservation of forests. The above results made reference to farming activities that gelam can grow well if it has a good growing space by thinning, deadly weed, and maintenance. Further research mainly stands gelam management system (good silvicultural techniques) so as to support the development of the forestry sector of ecological aspects (environment) and the economical aspects (production) sustainable and continuous to create a welfare society, especially in Central Kalimantan.

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Appendix 1. Data Analysis Soil Fertility

UNIVERSITAS GADJAH MADA
FAKULTAS PERTANIAN
JURUSAN ILMU TANAH
Bulaksumur, Yogyakarta, 55581 Telp. 0274-548814

Hasil Analisis Tanah Order Sdr. Alpian
Sebanyak 6 Contoh duplo

Kode	Kadar lengas %		pH	C	BO	N tot	P tsd	K tsd	KPK
	0.5 mm	2 mm	H_2O	%	%	%	ppm	me/100 gr	
1A.1	10,05	10,63	3,80	3,43	5,92	0,19	2,08	0,34	12,54
1A.2	10,46	10,95	3,81	3,45	5,94	0,19	2,12	0,35	11,90
1B.1	8,05	8,42	3,63	3,40	5,86	0,17	1,44	0,48	9,87
1B.2	7,98	8,06	3,75	3,20	5,52	0,18	1,57	0,48	10,01
2A.1	12,52	12,66	3,81	3,16	5,45	0,21	1,99	0,37	11,71
2A.2	11,54	11,95	3,70	3,48	6,00	0,19	2,00	0,36	11,83
2B.1	12,76	13,13	3,32	2,98	5,16	0,14	1,36	0,65	15,09
2B.2	12,13	12,51	3,34	2,97	5,13	0,15	1,32	0,60	14,87
3A.1	13,77	14,74	3,91	4,26	7,34	0,20	2,17	0,40	8,65
3A.2	13,56	14,94	3,89	4,25	7,33	0,20	2,17	0,37	9,00
3B.1	24,50	26,28	3,48	3,80	6,70	0,16	1,59	0,57	13,25
3B.2	23,72	26,39	3,36	3,86	6,66	0,17	1,56	0,59	13,22

Mengetahui,
Ketua Jurusan Ilmu Tanah,

Prof. Dr. Ir. Azwar Ma'as,M.Sc.

Yogyakarta, 16 Desember 2011
Ketua Komisi Pengabdian Masyarakat,

Nasih Widya Yuwono, SP., MP.

Improving the Properties of Oil Palm Trunk (*Elaeis guineensis* Jacq) with Chemical Modification

Enih Rosamah[1)] and Lambang Subagiyo[2)]

[1] *)Faculty of Forestry, Mulawarman University, Samarinda Indonesia*
[2)]*Faculty of Teaching and Education Sciences, Mulawarman University, Samarinda Indonesia*

Email : enihros@yahoo.com, lbsubagiyo@yahoo.com

ABSTRACT

Indonesia was the largest crude palm oil (CPO) producer with total production of over 30 million tons on 2015. It is assumed one oil palm trunk (OTP) produce 1.25 m3 timber, within period of 20 to 25 years will upcome OTP waste of 147,792,488 m^3. The OTP (Elaeis guineensis Jacq) waste will cause serious environment problems. On the other hand, in the era of globalization and the rapid growth of science, technology, and art has prompted scientists take advantage of a variety of materials, including waste material converted into useful and economics valuable goods. In general, the use of wood as buildings or industrial needs has always focused on aspects of the lifetime of wood, wood stability, esthetically value, and environmental health.Acetylation process aimed at substituting the hydroxyl groups in wood by acetyl group. Since increasing the acetyl groups in wood is expected to reduce the ability of wood to absorb water vapor which lead to the dimensions of the wood becomes more stable. The purpose of this study was to determine changes in the physical and mechanical properties of the oil palm wood due to acetylation and impregnation process. The results showed that the acetylated and impregnated oil palm wood (E. guineensis Jacq) were changed in their physical, mechanical properties and increase in resistance to biological attack.

Key words: acetylation, impregnation, dimension stability, oil palm wood

The Effect of Macro Nutrients on the Growth of Tengkawang (*Shorea stenoptera* Burck) in the Nursery

Tri Wira Yuwati and Safinah S. Hakim

[1]*Banjarbaru Environment and Forestry Research and Development Institute*
Jl. A. Yani Km 28,7 Landasan Ulin, Banjarbaru 70721 South Kalimantan Indonesia
Phone/fax: +62-511-4707872;

E-mail: yuwatitriwira@gmail.com

ABSTRACT

Tengkawang (*Shorea stenoptera* Burck.) or Light Red Meranti is a family of Dipterocarpaceae which produce Illipe Nuts and Borneo Tallow; as a raw material for cosmetics, chocolate, margarine, soaps and candles. However, due to the high exploitation, its presence is endangered and includes in the *IUCN Red List Species.* In order to conserve and increase the production of Tengkawang, the silviculture of the purpose species shall be determined. Environment manipulation is needed to increase the productivity of Tengkawang. The objective of this paper is to determine the dosage and frequency of macro fertilizer on the growth of Tengkawang in the nursery. The research design used in this research was Split Plot with three dosage (1, 2 and 4 gram per pot) and two application frequencies (two weekly and monthly). The parameter observed were height, diameter, number of leaves, survival rate, shoot/root ratio, total biomass, Relative Growth Rate, soil and plant's tissue chemical contents. The observation was carried out for four months. The result showed that the dosage of four grams per pot monthly is the best treatment on the growth of tengkawang in the nursery.

Keywords: macro nutrients, tengkawang, NPK, nursery.

Effect of Land System to Wood Quality of Teak (*Technograndis* L.F) in Humid Tropics

Yusanto Nugroho

Faculty of FOrestry Lambung Mangkurat University, Banjarbaru Indonesia

E-mail: [1)]yusant_1977@yahoo.co.id

ABSTRACT

Plant of Teak in the humid tropics is kind of in the introduce of its original area in Java (tropical), variations of land systems in humid tropics supposed to influence the wood quality of teak produced. This study aimed to analyze the influence of the humid tropics land system of the quality of teak produced compared with teak in tropical area (deciduaous). Research was conducted on private forest teak in humid tropic areas that are in Tapin and Banjar districs of South Kalimantan as well as a comparison of teak forests of the tropics in Ngawi, East Java. The research method includes determining land units based system of land, wood quality test includes physical and mechanical properties of wood as control quality teak wood from tropical (deciduous). Research results show that the system of land contained teak plants covering 6 (six) land system that are Tanjung (TNJ), Pendreh (PDH), Lawang-uwang (LWW), Okki (OKI), Maput (MPT) and Teweh (TWH). The quality teak wood produced from the humid tropics is based on the physical properties of wood moisture content and shrinkage showed differences with Java Teak (tropical) and no different on each land system. Density of teak in the tropics and the humid tropics showed no difference between the systems as well as land. Based on the mechanical properties of wood in all the land system did not show a difference with quality teak wood from deciduous region (tropical) that generate strong class I.

Keywords: land system, wood quality, humid tropic, tropical.

Variation Morphology of Nyawai (*Ficus variegata* Blume) Provenance Borneo

Junaidah, Reni Setyowahyunintyas, Rusmana, Abdul Kadir, Mukhlisin dan Sukma Alamsyah

Banjarbaru Environment and Forestry Research Development Institute, Indonesia

E-mail : junaidah_btr@yahoo.co.id

ABSTRACT

Nyawai (*Ficus variegeta* Blume) is one of the alternative tree species that have prospect to be developed as a plant producing pulp and paper, timber and plywood. Nyawai spread almost throughout the borneo island and has a high species diversity. The purpose of this research activity is to determine the distribution and morphology of nyawai from Borneo seed source. The method used was a survey, herbarium collections, documentation and species identification. The survey shows that nyawai can be found in the area of South Kalimantan, East Kalimantan, Central Borneo and West Kalimantan. The species identification result indicate two species of nyawai are *Ficus variegeta* Blume Sinonim *Ficus variegeta* var. *chlorocarpa* and *Ficus variegeta* Blume Sinonim *Ficus variegeta* var. *sycomoroides*. Both of them have considerable morphological diversity, ranging from the bark, leaves and fruit.

Keywords: nyawai, morphology, bark, leaves, fruit

The Effect of Rooting Media on the Success of Cratoxylumarborescens Cuttings

Reni Setyo Wahyuningtyas [1] and Arif Susianto [2]

[1] Researcher at Research and Development Institute of Environment and Forestry at Banjarbaru
[2] Technician at Research and Development Institute of Environment and Forestry at Banjarbaru
Jl. A. Yani Km 27,8 Landasan Ulin Banjarbaru – South Kalimantan 70721, Indonesia
Telp/fax. (0511) 4707872 Website:www.foreibanjarbaru.or.id

E-mail : reni_forest@yahoo.com

ABSTRACT

Gerunggang (*Cratoxylum arborescens* Blume.) is one of a native peat swamp species which potential for rehabilitation and pulp material. Therefore, vegetation propagation were needed to develop this species. Vegetative regeneration has several advantages i.e can produce cuttings with similar characteristic with its parents and also can produce tree cutting in short time. This study objectives is to observed the suitability of several rooting medium for gerunggang. Four planting treatment were used during this research : (a) river sand medium (b) mixture of peat+rice husk (3:1), (c) mixture of top soil+rice husk (3:1), (d) mixture of coco dust+rice husk (2:1). Every teatment consist of 20 cutting with 4 replication. Each observation was done once in a week for 8 weeks. We observed some parameters : number of sprouts, leaves and roots, root percentage (%), cutting survival rate and rooting speed. We also examined roots number, roots lenght and survival rate of cutting. Variance analysis result showed that planting medium did not significantly affected to cutting roots percentage, number of sprouts, leaves, roots, cutting survival rate, and rooting speed. While, rooting medium very significantly affected to root lenght average. Rooting percentage of cuttings in this research is about 21,25% - 47,5%, and survival rate of cutting ranging from 56,25% to 80%. Topsoil and rice husk is the best medium for the early growth of gerunggang cutting because it can showed best rooting percentage, number of sprout, leaves, and rooting speed ability. In addition, cutting which planted in riversand medium showed ability to produced highest root number (18,45), while in mixture of coconut dust +rice husk (2:1) medium, cutting showed the best root lenght (7,85 cm).

Keywords: gerunggang (*Cratoxylum arborescens* Blume.), cuttings, rooting media, peat swamp

Tissue Culture (*Dyrra lowii*) on Basic Media

Adistina Fitria[1,4], Dina Naemah[1,4], Rodinah[3], Fakhrur Razie[2]

[1] Department of forestry, Lambungmangkurat Univ., Indonesia
[2] Department of Agronomy, Agriculture Faculty, Lambungmangkurat Univ., Indonesia
[3] Department of Soil Science, Agriculture Faculty, Lambungmangkurat Univ., Indonesia
[4] Center of Excellence Research Consortium for Sustainable Tropical Forest Management., Indonesia

E-mail : dinah_rsm@yahoo.co.id

ABSTRACT

Dyera lowiia commercial plant of high economic value. Nurseries Dyera lowiiproblem is recalcitran nature of the seed. Tissue culture technology is very necessary for the supply of seeds in large quantities. Media basic tissue culture is one of the critical success factors in tissue culture propagation. The purpose of this research to determine the influence of some media on explants Dyera lowiiand to determine the best basic medium or explant Dyera lowiibest. This research uses completely randomized design, these two factors. The first factor: the basic media m1 = Murashige and Skoog; m2 = Woody Plant Medium; m3 = B5. The second factor is the explants e1 = nudes, e2 = leaf, with four replications. The results showed that the highest percentage of life at week 1 was obtained on B5 media, browning smallest percentage B5 and WPM media. Results of different test median values at week 2, the 3rd, 4th and 5th at the variable percentage of contamination smallest obtained on leaf explants, the percentage of browning lowest in explant nudes, and the percentage of formed shoots at week 2 was obtained that best in the nude.

Keyword : jelutung, basic media, explan

INTRODUCTION

Dyera lowii including a tree that has the double benefit that commodity timber products and commodities timber forest products (NTFPs) in the form of latex. Dyera lowii have good adaptability and tested on peatlands, growth is relatively fast and can be cultivated with minimal manipulation of the land, as well as having the dual result of sap and wood (Bastoni & Lukman, 2004). Dyera lowii woodeasy to dountil soft, either by machine or hand tool, easily screwing and nailed. The usefulness of this wood for mold, drawing table, plywood, boxes, kelom, carving, wood pencils and household utensils (Martawijaya et al., 2005). While the raw material resin for chewing gum, paint and electrical cable insulator (Sofiyuddin, 2013).

In Indonesia Dyera lowii grows in Sumatra and Kalimantan (West Kalimantan, Central Kalimantan, South Kalimantan and East Kalimantan) (Lemmens et.al, 1995). In general, the multiplication Dyera lowii conducted through generative propagation from seeds or seedlings (Bastoni, 2014). Nurseries Dyera lowii constrained by the nature of the seeds that are easily damaged and quickly germinate (recalcitran). The challenge remains the availability of seeds, harvest and seed quality, so as to get the seeds plant in a short time, the number of lots and genetic properties similar to the parent, it would require tissue culture propagation. To develop the kind of support needed Dyera lowii quality seeds and numerous. One way to develop a seed Dyera lowiii in vitro (Hendromono, 2003)

Stages of in vitro techniques include: provision of planting materials (explants) of the parent elected, sterilization explant in initiation media,; planting media for shoot multiplication; planting media for rooting or plantlets formation; and acclimatization (George & Sherrington, 1994).

In the supply of planting materials or explants may be part of plant organs such as shoots, roots, stems, seeds, tubers, leaf and petiole (Hendaryono and Wijayanti, 1994). According Gamborg and Shyluk (1981) almost all parts of the plant tissue can be used as explants. Organs commonly used as explants among others shoot tips, buds armpit (axillary), roots, buds, nudes, leaves and embryos.

For planting explant require basic media in order to foster optimal tissue culture varies between species and between varieties, even the network that come from different parts of the plant that would be different nutritional needs (Zulkarnain, 2009). Therefore, none of the basic media universally applicable to all types of tissues and organs, such as leaves of different organ by organ nude nutritional needs.

Media basic tissue culture is one of the critical success factors in the multiplication in vitro. The composition of the nutrients contained in the basic medium is different. The basic medium consists of various compositions and of nutrients in it. According Ryago (1988), that the growing media in tissue culture contains a combination of essential amino acids, organic salts, vitamins, buffer solution, and resources carbohidrat. Some basic media that can be used for example, Murashige and Skoog (MS), Woody Plant Medium (WPM), Gamborg (B5), Shenkdan Hildebrant, and others (Gunawan, 1987).

According Gamborg and Shyluk (1981) almost all parts of the plant tissue can be used as explants. Organs commonly used as explants among others shoot tips, buds armpit (axillary), roots, buds, leaves and embryos. The success rate of this type of organ that is used will not be the same for each type of plant (Gamborg and Shyluk, 1981).

The purpose of this research is to: 1. Determine the influence of media on the basis of explants jelutung, 2. Knowing the basic media best on Dyera lowiiexplants, the explants Dyera lowii3. Knowing the best of basic media.

MATERIALS AND METHODS

Place

This research was conducted in the greenhouse and tissue culture laboratory at the Faculty of Agriculture Unlam Banjarbaru. Starting from August to December 2016.

Material

Materials used Dyera lowiiplant, sterilizing materials, bactericides, fungicides, antibiotics, sublimat, alcohol, bayclin, Hydrogen Peroxide, distilled and Murashige and Skoog (MS), Woody Plant Medium (WPM), B5 media.

The equipment used is the laminar air flow, autoclof, oven, hotplate, analytical balance, shaker, thermometer, hygrometer, camera, tweezers, scalpels, yells, metal shelves, bottles planting, Petrides, and Erlenmeyer.

Experimental desaign

This experiment using completely randomized design (CRD), with the first two factors of treatment with explant media base. The first factor is the basic medium (M) ie m1 = media MS, m2 = media WPM, m3 = B5. The second factor is the explant (E) that e1 = leaf, e2 = a nude with four replications, each experimental unit there are 5 pieces.

Implamentation

Equipment such as bottles planting, scalpels, penset and petridis washed and then dried aired. If it is dry planting bottles put in the oven, petridis, scalpels and tweezers wrapped put into the oven.

For the next event, which is designing a planting medium Murashige and Skoog, Woody Plant Medium and B5. Media that are in erlemeyer 1000 ml put into culture bottles each 25 ml is then covered with a lid. After the planting bottle sterilized using autoclaf.

Eksplan leaves and nudes cut on plant seeds on top, cleaned in running water, then given detergent while cleaning, the following is done sterilization with a solution of Dithane M-45 2 g l-1 and Agryft 2 g l-1, shaken 30 minutes. Then explants was added Laminar Air Flow, explants soaked in 70% alcohol, 5 minutes, $HgCl_2$ 0.02 mg l-1 3 minutes, 17.6% H_2O_2, bayclin 20% 5 minutes, baclin 10% 5 minutes. From each of the stages nasing sterilisan material should be rinsed with sterile aquadqs last 5 minutes and rinsed in succession 5 minutes.

After completion of sterilization leaf explants do incision on the left and right sides of leaves, then a square with a size of 1 cm width da length of 1 cm. While the nude is cut to a length of about 1 cm. The following planting bottle filled with explants were prepared, then covered with a lid and wrapped with chiling wraf. The following planting bottles placed on a metal rack in the incubation room with fluorescent lighting, temperature 25 ° C.

RESULT AND DISCUSSION

Based on the results of research on basic media explants jelutung, turned out after the test of homogeneity of the variable percentage of contamination, the percentage of browning, percentage of survival, the percentage formation of shoots from week 1, 2nd, 3rd, 4th and 5th was not homogeneous so that a transformation of the data log (X-10) and the result is homogeneous.

Based on the results of the treatment some basic media explants jelutung, it turns out analysis of variance showed that the treatment media real effect on the variable browning in the first week.

Results of different test middle value percentage browing week 1 in the treatment of the basic media showed significant differences can be seen in Table 1.

Table 1. The different basic media treatment the median value at the variable percentage of browning at week 1

Treatment	Browning Percentation (%)	
	A	B
B5	1.00 b	0 b
MS	1.24 a	10 a
WPM	1.00 b	0 b

Description: The figure followed by the same letter in the same column are not significantly Different from thr real level BNT 0:05

A = Data transformations, B = original data

Based on the Table 1, that the smallest percentage of browning obtained on B5 media and Woody Plant Medium (WPM) which was respectively (0%) and significantly different from the media Muashige and Skoog (MS) (10%). The explants were visible yellowing decline and eventually die explants. When viewed from the three basic kinds of media ie media MS, WPM and B5, then browning highest percentage was obtained on MS medium.

The basis of media composition on MS medium that is more dominant or a higher concentration of B5 and WPM media is NH4NO3 ie 1,650 mg l-1 and CaCl2.2H2O ie 440 mg l-1. According Ryugo (1988) growing in tissue culture media contain a combination of essential amino acids, inorganic salts, vitamins, a buffer solution and an energy source (glucose).

A suitable medium for annual crops by Mariska and Purnamaningsih R. (2001) is a media WPM, this is due to woody perennials. With WPM media it is hoped will provide better results than media MS. Media that is appropriate for use in tissue culture can not be confirmed because there are factors that influence, such as plant species cultured, the age of the parent plant, the age of explants, type of explant used, the needs of plant growth regulators, and the process is conducted in tissue culture (Wetherell, 1982).

Browning by the enzyme polyphenol oxidase caused wounding for their on the explants are cut, and in contact with oxygen and light. Phenolic compounds can inhibit the absorption of nutrients in the media, causing explants lack of energy for growth and development of explants. Allegedly wounding the explant causes the browning effect on MS medium higher and inhibits absorption of nutrients contained in the media.

From the analysis of variance of the variable percentage of contamination, explants showed highly significant treatment at weeks 2 and 3, variable browning percentage of explants showed highly significant treatment at week 2, the 3rd, 4th and ke- 5, the variable percentage of live explants showed highly significant effect of treatment on Sunday 3rd, 4th and 5th.

The different test results mean value explants treated at the variable percentage of life, contamination and browning in week 2, the 3rd, 4th and 5th can be seen in Table 2 and 3.

Table 2.the Test different explants treated middle value at the variable percentage of life,

contamination and browning at weeks 2 and 3.

Treatment	week -2				week -3					
	Average				Average					
	Contamination Persentation		Browning Percentation		Contaminaton Persentation		Browning Persentation		Life Percentation	
	A	B	A	B	A	B	A	B	A	B
Nude	1.70 a	43.33	1.43 b	21.67	1.27 a	56.67	1.83 a	33.33	1.62 b	10.00 b
Leaf	1.30 b	13.33	1.82 a	59.33	1.00 b	13.33	1.30 b	68.33	1.95 a	18.33 a

Description: The figure followed by the same letter in the same column are not significantly Different from thr real level BNT 0:05

A = Data transformations, B = original data

Table 3. Different test treatment the median value at the variable percentage of live explants, contamination and browning at week 4 and 5th.

Treatment	week -4				Week -5			
	Averange				Averange			
	Browning Percentation		Life Percentation		Browning Percentation		Life Percentation	
	A	B	A	B	A	B	A	B
Nude	1.84 a	36.67	1.64 b	0 b	1.84 a	38.33	1.64 b	0 b
Leaf	1.30 b	80.00	1.95	3.33 a	1.30 b	80.00	1.95 a	3.33 a

Description: The figure followed by the same letter in the same column are not significantly

Different from thr real level BNT 0:05

A = Data transformations, B = original data

The table 2 shows that the percentage of contamination at week 2 and week 3 was obtained a percentage less contamination on leaf explants, which was respectively 13:33% and significantly different from the explants nude. This is due to the sterilization process is carried out in stages starting shaking above the shaker using Dithane M-45 2 g l-1 and Agreft 2 g l-1 of each 30 minutes, after which the explants was added laminar air flow for sterilization next.

Agreft solution was removed and shaken out with sterile distilled water for 5 minutes, then shaken with 70% alcohol for 5 min, rinsed again with sterile distilled water 5 minutes, shaken out again with 0.02% HgCl2 for 3 minutes, rinsed again with sterile distilled water 5 minutes , shaken out again with 17.6% H2O2 for 5 min, rinsed again with sterile distilled water 5 minutes, shaken out again with bayclin 10% for 10 minutes, rinsed again with sterile distilled water 5 minutes, 3 times last ekplan soaked in a solution kalpanak in 150 ml to 20 drops for 60 minutes.

Sterilization is done for leaf explants and nudes, the nude turns contamination stems obtain greater percentage (43.33% and 56.67%) at week 2 and 3, because sidelines ekpslan nude there are parts that have not get fully material sterilant, while in ekslan leaves all surfaces get a touch of the sterilizing material, causing contamination of explants nude more. It is also possible fungus internally they are on the network.

In accordance with the statement Mariska (2003) that, the obstacles encountered in the success of tissue culture are among the internal pathogens, especially in woody plants that are difficult to remove. Likewise, according to Mattjik (2005) barriers in planting materials (explants) caused by the flow of fungi and bacteria that still exist in the plant tissue. Dyera lowiiplants are woody plants and grow dirawa, seeds produced by seed obtained by deactivation in wetlands, given the small size Dyera lowiiseeds and when ripe will burst and fly so that the possibility of contaminants through internally seeds already in the network.

From Table 2 and 3 shows the results of different test middle value, that the percentage of browning on the 2nd week showed leaf explants higher and significantly explants nudes, whereas, all week 3rd, 4th and 5th, was obtained a percentage browning larger in nudes and different explants leaf explants. This is possible due to the sterilizing material last for both nude and leaf explants soaked in kalpanak long enough that for 60 minutes, leaving many of the sterilizing material is attached to the nude which results influence the explant nudes and produced many nudes explant browning.

From Table 1 and 2 look different test results are mean, that the percentage of life on Sunday 3rd, 4th, and 5th showed higher leaf explants and significantly explants nude. In the 3rd week of the leaf explants of living is higher (18.33%) compared to explant the nude, as well as leaf explants were alive at week 4 and all five survivors of 3.33%, while the nudes are all dead explants , Explants or planting material is a small piece of tissue or organs taken / separated from the parent plant and then cultured. Accuracy in preparing explants is one of the factors that may affect the initiation explants (Muslim, 2010). Leaf explants was obtained a higher percentage of survival, this is due to the percentage of explants less contamination so that they can survive until mingg 5th. The explants were taken as research material is in the form of crop seeds that have been conditioned and maintained in the greenhouse, and every week do penyemperotan with fungicide and bactericide. But in fact there are still banyka contamination of explants jelutung. In accordance with the statement Ma'rufah (2010), that election explants explants as a source material by way of conditioning the parent plants in a controlled environment eg parent plants are maintained in a green house.

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Growth Variation of Bitti Seedlings *(Vitex cofassus)* From Several Families

C. Andriyani Prasetyawati[1)], Tri Wira Yuwati[2,3)] and Purwanto Budi Santosa[2,3)]

[1]Makassar Environment and Forestry Research Development Institute
Jl. Perintis Kemerdekaan Km 16,5 Makassar, Sulawesi Selatan Indonesia
Telepon/Fax : (0411) 554049/554051
[2]Banjarbaru Environment and Forestry Research Development Institute
Jl. A Yani km 28,7 Landasan Ulin, Banjarbaru 70721, South Kalimantan Phone: (0511) 4707872
[3]Center of Excellence Research Consortium for Sustainable Tropical Forest Management, Banjarbaru Indonesia

E-mail :andriyani_pras@yahoo.co.id

ABSTRACT

Timber exploitation with out replanting could extinct some of certain commercial species. Establishment of forest plantation is urgently needed. Genetic diversity hasa key positionin the breeding program because there areopportuniti estoperformgene selectionfor desirable traits. The aim of the research was to investigate thevariation ofseedlinggrowth of bittiwhich is influenced by gen. The research method was using Completely Randomized Design (CRD). There were 17 families of bitti seedling from Bulukumba Regency and 11 families from Bone Regency. Each family has 40 seedling. Bitti seedling originated from Bulukumba Regencyat the age of 9 month sin nursery, have significant differencesbetweenfamiliesatvariable height, diameterandseedlingrobustnessvalue. High estseedling obtained by BK8 with an average height 50.05cm and an average diameter of 4.35 mm. Robust nessfairly balanced seedling sobtained by family ofBK12with a value of8.50seedlingsrobustness. Bitti seedlingoriginated fromBone Regencyat the age of7monthsin the nursery, havesignificant differencesbetweenfamilieswhichwere testedatvariable height, diameterandrobustness ofseedlings. HighestseedlingBNobtained by 23familieswithan height average33.41cmandthe largestdiameterof theBN 08 familywithaverage of4.15mm. Optimalrobustnessseedlingsobtained byfamiliesBN 5, BN17, BN08andBN21, which is value between6.95 to 7.84.

Keywords : Bitti, growth, robustnessseedlings, genetic variations.

INTRODUCTION

Currently, the domestic timber consumption of are increasing, however, natural forests are no longer able to support timber. Illegal logging and timber exploitation without re-planting has caused the decreasing amount of timber species. Plantation forest establishment by entrepreneur and or community is needed to fulfill the ceed of timber and conserving the forests.

Bitti (*Vitex cofassus*) is the main species from Sulawesi. The people of Sulawesi utilized Bitti as furniture, household appliances and traditional ship of Sulawesi : The Phinisi (Darmojo, 2014). Utiliation of Bitti without re-planting caused the degrading amount of its population. Nevertheless, Bitti development is needed.

One of the constraints for the development of forest plantation is the availability of high quality seedlings. So far, the plantation has not used the high quality seedlings. High quality seedlings will become high quality plantation forest that can adapt to the habitat condition then it will result in high quality timber. High quality seedlings can be obtained from mother trees of selected seed source. High quality seedling are influenced by the genetic and environmental factors. In a uniform environment, the genetic quality can be observed from intial growth of plants. The aim of this research is to determine the growth variability of bitti that genetically inflenced.

MATERIALS AND METHODS

a. Location and Time

The research was carried out at the Nursery of Makassar Environment and Forestry Resealopment Institute in March to November 2012.

b. Materials

The materials used in this research is Bitti seedlings (*Vitex cofassus*) from exploration of several mother trees in selected districts. The Bitti seedlings consisted of 17 families from Bulukumba district dan 11 familes from Bone district, South Sulawesi. Other materials were top soil, compost, polybags, fungicide and labels. The equipments that were used including stationaries for data collection, measuring ruler to obtain height growth an diameter growth. Other equipment was a caliper to collect plant's diameter.

c. Research Design

Bibit seedlings were planted using bitti CRD (*Completely Randomized Design*) from 17 families of Bulukumba district and 11 families of Bone district. Sulawesi Selatan due to the un-matched age. The Bitti from Bulukumba was 9 months old while Bitti from Bone district was 7 months old. The differences in age was caused by the separation of sedes collction. There were 40 plant replications for each family.

d. Procedures

The research was carried out in the nursery. The seeds collected were extracted for less than 3 days to separate the flesh from the sedes. For each extraction process, the identity of each family was kept to avoid mixing with other families. The extracted sedes were then sown and transplanted after 2 leaves appeared. Each seedling was group according to each family, and there were 40 seedlings each. The height, diameter and survival rate of seedlings were observed and measured.

e. Data Analysis

The data of height, diameter and survival rate was analyzed using ANOVAto determine the variat on between families and Duncan post hoc test was carried out to determine the variability of growth. The seedling sturdiness was counted with formula:

$$\text{Seedling sturdiness} = \frac{\text{height (cm)}}{\text{diameter (mm)}}$$

RESULT AND DISCUSSION

The tree improvement program is initially started with a wide genetic base and using strategy of breeding for genetic conservation of potential traits available at base population (Hakim, 2006). Base population could be natural forests or plantation forests and the next generation can be a genetic plantationspf selected mother trees. The result of Bitti exploration was 24 mother trees from Bulukumba and 25 mother trees of Bone. The well grown seedlings were 17 families of Bulukumba and 11 families of Bone.

The sedes were then sown. The bitti seedlings from Bone had a lower survival rate compared with Bitti from Bulukumba. Out of 25 mother trees, only 11 mother trees had a good growth. It was caused by the physiologically un-ripe fruit of Bone’s Bitti or low quality of seeds.

Generally, the seedling quality was effected by genetic and environmental fact ors. By the assumption that the environmental condition is homogen, it meant that genetic factor was the important factor affecting seedling quality. The measurement of height, diameter and seedling sturdiness were important to determine genetic quality of seedlings. The growth of Bitti seedlings from Bulukumba and Bone was not analyzed at the same time due to the un-even age of seedlings.

Growth Variation of Bitti

Bitti seedlings of Bulukumba showed good growth. The result of analysis of variance for height and diameter of Bitti from Bulukumba in the nursery is presented in Table1.

Table 1. Analysis of varians result for height and diameter of bitti seedling from Bulukumba at 9 month age in nursery.

Source of Variation	Height		Diameter		Seedling sturdiness	
	Sum of squares	F	Sum of Squares	F	Sum of squares	F
Family	1036,574	7,433*	3,447	3,188 *	19,638	4,092*
Error	139,458		1,081		4,799	

Remarks : * significantly different (95% confidence level)

Based on the analysis of variance, there were significantly different on height diameter and seedling sturdiness. There were genetic variation between families. Variations meant that the genetic factors were improving through generations. The higher variations the higher selection and the smaller number of members in the population. A population with high heritability and high selection intensity will cause a higher genetic gain. The results of analysis of variance showed that Bitti seedlings of Bone at 7 months in the nursery were significantly different in terms of height, diameter and seedling sturdiness. As for Bitti from Bulukumba, the variations meant that there was a genetic gain from time to time. Mahdi (1986) inWawo (2008) stated that seed germination and seedling growth were affected by mother trees as seed source and each tree produced sedes with different main characteristics.

Table 2. Result of analysis of varians bitti seedling originated from Kab. Bone at 7 month age in nursery

Source of variation	Height		Diameter		Seedling sturdiness	
	Mean square	F	Mean square	F	Mean square	F
Family	745.041	9.381*	10.371	10.451 *	41.212	7.797*
Error	79.417		0.992		5.286	

Remarks: * = significantly different at 95% confidence level

Seedling height and diameter

The easiest growth parameters to be measured were height and diameter when height was also an indicator for seedling quality standard (Cahyono and Rayan, 2012). The mean height and diameter was measured to determine the best growth for all families. The environmental factors were kept uniform , then it can be concluded that the differences in diameter was caused by genetic factor. It was also supported by Zobel and Talbert (1984) who stated that growth was influenced by genetic and environmental factors and the interaction between both factors. According to Hasnah and Windyarini (2014), the quality of seedling growth is a combination of height, diameter, nutrient, health, form and seedling rooting architecture. As stated in Figure 1, the highest mean height and diameter of 9 months old Bitti seedlings originated from Bulukumba was BK 8 (50,05 cm and 4,35 mm, respectively). The lowest mean diameter growth was BK 12 with mean height and diameter 26,56 cm and 3,12 mm, respectively.

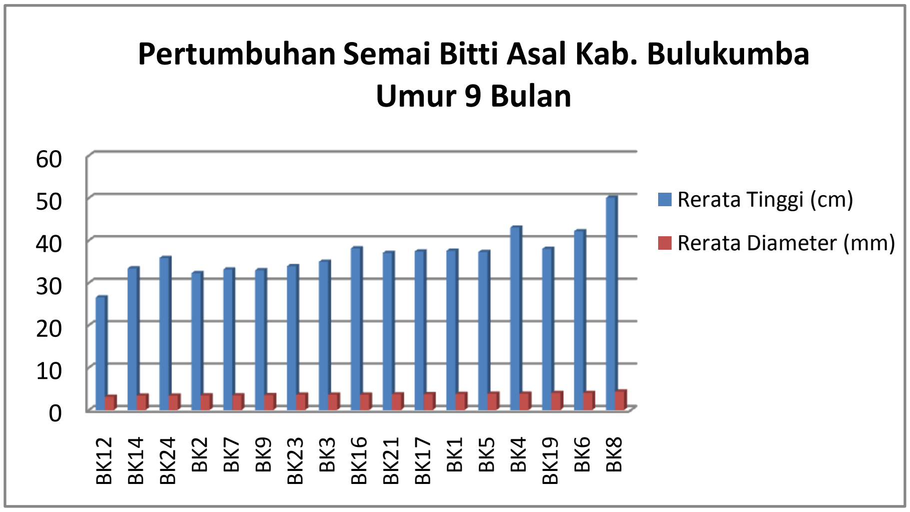

Figure 1. The mean height and diameter of bitti seedling from Kab. Bulukumba, at 9 month age in the nursery

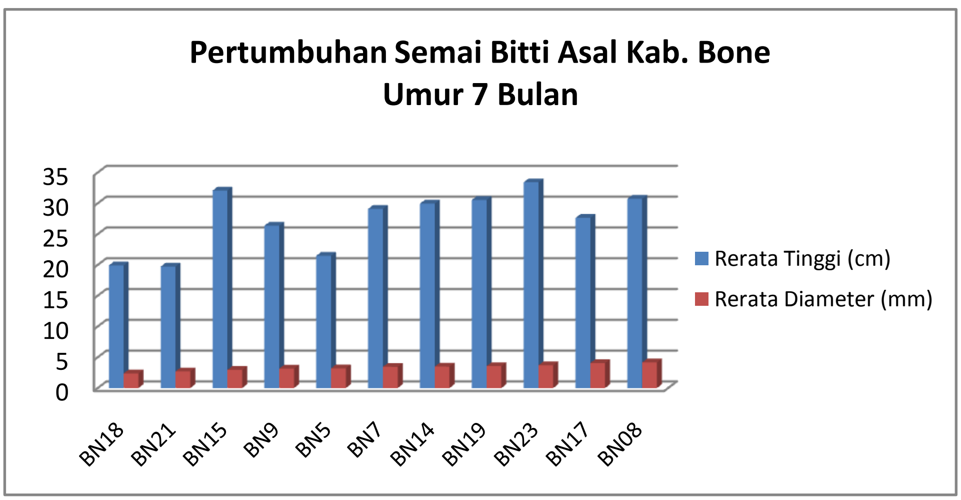

Figure 2. The mean height and diameter of bitti seedlings originated from Bone at 7 month in the nursery.

The bitti seedlings originated from Bone BN23 has the best height growth of 33.41 cm and the best diameter growth of BN 08 was 4.15 mm. The lowest height was BN 21 with 19.73 cm and the lowest diameter was BN 18 with 2.38 mm. The differences in the bitti seedlings growth were caused by genetic factors because the environmental factors were uniform. Moreover, the best family was hoped to maintain the growth performance and becoming new mother trees in the future.

The maximum genetic gain for selective traits can be reached when there are opportunities to conduct gene selection for the wanted traits in a population. However, before the selection efforts were carried out, counting the heritability value and genetic gain was necessary. The number of heritability value is necessary because it was a determining factor in the success of tree improvement program Zobel and Talbert, 1984). Directly, genotype will effect the germination and growth (Cahyono and Rayan, 2012).

Figure 3. a) Bulukumba seedling (left), Bone seedling (right)
b) The condition of Bitti seedlings in the nursery

Seedling Sturdiness

Seedling sturdiness is another variable that affect the seedling quality. The seedling sturdiness value was obtained by comparing the height and diameter of seedling. The value of seedling sturdiness was affected by the height and diameter growth of seedlings (Burhanuddin, 2010). The variability between families, of 9 months bitti seedlings originated from Bulukumba is presented in Table 3.

Table 3. Duncan's Multiple Range Test result of robusnest of bitti seedling originated from Kab. Bulukumba at 9 month age in nursery.

No.	Family	Seedling sturdiness	
1.	BK12	8,50	a
2.	BK23	9,56	ab
3.	BK2	9,57	ab
4.	BK19	9,59	ab
5.	BK9	9,62	ab
6.	BK3	9,76	ab
7.	BK5	9,82	ab
8.	BK21	9,90	ab
9.	BK14	9,93	ab
10.	BK1	9,96	bc
11.	BK7	10,03	bc
12.	BK17	10,24	bc
13.	BK24	10,59	bcd
14.	BK16	10,62	bcd
15.	BK6	10,65	bcd
16.	BK4	11,11	cd
17.	BK8	11,63	d

The bitti seedlings originated from Bulukumba has a seedling sturdiness value of 8.50 – 11.63. The condition caused by the longer period in the nursery (9 months) resulting in a stronger stem structure. The best seedling sturdiness was BK 12 with the value of 8.50. However, generally, the seedlings are still qualified to be planted in the field.

The smaller seedling sturdiness value will have a better capability to grow in the field. It can bear wind and rain compared with a bigger seedling sturdiness. The value of seedling sturdiness ranging from 6.3 – 10.8 (SNI 01-5005.1-1999) in Suyana (2010). According to Yudohartono and Fambayun (2012), beside the ability to bear wind pressure, seedling sturdiness is also the ability of seedling in bearing the weight of upper biomass. The height variation caused the variation on seedling sturdiness (Fatmi, 2011). However, the optimum values of seedling sturdiness are different between species. The seedling sturdiness value is affected by various factors such as growth media, container, plant density, light intensity and water (Suryawan, 2014).

The seedling sturdiness value of Bitti seedlings originated from Bone ranging from 6.95 – 11.28 (Table 4). The Bitti seedlings originated from Bone with relatively good seedling sturdiness were BN 05, BN 17, BN 08 and BN 21

Table 4. Duncan's Multiple Range Test result of robustness bitti seedling originated from Kab. Bone at 7 month age in nursery

No	FAMILI	Rerata Kekokohan Semai
1	BN5	6,95 a
2	BN17	7,18 ab
3	BN08	7,38 abc
4	BN21	7,84 abc
5	BN9	8,32 abcd
6	BN18	8,41 abcd
7	BN7	8,66 bcd
8	BN19	8,70 bcd
9	BN14	8,85 cd
10	BN23	9,08 d
11	BN15	11,28 e

The balance between seedling's height and diameter are described as seedling strudiness. The higher seedling sturdiness will cause a lower survival rate beccause the unbalance between height and diameter (Adma, 2011).

Indonesia has a standard for forest species seedlings acccording to The Letter of Directorate General of Land Rehabilitation and Social Forestry No. P11/V-PTH/2007 regarding Guidelines of Technical Monitoring of Seedling Quality. In general, the regulation was functioning as guideline to mark the seedling quality based on its morphology. The general parameter was a single stem, straight, healthy. The specific parameter was the stem diameter, height, medium compactness, numwe of leaves and age (Syamsuwida et al., 2010).

CONCLUSION

The height, diameter and seedling sturdiness of Bitti seedlings from Bulukumba at 9 months old in the nursery are significantly different between families. The highest seedling was BK8 with mean height of 50.05 cm and mean diameter of 4.35 mm. A balanced seedling sturdiness was Bk 12 with the value of 8.50.

Bitti seedlings from Bone district at the age of 7 months old in the nursery were significantly different between families in terms of height, diameter and seedling sturdiness. The highest height was BN 23 with mean height of 33.41 cm and diameter of 4.15 mm from BN 08. The optimum seedling sturdiness were BN 5, BN 17, BN 08 and BN 21 between 6.95 – 7.84. The bitti seedlings were equally balance in terms of seedling sturdiness to be planted in the field.

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PRESENTATION ORAL COMMISSION - C

Vegetation Analysis of Bamboo in the Hulu Banyu Village, Loksado, Hulu Sungai Selatan Regency

Dina Naemah [1,2], Emmy Winarni [1], Susilawati [1]

[1]Faculty of Forestry Lambung Mangkurat University, Banjarbaru Indonesia
[2] Center of Excellence Research Consortium for Sustainable Tropical Forest Management., Indonesia

E-mail: dina_naemah@yahoo.com

ABSTRACT

Bamboo plants could grow starts from the banks of the river, up into the mountains, so the bamboo that grow naturally or are planted in Loksado is one of the commodity which could open a kind of business with employment of people live there, which also increase incomes. But the magnitude potential of bamboo has not been known, neither bamboo species that grows on the banks of the river. On the other hand, the information about bamboo is very important in order to manage in a sustainable bamboo management. The research was held on the banks of the River of Amandit, District of Loksado, Hulu Sungai Selatan Regency. The data was taken by using terraced paths (nested sampling) with a size of 20 m x 500 m, in the path of created plots with the measurement about 20m x 20m. The data was taking in two lines. Analysis of the data is using the Important Value Index. Based on the research, it was found 4 (four) types of bamboo that is; Bamboo Banar / Rabungan (*Gigantochloa psendianum linoceae*), bamboo reed (*Schizoseyum brchycladum* Kurtz), Bamboo Tali (*Gigantochloa lear*), bamboo Tamiang (*Schizoseyum blamei* Ness). Index values are important for each type of bamboo which are, bamboo ridge (77.14), the bamboo haur (37.51), the bamboo rope (23.10), the bamboo reed (22.17) and sweet bamboo (23,52). The potential of bamboo on the location of the study, was found that there were 476 bamboo groves. Additional knowledge is required to cultivate bamboo in the study site so that it can be utilized in a sustainable way.

Keywords: Analysis of Vegetation, Important Value Index, Nested Sampling.

INTRODUCTION

Background

The close relationship between people and forests has been started a long ago, especially for the people who live around the forest. Commonly, people use the forest product for their life. The use of forest products are including wood or non-wood. Untill now, One of the non-wood forest product that is potential until now and cultivated by the people in the forest area is bamboo.

Nowadays, Bamboo in the era of the regional economy is now very important to increase local revenues in Loksado districts, the district south of HSS, because it has been cultivated by the local community.

Bamboo is a versatile crop or multi purposes trees species (MPTS), because almost all of the bamboo plants are can be used, such as:

1. Roots and cob for crafts / souvenirs
2. *Rebung* (bamboo shoots) for foodstuff (vegetables)
3. The trunk is the main product of bamboo as a raw "*anyaman*" material, household appliances, musical instruments and home building materials, and also as pulp material. Besides the economic value, bamboo has ecological value that is used as an ornamental plant, curtains silencers, binding carbon dioxide and prevent erosion on the brink, cliffs and rivers and also can be used as a type of plant for greening (Prosea Foundation, Bogor, Indonesia, 1996).

Bamboo plants can grow at the edge of the river to the mountains, so that bamboo grows naturally and bamboo is also planted in the Loksado district, becomes the commodity of lokaso, that can open the field of business in rural areas, also increase incomes of the people there. But the location and the great potential of bamboo had not been known. On the other hand the information is very important in order to manage a sustainable bamboo management.

Based on the description above, the writer tried to examine the composition and types of bamboo in the riverside of Amandit

Purposes

The purposes of this research are:

1. Knowing the type of bamboo along the river of Hulu Banyu Village, Amandit.
2. Knowing the life management of the types of bamboo in the lowlands along the river of Hulu Banyu Village, Amandit.

MATERIALS AND METHODS

Location

This research was conducted in the village of Hulu Banyu, Loksado District, Hulu Sungai Selatan. Research has been conducted for 3 (three) months, 1 (one) month for preparation and implementation, and two (2) months for extensive analyzing and reporting the data.

Objects and Equipments of the research

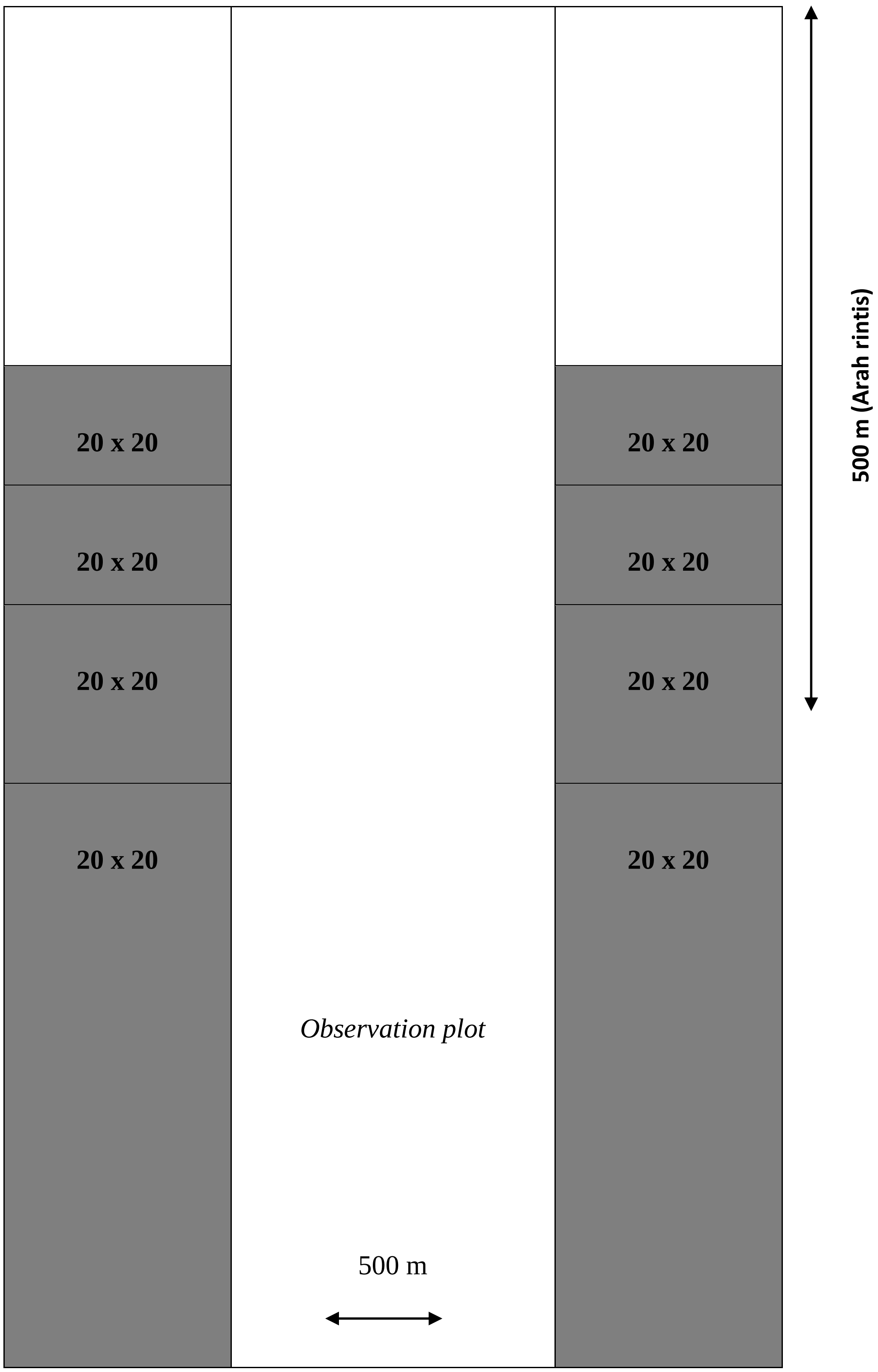
The object of this research is the bamboo clumps that grown on the banks of the river Hulu Banyu Village Amandit, Loksado District, Hulu Sungai Selatan.

1. Map of the Loksado District (a scale is 1: 100,000) as the information for the location of the research
2. Compass, to create a research path
3. Altimeter, to determine the altitude
4. Roll meters (50 meters long)
5. Pieces of zinc, paint and brushes
6. Rope (*rapia)*
7. Tally sheet, to record the type of bamboo
8. Cleaver

Research procedure

The procedures of this research are:

1. Preparation of materials and tools that will be used in research
2. Determine the location of the research
3. Collecting data in the field, using terraced path method (nested sampling)
4. Make a research path along 500 m with a width of 20 m, in the path, we create plots – the mesurements of each plots are 20 m x 20 m, so there are 25 observation plots (plot example). There are v2 tracks, so the total number of sample plots are all 50 plots, with a total area of 10,000 m^2 (1 ha)
5. Record the number of clumps, and the amount of bamboo rods, and type of bamboo.



Picture 1. Observation Plot

Data Analysis

Data were analyzed as used in ecological studies of plants. Overview quantitative research in the field is shown by Important Value Index.

Important Value Index

Importance Value Index (IVI) is the number of density (K), relative density (KR) then added to the Relative Frequency (FR). To know the Important Value Index, we need to calculate density (K), relative density (KR), Frequency (F), Relative Frequency (FR), using the formula of Seorianegara and Indrawan (1978), that is:

$$K = \frac{\text{Total no of individuals of a species in all quadrats}}{\text{total no of quadrats samples}}$$

$$KR = \frac{\text{Density of particular species}}{\text{Sum of the densities of all species}} \text{ x } 100\%$$

$$F = \frac{\text{no of occurances of a species}}{\text{total no of site samples taken}}$$

$$FR = \frac{\text{no of occurances of particular species}}{\text{total no of occurances of all the species}} \text{ x } 100\%$$

K = Total Individu: Location of example plot

KR = Density of each varian: Total Density

F = Total plot for each varian: Total varian

FR = The frequency of each varian The frequency of total varian

So Importance Value Index (NP) = KR + FR

The calculation formula applies to all levels of types of bamboo that will be analyzed. The INP value ranges between 0-200%, If the calculation of each type is close to 200% which is high, so the ecological mastery in a community means higher and if the number is close to 0%, the ecological control of these types means low (Seorianegara and Indrawan, 1978).

RESULTS AND DISCUSSION

The potential use of Bamboo

Based on observations on the river bank, we already found seven (7) different species of bamboo, which are ; banar/rabungan, bambu buluh, bambu tali, bambu tamiang daan bambu haur, bambu manis, bambu batung

There are differences of 7 types of bamboo that we found. On the type of bamboo banar / rabungan, the number of stems and clumps area lot, compared with other types of bamboo such as bambu tali, bambu tamiang daan bambu haur details can be seen in Table 2 and 3.

Table 1. The total potential of bamboo clumps on research plots

Number.	The type of Bamboos	Total Clumps
1	Rabungan (*Gigantochloa psendianum linoceae*)	265
2	Haur (*Bambusa vulgaris Scrad*)	71
3	Buluh (*Schizoseyum brchycladum Kurtz*)	41
4	Manis (*Gigantochloa atter* (*Hassak*) *kurtz ex Munkro*)	34
5	Tali (*Gigantochloa apus*)	32
6	Tamiang (*Schizoseyum blamei Ness*)	26
7	Batung (*Dendro colamus Asper*)	7

From those table, 3 types of bamboo that have many clumps are bambu Rabungan (265), bambu Haur (71) dan bambu Buluh (41).

Table 2.The Potential of Bamboo's rods

Number.	The type of Bamboos	The Total Rods
1	Rabungan (*Gigantochloa psendianum linoceae*)	2560
2	Tali (*Gigantochloa apus*)	2531
3	Tamiang (*Schizoseyum blamei Ness*)	1597
4	Haur (*Bambusa vulgaris Scrad*)	1407
5	Manis (*Gigantochloa atter* (*Hassak*) *kurtz ex*	1221
6	*Munkro*)	482
7	Buluh (*Schizoseyum brchycladum Kurtz*)	295
	Batung (*Dendro colamus Asper*)	

Based on Table 2, the number of clumps and the number of stems of bamboo rabungan is most numerous compared with other types of bamboo such as bambu tali, tamiang, manis, batung and haur, and the less is Tamiang bamboo. Tamiang Bamboo has a similarity with other types of bamboo species, but the number of clumps and the number of stem are still less numerous . *Bambu buluh* has not much different from other types of bamboo, this bamboo able to adapt the environment factors to keep the bamboos to grow, even the number of the clumps and the number of stems is less numerous.

Composition and Deployment

Meanwhile, according to Bambang (2002) It is found 7 species of bamboo from three clans, bambu Banar/Rebungan (*Gigantochloa psendianum linoceae*), bambu Buluh (*Schizoseyum brchycladum Kurtz*), bambu Tali (*Gigantochloa apus*), bambu Tamiang (*Schizoseyum blamei Ness*), dan bambu Haur (*Bambusa vulgaris Scrad*), bambu Manis (*Gigantochloa atter* (*Hassak*) *kurtz ex Munkro*), bambu Batung (*Dendrocalamus Asper*) and, Haur Bamboo (Bambusa vulgaris Scrad). It means most type of bamboos are suitable to live in in area that have enough water

According to the National Institute of Biology (1997), generally, *bambu tali and rebunga / banar* can grow in the lowlands and can also grow well on highlands to an altitude of 1000 m above sea level. *Bambu Tamiang* prefer to live in the open area, lowland with an altitude below 650 asl. *Bamboo Buluh* can grow in the lowlands to an altitude 2000 m. Thisskind of species will grow well if land is fertile and the climate is not too dry. *Bambu Haur* can grow on a variety of soil and moisture in the lowlands.

According to the Prosea foundation (1996), *bamboo banar* can grow well in rain-type areas of A, B, C, and D, rainfall> 1800 mm / year and not logged by the water, lowland to the altitude> 1000 m above sea level. *Bambu tali* grow well in the rain-type area of A and B of, with the average rainfall> 2000 mm / year, lowlands to altitudes> 900 asl. Bambu buluh can grow on various types of soil, to the altitude of <600 m asl.

Frequency can be used as a measurement for determining the distribution of the type of bamboos in the area, which can be seen from the relative frequency. Based on the life surviving terms of a species, there are type of bamboos that have large deployment, and have a small deployment. It is because the large deployment of those type of bamboos also have larger ecological tolerant.

All those type of bamboos are not integrated grow with the community, because of the competition between individuals or the differences of altitude above sea level.This is possible because of the similarity of habitat, interactions between individuals and also the distribution.

Bambu banar species have the most extensive deployment compared to other types. Therefore, based on the presence, this type of bamboo is the most powerful among all the species. Becking (1963) which is cited by Ma'mum (2002) t the type that has largest deployment (highest frequency) is called the dominant species in the region where it is concerned.

Other species has a narrow spread. This is presumably because the factors that influence the spread of these types such as the altitude of sea level and the competition between species, and also a human factor.

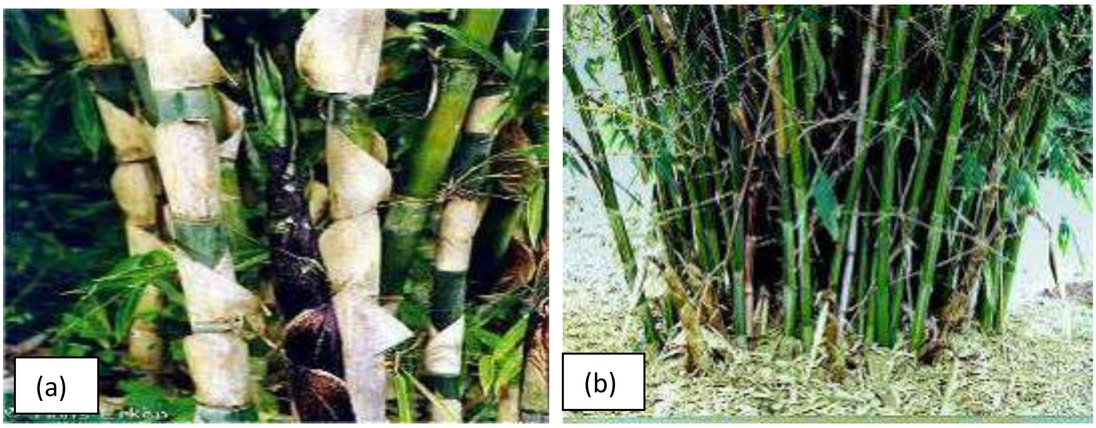
The spreading of *Bambu Banar* illustrates that this type will still play a role in the community in the future as long as no environmental destruction. While the other type of bamboo that has a small deployment could be lost soon if it cannot survive (extinct).

Important Value Index

Important Value Index reflects the life force against different environmental conditions and the ability to control certain areas. INP of bamboo vegetation can be seen in Table 3

Table 3. Calculation data of density, relative density, frequency, relative frequency and importance value.

	Species	The number of clumps	K	KR(%)	F	FR(%)	INP(%)
1	Rabungan	265	0,6625	55,67	0,95	21,47	77,14
2	Haur	71	0,1775	14,91	1	22,60	37,51
3	Manis	34	0,085	7,143	0,725	16,38	23,52
4	Tali	32	0,08	6,723	0,725	16,38	23,10
5	Buluh	41	0,1025	8,613	0,6	13,56	22,17
6	Tamiang	26	0,065	5,462	0,275	6,215	11,68
7	Batung	7	0,0175	1,470	0,15	3,390	4,68
Total		476	1,19	99,99	4,425	99,99	199,98



Picture 2. (a) *Gigantochloa apus* (b) *Gigantochloa psendianum linoceae*

The highest importance value index of bamboo species on the plot observations are bambu rabung (77,14%), bambu haur (37,51%), bambu tali (23,10%), bambu buluh (22,17%) and bambu manis (23,52%).

The dominant species of bamboo take a role in the community, this can be seen by determining importance value index, highest to lowest. *Bambu banar* species have the highest importance value compared to other bamboo, it means that the type of bamboo Banar can adapt to the environment.

Bambu batung species have the smallest importance value index, this means that the type of bamboo Batung less adapt to environment.

Deployment of bamboo species have a good potential in a lowland, those species have a large number of density value, frequency and INP for observation

It is not based on the type of topography, but because of the most dominant species in the area.But, It might not last forever, because many factors that affect the growth of the community such as the altitude above sea level, exploitation on a large scale, light, water, and soil fertility.

CONCLUSION

1. There are 7 compositions of the species of bamboo on the plot of the research,There are bambu Rabungan (*Gigantochloa psendianum linoceae*), bambu Buluh (*Schizoseyum brchycladum Kurtz*), bambu Tali (*Gigantochloa apus*), bambu Tamiang (*Schizoseyum blamei Ness*), bambu Haur (*Bambusa vulgaris Scrad*), bambu Manis (*Gigantochloa atter* (*Hassak*) *kurtz ex Munkro*), dan bambu Batung (*Dendrocolamus asper*).
2. The potential of bamboo on a plot of research are 476 bamboo groves
3. The highest (INP) of bamboo is bambu Rabungan (77,14 %) followed by Bambu Haur (37.513%), while the lowest is Batung (4.86%).

Suggestion

Specific study should be done to *Bambu Banar/ Rebungan* and *bambu tali* to know cultivation and resistance towards pests and diseases, so it can be fully utilized by the people.

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Policy Analysis On Bio and Wood Energy Development in East Kalimantan

Tien Wahyuni

Centre for Dipterocarps Forest Ecosystems Research and Development
Jalan A.W. Syahrani, Samarinda 75124, East Kalimantan. Indonesia
Phone.+62-0541-206364,

E-mail: *yunitien@hotmail.com*

ABSTRACT

The Provincial Government of East Kalimantan is committed to integrate green growth objectives into economic and development planning by declaring the great movements entitled *Green Growth Compact* (GGC). At present, East Kalimantan relies on heavily on fossil fuels including diesel and coal for on grid power and diesel generator sets for off-grid power. The development of wood energy is one way to utilize forest products that are currently underway. Various efforts and research projects have been conducted, but there are still barriers in an effort to implement and practice in the field. This study aims to identify potential barriers and policies proposed in the framework for successful development of bio and wood energy in East Kalimantan. Data collected through documents study, interviews, and observation, using content analysis. The result showed that the existing local policies and regulations have been supporting efforts to accelerate development of bio and wood energy. However, the necessary number of policy interventions were identified to support of investment of the development of bio and wood energy by improving financial performance, technical and human capacity, integrated planning dan reducing business and regulatory risks. While the proposed policies to address the barriers that will support the successful development of bio and wood energy are macroeconomic and market policies, financial investment policies, operational and enabling policies and legal-regulatory policies.

Keywords: Policy analysis, bioenergy, wood energy, East Kalimantan

INTRODUCTION

East Kalimantan Province is committed to realize the sustainable green development that have been implemented since 2010 in the Kaltim Green Movement. To reinforce this commitment, East Kalimantan redeclare a big movement entitled *Green Growth Compact* (GGC). GGC aims to accelerate and expand the implementation of environmentally friendly development in the entire region of East Kalimantan in accordance with policies, regulations, programs, targets and time frame outlined in the provincial level. East Kalimantan is a province of the three provinces of Indonesia with the highest emission of Green House Gases (GHG), since a land with forest cover, potentially implement green economic growth and potential as well as the granary of biomass energy. Utilization of biomass as a source of electrical energy profitable if assessed from the protection of the environment because it does not contribute to the increase in the greenhouse gas effect.

A relatively high economic growth in East Kalimantan (approximately 10% per year) fueled the growth of electricity demand is also high (about 8.7% per year) with the largest share of use in the household sector (about 60%). As a result the condition of the electrical system is difficult to keep pace with the electrical load is so high. East Kalimantan province still has a power deficit of approximately 130 MW (RUPTL PLN 2015-2024). Thus, the Provincial Government of East Kalimantan plans to develop several additional generators using fuel that is widely available in the province, namely coal, oil, natural gas, new and renewable energy (hydropower, solar power and bioenergy).

East Kalimantan has great potential for the development of bio and wood energy. Based on data from the Ministry of Environment and Forests in 2014, the production forest area of East Kalimantan is 9.34 million ha. From the area, 83 companies awarded *License of Utilization Timber Forest Products in Natural Forest* (*IUPHHK-HA*) with working area of approximately 5.29 million ha and *License of Utilization Timber Forest Products in Forest Plantation* (IUPHHK-HT) with a working area of about 1.8 million ha. East Kalimantan launched to produce woody biomass for energy by managing forest plants of energy, including utilizing degraded lands by revegetation planting and reclaiming land mines, rehabilitate watershed (DAS). All activities are performed by the mining company which hold *Borrow and Use of Forest Area Permit* (*IPPKH*) and building energy plantation on degraded land belongs to the village and the community.

In terms of technological development of bio and wood energy in East Kalimantan has also been applied in some areas. The power plant with bioenergy fuels has been built, namely (1) Biogas Power Generation (PLTBg) in Kembang Janggut District, Kutai Kartanegara regency by using palm oil mill effluent (POME). This power plant is the largest in Indonesia. Meanwhile, power plants with biomass fuels of wood-based forestry has been in operation, namely (2) Biomass Power Plant (PLTBm) owned by PT. Mangkujenang Harmonis Sinergy with a capacity of 5 MW which will be increased to 10 MW and its electricity supply to the Mahakam system with excess power scheme; (3) PT. Kyong Dong Minerals also produces plant fuel in the form of wood pellets from fine wood chips, waste wood industry of SBSA (PT. Sarana Bina Alam Semesta) of the Sinar Mas Group in Muara Kaman with a production capacity of 67,000 tons per year.

The development of bio and wood energy as a renewable energy resource needs 3 major parts. Those are energy plantation forest as “mine of energy", conversion facility of bio and wood energy and infrastructure at the end user level. In the development of biomass energy, particularly electricity generation, security of supply and price of biomass in the long term is essential. In addition, to generate optimum energy output, the correspondence between types of biomass that is utilized with the technology which is also an aspect that should receive great attention. Advantages of biomass energy is allowed to be developed in remote areas or islands to be the location of the growth of energy crops.

Boost innovation, roles of policy and regulatory support assuredness bio raw materials and wood energy is very important and necessary. Demand in the long run will motivate stakeholders to preserve and improve forest management and develop critical land to energy plantation forest. To encourage development, the government of East Kalimantan expects private investment and the support of stakeholders in the development of bio and wood energy infrastructure in a variety of scales. However, some of the problems and potential barriers are still an obstacle in efforts to implement and practice in the field extensively, so it is necessary to identify potential barriers and proposed policies in order to foster the success of bio and wood energy development in East Kalimantan.

MATERIALS AND METHOD

Location and Time

This research was conducted in the province of East Kalimantan (Figure 1). This province was selected purposively based that at the provincial level, the policies are more conical taking into account the biophysical conditions and expected final energy in order to contribute to regional development. The research was conducted during 2015 and 2016.

Figure 1. East Kalimantan Map

Data Collection Method

Primary Data

Primary data were collected from focus group discussion (FGD), seminars and other meetings with stakeholders at the local level, as well as from interviews with the personal who is considered an expert and in-depth understanding of bio and wood-based energy forest resources, such as the relevant officials, academics and researchers, businesses or other parties.

Secondary Data

Secondary data was used in this study is largely up to date data, namely in the span of 10 years. Sources of secondary data was obtained from several media that can be accounted for truth and accuracy. These medias are scientific journal and articles, papers, statistics, reports, law, legislation, regulations and other policies.

Data Analysis Method

Analysis of Legislation Method (ALM)

Analysis of Legislation (ALM) is a tool to help mapping, assessment and referrals to new regulations or laws applicable (existing) indicating problematic or potentially problematic. The main reason the selection of this method is simple (easy to understand), easy to use (user friendly) and can be accounted for. Analysis of regulation with (ALM) method to be used only from the aspect of legality, necessity (needs), and friendly.

Content Analysis and Qualitative Descriptive Method

Data collected were analyzed by using content analysis and qualitative descriptive analysis. Content analysis is used to examine the papers of regulations and policies related to development efforts of bio and wood energy is underway in East Kalimantan. Qualitative descriptive analysis is used to describe the quality of data in the form of a regular sentence, sequential, logical, not overlapping and effective according to research topics so as to facilitate the understanding and interpretation of the data. The above analysis is to evaluate policies and wood bio energy development in East Kalimantan.

RESULTS AND DISCUSSION

Results

General overview of the potential development of bio and wood energy in East Kalimantan

East Kalimantan is still regarded as one of the national energy granary, considering the number of energy sources in the territory of the province in the form of petroleum, natural gas and coal. But on the other side of some areas in East Kalimantan had the energy deficit. Most of the energy resources in Kalimantan exported out of the region, both for fulfillment of export to overseas as well as domestic use. As a result of exploitation of coal are massively leaving critical lands that can not be used productively. The total area of critical land in the province of East Kalimantan until 2013 according to data from the Ministry of Forestry, has reached 7.800.400 million ha of degraded land. Details, land category rather critical 6,888,254 ha, critical 848.887 ha and very critical 63.259 ha.

Based on statistical data of BPDAS Mahakam Berau in 2010, which has a working area covers thirty-one watershed in East Kalimantan. The working area consists of various levels of criticality land. The total area of land included in the category of very critical land in the province of East Kalimantan area 3.648.79,44 ha.

Land that includes the critical area of 976.97,78 ha, while the category rather critical area of 8,247,907.07 ha, the total area of land belonging to the category of potential critical area of 7,440,426.49 ha, while the category is not critical is 2.585.840,76 ha. Availability of critical land in East Kalimantan make no land competition for other uses. The development of bio and wood energy deservedly take advantage of critical lands.

A total of 34 (thirty-four) Production Forest Management Unit (KPHP) in East Kalimantan Province has set its working area by Ministerial Decree No. SK. 674 / Menhut-II / 2011, with an area of 12,567,139 hectares. At the site level, KPHP can be very large role as a provider and manager of energy and KPHP can determine its role in accordance with the potential and condition of forests in the region.

Policy of bio and wood energy development in East Kalimantan

Some local regulations related to the development of bio and wood energy in particular and supporting renewable energy (EBT) which have been issued by the Government of East Kalimantan as follows:

Table 1. Regulations and Regional Policy Related Renewable Energy

No.	Regulation	Target
1.	Governor Regulation No. 17/ 2015 concerning Governance and licensing and Non Licensing and Licensing Improving Governance in the sector of Mining, Forestry and Palm Oil Plantation	Encouraging the development of renewable energy Ministry of Energy and Mineral Resources
2.	Regional regulation No. 15 / 2008 on Regional Long Term Development Plan of East Kalimantan Province 2005 - 2025	The fulfillment of electricity supply reliable and efficient
3.	Local regulation No. 4 - 2009 on the Medium Term Development Plan 2009 - 2013 of East Kalimantan Province	Making East Kalimantan for leading energy center in Indonesia
4.	Governor Regulation of East Kalimantan No. 54 - 2012 on Regional Action Plan for Greenhouse Gas Emission Reduction on Energy, Industry and Transport in 2010-2020	Conversion of fuel / fossil energy to renewable energy and energy conversion
5.	East Kalimantan Governor Decree No. 670.12 / K.447 / 2013 on the	The establishment of the Coordination Team, The Technical

	Establishment of the Coordination Team and the Technical Committee of Action and Alternative Energy Utilization	Committee of Action and Alternative Energy Utilization
6.	East Kalimantan Governor Decree No. 522 / K.227 / 2015 on the Establishment of Biomass-Based Bioenergy Development Team in the Forestry Sector	(1) Composed master plan for development of biomass-based energy, (2) Dissemination of biomass-based energy development (3) Mentoring process implementation biomass-based bioenergy development (4) Providing advice and policy direction in order to smooth the implementation of biomass-based bio-energy development in East Kalimantan forestry sector, (5) Coordination and consultation to organizations / institutions relevant

Discussion

Bio and wood energy utilization is still very low considering many obstacles, such as: the cost of investment and the selling price of electricity is relatively higher than fossil energy, potential resources are generally small and scattered, poor infrastructure, and lack of success story. For that, we require policy interventions are integrated vertically and horizontally. It really depends on the active participation of government, especially in terms of policy making, starting from the upstream side (Ministry of Environment and Forests) to the downstream side (the Ministry of Finance, Ministry of Agriculture, Ministry of Industry, the Ministry of State Enterprises and the Ministry of Commerce).

A number of policy interventions were identified to support investment in bio and wood energy projects in East Kalimantan, such as:

1. Improving financial performance: revenue incentives such as feed-in tariff, carbon incentives and subsidies, easier access to domestic and foreign capital.
   These policy interventions carried out because the incentives given by the government was not able to attract investors to invest in the field of bio and wood energy. The utilization of bio and wood energy for electricity also face constraints due to the selling price of the Feed-in-Tariff (FIT) which still deemed not attract investors. In addition, the sale of electricity mechanism to State Electricity Company (PLN) requires the involvement of many stakeholders. In addition, the resulting fuel subsidies for biofuels can not compete.

2. Addressing technical and human capacity: training of local technicians, certification of external parties, and national guideline on feasibility study.
   This is necessary because the use of bioenergy as biofuel (BBN) experienced problems

due to the absence of clear regulations on the mechanisms of production and distribution. Amenities mixing (blending) is not yet complete in all General Fuel Filling Stations pump. The lack of human resources in quality and quantity.

3. Integrated planning: East Kalimantan-wide resource assessment and energy planning.
   The local government is still experiencing difficulties in adapting the policies of the center, giving the impression that regional policy making that walk alone or integrated with the central policy. The problems of the institutional side of energy in general is still complicated structure and only a formality and lack of coordination between central and local.

4. Reducing business and regulatory risks: clearer identification of area to be electricity by PLN, faster permitting procedures.

   There is no regulation or a guarantee from the government to make the purchase of raw material supply, so that investors are reluctant to invest in the supply of raw materials. This is due to lack of socialization, a long bureaucratic procedure and convoluted or difficult, as well as the requirements of the company to obtain the investor is not in accordance with the renewable energy company.

The most important barriers to the success of renewable energy projects and the proposed policies to address them are listed in the matrix below.

Table 2. The most important barriers to the success of renewable energy projects and the proposed policies

	Potential barrier to investment	**Potential policy intervention**	**Outcome**	**On-grid**	**Off-grid**
Macroeconomic and market	Low financial viability	Reform diesel and power prices	Stronger incentive to uptake renewables	FR	FR
Financial investment policies	Access to capital	Debt guarantees for domestic lenders Capital grants	Lower hurdle rates and better financial viability of investment	FR FR	FR RR
Operational and enabling policies	Low technical expertise in design and operational stage Poor resource data	Capacity building and involvement of wider (including foreign) expertise	Well-designed and maintained projects Lower development risk and higher investment	FR S/OR	S/OR FR

Legal and regulatory policies	Lack of transparency in grid expansion plans	Clearer earmarking of PLN electrification budget to certain areas and better coordination between local PLN staff	Avoiding strandard assets and reduced risk for investments	S/OR	FR

FR = Frequenly relevant
S/OR = Sometimes/often relevant
RR = Rarely relevant

CONCLUSION

The existing local policies and regulations have been supporting efforts to accelerate development of bio and wood energy. However, the necessary number of policy interventions were identified to support of investment of the development of bio and wood energy by improving financial performance, technical and human capacity, integrated planning dan reducing business and regulatory risks. While the proposed policies to address the barriers that will support the successful development of bio and wood energy are macroeconomic and market policies, financial investment policies, operational and enabling policies and legal-regulatory policies.

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Manufacture Of Fiber Composite Materials Musa Acuminate *L.* Prepared By The Randomized Position With Polymer Matrix Resin.

The Prospects of Producing Bamboo Shoots in Tana Toraja, South Sulawesi

Merryana Kiding Allo

Environment and Forestry Research Insitutu of Palembang, Ministry of Environtmental and Forestry, Makasar Indonesia
Jl. Perintis Kemerdekaan km. 16. Makassar, 90243, telp. (0411) 554049, fax. (0411) 554058,

E-mail: merrymksr@yahoo.co.id, merrymakassar@gmail.com

ABSTRACT

Bamboo as timber forest products afford as a substitute material timber from the forest in terms of both strength and durability. Multipurpose species with stout benefit economically or ecologically. Bamboo as a traditional commodity for the people of Toraja, grown in agroforestry system with plantation crops such as coffee, cocoa and clove on private lands and private forests. Very important role in any traditional ceremonies of mourning and celebration, therefore the preservation of bamboo are very guarded. Petung bamboo (Dendrocalamus asper f.Backer Schultes ex Heyne) types of bamboo with a diameter of the largest in Indonesia. In accordance living at altitude, because the business opportunity in addition to the stem also produces young shoots or shoots famously delicious taste, high fiber content and size of the shoots reach weight 7-8 kilograms per bamboo shoots through fertilization treatment and singling. In one clump are produces shoots 6-12 in the stands aged <15 years.

Keywords: Bamboo petung, bamboo shoots, yield

INTRODUCTION

Law No. 41 of 1999, to instruct that forests as one determinant of the life support system and source of prosperity for the people tend to deteriorate, therefore, its existence must be maintained optimally, guarded sustainable carrying capacity, and taken care of noble character, fair, wise, prudent, transparent, professional and accountable. Further affirmed in Article 42 paragraph (2) that the implementation of forest and land rehabilitation preferred implementation through participatory approaches in order to develop the potential and empowerment the local community.

Rebuilding the forest to restore forest resources is ever lost, the forest communities to replant so that agroforestry could be one source of supply that can increase revenue income communities. One of the land management system which may be offered to address the problems arising from the conversion of the land and at the same time to address the problem of food availability. This system is a combination of various types of trees with annual crops, and plant timber forest products (NTFPs). The measures in the handling required in order to successfully tilling, fertilizing,weeding and pruning.

Tana Toraja District is located in altitude, ie> 800 m up sea level, agrofosrestri system is a legacy of ancestral farming practices and until now maintained. Planting is done by pairing plants with crop plantation forestry and agriculture such as fruit. Bamboo plant is one of the traditional commodities for the people of Toraja. So nearby bamboo with social and cultural life of the Toraja people so that the bamboo plant must be owned by every family, whether to meet the needs of families during cultural events as well as limiting the location of the land with other families. Utilization of bamboo plants start to root to the leaves, has been ongoing since the first. Similarly, the use of bamboo shoots or young shoots petung that has not fully managed properly so that taste, packaging and preservation of bamboo shoots can be further increased revenue bamboo farmers.

Bamboo business opportunities for the benefit very much from the leaves to the roots of economic value. In addition, bamboo can be as a substitution for wood based on the level of strength and durability of bamboo fiber that is more limited by the strength and durability of bamboo fiber. Petung bamboo shoots as a manufacturer very beneficial for the purpose of preservation of forest resources, improve the quality and enhance agricultural intensification and diversification in the context of Indonesia towards Food Sovereignty.

As well as above ground biomass stocks, in accordance with previous CONCLUSIONs (Hunter and Wu 2002; Kleinhenz and Midmore 2001; Lou et al. 2010; Scurlock et al. 2000; Widenoja 2007), the comparison indicates that aboveground biomass stocks of bamboo and timber probably do not differ drastically (Fig. 3). In our comparison, half of all stands are likely to fall below 87 t/ha and 107 t/ha for bamboo and timber species, respectively. Twenty percent of stands exceed 158 t/ha or 170 t/ha for bamboo and timber, respectively. If anything, bamboos have probably slightly lower aboveground biomass stocks. Certainly, maximum biomass stocks of timber trees will exceed those of bamboos (Hunter and Wu 2002). Woody biomass of both species groups contains roughly the same C concentration of 45% to 52% (Scurlock et al. 2000).

Therefore, on this occasion we will present our results, namely, how the growth as well as techniques that can stimulate the production of young shoots or bamboo shoots Petung on its habitats in Tana Toraja.

Production and Benefits of Bamboo Petung as producer shoots

Bamboo classified Gramineae family (grasses), often referred to as Hiant grass (grass giant) lives in a clump, composed of a number of rods (reeds) that grows gradually, ranging from bamboo shoots, young and adult stem rod at the age of 4-5 years. Bamboo very promising business opportunities for the benefit very much from the leaves to the roots can be used. Beside that, this time as substitution bamboo wood from tropical forests are increasingly limited.

Additional to 40 million hectares of existing bamboo forests, many potential host countries for C projects harbor suitable sites. Definitions, methods and default values, such as the root/shoot- ratio, biomass conversion factors, allometric equations and sampling variables need adjusting. Rapid maturation, persistent rhizomes, a rich palette of species, and wind-firmness may mitigate risk. Bamboos can accommodate agro-and urban forestry, and reign in unsustainable shiftingcultivation. Distribution functions of bamboo biomass stocks and growths do not deviate drastically from those of trees. If anything, bamboo stocks are slightly lower, and growths slightly higher, with medians of 87 $t*ha^{-1}$ and 10.5 $t*ha^{-1}*yr^{-1}$, respectively

A more recent instrument, reducing emissions from deforestation and forest degradation, conserving and enhancing forest C stocks, and managing developing countries' forests sustainably (REDD +), also aims at much more than mere C conservation. In a wider perspective, REDD+ comprises a major planned adaptation of forests, rural societies and North-South relations to Climate Change (Schoene and Bernier 2011).

Support technology bamboo cultivation course, would be to raise the prestige of bamboo as one of the country's foreign exchange. Cultivation of a series of planned activities ranging from the maintenance of biological resources is performed on an area of land and subsequently taken benefit / crop. Based on the source http://economy.okezon.com accessed on 12 November 2014 which stated that the quality of bamboo from East Indonesia touted the best in the world.

Shoots that arise from stem cuttings are multiprimordial (many buds), while the shoots emerge from cuttings rhizom / root is monoprimordial (one shoot). But the easiest way is the technique of vegetative propagation (cuttings). It is important to note how this course can succeed if supported by optimal conditions for the growth needs of the bamboo.

Grown in optimal conditions, namely a place to grow, especially the nature of soil and climate edafik appropriate and intensity of maintenance is the most important thing, but it requires temperatures of 8.8 to 32 ° C, humidity> 60% and a minimum of 1020 mm rainfall per year (Huberman, 1959).

Bamboo shoots are the young shoots of bamboo that grows at the base of the hill and came to the ground when high humidity conditions. When the rainy season to rainy season peaks bamboo grove will produce young shoots / bamboo shoots in large quantities. The economic value of bamboo shoots is now very likely cultivated. Some Asian countries such as China and Taiwan have successfully commercialize canned bamboo shoots and exported to foreign countries, including Indonesia.

Bamboo shoots which will be used as the flour derived from bamboo shoots betung. Bamboo betung in English is also called Giant bamboo, Awi betung (Sunda), reed Batung (Batak), also known as the Tower rocky areas. Scattered in Sumatra, South Sulawesi, Seram and Papua. In Java, betung bamboo can be planted in the lowlands to an altitude of 2000 m above sea level (Elida, 2002). According Heyne (1987) referenced in Ruhiyat (1998) betung bamboo grove has a rather lush, tall reed reaches 30 m, a diameter of 8.5 to 20 cm. Books - his bloated, with a length of 40-60 cm and wall thicknesses between 1 - 1.5 cm. Bamboo is widely used for construction of the building, where the water and the roof to accommodate roomie. Young shoots or shoots have a sweet taste, and many are made for vegetable bamboo shoots are formed at the beginning of the rainy season, but it is formed at the end of the rainy season. Bamboo shoots harvest season usually falls around December to February or March (Maretza, 2009).

The Chemical composition of bamboo shoots per 100 grams of material:
Composition of Water (g) 85.63
Protein (g) 2.50
Fat (g) 0.20
Glucose (g) 2.00
Fiber (g) 9.10
Phosphorus (mg) 50.00
Calcium (mg) 28.00
Vitamin A (mg) 0.10
Vitamin B1 (mg) 1.74
Vitamin B2 (mg) 0.08
Vitamin C (mg) 7.00 Source: Andoko (2003)

MATERIALS AND METHODS

Field Preparation

1. INTRODUCTION Petung Bamboo (*Dendrocalamus asper*) is easily recognizable from its trunk morphology. Belong to the kind of large-diameter bamboo, tinggi stems from the base segment is the highest among the types of bamboo. Bamboo type Petung
2. Selection of clumps

   Select clumps of the same age or nearly the same age. Can be derived from naturally occurring clumps or through planting. Note the distance between clumps should be there, when the adjacent grove possibility originated from the same family so that the results obtained are less qualified shoots.

3. Cleaning the bottom and in clumps

   Cleaning includes cleaning litter clumps of leaves and stems in a clump midrib. This meant that the sunlight until k floor can stand up given the growth of shoots and the taste is determined by the sun.

Application of the treatment

The treatments that have been tested include reduction activity stems in a clump or known by the term 'singling out'. The first factor is the singling out (S); (S0) Control, (S1) singling 90% and (S2) singling 45%. The second factor is fertilization (P); (P0) Control, (P1) A mixture of 2 kg of compost with 2 kg of NPK / clump and (P2) A mixture of 3 kg of compost with 3 kg NPK / clump. Stalks left in each cluster is a trunk option-aged> 3 years. Cleaning covers in clumps and clumps around the clump by clump within ± 1m from outer.

Fertilization

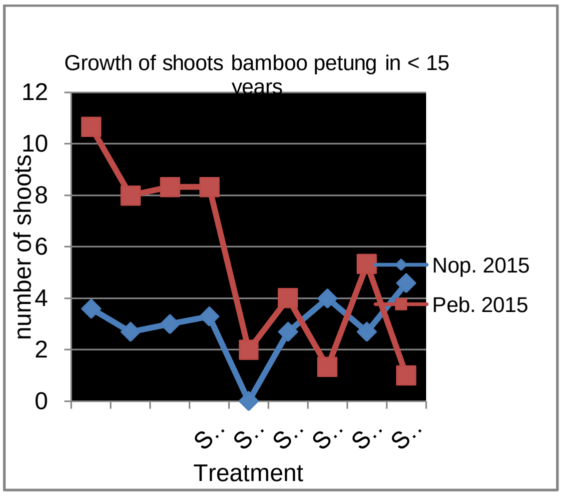
For fertilization activities create grooves with a distance of 30 cm from the outer clump and dig as deep as 10 cm, enter the fertilizer that was mixed with the appropriate fungicide dose as early fertilization. Fertilizing should be done at the beginning of the rainy season or when little rain. Fertilizing organic liquid fertilizers continued to be used after the root portions showing signs will sprout buds with a fresh look and started to bud. The trick diencer liquid fertilizer by mixing it with water and then watered at the roots will bud.

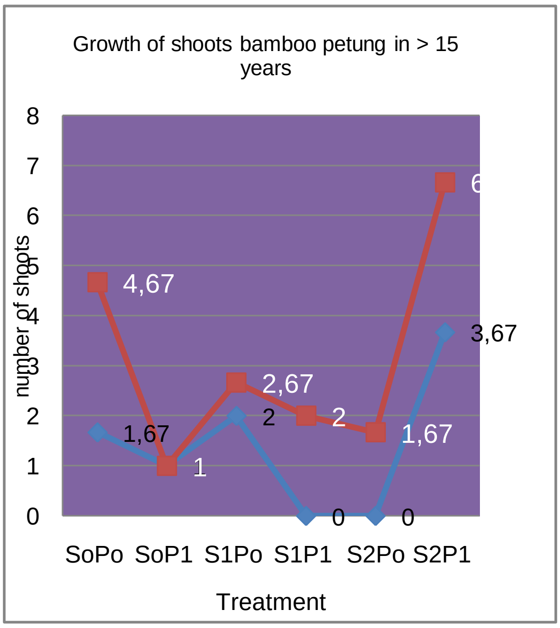
RESULTS AND DISCUSSION

Petung bamboo shoots reddish-brown, brown miang closed, tongue purple stem of bamboo shoots (Sindoesoewarno, 1973, in Muchtadi, 1994). Some types of bamboo shoots are formed at the beginning of the rainy season, but it is formed at the end of the rainy season. Bamboo shoots harvest season usually falls around December to February or March (Maretza, 2009). Sindoesoewarno (1963) in Muchtadi (1994) states that bamboo shoots are young stems of bamboo plants which are all still shrouded by the leaf sheath. The new shoots to come out oval-shaped, solid, and encased dalamkelopak dense leaves and bermiang (thorns smooth) a lot. During musimhujan, bamboo shoots grow rapidly, within a few weeks the buds are already very high. Within 9-10 months have mecapai tinggimaksimal shoots 25-30 cm. In the early stages of bamboo shoots look short, tightly wrapped in fronds batangyang and bermiang with miang brown to black color. Bamboo shoots grow rapidly poles for young stems during the rainy season. Setelahmencapai maximum growth, reed sheath opened and followed by the growth of the lateral buds primordial as will branch. Branching grow mulaidari third book on top followed branching section in the middle of reed continues to bottom, bamboo branching betung including many groups of branches (bud multiple branching), (Ruhiyat, 1998, in Maretza, 2009) which can reach 10-20 tributary in one book. Eyes in the reed branch consisting of a large branch in the middle (central bud) and groups of smaller branches in the left and right..

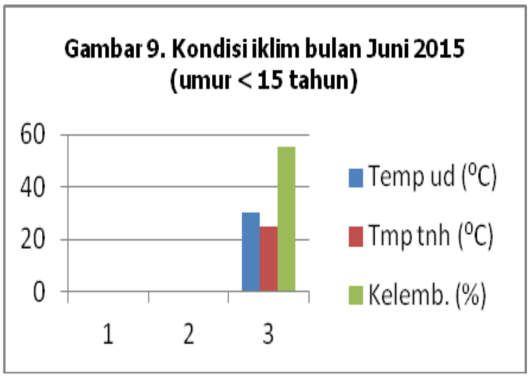
Each type of bamboo shoots powerful protected petals fluffy. Petung bamboo shoots taste the most delicious, protein, carbohydrate, fat, vitamin A, thiamin, riflavin as well as minerals such as calcium, phosphorus, iron and potassium (Qiu, 1992; Shi, 1992 in Widyarti, 2013). Shoots also efficacious drugs for potassium levels of 553 mg / 100 gdapat reduce cholesterol in virgin (Senior, 2007 in Wydiarti, 2013). The fiber content of food on a bamboo shoot is high at around 2.56%, which is higher when compared to other types of tropical vegetables, such as 1.27% soy sprouts, cucumber and mustard 0.61% 1.01%. Therefore, bamboo shoots well enough to be use for other processed food items.

Observations perebungan process which lasts for 63 days, starting time perebungan occurs when the rainy season has been unevenie November 2015- February 2016.

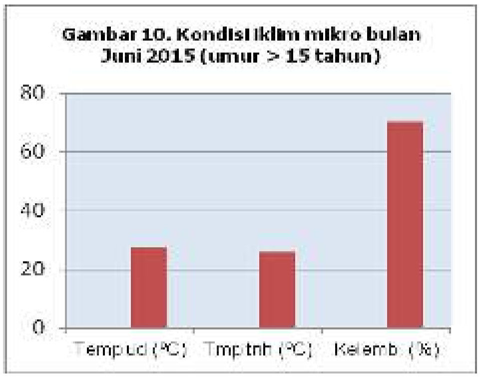




The figure below shows the micro-climatic conditions in June 2015 at two locations of stands aged <15 years and> 15 years old when the season shoots occur. The time interval between the application of singling treatment (S) and fertilization (P) to the growth of young shoots / bamboo shoots 4 months. When connected to a micro-climatic conditions in June 2015, where the humidity level is very low <65% indicates that the dependency bamboo shoots Petung in producing highly influenced by air humidity and rainfall.



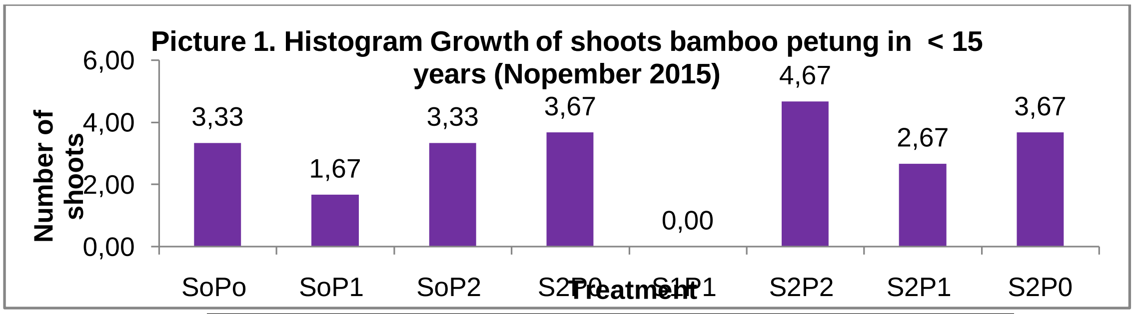
Gambar 9. Kondisi iklim bulan Juni 2015 (umur < 15 tahun)



Gambar 10. Kondisi iklim mikro bulan Juni 2015 (umur > 15 tahun)

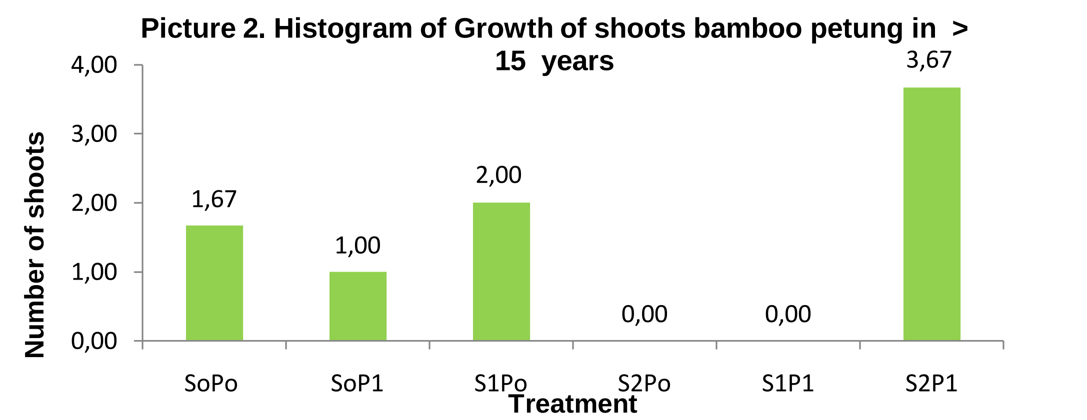
The trial results Anonymous (2011) against planting several varieties of bamboo tissue culture results in optimal conditions, suggesting that petung bamboo shoots can reach a diameter of 300 mm with a height of 600 mm and a weight of 7.2 kg. Based on these results it can be said that during the rainy season of the year can be produced 8-12 clump of bamboo shoots every year which is equivalent

Nu.	Treatment	Number of shoots	Remarks.
1.	SoPo	3.33	
2.	SoP1	1.67	
3.	SoP2	3.33	
4.	S2P0	3.67	
5.	S1P1	0.00	
6.	S2P2	4.67	
7.	S2P1	2.67	
8.	S2P0	3.67	



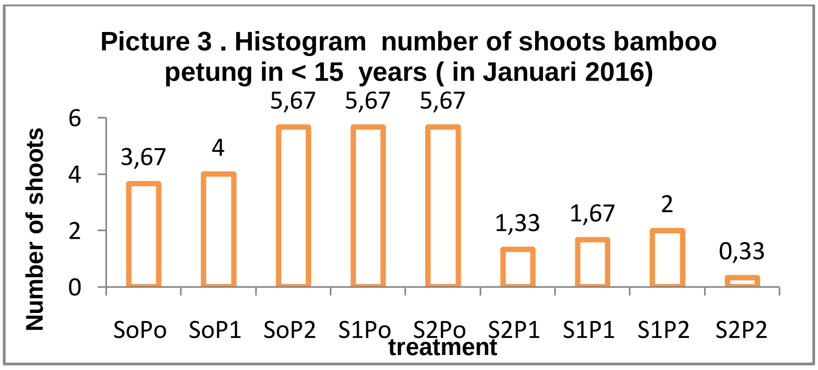
Picture 1. Histogram Growth of shoots bamboo petung in < 15 years (Nopember 2015)

Nu.	Treatment	Number of shoot	Remaks.
1.	SoPo	1.67	
2.	SoP1	1.00	
3.	S1Po	2.00	
4.	S1P1	0.00	
5.	S2P1	3.67	
6.	S2P0	0.00	



Picture 2. Histogram of Growth of shoots bamboo petung in > 15 years

No.	Kombinasi perlakuan	Pertumbuhan mata tunas	Ket.
	SoPo	3.67	
	SoP1	4	
	SoP2	5.67	
	S1Po	5.67	
	S2Po	5.67	
	S2P1	1.33	
	S1P1	1.67	
	S1P2	2	
	S2P2	0.33	



Picture 3 . Histogram number of shoots bamboo petung in < 15 years (in Januari 2016)

Nu.	Treatment	Growth		Remarks.
		Diameter	Heighti	
1.	SoPo	5.14	34.37	
2.	SoP1	5.93	46.7	
3.	SoP2	49.97	73.53	
4.	S1Po	36.23	54	
5.	S2Po	7.3	7.7	
6.	S2P1	7.27	10.77	
7.	S1P1	7.53	7.13	
8.	S1P2	9.33	12.4	
9.	S2P2	1.57	21	

CONCLUSION

The growth of young shoots petung determined by age, the older shoots diminishing productivity, optimal age around 15-25 years. Growth of the best shoots reach 11 shoots at the height of the rainy season, the month of February with a combination treatment of singling and fertilizers have non significant but based on the growth of shoots in diameter and weighing the best results from treatment combination compost fertilization 3 kg and 3 kg NPK.

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Biomass and Carbon Content on Peat Swamp Forest After Fire

Ahmad Yamani and Sulaiman Bakri

Faculty of Forestry Lambung Mangkurat University, Banjarbaru Indonesia

E-mail: yaman.banjar@gmail.com

ABSTRACT

Forest biomass is very relevant to the issue of climate change. From the overall yield of forest carbon, approximately 50% of which are stored in forest vegetation. In the highly vulnerable peat swamp forest fires, especially in the dry season, these circumstances resulted in destruction of forests and increase the amount of atmospheric carbon and reduce the potential for carbon stored in forests. In line with the Indonesian government's program to conduct carbon trading and fulfill the commitment to contribute to the global effort to meet the target of reduction in greenhouse gas emissions (GHG), the measurement of the potential of biomass, the content and carbon uptake is very important to conduct including in the peat swamp forests. Objective of studies examined the amount of biomass and carbon content and the amount of carbon dioxide absorbed. The method used to calculate the amount of biomass and carbon content and carbon dioxide uptake in these peat swamp forest use standard formula. The results showed the amount of biomass in the forest after the fire of peat swamp forest 13.21 tonnes / ha and the carbon content 6.61 tonnes / ha, and also as the absorption of carbon dioxide was as much as 24.26 tons / ha.

Keywords: Biomass, carbon, forests, swamps, peat

INTRODUCTION

Background

The forest is a storage and carbon emitters. On the face of it, there are approximately 90% of biomass contained in the form of principal forest wood, branches, leaves, roots and forest litter (litter), animals, and microorganisms (Arief, 2005). Biomass is a carbon storage and so-called carbon sinks (carbon sinks).

According to the Ministry of Forestry (2006), the destruction of forests in Indonesia has reached approximately 50% (59.62 million ha), and it continues to grow to 2.8 million ha / yr. Similarly, the presence of Galam forests in South Kalimantan that potential is quite big increasingly endangered (Karim, 2009). This condition significantly reduces sources of carbon stored in forest biomass and the earth's ability to absorb CO2 from the air through photosynthesis Reduced forest.

In addition to these effects, the intensity of the Greenhouse Effect (ERK) will go up and causes a rise in temperature of the earth's surface. This is what triggered accusations that the destruction of tropical forests has caused global warming (Soemarwoto, 2001). Global warming will have a major impact on human welfare in general, has even led to various natural disasters in parts of the world, such as rising sea levels, increasing atmospheric storms, increasing the types and populations of organisms that cause disease, etc. (Soedomo, 2001). Most researchers said if global warming continues to increase, within 50 years, a quarter or more of life on this earth may perish (Soemarwoto et al, 1992).

In line with the development of issues related to forest biomass, then the study or measurement of entire components of forest biomass is very important to do. In the process, the measurement of forest biomass covers the whole biomass of living that are above and below the surface of trees, shrubs, lianas, epipet, and so coupled with the biomass of plants die like wood and litter, but in this study is limited to the living biomass above the existing ground level.

Research purposes

The study aims to assess the amount of biomass and carbon content and the amount of carbon dioxide absorbed in the peat swamp forest.

MATERIALS AND METHODS

Research conducted in the peat swamp forests, District Liang Anggang, Government Banjarbaru, South Kalimantan for 3 (three) months. The tools used in this study is haga, tape measure, camera, GPS and stationery.

Types of data collected

The data used are primary data and secondary data. Primary data were obtained from measurements of forest stands in the field. The parameters observed diameter and a total height at all levels of growth. While secondary data are required as the general state of the data location, location maps and data research results of the study of literature.

Data collection

For the tree level of data collection using sample plot circle with a radius of 17.8 m (area 0.1 ha) by purposive sampling. In the sample plot was created sub plots measuring 10 m x 10 m for poles, and 5 m x 5 m to level belta (stake). The number of sample plots were made as many as 10 pieces, namely five pieces of sample plots in the village of Runway West Ulin and 5 pieces of sample plots in the village of Runway South Ulin. The primary data across the plot includes the identification of plant species of tree, pole, and sapling as well as measuring the diameter and height of trees.

Criteria vegetation found classified according Kartawinata et al., (1976) as follows.

a. Trees are woody plants with diameter at breast height (1.3 m) (D> 10 cm).

b. Pole ie woody plants with diameter at breast height (1.3 m) (D> 5 cm - <10cm).

c. Stake ie woody plants with diameter at breast height (D> 2 cm - <5 cm)

d. Seedlingie regeneration from sprouts to high <1.5 m.

Processing and Data Analysis

The density of trees per hectare in the conversion of a number of trees were recorded in the whole plot. Diameter and height data used to calculate the total volume of the stand, in this study stem volume is limited regardless of the tree canopy.

The formula used is as follows:

$$V = 1/4.\ \pi.d2.t$$

Where:

V = volume of trees (m3);

Π = constant (3.14)

d = diameter of the tree at breast height (cm)

t = total height (m)

To calculate the biomass of stand by Heriyanto, et.al (2012) used the formula:

Biomass = volume x density wood trees; based on the results of laboratory tests known value of wood density was 0.78

Calculating carbon stocks used formulation according to Brown, S.et.al (1984):

The content Carbon = Biomass x 50%

Measurements of carbon dioxide absorption potential according

to Bismark, el.al., (2008) using the formula:

Uptake of carbon dioxide (CO_2) = $Mr.CO_2$ / Ar.C x carbon stocks or

Uptake of carbon dioxide (CO_2) = 3.67 x carbon stocks

RESULTS AND DISCUSSION

Diameter, Height and Density Stands

The distribution of diameter, height and density of individuals on the basis of peat swamp forest growth rates are presented in Table 1.

Table 1. Average distribution of diameter, height and density of individuals on peat swamp forestsbased on the rate of growth

The rates of growth	Diameter (cm)	Heigh (m)	Density (N/ha)
Stake	D ≥ 2 cm - < 5 cm	2,23	2.320 (60,6%)
Pole	D≥ 5 cm - < 10cm	3,25	1.100 (30,7%)
Trees	D ≥ 10 cm	3,66	317 (8,7%)
Total (N/Ha)			3.737 (100%)

From Table 1 shows the diameter of the stand or growth trees dominate saplings around (60.6%) compared to the growth rate of the stake (30.7%) and tree (8.7%). This is understandable because diareal peat swamp forest dominated by trees Galam have frequent fires, so the vegetation at a rate of trees is low and after post-fire saplings Galam growth through tunasnyadibatang left and trees Galam include the type of plants that are resistant to fire , If seen from the composition of its standing on each plot research is young vegetation with a small diameter, it is according to the results of research Yamani (2011), in the secondary natural forest which shows generally, the larger the diameter of a relative amount of vegetation will decrease.

While high stands at each level of growth as seen in the results of the study showed that high standing on the growth rate of trees is higher than the level partumbuhan poles and stakes, it demonstrates the high stands still influenced by the age of each level stand growth is concerned , Another cause is because the number of individuals saplings and poles are more or meetings in the same plot so that there is competition in terms of acquiring nutrients and light. Based on the observations of many stands have a height of less than 3 m is because the number of individuals in the area of peat swamp forest is more dominated by the growth rate of sapling and pole as shown in Table 1. Compared to the results of research conducted Yamani (1996), primary and secondary natural forest most of the trees have a height below 30 m, then the data from this study is much smaller.

For a fairly high density (3,737 people per hectare) for general plant growth Galam clustered or clustered, even rarely seen in the main stem there are two or three individual plants Galam. When compared to the density of trees in the mangrove forests of 5833.32 people per hectare committed by Yamani (1987), the results of the studies are still smaller. Meanwhile, when compared with the stand density in the primary forest and natural forest logged respectively 507 individuals and 346 individuals per hectare has been done Yamani (1996), then the density of individuals in this study is much larger due to differences in forest types and distribution diameter.

Biomass and Carbon Content

From the results of data processing by using the formula obtained the total amount of biomass and carbon content in the peat swamp forest in the respective growth rates as set forth in Table 2, while the graph shown in Figure 1.

Table 2. Biomass and carbon content of peat swamp forest

The rates of growth	Volume (m^3/ha)	Biomass (ton/ha)	Carbon content (ton/ha)	CO2 Uptake (ton/ha)
Stake	0,145	0,113	0,057	0,209
Pole	4,42	3,448	1,724	6,327
Trees	12,37	9,649	4,825	17,708
Total	16,935	13,21	6,61	24,259

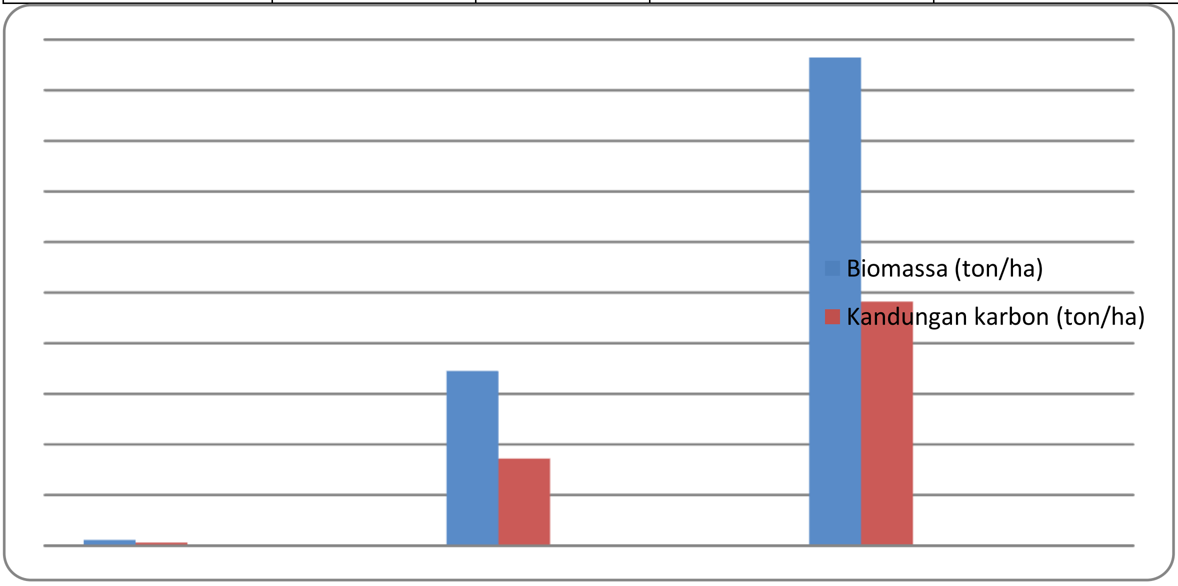

Figure 1. Graph of the amount of biomass and carbon content in the respective growth rates in peat swamp forests

Based on Table 2 above to find the amount of biomass in the growth rate of trees is greater than the rate of growth of saplings and poles. This is presumably because there is a positive correlation between the size of the diameter and height stems with many individual total biomass than its standing, in other words, any increase in the diameter and height will always be followed by an increase in biomass in every part of the tree. As the ratio of the amount of carbon from research can be seen in Figure 2 below.

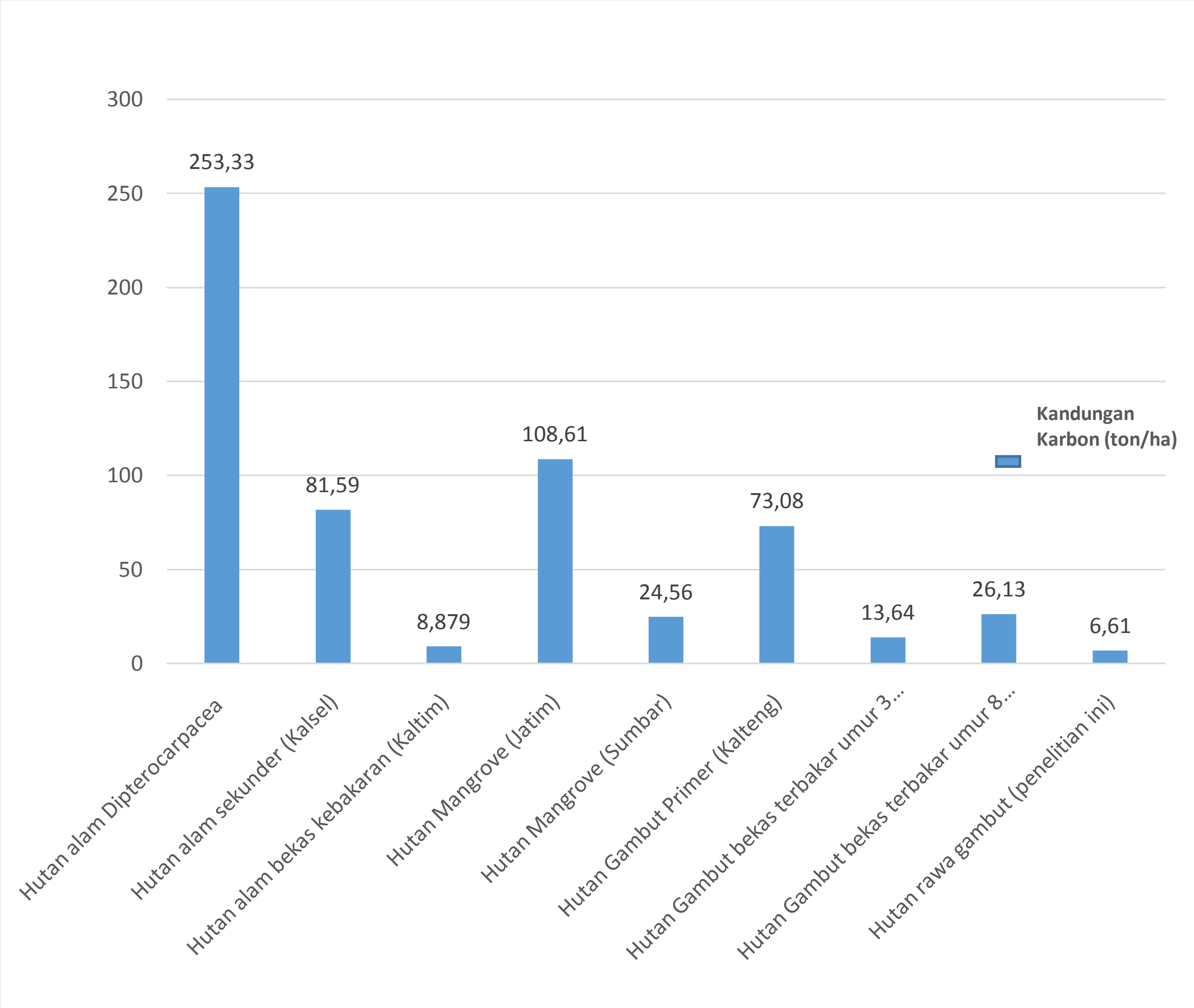

Figure 2. The carbon content of various research results

The amount of carbon content in this study was much lower compared to the results of research Yamani (2011), the secondary natural forest 81.59 tonnes / ha, this is because different types of forests and natural forest in general more than the kind of peat swamp forest. According to the research Francisco (2009), the average carbon stock in the soil in the garden and orchard sengonGalam on peat respectively by 337.47 tons / ha and 259.83 tons / ha at a depth of 0.15 m. When compared with the results of research on primary and peat forests burn mark on the various results of previous studies, the carbon content in this study was much smaller because as well as the study location of frequent fires, especially in the dry season was also their illegal logging activities by the community.

CONCLUSION

1. The potential of peat swamp forests, ie 3,737 trees per hectare.
2. The percentage of the number of stands at the level of the stake (60.5%), poles (30.8%) and the tree level (8.7%).
3. Biomass in peat swamp forests 13.21 tonnes / ha and the carbon content of 6.61 tonnes / ha
4. hile the carbon dioxide uptake 24.259 tons / ha.

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Nepenthes Gracilis As An Important Species for Conservation of Kerangas Forest: Ethnobotanical Identification and Antibacteria Activities

Kissinger[1,3], Zuhud AM.E. [2], K.D. Latifah[2], S.Z. Iskandar[2]

[1]*Faculty of Forestry Lambung Mangkurat University, Banjarbaru Indonesia*
[2]*Faculty of Forestry, Bogor Agricultural Institute, Bogor Indonesia*
[3] *Center of Excellence Research Consortium for Sustainable Tropical Forest Management., Banjarbaru Indonesia*

E-mail : durror2ali@yahoo.com

ABSTRACT

Nepenthes gracilis as indicator species for infertile land is well known. According to IUCN red list and World Conservation Monitoring Center (WCMC), N.gracilis chategorize as a rare species (Appendix II). There is an urgent call to conserve the N.gracilis due to it's vulnerability and sound strategy needs to be well designed by utilizing its values and importances. Maintenance of functional biodiversity of N.gracilis and its sustainable utilization through biodiversity prospecting (bioprospecting) approach are two key factors that could be considered in the conservation efforts of kerangas forest. This paper was conducted with objectives to : i) gain data and information on ethnobotanical of N.gracilis from kerangas forest, ii) determine the antibacteria activities of N.gracilis from kerangas forest. Based on ethnobotanical information, N.gracilis uses such as ornamental plants, traditional plant for cooking, medicinal plant and could be used to stimulate the conservation actions. N.gracilis have various phytochemical compound. The methanol extract from roots, stems, leaves, pockets and closed pocket liquid of N.gracilis effectively inhibited S.aures at concentration 62,5 ppm, 125 ppm, 125 ppm, 2000 ppm, 3000 ppm, respectively; while E.coli were inhibited at concentration 15.6 ppm,125 ppm, >2000 ppm, 1000 ppm, 6000 ppm, respectively. Description of the beneficial using from N.gracilis in kerangas forest can be used as important basic data for determining N.gracilis as an important species for conservation of kerangas forest.

Keyword: N.gracilis, kerangas forest, ethnobotanical, antibacteria, important species

INTRODUCTION

N.gracilis is one kind of plant species that can grow in kerangas (heath) forest. *N.gracilis* able to grow predominantly in open space or under the canopy stands. (Kissinger 2002; Onrizal 2004). *N.gracilis* classified as terrestrial climber that grows solitary or clump (Cheek and Jebb 2001).

N.gracilis is a plant species that has the ability to prey on insects (insectivorous species / pitcher plant). The presence of this plant is an indicator of a low of nutrients in the soil (Adam et al., 1992; Kissinger, 2002; Onrizal *et al*. 2005). Predation is a specific mechanism for Nepenthes to overcome the limitations of existing nutrients. The process of converting organic matter into nutrients rough (especially as a source of N) that are ready to use plants *N.gracilis* by using nepenthesin enzyme (Takahashi *et al*. 2005).

N.gracilis is a rare plant based on the category of the International Union for the Conservation of Nature and the World Conservation Monitoring Center (Appendix II). On the other hand, Kerangas forest as a habitat for *N.gracilis* are also considered vulnerable category. Based on the status, *N.gracilis* and kerangas forest becomes into conservation priorities.

N.gracilis conservation action must be developed by reforming a conservation attitude in individuals community or other stakeholders toward *N.gracilis* and kerangas forest. The weakness of conservation attitudes towards N.gracilis is the trigger scarcity of *N.gracilis* and degradation of kerangas forest. Based on the these problems, we need a stimulus approach in generating interest and build attitudes and conservation action. To build stimulus can be started from the finding the benefits value of biodiversity so that the application of the conservation of *N.gracilis* and kerangas forest can be done.

The initial step in conservation action based on the utilization *N.gracilis* are to gather ethnobotanical information about N.gracilis and provide empirical evidence of bioactivity *N.gracilis*. N.gracilis bioactivity can be obtained by testing materials plant of N.gracilis as an anti-bacterial. Phytochemical screening performed as a support in describing the bioactivity of which is owned by *N.gracilis*. The ethnobotanical results on the benefits value of N.gracilis Ethnobotany and the in vitro antibacteria test can be taken into consideration to make *N.gracilis* as important species for conservation kerangas forest.

MATERIALS AND METHODS

Tools and Material

This study uses the equipment and materials for the survey ethnobotany puposes, sample collection and laboratory analysis of phytochemical compounds and test for inhibitory activity against *S.aureus* and E.*coli*. Ethnobotany survey equipment and sample collection consists of writing equipment, container samples, questionnaires, camera, and GPS. Materials tested their activity is part of the liquid, steem, pocket, leaves, and roots of N.gracilis. Equipment and materials for chemical analysis are equipment and materials for plant extraction activities, qualitative phytochemical test and test inhibitory effect on plant samples to *S.aureus and E.coli*.

Chemical testing conducted at the Laboratory Centre for Studies medicinal IPB Bogor. The method used in the testing of antibacterial is dilution method by using microplate. The media used is Nutrient Broth (NB). A total of 95 mL of sterile medium, 100 mL of sample was dissolved in DMSO 20% or control and 5 mL of bacterial inoculum put into each well (96-well plate). Inoculum was prepared at a concentration of 10-5 CFU / ml.

Data Collection and Analysis

The scope of activities are an inventory of field and laboratory testing. Ethnobotany research locations covering heath forest which contained two provinces, namely: 1) South Kalimantan: the village of Guntung Ujung Banjar Regency, 2) Central Kalimantan: i) Sampit Kotawaringin East, ii) Palangkaraya, and iii) Muara Kelanis

Stages of the activities carried out in the selection of part of plant species that has potential as a natural material which has antibacteria activity is as follows:

1) Survey of ethnobotany; Ethnobotany survey aims to identification benefit value and utilization of N.gracilis. The data collection was conducted using a structured interview (Rahayu *et al*., 2008). The data were analyzed descriptively using tabulation matrix.
2) Identify qualitative phytochemical compounds (Harborne, 1987): Tests conducted qualitative phytochemical with color visualization method. Phytochemical analysis results into additional reference in the choice of plants that has potential as an antibacteria. The use of reference literature on the relationship between the content of phytochemical compounds on the capacity of antidibacteria. The data were analyzed descriptively using tabulation matrix.
3) In vitro antibacterial analysis

   The testing for antibacterial capacity of *N.gracilis* methanol extracts used in vitro analysis to bacteria *S. aureus* and *E.coli*. The method of test is the dilution by using a microplate. The bacteria were incubated in media for 24 hours. The concentration of the extract showed no bacterial growth (nodes) are visually described as MIC (Minimum Inhibition Concentration). A total of 100 mL of media that showed no bacterial growth was inoculated in 100 mL of new media. Concentration which shows no bacterial growth after inoculation both described as MBC (Minimum Bactericidal Concentration). The negative control used is DMSO and the positive control is amoxylin. Data were analyzed by matrix tabulation of the sample concentrations show MIC and MBC.

RESULT AND DISCUSSION

Ethnobotanical Knowledge about *N.gracilis* from Kerangas Forest

There many local names for N.gracilis in South and Central Kalimantan, like ontong-ontong, kampil warik, lanjung datu, hambinan warik, gintuwung, kantong bakei, kusak kameluh, telep umang, tembiku. According to ethnobotanical study, the result about utilization of *N. gracilis* from kerangas forest can be explained on Table 1.

Table 1. Utilization of N.gracilis based on traditional knowledge

Location	Local names	Keterangan Penggunaan Terkini
Guntung Ujung village Banjar District, South Kalimantan	Ontong-ontong Kampil warik	• Fluid from a closed pocket still used today for the treatment of cough and eye drops • A small percentage of the population still uses liquid from closed pocket as a mixture for the treatment of kidney stones. As the material conduction for married celebration (abandoned) • Sack pocket used to cook rice but is already becoming obsolete • Ornamental Plants (temporary)
Muara Kelanis Central Kalimantan	Lanjung datu Hambinan warik Gintuwung	• Some community members still use the root N.gracilis for the treatment of diabetes. • Some community members still use herbs for the treatment of back pain • The liquid that is sealed used for asthma • Place cooked rice (incidental)
Nyaru Menteng Palangkaraya Central Kalimantan	Kantong Bakei Kusak kameluh	• Roots N.gracilis boiled for body fitness and bone tendon pain (so berigas biti an Hapan tatamba Pehe uhat Kahang), youthful drug • pocket for cooking rice / sticky rice (incidental) • Ornamental Plants (temporary)
Sampit Kotawaringin Timur Central Kalimantan	Telep umang Tebiku	• The liquid in the pocket as a stomach medicine • *N.gracilis* roots and stems were burned first, then boiled and used for the disease beriberi • Sack pocked used for cooking rice or sticky rice (takes incidental)

Antibacteria Activity

Antibacterial activity was tested on parts of N.gracilis are: the liquid, roots, stems, leaves, pocked. The results of the analysis of antibacterial for *N.gracilis* against *E.coli* and *S.aureus* are listed in the following table:

Phytochemistry compound	**leaves**	**Pocket**	**Stem**	**Root**	**Liquid from closed pocket**	**Liquid from opened pocket**
Alkaloid	++	++	+	++	+++	+
Flavonoid	+++	+	+++	++++	+	-
Phenolhidroquinon	+++	-	+++	+++	-	-
Steroid	+++	++	+++	+++	-	-
Triterpenoid	-	-	+++	++++	-	-
Tanin	++	++	+++	++++	-	-
Saponin	++	++	++	++	-	-

Antibacterial extracts of *N.gracilis* showed that methanol extract parts of stems and roots have MIC values finest low concentrations. MIC values of extracts of the root is greater than the positive control of Amoxilin, this shows that *N.gracilis* of methanol extract of the root is very potential to be developed as an ingredient for the treatment especially antibacterial. Although pockets and extract stem extracts have inhibitory effects at higher concentrations of the extract of the roots, but still relatively potential for use as an antibacterial. *E.coli* bacteria killing power to be measured after an interval of 18 hours, the result is a methanol extract of the roots are able to kill bacteria at concentrations of 500 ppm and is followed by a bark extract at a concentration of 1000 ppm. These results give a positive hoping for the plant, especially the roots, as an anti bacteria for gram-negative bacteria.

The methanol extract of N.gracilis roots provide the highest MIC activity at a concentration of 62.5 ppm, equivalent to 0.0625 mg / L. In addition to the shaft of the methanol extract, methanol extract the stem and leaves *N.gracilis* also potential as an antibacterial. MBC value in gram-positive bacteria S. aureus showed a concentration of 500 ppm for root extract and extract stem, while the leaves at a concentration of 1000 ppm.

The result show that the antibacterial actvity to two types of gram positive and negative bacteria indicate that the methanol extract of the stems and roots of plants N.gracilis very potential to be developed as an antibacterial than methanol extracts of leaves and bags. Methanol extract of leaves N.gracilis still have the opportunity to be developed as an antibacterial E. coli (MIC = 125 ppm) and methanol extract part of the bag against S. aureus (MIC = 1000 ppm). Both parts of this plant is used as an antibacterial potential through a process of purification and isolation of the methanol extract that has been obtained. A phenomenon that should be the main concern is the use of doses of methanol extract of the root *N.gracilis*. it is associated with a margin of savety use methanol root extract as antibacterials. Description of the beneficial using from *N.gracilis* from kerangas forest can be used as important basic data for determining *N.gracilis* as an important species for conservation of kerangas forest.

CONCLUSION

According to ethnobotanical knowledge, there are many utilization from *N.gracilis*. The beneficial using of *N.gracilis* are: i) medicinal plant, ii) ornamental plant, iii) plant for tools cooking, iv) plant for married celebration, v) traditional wire, vi) sources of water. The methanol extract of the stems and roots of plants *N.gracilis* very potential to be developed as an antibacterial than methanol extracts of leaves and bags. Description of the beneficial using from *N.gracilis* from kerangas forest can be used as important basic data for determining *N.gracilis* as an important species for conservation of kerangas forest.

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A Natural Coagulant from Cellulose of Rattan Umbut (*Calamus Sp*): Isolation, Characterization and Potential for River Water Purification

Retno Agnestisia and Deklin Frantius

Chemistry Education Department, Universitas Palangka Raya Indonesia

E-mail : r_agnestisia@yahoo.co.id

ABSTRACT

Isolation cellulose of rattan umbut (*Calamus sp*) can be done by delignification using 20% NaOH solution at 80°C. Cellulose obtained from the isolation is characterization by using FTIR spectroscopy (Fourier Transform Infrared). The next step is testing the efficiency of cellulose umbut rattan as a natural coagulant for water taken from the river. Testing the efficiency for reducing turbidity has been done in 2 steps: (1) study the influence of the mass coagulant and (2) study the influence of the settling time. The results show that the cellulose of rattan umbut can be used as a natural coagulant at mass coagulant 5 grams for 12 hours of settling time with the ability of turbidity is 87.5%.

Keywords: cellulose, rattan umbut, coagulant.

INTRODUCTION

One method that can be used in water purification process is coagulation. This method is based on the addition of coagulant in water that causes destabilization of colloidal particles. These particles which make turbidity occurs aggregation of particles have been destabilized. By adding coagulant, colloidal stability can be destroyed and agglomerated to form particles become a larger size so that it can be removed by sedimentation or filtration process.

Coagulant is an important additive in reducing turbidity. According to Kawamura (1991) coagulant can be divided into two, namely chemical coagulant and natural coagulant. For example, alum ($Al_2(SO_4)_3$) and lime (Putra et al, 2009), ferrous sulfate ($FeSO_4$) (Suyatni, 2003), ferric sulfate ($Fe_2(SO_4)_3$), ferric chloride ($FeCl_3$), poly aluminum chloride (PAC) and poly acryl amide (PAA) (Susanto, 2008) are used as the chemical coagulants. However, chemical coagulants can cause Alzheimer's disease. The use of natural materials as the coagulants is being developed because it is biodegradable, safe to human health, and more effective economic value. Natural coagulant can be produced from local materials such as plants and animals.

Several types of natural materials that can be used as coagulants are the moringa seeds (Moringa oleifera) (Sutherland, 2003; Hidayat, 2009), tamarind seeds (Tamarindus Indica) (Enrico, 2008), maize (Prihatinningtyas and Effendi, 2013), beans (Phaseolus vulgaris) (Antov et al, 2010) and skin of peanuts (Arachis hypogaea L.) (Rusmawati et al, 2015). Peanut shells can be used as a coagulant because it contains cellulose. Cellulose is an organic polymer containing hydroxyl groups that can destabilize colloidal particles causing water turbidity. Based on the prior researches, the natural material containing cellulose can be used as a coagulant in water purification process.

Rattan (*Calamus sp*) is one of the plant species found in Central Kalimantan. This plant is widely used as a local vegetable of Dayak tribes in Central Kalimantan. Part of rattan used as a vegetable is usually referred to “umbut”, while the skin part of rattan which is not consumed will be discarded. This action generates waste of rattan. This is certainly going to be the environment problem.

Skin of rattan umbut has the cellulose content of 54.66%. The high cellulose content makes skin of rattan umbut can be used as a coagulant in water purification process.

Experimental

Isolation of cellulose from rattan umbut (Calamus sp)

The skin of rattan umbut was taken and cut into the size of 3 cm, then dried by the sunlight. Then the dry skin of rattan umbut was crushed using a blender and filtered through 60 mesh producing the bark powder. This result is referred as the coagulant of RU (rattan umbut).

The bark powder was soaked in a solution of 20% NaOH, heated at 80 °C while being stirred for 5 hours. Then the suspension was filtered and washed using water until pH 7. The next step was the sample dried at a temperature of 60°C and filtered again through a 60 mesh. This result would be referred as the coagulant of CeRU (cellulose of rattan umbut).

Characterization of cellulose produced from rattan umbut (Calamus sp)

The infrared spectra of RU and CeRU coagulant were recorded by a Fourier Transform Infrared Spectrometer (FTIR prestige 21). Fourier Transform Infrared Spectrometer analysis was performed to detect the changes in functional groups that might have been caused by the isolation process. The FTIR spectrum was recorded between 4000 and 400 cm^{-1}.

Testing the efficiency of natural coagulant for the river water purification.

Water purification process were done by the method of the coagulation using RU and CeRU coagulant. Testing the efficiency of reducing turbidity of river water had been done in 2 steps: (1) Study the influence of the mass coagulant and (2) Study the influence of the settling time.

Study the influence of the mass coagulant

The amount of 0, 1, 2, 3, 4 and 5 grams of RU and CeRU coagulants were used to purify 100 ml of river water. The sample solution was stirred using a shaker at a speed of 200 rpm in 5 minutes, then continued at a speed of 60 rpm in 30 minutes. After that the solution was left standing on a shaker during the settling time of 24 hours. The solution was filtered and the filtrate was analyzed using a turbidimeter.

Study the influence of the settling time

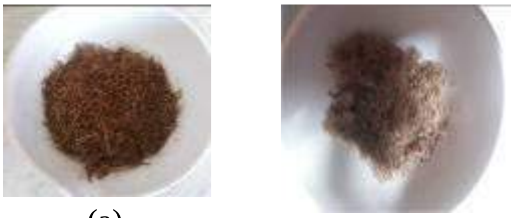
RU and CeRU coagulant at the optimum mass were used to purify 100 ml of river water. The solutions were stirred using a shaker at a speed of 200 rpm in 5 minutes, then continued at a speed of 60 rpm in 30 minutes. After that the solutions were left standing in the shaker at the settling time for 0, 1, 3, 6, 12, 24 hours. The solutions were filtered. The filtrate obatained by filtration process was analyzed using a turbidimeter.

RESULTS AND DISCUSSION

Isolation of cellulose from umbut rattan (Calamus sp)

The isolation of cellulose from rattan umbut can be used as a natural coagulant in water purification process by eliminating dissolved chemical compunds. Generally, plants contain chemical components such as cellulose, hemicelluloses, lignin, wax, grease, and other substances that dissolve in water (Onggo, 2005). Lignin of the plant has a function as a binder of cells, which is the cellulose cells become into a single unit so that it increases the hardness and strength of the plant (mechanical strength). The lignin that binds the cellulose cells is unprofitable for the coagulation process. Therefore, lignin has to be removed to obtain the pure cellulose as a coagulant.

In this study, removal of lignin could be achieved by delignification in 20% NaOH solution for 5 hours at a temperature of 80°C. Results showed that the rattan was browner than the produced cellulose. Delignification process produced cellulose fiber in elongated shape.



(a) (b)

Fig. 1. (a) RU and (b) CeRU coagulant

Characterization of cellulose from rattan umbut (Calamus sp)

FTIR spectroscopy was used to identify the changes of cellulose structures during extraction process. Figure 2 represents the FTIR spectra of rattan umbut (RU) and rattan umbut cellulose (CeRU) samples. The representative bands were summarized as follows.

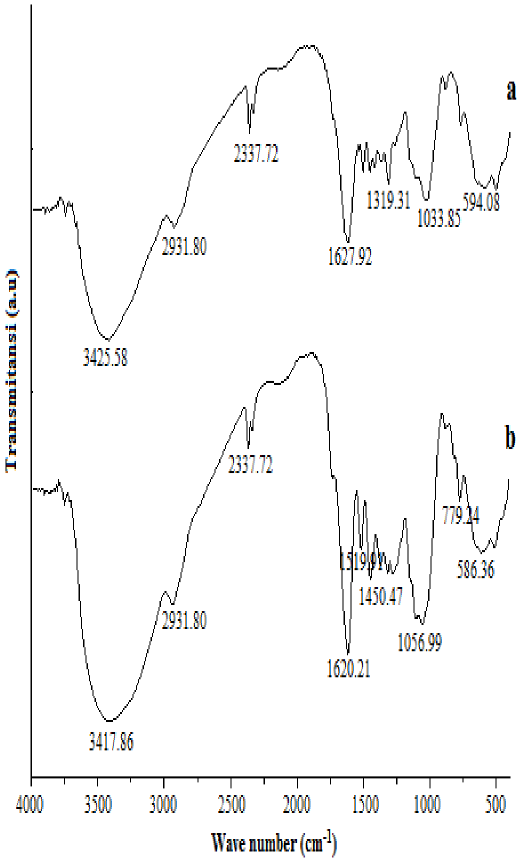


Fig. 2. FTIR Spectra of (a) RU and (b) CeRU coagulant

One of adsorption bands, 1057-1034 cm^{-1}, arose from C-O-C stretching at the β-1,4-glikocidic linkages (Sindhu et al. 2012). Bands at 1000 to 1200 cm^{-1} is associated to structural changes of cellulose and hemicelluloses while the C-H bending occurs at 1280 cm^{-1} and 1381 cm^{-1}. The bands 1319 cm^{-1} in the spectrum can be assigned to symmectric CH_2 bending and wagging. The peak of CH_2 stretching at the 2931 cm^{-1} region is distinguished as a feature of cellulose. The band adsorption at the 3426 cm^{-1} region is related to O-H stretching of the hydrogen bonds.

Band of 1451 cm^{-1} indicates the presence of vibration of the C=C aromatic ring. According to Fengel & Gerd (1995) absorption band is the most characteristic of the lignin which is about at 1470-1450 cm^{-1}. But the bands is not found in the representation FTIR spectra of CeRU coagulant. This indicates that the delignification methods is successful to reduce or eliminate lignin.

Testing the efficiency of natural coagulant on river water purification.

Mass coagulant is very effective to reduce the turbidity of river water. The results of coagulation in the initial turbidity of 193 NTU at a pH of ± 5 using coagulant RU and CeRU are shown in Figure 3.

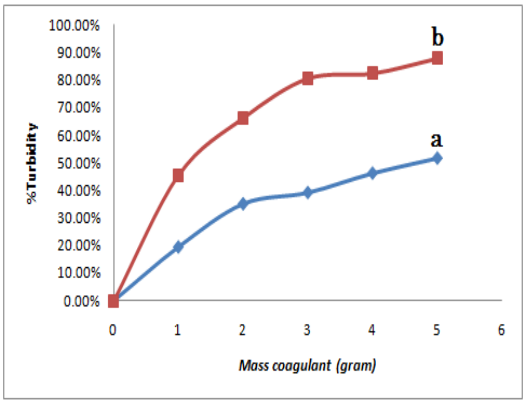


Fig. 3. Effect of mass coagulant on the percentage removal turbidity of the river water.

The results showed that the more mass coagulant was used, the more efficient was removal turbidity. This facts are quite relevant to the research conducted by Han (1999). The largest impairment of river water turbidity was shown in use of 5 grams of RU and CeRU, Impairment turbidity respectively in 51.52% and 87.79%. The use of 5 grams the coagulant was effective to destabilize the colloids. According to Wiley (1995) a coagulant to be effective, if it is able to reduce turbidity value by 50% so that it can be said that RU and CeRU coagulants are effective to use for reducing the turbidity of river water.

Settling time shows the efficiency of reducing the turbidity. During the deposition, there are interactions between the particles and coagulants. These interactions will make the particle increase in size so that the particles will be easier to be separated from water using the process of sedimentation and filtration. Effect of settling time on percentage removal turbidity of the river water is shown in Figure 4.

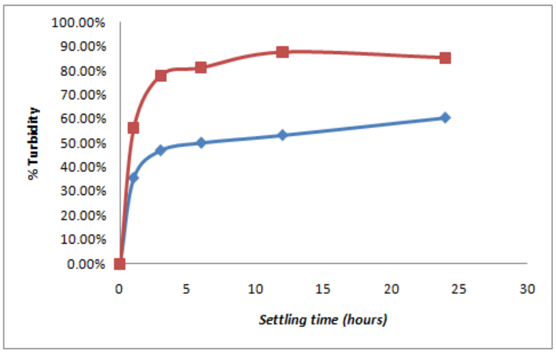


Fig. 4. Effect of settling time on the percentage removal turbidity of the river water.

The results showed that the percentage removal turbidity are optimal at 24 hours for RU and 12 hours CeUR coagulant. The reduction percentage of turbidity are respectively 60.34% and 87.5%. Based on the analysis, the use of coagulants cellulose rattan umbut is able to reduce river water turbidity of 193 NTU become 24.12 NTU. This results relevant to the standard PP 82 of 2001 (Government rules of Indonesia) concerning to the water quality less than 25 NTU.

Colloids are group of charged atoms or molecules are very small and have stable properties in water. Stability is due to repel the charge among the colloidal particles. The existence of colloidal particles stable the ground and is dispersed in water causing the water turbidity. The method used to derive the value of the turbidity of river water was the coagulation. Basically, this method involved a process of destabilization of the colloid with the aid of a coagulant. Cellulose of rattan umbut can be used as a coagulant because it has an active group, such as hydroxyl (OH). This active group under acidic solution (pH of river water = 5) is positively charged as a result of protonation -OH group into $-OH_2^+$ (Han, 1999).

Furthermore, the positive charge formed on the surface of the peanuts shell destabilizes the colloidal by neutralizing the colloid surface electric charge. This negative charge results from colloidal inorganic (Al-silicate mineral clay) and colloidal organic (humus). Destabilization of colloids will form the core of clots (microfloc) which can then be joined to each other to form a floc with a larger size to obtain sufficient mass to settle. The sediment will drop to the bottom.

The results also shows that the settling time occurs faster by using the CeRU. This can happen because it is less contain of lignin and other compounds. Presence of lignin along with cellulose is not profitable for the time of the adsorption process. Therefore, removing the lignin is necessary to obtain the faster settling time.

CONCLUSION

Cellulose of rattan umbut (*Calamus sp*) can be used as a natural coagulant at mass coagulant 5 grams for 12 hours of settling time with the ability of turbidity is 87.5%.

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River Water Purification Using the Coagulant of Rambutan Tree Bark (*Nephelium lappaceum L.*)

Nasrul Latif , I Made Sadiana and Retno Agnestisia

Chemistry Education Department, Universitas Palangka Raya, Indonesia

E-mail: nani12412@gmail.com

ABSTRACT

Rambutan tree bark (*Nephelium lappaceum* L.) is prepared using NaOH solution 2%. Coagulant obtained from the preparation then is analyzed using FTIR spectroscopy (Fourier Transform Infrared). Coagulation process is done by adopting Jar Test method. Parameters studied include the effect of coagulant dose and settling time. The results show that the rambutan tree bark can be used as a coagulant in purification process of river with the ability of turbidity is 92.23%, which is achieved coagulant dosage at 1 grams for the settling time in 24 hours.

Keywords: rambutan, coagulant, turbidity.

INTRODUCTION

Kahayan is a river that divides Palangkaraya city with more than 600 km of length (Wikipedia, 2015). Based on the Environment Agency of Palangka Raya city, Kahayan river is now in critical categories which means it can not be used directly for drinking, cooking, washing, and other purposes. One of the reasons is the high turbidity of river water due to soil erosion, gold mining that produces the sludge waste or sediment (Herimariaty, 2011), industrial activities, transportations, and people activity throwing directly the household waste into water.

Water turbidity value of Kahayan river is known to be exceeded from the determined threshold. The threshold value of turbidity is 50 NTU while the value of Kahayan turbidity has reached from 86.10 to 150 NTU. Therefore, some efforts should be made to reduce the turbidity of the water so that the river water can be consumed anymore.

One method that can be used for that purpose is coagulation. Coagulation method is chosen because it is effective, easy, and inexpensive. Coagulation is a method based on the destabilization of colloidal particles with coagulants (Hidayat, 2009).

Material used as a coagulant is a material that is relatively abundant in nature and has not been used intensively. Several types of natural materials that can be used as the coagulant, such as moringa seeds (Moringa oleifera), tamarind seeds (Tamarindus Indica), maizes, beans and peanuts shells (Arachis hypogaea L). These materials have several advantages, including more biodegradable, safer to human health, and more economical (Sutherland, 2003; Hidayat, 2009).

Rambutan (Nephelium lappaceum L.) is a plant species found in Central Kalimantan. Rambutan tree bark is known as a lignocellulosic material containing cellulose 48.32%, hemicellulose 40.68%, and lignin 11%. Cellulose is a polymer containing hydroxyl groups. In acidic conditions, the hydroxyl group tends to positively charged as a result of protonation process. The formed positive charge then can be used to destabilize the charged colloidal particles that cause the turbidity of river water. Mostly in Indonesia, colloidal partciles are negatively charged (Rusmawati et al, 2015). The content of cellulose with an active group such as hydroxyl groups makes the rambutan tree bark can be used as a coagulant in water purification.

Experimental

Preparation natural coagulant from Rambutan Tree Bark.

The bark from the rambutan was cleaned then dried in the sunlight. After that, it was blended to produce the powder. The produced powder was sieved through 60 mesh. Then the rambutan tree bark powder was activated by using a solution of NaOH 2% (w/v) with ratio 5 grams : 300 mL for 2 hours at 100 ^{o}C. Then it was washed and dried in an oven at 100 °C. Coagulant was then characterized by FTIR instruments.

Study the influence of the coagulant dose

Coagulant doses of 200; 400; 600; 800; 1000 mg were inserted to erlenmeyer and added with 100 ml of river water. The mixtures were stirred quickly using sheaker at a speed of 100 rpm in 3 minutes. Then it were stired slowly with a speed of 40 rpm in 12 minutes. After that, they were deposited in 24 hours. The next step was separating the mixtures by filtration. The filtrate was evaluated to determine the turbidity level by turbidimeter.

Study the influence of the settling time.

The optimum dosage of coagulant was poured into 5 erlenmeyers. Each of them was added 100 ml of river water. The mixtures were stirred quickly with shaker at a speed of 100 rpm in 3 minutes. Then they were stired slowly with a speed of 40 rpm in 12 minutes. After that, they were deposited with variations: 1, 6, 12, 18, and 24 hours. The next step was separating the mixtures by filtration. The filtrate was evaluated to determined the turbidity level by turbidimeter.

RESULTS AND DISCUSSION

Natural Coagulant

Before it was used as a coagulant, rambutan tree bark was activated to remove impurities such as lignin and other chemical compounds so that active groups such as hydroxyl groups would be activated. Activation results were then characterized with FTIR spectrometer (Fourier Transform Infrared) to evaluate the characteristics of rambutan tree bark. FTIR spectra before and after activation shown in Figure 1.

The FTIR spectra shown in Figure 1(a) shows the band absorption appearing at wave number 3425 cm^{-1}. This represents the presence of –OH stretching vibration. Absorption occurs sharply at wave number 2931 cm^{-1} which indicates the stretching vibration of C-H. Furthermore, at wave number 1635 cm^{-1} and 1456 cm^{-1} respectively are -COO- asymmetric and C = C aromatic stretching vibration. The wave absorption number of 1056 cm^{-1} is strong enough. It shows the presence of C-O (β-1,4-glycoside) vibration. (Sindhu et al, 2012).

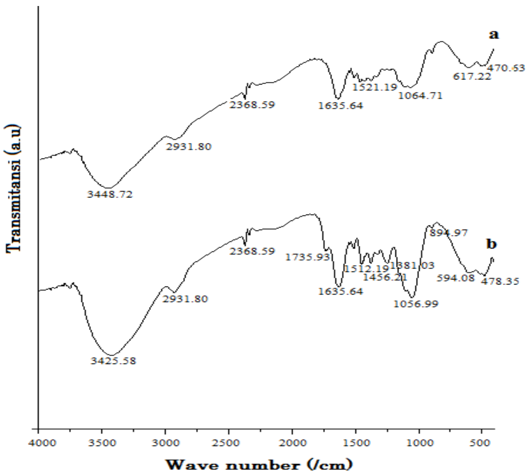

Fig. 1. FTIR Spectra of (a) Untreated Rambutan Tree Bark and (b) Pretreated Rambutan Tree Bark

Figure 1(b) shows the FTIR spectra of sample after activation. There is shifting at the absorption band from 3425 cm-1 to 3448 cm^{-1}. This indicates that the hydroxyl group -OH is more freely because of reducing atom which can bond the hydrogen with -OH group. Peak shift also occurs on the wave number of 1056 cm^{-1} to 1065 cm^{-1} which shows the vibration of C-O (β-1,4-glycoside) (Sindhu et al, 2012). This shift wave number indicates that C-O of cellulose is more freely. This happens because of the decreasing of atoms that can bind or interact.

The significant difference occurred at wave number 1456 cm^{-1} indicates the vibration of C=C aromatic ring (Fengel, 1995). This absorption band is the characteristic of absorption band of the lignin which is at the wave number 1470-1450 cm^{-1}. In the activated sample, this absorption band is disappear. This indicates that activation is successful for reducing the lignin in the rambutan tree bark.

Testing the Efficiency of Natural Coagulant on the river water purification.

Purification process was done by adopting Jar Test method through two steps: (1) Study the influence of the coagulant dose and (2) Study the influence of the settling time.

Variations of coagulant dose were make to determine the most effective coagulant dose to reduce Kahayan water turbidity. Effect of coagulant dose on the percentage removal turbidity of the river water. can be seen in Figure 2.

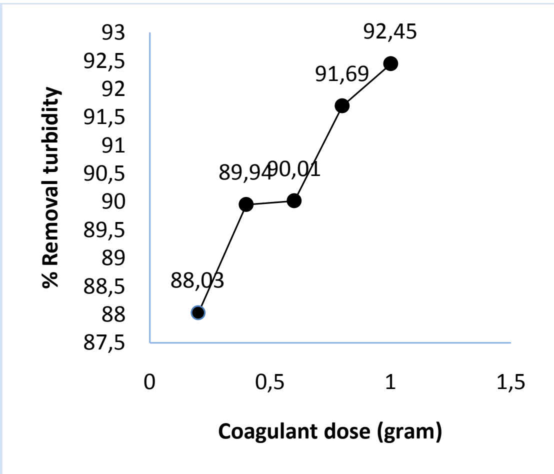

Fig. 2. Effect of coagulant dose on the percentage removal turbidity of the river water.

The results shows that the addition of coagulant dose tends to decrease the value of the river water turbidity. It is quite relevant to the research of Han (1999).

Study the influence of the settling time was done by adding the 5 grams of coagulant in 100 mL of water with settling time variatons were 1, 6, 12, 18, and 24 hours. Effect of settling time on the percentage removal turbidity of the river water can be seen in Figure 3.

The results show that the largest percentage of decreasing the river water turbidity occurs in the settling time 24 hours with the percentage value is 92.22%. According to Wiley (1995) a coagulant is said to be effective, if it is able to reduce the turbidity value of 50% water so it can be said that the rambutan tree bark is an effective coagulant used to reduce of turbidity.

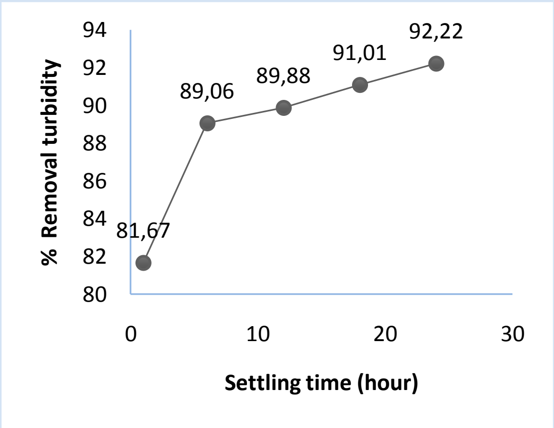

Fig. 3. Effect of settling time on the percentage removal turbidity of the river water.

These results are obtained because rambutan tree bark is rich in cellulose. Cellulose is a polymer that has an active group, hydroxyl (-OH). Under acidic solution (pH of the water environment Kahajan = 5), hydroxyl group is positively charged as a result of protonation -OH group into $-OH_2^+$ (Han, 1999).

Furthermore, the positive charge is formed to be destabilizing colloidal that causes the turbidity by neutralizing the electric charge at surface of colloid, such as Al-silicate clay minerals and humus. This destabilization will form the core blob (microfloc) which can then be joined to each other to form a larger floc so it is sufficient mass to settle (Rusmawati et al, 2015).

CONCLUSION

Rambutan tree bark (Nephelium lappaceum L.) can be used as a coagulant for river water purification with the best turbidity removal occurs coagulant dose at 5 grams and settling time at 24 hours.

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Utilization of Medical Plants of Dayak Community in Saka Mangkahai Village,West Kapuas in Central Kalimantan as Local Wisdom

Wahyu Supriyati and Alpian

Department of Forestry Faculty of Agriculture, University of Palangkaraya Indonesia

E-mail : wahyu_plk@yahoo.com

ABSTRACT

Villagers of the Saka Mangkahai village of Central Kalimantan have always lived by utilizing the natural resources around them. Their local wisdom includes the utilization of plants in medicine, food and building materials. The knowledge of the benefits of medicinal plants from this community is still not widely known. The purpose of this study is to investigate the plants used as traditional medicinal herbs by Dayak who are the local tribe of the village. The methodology used of this research was conducted through interviews of the villagers and direct observations in the field The results showed that no less than 30 species used for medicinal plants. Some of these plants is endeangerred such as akar kuning / yellow root (*Arcangelisian flava* L. Merr) and pasak bumi (*Eurycoma longifolia*). These endangered plants need protect.

Keywords : Medical plants, Dayak, Central Kalimantan

INTRUDUCTION

Background

Villagers of the Saka Mangkahai village of Central Kalimantan have always lived by utilizing the natural resources around them. Their local wisdom includes the utilization of plants in medicine, food and building materials. The knowledge of the benefits of medicinal plants from this community is still not widely known.

On the other hand, deforestation and process of modernization was also occurred in this area.The effect of those activities are expected to degrade the local wisdom and destroy natural resources. For this reason study on the utilization of medicinal plants by the local community is needed.

The purpose of this study

The purpose of this study is to investigate the plants used as traditional medicinal herbs by Dayak who are the local tribe of the village.

MATERIALS AND METHODS

The methodology used of this research was conducted through interviews of the villagers and direct observations in the field.The investigation includes finding out what kinds of plants and parts of plants are used along with the processes are required to make them into medicine

RESULT AND DISCUSSION

The results showed that no less than 30 species used for medicinal plants. The kinds of medical plants from many family.

Table 1.Kinds of Medicinal Plants in Saka Mangkahai village-West Kapuas, Central Kalimantan

No.	Local name	Latin Name	Spesies	Part of Plant that used	Benefit	Process into medicine
1.	Kalakai	*Stenochlaena palustris*	Blechnaceae	Leaves	Anemia, pasca maternity	Boiled
2.	Katuk	*Saurapus androgynus L.*	Euphobiaceace	Leaves	Breast milk	Boiled
3	Karamunting kodok	*Melastoma affine*	Melastomataceae	Leaves batang dan akar	Diabetes; pasca maternity (root)	Boiled, drink the water
4	Jaringau	*Acorus calamus*	Acoraceae	Leaves	1.Bruises, ceremonies	1.Mashed, apply into the pain skin.

5	Kumis kucing	*Orthosipon aristatu*	Lamiaceae	Leaves	Infection ureter,, hipertensi on	Boiled, cooled, drink the water
6	Kayu Dadap	*Erythrina sp*	Fabaceae	Root	Pasca maternity	Boiled
7	Langsat	*Lansium domesticum*	Meliaceae	Bean	Wormy	Mashed, Brewed
8	Kambasira	*Ilex cymosa* Blume	Aquifoliaceae	Stem	Pasca meternity	Burn
9	Sawangkak	-	-	Stem	Stomach ache, disentry	Mashed, squeezed, drink the liquid
10	Kemot	*Passiflora Foetida*	Passifloraceae	Fruit	Laxative urine	Eat
11	Lidah buaya	Aloe vera	Asphodelaceae	Leaves	Skin after contact with hot oil	Apply to burn skin
12	Terung pipit	Solanum travum	Solanaceae	Fruit	Hipertensi on	Eat
13	Sarai	*Cymbopogo n citratus*	Poaceae	Stem	Diabetes	Boiled mixed korsen leaves
14	Lai	*Zingiber officinale*	Zingiberaceae,	rihizom a	Stomach ache	Burn, mashed, put on the stomach
15	Henda	*Curcuma domestica*	Zingiberaceae,	rihizom a	Heartburn	Grated, squeezed, drink that liquid
16	Pinang	*Areca cathecu L.*	Areaceae	Bean/se ed	Worms	Mashed
17	Kastela/ Pepaya	*Carica papaya*	Caricaceae	Root	Worms	Mixed with coconut oil, drink
18	Langkuas	*Alpinia galanga,*	Zingiberaceae	rhizom a	Tinea versicolor	Mashed, apply to skin
19	Limau nipis	*Citrus aurantifolia*	Rutaceae	Fruit	Cough	Drink with the honey
20	Mengkudu	*Morinda citrifolia*	Rubiaceae	Young leaves	ulcers (young leaves), sprains (leaves)	Mashed, apply to the skin
21	Tingen	*imperata cylindrica*	Poaceae	Root	kidney health	Boiled
22	Bluntas	*pluchea indic*	Asteraceae	Leaves	Hypertensi on	Eat
23	Kanas	*Ananas comosus*	Bromeliaceae	Young fruit	Worms	Grated, squeezed, drink that liquid

		(L.) Merr				
24	Uwei namei	*Flagellaria indica* L.)	Poaceae	1.Root, 2.young leaves	1.Powder; 2. Syphilis	1.Mashed, mixed with rise 2. Boiled with tingrn root, kumis kucing., drink the water
25	Gulinggang	*Cassia alata, C. Quaderialata*	Fabaceae	Leaves	Ringworm, tinea versicolor	Mashed, apply
26	Bajei	*Paku-pakuan*	*Pteridophyta*	Root	Ashma	Boiled
27	Sirih	*Piper Belle*	Piperaceae	Leaves	Nose bleeds	Put the leaves into the nose
28	Jambu biji	*Psidium guajava*	Myrtaceae	Leaves	diarrhea	Boiled, drink the water
29	Sungkai	*Peronema canescen*	Verbenaceae	Leaves, root	Arthritis	Boildes, drink the water
30	Belimbing manis	averrhoa carambola	Oxalidaceae	Fruit	Cough	Eat
31	Jalukap	Cantella asiatica	Mackinlayaceae	Leaves	Wound	Mashed, apply to wound
32	Akar kuning	*Archaugelisia Flava*	Menispermaceae	Stem	Hepatitis	Boiled, drink that watert
33	Pasak bumi	*Eurycoma longifolia*	Simaroubacea	Root	Stamina	Boiled

Medicinal plants in Indonesia is one group of commodities forest and garden relatively rapid genetic erosion. It is caused by several factors, namely (1) damage to habitat caused by industry and residence make the medicinal plant habitats disturbed, (2) Low attention to the cultivation of medicinal plants especially for the types used, and (3) the ability of regenerating that slow, especially plant species (Djauhariya and Sukarman 2002).

Certain plants grown in a particular area. The concept of land systems based on ecological principles to consider the close relationship between rock types, hidroklimat, landform, soil, and vegetation (Christian and Stewart, 1968). The diversity of vegetation types can associated with soil type. According to Mac Kinnon in Alikodra (2000),conservation system can be achieved through the following ways(1) maintain and sustain the lifeessential for human survival and developmentbuilding, (2) preserve the diversity of plasterma germ important for breeding programs (3) ensure the continuity of utilization species and ecosystems by supporting human lives of millions of rural residents and can sustain a large number of industries.

CONCLUSION

That no less than 30 species used for medicinal plants in SakaMangkahai village. The kinds of medical plants from many family Some of these plants is endeangerred such as akar kuning / yellow root (*Arcangelisian flava* L. Merr) and pasak bumi (*Eurycoma longifolia*). These endangered plants need protect.

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The Ability of Wood Vinegar From Gelam (*Melaleuca cajuputi*) as A Coagulant Latex

Siti Hamidah[1,2) & Yudi Firmanul Arifin[1,2)

[1)] *Faculty of Forestry, Lambung Mangkurat University, Banjarbaru Indonesia*
[2)] *Center of Excellence Research Consortium for Sustainable Tropical Forest Management, Banjarbaru Indonesia*

Email : reylitahadi@gmail.com

ABSTRACT

Galam (*Melaleuca cajuputi*), is a typical type of wetland wood. Various studies on the possibility of utilization of galam have been done by the research team, including its potential as raw material of charcoal and wood vinegar. Based on the results of chemical analysis, wood vinegar is very potential to be used as latex coagulation, due to the high content of phenol and carboxylic acid (Hamidah, 2009). It is therefore necessary to research the ability or potential of wood vinegar as a latex agglomeration, especially in the case of freezing velocity, odor & color of latex after being given overnight vinegar. The galam wood vinegar is made in various concentrations (5%, 10%, 15%, 20% and 100%) mixed into latex and observed duration of latex coagulation, as well as latex smell and color after 1 (one) day of storage. As a comparative material is cinnamon vinegar and clotting materials that have been commonly used by rubber farmers, namely alum. The results showed that galam wood vinegar is potentially used as a clotting of garden latex (at 100% concentration), since latex coagulated with oven vinegar frozen faster, more plastic and odorless than cinnamon vinegar or common coagulation Used by farmers (alum). Latex was given 100% vinegar with a 100% concentration, after 24 minutes had coagulated, while the new alum was clothed after 35 minutes, and latex with cinnamon vinegar was clothed at 285 minutes. However, latex coagulated with wood vinegar Tend to be darker. The potential of wood vinegar vinegar as latex bulking increases as the concentration increases. The optimal concentration is 100%. Nevertheless, the use of this 100% concentration should be reviewed especially in terms of economics. Therefore, further research with concentrations above 20% and below 100% should be done so that later obtained the most optimal concentration both in terms of technical and economical.

Keywords: galam (*Melaleuca cajuputi*), wood vinegar,

Agroforestry Study as a Business to Improve Community Food Security in Krph-Oro Oro Ombo Bkph Pujon Kph Malang

Joko Triwanto

Forestry Dept University of Muhammadiyah Malang Indonesia

E-mail : joko.fppumm@gmail.com

ABSTRACT

This study aims to learn the implementation of asroforestry system to the increasing diversification in the implementation of agroforestry systems to be better. The research was conducted On 28 th June - 29 th September 2016 in Oro-Oro Ombo village, KPH Malang Batu sub-distric BKPH Pujon KRPH Oro-Oro Ombo. A method of data processing using analysis of multiple regression to know the relationship of land contributes to the production and income, while the improved food endurance outcomes were Analyzed with simple regression. Farmers' income diversification in farming as the average gains of 5.5 times than the cost incurred. In the correlation matrix between production and revenue Obtained r = 0.442 with probability = 0.006 <0.050, then there is a significant relationship / correlation between the factors of production factors that is influenced the income share of the land area. Based on simple regression analysis, where the farmer respondentsâ€™ revenues / receipts have significant linear relationship to Increased food endurance for the Anova significant value is 0,025 <0,050. Agroforestry systems provide advantages and benefits for farmers and forestry. With the result that agroforestry systems Affect the society food endurance. therefore it needs to have improvement and utiliation.

Keywords: Agroforestry, food security, KPH

INTRODUCTION

Background

Population growth is a major factor for efforts to use natural resources, especially forests, in addition to the intensity of the technology used. Forestry then faced with the increasing of public demand for goods and services from forests, such as the need for clean water, land conservation, and wildlife habitat or the depreciation of certain land as the basic needs of society, especially forest communities (Faiq 2010). The purpose of agroforestry was built is to bridge that problem, as agroforestry is an aquaculture technology through a combination of forestry and agriculture in order to optimize the use of land for agriculture is increasingly limited, but it is also helpful to create opportunities to increase the potential for the welfare of the community as well.

Statement of the Problem

Various efforts have been made in fulfilling the daily needs, but they are often not enough to make ends meet. It is because there is no knowledge about how to manage the land, so that the crops are not as expected. In principle, agroforestry systems help economic problems and can petrify farmers facing food security (Evrina 2015).

Research Purpose

a). To assess the impact of the use of agroforestry, woody vegetation and crops. b). To diversify the core plant growth with the stream of commodities grown in agroforestry systems. c). To analyze the success of agroforestry system that have done as the effort to improve the food security of community around forest.

Significant of the Research

a). This research can be used as information for the community about the implementation of agroforestry system that can improve the diversification of product as effort to supply of food security. b). As a material and suggestion in government policy to improve the social economic.

Hypothesis

a). Agroforestry system give more profit than the pattern of monocultural farming, in the term of production and land conservation. b) . The implementation of agroforestry system can be used as a product to improve food security and economic of community around forest. c). The improvement of divesrsification product from agroforestry system can fulfill the needs of community.

MATERIALS AND METHODS

Place and Time of Research

This research was conducted on 28 Juni-29 September 2016 atOro-oro Rombo village,BatuSub-District KRPH Oro-oro Rombo BKPH Pujon KPH Malang.

ObjectandIntrument of Research

The respondentor objectof interview in this research is the farmers in Oro-oro ombo village,BatuSub-district, Malang Regency.

The Type and Source of Data

This Research used two types of of data such as primer data and secunderdata.

Method of Collecting Data

The data was collected by doing observation to the community in Oro-oro ombo village.

Methode of Analysis the Data

Analysis of undergrowth (crop farming)

$$\text{Density } = \frac{\text{Total of a type individu}}{\text{Total of a land area}}$$

$$\text{KF} = \frac{\text{Total of a type individu}}{\text{total density of a type}}\ x\ 100\ \%$$

$$\text{Frequency} = \frac{\text{Frequency of a type}}{\text{Total of partition}}$$

$$\text{FK} = \frac{\text{Frequency of a type}}{\text{Total frequency of a type}}\ x\ 100\ \%$$

Important index value = FR + KR

Community Revenue

The income of community with agroforestry system can be known with formula:

PT (total of production) = H (Price) x JP (Total income)

The calculation of total cost using the formula below:

BTot = BTT + BT

Whereas the calculation of profit of community using the formula below:

K = PT - BTot

The level of efficiency of farming can be known by using analysis B/C ratio (Duchlun, 2006).

E = PT / BTot

Explanation:

E = Efficiency

E> 1, the farming with agroforestry system is profit

E = 1, the farming with agroforestry system is not give profit and not give harm.

E < 1, the farming with agroforestry system is harming.

Analysis the relation of land with production and revenue

The analysis was done by using *SPSS for windows*through *multiple regression*:

$$\boldsymbol{Y = X_1 + X_2}$$

Explanation;

Y = farmer income

X_1 = Production

X_2 = Land area (ha)

Securty improvement of community

The analysis was done by using *SPSS for windows*through *multiple regression* based on GomezdalamAdil(2013):

Y = a + bX

Explanation:

Y : DependentVariabel, Foodsecurity

X : IndependentVariabel, Total Productionorrevenue

a : Intersep

b : Koefficienregresi

RESULTS AND DISCUSSION

Overview of ResearchLocation

This research was carried out in RPH Oro-oroOmbo, BKPH Pujon, KPH Malang, PerumPerhutani Unit II East Java. BKPH Pujon has a forest area of about 12856.9 ha. BKPH Pujon has 4,826 ha of production forests, 6643 ha protected forests, 37.9 ha of land and other wood and special purpose field with 43.4 ha. BKPH Pujon KPH Malang is divided into five RPH such as RPH South Pujon with area 2.950 ha and 146 subplot, RPH North Pujon land area of 1629.0 ha with 112 subplot, RPH Punten 22.1668,10 ha with 115 subplot, RPH oro-oroOmbo 1989.40 ha and 118of subplots and RPH KedungRejo 2831.50 ha with 130 subplot. The five RPH in Pujonare divided into two main producing wood types, namely: 1) ProducePinus, in South Pujon RPH RPHPunten, RPH Oro-oroOmbo and RPH Njunggo; 2) Produce Pine and Damar, at RPH North Pujon Boundaries BKPH Pujon.

Topography of Oro-OroRombo Village

Topography or landscape area in the village of Oro-oroRomboare mountains or hills about 363 ha with soil fertility is moderate, while the average rainfall is 2889 mm / yr. The total area of the village of Oro-oroOmbo amounted to 16 916 km2,

Social Economic of Community Neighbourhood Region

Especially the surrounding communities in the study area with forest relation is basically has existed for a long time. Where people have a dependency on forests, but also there is a limit in forest use.

Population

The population in the village of Oro-oroRombo amounted to 10,094 inhabitants by 5.103 the number of men and the number of women's lives 4,991 inhabitants. (Central Bureau of Statistics in Batu 2015).

Health

Health facilities that provided are 1Polindes and 7Health Center, 8 health nurses and 4midwifes (Central Bureau of Statistics inBatu2015).

Rural Infrastructures

There are 3 Elementary Schools amounted Islamic elementary schools and one junior high school (JHS). Health facilities are 7 HealthCenter of Melati which distributed in the three hamlets, although the existing health infrastructure in the health center / IHC is not enough to meet (Central Bureau of Statistics in Batu 2015).

Community Characteristics in Agroforestry

a. Age of respondents

There are several level of age of respondent in this study. One of them is the level of advanced age ranging between 50-60 years. At this level, there are 3,1% of the respondent or only a farmer. The level of productivity is greater than the farmers who entered the elderly. As is known to the average of all activities in the farming associated with the level of physical ability (RizkiRahmadani 2012).

b. Level of education

The education level of respondents is start from the people who do not graduate from school, elementary school, and junior high school (JHS). The highest percentage was in the elementary education level by 50%, and followed byJHSby 31.2%.

c. Number of family members

On the observations show the highest number of family members is consist of 5 people by 34,3% of respondent or 11 respondents.

d. Number of livestock ownership respondents

Number of livestock ownership based on primary data obtained in this study can be classified into; 9.3% of respondentsor 3 respondents have 0-2 tails, 65.6% of the respondents or 21 respondents have 3-4 tails, while 25% of respondents or 8 respondents have 5-6 tails.

a. Land area

1) Land share

In this study, the share of land area given to the respondents is 0.17 ha.

2) Land owned

In this study, respondent which has a land area of 0-0.5 ha is 9.3% or 3 respondents. Meanwhile, respondents who have a land area of 0.6-0.7 ha is as much as 34.3% or 11 respondents. The highest percentage of 37.5% of respondents have a land area of 0.8 to 0.9. Meanwhile, the land area of 0.10- 0.11 is owned by 18.7% of respondents, or as many as 6 respondents.

The Use ofLand in Agroforestry Planting Systems

Farming in this study is planted with cropping system. Farmers plant his farm with a wide variety of commodities, including corn, chili, ginger, onion, tomatoes, and broccoli. The results of direct observation, farmers planted with turn by turn, with reasons to optimize growth. Pine with a spacing of 4 x 4 m is expected to provide an effective growing space for plants (agricultural) season so as to increase the productivity of annual crops and increase income for farmers. Litter decomposes speed, the ability to bind N-smoking, and maintaining run-off every kind of plant nucleus determines the preservation of soil fertility. The selection of the type of plantwhich give relative better growth of agricultural crops become a good option in agroforestry systems.

Analysis On Crop Farming

The presence of a species in an area showing adaptability to the habitat and the wide tolerance to environmental conditions. (Soegianto, 1994). See Figure 1

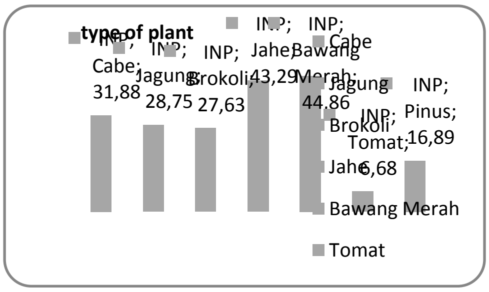

Figure 1: Graph of important value index

The highest important value index (IVI) is onion 44.86%, this indicates that plants spread and dominate in the area of observation, while the lowest IVI is tomatoes with a value of 6.68%. Meanwhile, other types IVIs ranged from 16.89 to 43.29% . IVI prevalent in many types can be used as an indicator of increasing biodiversity in an ecosystem. The importance value index of the onion is higher than other types because of this type is quite dominating and spread evenly with a large amount on all plots causing high density value that is equal to 80 625 individuals / ha, while the pine has the lowest density that is equal to 2500 individuals / ha.

Analysis On Core Plant

This study was conducted over three replications.Under observation for 3 replicates, the diameter and height growth experienced continuous growth. (Figure 2)

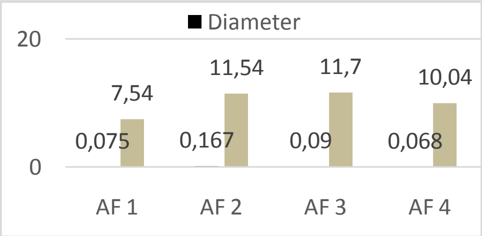

Figure 2:Core Plant Growth Charts.

In figure 2,the highest growth of the growth in diameter and height is shown in AF 2 is with pine agroforestry patterns - ginger, corn, tomatoes, peppers and broccoli. This is because the agricultural crop commoditiesis more varied, soit is more varied and fertilizer than other patterns. Fertilizer application varied implications for the addition of a large nutrient inputs to the plant nucleus and lead to growth rising core plant to be optimal. Factors of soil fertility under the stand can cause the growth of plants of different cores.

Farmers' income

Production cost

The two kinds of production costs incurred by the farmer, namely a fixed cost and variable costs.

Fixed cost

The means of transport and equipmentsneeded such as hoes with an average price of Rp. 45,000.00, sickle with price Rp 35.000,00 and Rp 50.000,00 cost of the truck so that the average fixed costs incurred farmer is Rp 130,000.00 In any farm management by one period.

Variable Cost

a. Seeds

Farmers plant corn with a land area of 0.17 ha in need of seeds mean ± 201kg. Price per kg to Rp 3500.00, bringing the total price of seed needed for maize farming is Rp 201,000.00.Chili seeds required are 374 with an average area of 0.17 ha land management, where the price of the seed amount of Rp1,500.00 so the total cost required for the chilliseed is Rp 561,000.00.Ginger seeds required are 300, where the price of the seed amount of Rp 2,500.00 so the total cost required for the ginger seed is Rp750,000.00. Onion seeds required are 297 with an average area of 0.17 ha land management, where the price of the seed amount of Rp 20,000.00 so the total cost required for the onion seed is Rp 5,940,000.00.Tomato seeds required are 750 with an average area of 0.17 ha land management, where the price of the seed amount of Rp750.00 so the total cost required for the tomato seed is Rp 562,500.00.Brocolli seeds required are 151 with an average area of 0.17 ha land management, where the price of the seed amount of Rp 1500.00 so the total cost required for the brocolli seed is Rp226,500.00.

b. Fertilizers

Farmers get from the cattle themselves. As for NPK fertilizers average farmer buy it in agricultural stores. Farmers buy NPK fertilizer purchase in stores at an average price, which amounted to Rp 11,417.00 with the average needs in the area of 0.17 ha is 255 kilos in farming so the total cost incurred with fertilizers to farmers in all types of plants is Rp. 2.990,929,00.

1. Cost Drugs

In this study, the farmers provide a cure for all plants with an average of 44 kg. Farmers buy in stores of different drugs at different prices, the average price obtained farmers in this study, ie at a price of Rp 18,000.00 thus the total cost of treatment incurred farmers isRp 792,000.00.

2. Labor

Costs incurred by farmers in farm management in this study is Rp 30,000.00 / person. Average in-progress of the farmers in this study requires four people in its management. So farmers spend Rp 120,000.00.or cultivating in each period.

d.Transportation

In this study, the farmers used truck with average prices in each planting to production is Rp 50,000.00.On average, farmers plant five types of agricultural commodities, so the total cost of farmers is Rp 250,000.00.

Total Cost of Production

Total production costs are all costs incurred in the production process until the resulting product, ie the amount of fixed costs (fixed cost) and variable costs (variable cost) Sukirno (2006). In corn crop, every farmer average production cost of Rp 791,909.00. Chilli plants, production cost is Rp 1,319,146.00. Ginger plant, total production cost is Rp 1,481,628.00. Onion crop total production cost of Rp 6,458,669.00. Agricultural crops of tomatoes total cost is Rp. 7,250,578.00. At broccoli,the total production cost is Rp 1,443,688.00 in one production period with an average land area of 0.17 ha.

Farmer Income In Agroforestry Systems

Income is one indicator to measure the welfare of a person or required in a business. without capital, bussinesse certainly can not be done (Hanafie 2010). (Figure 3)

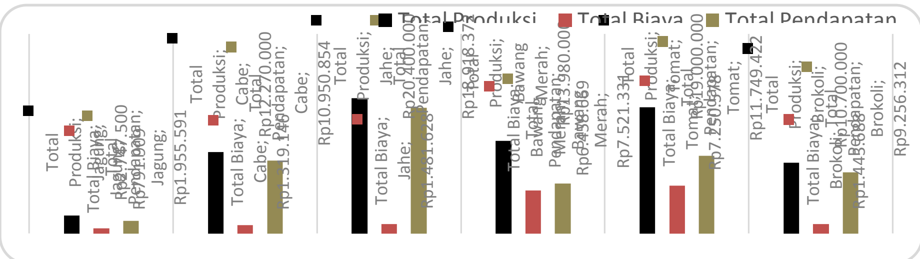

Figure 3: Graph Average Production and Total Revenue

In corn farming, farmers' net income reached Rp 1,955,591.00. At chilli plants, farmers can earn net income Rp. 10,950,854.00. In Ginger plant, farmers can reach Rp 18,918,372.00. In Onion crop, farmer earned income of Rp 7,521,331.00. While in tomato farming, farmers' net income reached Rp. 11,749,422.00 and whereas in the farming broccoli farmers received an average net returns of Rp 9,256,312.00.

Relationship of Land's share with Total Production and Income

Great Value (R) between variable land area (X2) and income (Y) that is equal to 0.594 and the explanation of magnitude relationship variable percentage of land to income called the coefficient of determination is the result of the measurement of R. The coefficient of determination (R2) of 0.352, which implies that the influence of independent variables (land area) on the dependent variable (income) amounted to 35.2%, so it can be concluded the influence of production variables (X1) on revenue (Y) of 19.5%, and the influence of land area (X2) on revenue (Y) = 15.7% (35.2% - 19.5%).

Production of the t value is 3.452 with probability = 0.002 <, 0500 means that there is a significant effect. For variable land value t = -2.654 with probability = 0.013 <0.050, which means there is a significant effect.

Efficiency Revenue Diversification Agroforestry

Economically farming can be profitable, when the costs incurred by farmers in the process is small,whereas the revenue earned great. (figure 4)

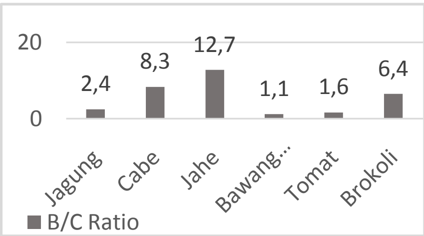

Figure 4; Graph B / C Ratio

Based on Figure 4 graph B / C ratio of the sixth type of crop farming through agroforestry systems are highly efficient and profitable. Known of the six types of the most profitable crop in this study were housed in plot 225 C KRPH Oro-oro Ombo BKPH Pujon KPH Malang East Java Unit II Ragional applied in agroforestry system is a ginger plant.

Improved food security

Rated R which is a symbol of the value of the correlation coefficient. The correlation value is 0885, the value can be interpreted that the relationship between the two variables in this study is considered strong. KD value in this study is 0.748 which can be interpreted that the independent variables have an impact for 74% of the dependent variable. Sig value obtained was 0.025> significance criteria (0.050), thus the regression model based on research data are significant, it means that the model meets the linearity of the linear regression equation.

Discussion

Food security can be realized by means of its own production or import. The realization of food security system will be reflected in the availability of adequate food and reasonable prices by purchasing power, as well as their diversification both in terms of production and in terms of consumption. Therefore, the development in the field of food directed at food self-sufficiency, which is not oriented only rice but also other types of other strategic commodities such as staple food crops (Suhardi et. Al., 2002; Aaron, 2012).

Farming which is done in agroforestry systems with intercropping patterns make farmers more profitable. Based on the efficiency of space and time, farmers do not wait too long to continue planting other types of commodities, finally harvesting is sustainable. In this case Sitompul (2002) explains that the crops that are cultivated among the array of staple crops require a supply of sufficient sunlight available. Seasonal crops will not be fully operational when full shade by tree. Therefore, with a spacing of pine by 4 x 4 m is expected to provide growing space that is effective for under growth plant (agricultural) so as to increase crop productivity and increase farmers' income, with the pattern of this planting, farming in agroforestry systems as diversification can be generated in the same time. More than one crop produced in the same time vulnerable to a production efficiency.

Application of a cropping system that do provide benefits both to the main crop (forestry) and seasonal crops (agriculture). Intercropping patterns that combine types of annuals with fertilizer varying implications for the addition of a large nutrient inputs to the main plant and resulted in rising staple crop growth to be optimal. Factors of soil fertility under the stand can cause the growth of plants of different core. The distance between the Pine note 4 x 4 m that could potentially grow large enough space for staple crops that can affect the growth of core plant diameter greater. According Hairiah (2002) positive interaction between the core crop with agricultural crops resulting in increased production of all components of the existing plant in the intercropping pattern.

The results obtained of farming production reached an average of 1.018 kg in one period of the harvest with good enough quality. From the results of the production, number of farmers selling an average of 926 kg, and farmers provide food supplies for the food security of 150 kg. The income of farmers in one production reached a profit of 5.5 times the cost incurred.

Correlation of income (diversification) on food security demonstrate the value of 0,885, the value can be interpreted that there is a strong relationship. Rated R Square or the coefficient of determination indicates the value 0,748, it can be interpreted that the income of farmers has a 74% influence on the food security of farmers.

CONCLUSSION

Based on the results of research and discussion can be concluded, namely:

1. The system agroforestry intercropping pattern making farmers more profitable. Based on reviewing the efficiency of space and time.

2. The system of agroforestry as a diversification which done have an impact on farmers income which is become higher, with farm receipts of 5.5 times the cost of production. Based on simple regression analysis, revenue from diversification in farming has a significant relationship and linear because of the significant value at Anova 0,025 <0,050. This means that with farming in agroforestry programs, it can improve food security.

Suggestion

The need for improving land use to the maximum so that food security remains true.

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Natural Honey Quality in Tabukan Barito Kuala and Development Potentials

Rosidah Radam[1)], Arfa Agustina Rezekiah[1,2)], Eva Prihatiningtyas[1)], Anna Marya Makalew[3)]

[1)]Faculty of Forestry, Lambung Mangkurat University, Banjarbaru Indonesia
[2)]Center of Excellence Research Consortium for Sustainable Tropical Forest Management, Banjarbaru Indonesia
[3)]Faculty of Agriculture, Lambung Mangkurat University, Banjarbaru Indonesia

Email: rosidahkehutanan@gmail.com

ABSTRACT

Honey have a various colour, smell, and taste, depending on the dominant plants in their surroundings. Honey May consumed as Food agent and traditional cure, containing nectar or exudate-sugar from the plants collected by honeybees that benefit for traditional Cure in Community. Honey utility dependent on its Product purity. This Research is aimed to observe the quality of Common honey that collected from Tabukan Residence, so that we can give suggestion for further development. Honey quality Test is occupied in Laboratory of Research and Industrial Standardization Board Banjarbaru South Kalimantan. Honey quality Test Parameters are: Water content, Ash level, insoluble solid, reductor sugar, and sucrose Sugar content. The result shows that natural honey in Tabukan regency containing Water content 17%, Ash level 0,26%, insoluble solid 1,41%, reductor Sugar 65,63%, and sucrose Sugar content 3,82%. Comparing with the SNI 01-3545-2004 honey quality standards, the honey in this Research have a very good quality, because it fulfilled all Test parameter requirements. Thus, insoluble solid gains 1,41% which is higher from the 0,5% maximum SNI standard. So we can suggest that Natural Honey in Tabukan Regency May be developed by stump system.

Keywords: quality, natural honey, development

Improving Economic Value of South Borneo Fruits Through the Processing of Chips Fruit

Yuniarti[1,2], Henni Aryati[1], Lusita Wardhani[1]

[1]Faculty of Forestry Lambung Mangkurat University,Banjarbaru Indonesia
[2]Center of Excellence Research Consortium for Sustainable Tropical Forests Management, Banjarbaru Indonesia

E-mail: yuyun_aep@yahoo.com

ABSTRACT

South Borneo is rich in non-timber forest products, one of which is the fruit. These fruits have a delicious and unique taste and grows only in South Borneo, such as kasturi, cempedak (Borneo jackfruit), kuini, pineapple, and various other typical fruits. When the fruit harvest time arrived, the fruits are very abundant but the price is very cheap. The fruits are usually sold as fresh fruit without further processing as do the villagers Lok Tunggul, located in Pengaron District. The aim of service activities is improving the skills of fruit farmers to produce typical South Borneo fruits chips. The methods used are counceling, discussion, production training and monitoring. The results of service activities carried out went smoothly as expected although there are some constraints. Counseling and training on processing of a variety of South Borneo fruits chips have received a positive response from fruit farmers. Partners gain the knowledge and skills to produce some new products that can increase the shelf life of fresh fruits, increasing the economic value, and processing of fruits chips is likely to be developed as a home industry.

***Keywords*:** fruit chips, economic value, South Borneo fruits

INTRODUCTION

One of the central fruit production in South Kalimantan is in the Lok Tunggul village in Pengaron district, Banjar Regency. When the fruits season came by, the endemic fruits in South Kalimantan, such as kasturi, rambutan, cempedak, durian, nangka, kuini, hambawang, langsat, Binjai and others. In addition to their own consumption, typical fruits are sold in the form of fresh fruit without further processing. The economic value of typical fruits can actually be enhanced by making the fruits to become fruit chips. The price of fruit chips is about Rp. 40,000 -Rp. 100,000 / kg. The process of making fruit chips does not require expensive and complicated technology. Processing of these products could be developed home industry product.

Farmers Group of Tani Mekar Sari dan Tunas Harapan are the partners of IbM activities. Members of the group are selling fruit, agricultural and other gardens such as palm sugar, rice, rubber, spices etc for family income . Fruit crops are usually sold to middlemen "*tengkulak*" who came to Lok Tunggul Village, or sold in nearby markets withoutany further processing. If the fruits are not sold out, the fruit is partially decomposed and farmers suffered losses. Required solutions are necessary to process the fruits for longer shelf-life and has a higher economic value.

MATERIALS AND METHODS

This study is conducted for eight months from April - November 2016 in the Lok Tunggul village Pengaron district, Banjar Regency, South Kalimantan .

The methods are

Counseling and discussion

Providing information about the importance of fresh fruits diversification process into various fruit chips to develop and advance the communities of Lok Tunggul Pengaron, especially for the members of Tani Mekar Sari and Tunas Harapan. These should include counseling about business management so that businesses can run smoothly and advanced.

Production training

Provide production training of the making various fruit crisps with typical fruits of South Kalimantan.

Assistance

Provide mentoring during the production training up to 2 months after the training ended in order to provide an opportunity for partners to obtain guidance and monitoring so that the partners can diversify variety of products,which is fresh fruit fruit crisp, that was made from typical fruits of South Kalimantan. Training and mentoring about the packaging products should be unique and can attract the buyers.

Monitoring and evaluation

Monitoring and evaluation, from the beginning, middle and end of the program.

RESULTS AND DISCUSSION

Preparation

Preparation of implementation soon to be done after the signing of the contract in *Le mbaga Pengabdian masyarakat Unlam*. The activities are included the first meetings that was attended by all of members of dedication team in order to establish the work plan, implementation strategy, identification and inventory of materials and equipment, and also establish a division of labor among the implementation team.

The preparation is also needed, according to the coordination towards the headman of Lok Tunggul Pengaron Village and its partner. Determine time and place for counseling and training. The date that was chosen was on 23-25 August 2016 in one of villager's home.

Counseling

The counceling went smoothly as expected. The participants were very enthusiast to follow the counseling and the participants that were attended is exceeded the target (not just attended by the core). In counseling sessions the participants were given the motivation to actively participate in improving the welfare of the community, especially the welfare of his family. This was revealed because the participants wanted to improve the economy by utilizing the nature that grows around their house such as musk, jackfruit, banana, jackfruit, rambutan, etc. Members of the group both can do positive activities such as processing a variety of fresh fruit into chips Fruit chips have a distinctive taste and could improve the economic value of the fruit.

Beside the motivation about good and right entrepreneurship, they were also given counseling on marketing strategy and business management. Marketing strategy can be done by creating a unique and attractive packaging, news by word of mouth, brochures, sell the product via souvenir shop and via online through social media such as facebook, instagram, blog or through onlineshop account such as Tokopedia, trade , bukalapak, etc .. Management business is also very important to do so that the participants can manage their business well.

In the discussion session, the participants actively providing various questions about motivation, entrepreneurship, business management and processing of palm juice. Almost 65% of the participants actively asking a various questions, such as how to prepare raw materials, using the equipments, tips for success to eliminatie the fear of starting a business, preservatives that can be used, expiry date of products, promotion, marketing strategy, etc. They were really enthusiastic and interested in starting a business.

Training

The training activities ran so well. Participants played an active role in preparing some materials and equipments that are needed. Participants can controlled almost 70% of a given skill. Devotion Team consisted of faculty staff and students that were very happy to give an example, direction and guidance in this training session.

Fruit chips is packaged and directly consumed by all participants. Participants admitted that the chips tasted so unique, because the flavor taste is really original, just without adding any sweeteners or preservatives, so good for health. This is an entrepreneurial opportunity , because it increased the shelf life of fruit, improved the price of fresh fruit, and still there are no similar products on the market and to be marketed in a souvenir shop in Pengaron, Martapura and surrounding areas.

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Figure 1. Counseling and Training of Processing the fruit chips

Assistance

Assistance should be done with partners in order to have the motivation and high support in processing a variety of diversified products from palm trees and rambutan. The price of fruit chips that is sold by the partner is about Rp. 15,000 per 250 g or Rp.60.000 per kg. The chips will be sold widely on the fruit season.

Monitoring and Evaluation

This event was held in LPPM Unlam and in the community (partners). The products have the potential to be developed and should always be fostered. Hard work and tenacity are high in developing a business. Attractive product packaging and promotion should be intensively conducted. These businesses provide broad benefits for both fruit farmers in the village of Lok Tunggul especially for partners IbM activities Typical South Kalimantan Fruit Chips. Partners should continue to be supported and nurtured, especially in terms of business management and marketing for the business expansion of fruit chips typical of South Kalimantan has done growing and bring prosperity to the farmer's group in the village of Lok stumps. Partners also hope the cooperation would continue so that the potential that exists in the village of Lok stumps can be explored optimally.

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Figure 2.South Kalimantan's fruit chips

CONCLUSIONS

Conclusion

Implementation of this program, include preparation, counseling and training went smoothly and worked well. This can be seen from the parameter level of attendance, which is almost 100%, active participants in questioning is about 65%, practicing the training is about 70%, so there is an increased knowledge and skills in processing fresh fruit into fruit chips.

Typical fruit chips can increase the shelf life of fruit, increase the economic value, give various souvenirs of Pengaron and processing of the product could be developed as a home industry product.

Suggestions

Small business development in the village of Lok stumps Pengaron need to be encouraged in order to improve the welfare of the family can be reached. The obstacles that they face must be addressed and resolved by the government agencies.

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The Population Structure of Vegetation on Rawa Kalang Hakurung Village

Dharmono, Maulana Khalid Riefani and Mahrudin

Biology education of Teacher Training and Education Faculty
Lambung Mangkurat UniversityH. Hasan Basry Kayutangi, Banjarmasin,
South Kalimantan Indonesia

E-mail : dharmonoputra@yahoo.com

ABSTRACT

The maximum rate of population show develop plant in environment. The state of natural environment never stays for a certain time. The aim of research to describe the population structure of the vegetation on Kalang swamp. Type of research is the population structure description. The study was conducted in the area of Rawa Kalang, Hakurung village North Daha Hulu Sungai Selatan in March to June 2016. The samples were all plants on a total area of 10 Ha were taken randomly and the total specific plot. Calculations include seedling, sapling, pole and tree. Natural plant trees found (Ampalam, Kasturi, Jingah, Randu, Bungur, Pinang, Mengkudu, and Alaban). Eights plant found in Hakurung North Daha Hulu Sungai Selatan all have disrupted the structure of the population.

Keywords: population structure, swamp, rawa kalang, plant, hulu sungai selatan

INTRODUCTION

The population formulated as collection of individuals organisms somewhere having traits similar, have the same origin, and nothing hinders individual its members to connect with each other and develop offspring freely because it is a collection of individual heterosexual. While Odum (1993) said the population is a collective organime-organisme of the same species occupying space or a particular place. Having many the unique traits and has organization and structure that should be presented. Size of a population in a specific areas usually expressed in a name density of populations. Population density can be expressed in biomass per a broad, or can also expressed in biomass per a broad if the population. Formed by individuals varying size, is sprouts, is feed and plants and herbs of old age. In the course of the time a population will be changed, in studying change this sense speed plays an important role, and change this population is very much determined by several factors (birth or regeneration; death; imigration; and emigration).

The size of plants in the natural world population is very much determined by carrying capacity, namely the most number of individuals who may be accommodated in a ecosystem where of a microorganism it to be alive.In a state of competition amongst this species is in maximum savings that can be borne by the of a microorganism. The population structure of herbs constituting step population of herbs that were on a place. The structure of the population Study is very important to determine what is the status of or state of a pupulasi in a habitats, which is critical, threatened and safe. So that efforts can be done action against the population so not become rare or extinct.

Research on the structure of the population in the South Kalimantan had done especially for some kind of plants. A number of studies of the structure of the population has been done. Wati (2010) of the structure of the population of sungkai (*peronema canescens* jack.) in the village Balangan Aranio Banjar District. Syamsuddinnor (2015) of the structure of the population of *erythrina rista-galli* L. in tourism waterfall Bajuin Tanah Laut District. Based on those two research had the structure different population.

Hakurung is one of the villages in the sub-district Hulu Sungai Selatan South Kalimantan that is largely the area was streams and swamps and ordinary called as a lake kalang because there are many kalang or cage buffalo swamp. Herbs living in the area is plants able to live on condition habitat saturated water. The purpose of this research is to find the structure of the population of region of kalang village North Hakurung daha Hulu Sungai Selatan.

MATERIALS AND METHODS

The kind of research used is research description. The data was undertaken by using cruiser technique for the total of 1000 meters x 1000 feet or 10 ha in region of kalang village North Hakurung Daha Hulu Sungai Selatan. The data calculated is the number of seedling, sapling, poles, and trees. The structure of the population density of analyzed based on plants analyzed using formulas of odum (1993) as follows.

$$\text{Density} = \frac{\text{The total number of individuals}}{\text{area (ha)}}$$

The structure of the population of data can be presented in the form of a pyramid age. Categori scarcity based on International Union for The Conservation of Nature and Natural Resources / IUCN (2014), it is critical that if in 1 km^2 found less than 25 individual adults and if less than 5 individual mature called crunch. Based on the concept modified as follows.

> 25 Adult individual / Km^2 : Uncritical

5-25 Adult individual / Km^2 : Critical

< 5 Adult individual / Km^2 : Crucial

RESULT AND DISCUSSION

According to the research in region of hakurung about plants natural or not planted berhabitus trees found 8 sorts of crops with the density of as on a Table 1 the following.

Table 1. Population Density of Northern Hakurung Daha Hulu Sungai Selatan

No	Species	Local Name	Density (Individual / km^2)			
			Trees	Poles	Seedling	Sapling
1	*Mangifera indica*	Ampalam	88	106	6	113
2	*Mangifera casturi.*	Kasturi	31	44	31	69
3	*Gluta renghas*	Jingah	13	44	25	6
4	*Ceiba pentandra*	Randu	25	6	6	25
5	*Lagerstroemia speciosa*	Bungur	25	6	31	6
6	*Areca catechu*	Pinang	19	0	0	6
7	*Morinda citrifolia*	Mengkudu	19	6	6	0
8	*Vitex pubescens*	Alaban	25	6	0	0

Table 1 seen , that structure population of any kind of plants have a difference. Five types of plant having the number of sapling lower than phase upon it is *Areca catechu, Morinda citrifolia, Gluta renghas, Lagerstroemia speciosa*, and *Vitex pubescens. Morinda citrifolia*, and *Vitex pubescens* not having a phase sapling. Plant having phase sapling higher than the bushes phase is *Mangifera indica, Mangifera casturi,* and *Ceiba pentandra*.

Referring to Table 1, then form of structure population according to Odum (1993) eight different types of plants in the region of Northern Hakurung Daha Hulu Sungai Selatan having the form of the population as presented in table 2 the following.

Table 2. Structure population of region of Northern Hakurung Daha Hulu Sungai Selatan

No	**Species**	Structure Population Shape*****
1	*Mangifera indica*	Pyramid the wide disturbed
2	*Mangifera casturi.*	Pyramid the wide disturbed
3	*Gluta renghas*	Pyramid reversed disturbed
4	*Ceiba pentandra*	Pyramid the wide disturbed
5	*Lagerstroemia speciosa*	Pyramid pitcher disturbed
6	*Areca catechu*	Pyramid pitcher disturbed
7	*Morinda citrifolia*	Pyramid reversed disturbed
8	*Vitex pubescens*	Pyramid reversed disturbed

* Naming explanation by researchers

Table 2 shows that of eight plants found in region of Northern Hakurung Daha Hulu Sungai Selatan all structured population disturbed. *Mangifera indica, Mangifera castur, Ceiba pentandra* have a structured population by Pyramid the wide disturbed. *Gluta renghas, Areca catechu, Lagerstroemia speciosa* have a structured population by Pyramid pitcher disturbed. *Vitex pubescens, Ceiba pentandra Morinda citrifolia, Vitex pubescens,* dan *Morinda citrifolia* have a structured population by Pyramid reversed disturbed.

Referring to iucn (2014) of data research on Table 1, so the scarcity 8 sorts of crops are as on a Table 3 the following.

Table 3. The Scarcity of Region of Northern Hakurung Daha Hulu Sungai Selatan.

No	**Species**	**Density (Individual / km^2)**	**The Scarcity**
1	*Mangifera indica*	88	Unritical
2	*Mangifera casturi.*	31	Unritical
3	*Gluta renghas*	13	Critical
4	*Ceiba pentandra*	25	Critical
5	*Lagerstroemia speciosa*	25	Critical
6	*Areca catechu*	19	Critical

7	*Morinda citrifolia*	19	Critical
8	*Vitex pubescens*	25	Critical

From the Table 3 above , it is evident that six that plants are A*reca catechu, Morinda citrifolia, Gluta renghas, Vitex pubescens, Morinda citrifolia,* and *Vitex pubescens,* in status critical. While 2 plant species, namely *Mangifera indica*, *Mangifera casturi* remain in status uncritical. According to the interviews that have been done on 10 respondents consists of 5 the male and 5 of the female, shows that the swamp Hakurung know the origin of herbs naturally. They usually take up plants only the mature hew.Most of community does not replanting.

The structure of the population is region of Northern Hakurung having a triple form, namely M*angifera indica, Mangifera casturi, Ceiba pentandra* with the structure of the population pyramid wide disturbed. *Gluta renghas, Areca catechu, Lagerstroemia speciosa* with the structure population pyramid pitcher disturbed troubled. *Vitex pubescens, Ceiba pentandra, Morinda citrifolia, Vitex pubescens,* and *Morinda citrifolia* with the structure population pyramid reversed disturbed.

According to odum (1993) pyramid with natural width of having a number of individuals young more of the old. According to Hardjosuwarno (1990) mention simply structure age a population are simply as population developed quite, characterized by a number of individuals young very large proportion called also population. Odum (1993) pyramid with natural width of having a number of individuals young more of the old. Selajutnya according to Riyanto dkk (1995) said individual young more of the old , then natalias larger than mortalitas. Based on the concept of above, then plants *Mangifera indica, Mangifera casturi,Ceiba pentandra* developing characterized by the comparison of young individual be greater than old individuals, but in the normal. So that the term researchers give the structure of the population pyramid wide base disturbed.

Meanwhile *Gluta renghas, Areca catechu, Lagerstroemia speciosa* with the structure population pyramid pitcher disturbed troubled. It is alleged the percentage of young age group in plants *Gluta renghas* lower than herbs *Areca catechu*. The difference this is what causes of pyramidal form of plants *Gluta renghas* and plants *Areca catechu* is different. The number of seedling found many, but seedling which grow to be sapling , the and the table shows the calculation their numbers are declining, one of the causes because of death, many seedling the dead it is probably caused happened competition between seedling, due to lack of land to scramble find a riot gear and water for growth , so that the not able to endure will die and that were able to survive will live and developing.

The number of a larger than sapling as shown by table 1. According to Odum (1993) structure population of appropriate for survival of plants is the number of the smaller than sapling. While ihal was allegedly caused by the slow growth in the pole to phase trees according to Odum (1993) structure population of appropriate for survival of plants is the number of the smaller than sapling. Consequently phase sapling which grow to be collected phase pole with the initial phase slow grow into the trees. The impact is a phase pole having a larger number of phase sapling. Suspected it is a cause of *Vitex pubescens, Ceiba pentandra, Morinda citrifolia, Vitex pubescens,* and *Morinda citrifolia* with the structure population pyramid reversed. Provides term population basic structure pyramid wide disturbed.

The structure of the population changing according to time, one factor causing the changes are human activity (Surasana & Taufikurrahman, 1994). According to the interviews, usually people hew of the old and the to take its be firework and building materials for example to board and fruit forest area usually not all harvested to consumed and sold so many dropped grew seedling. According to the interviews according to local residents, the sum of eight plants are now was less than years earlier, but residents not worry population will be reduced the plant. Trees are affected by by the community to be taken its, but the absence of an effort to planting back, this is what caused the reduced population plants in the area.

CONCLUSION

Based on Table 2 looks that 6 that plants are *Areca catechu, Morinda citrifolia, Gluta renghas, Vitex pubescens, Morinda citrifolia,* and *Vitex pubescens,* in critical status .While type plant 2, namely *Mangifera indica, Mangifera casturi* still be in the status of not critical. The population in conjunction with units, density can show the existence of a plant or sustainability. Therefore the population in that region of Northern Hakurung continued decline, we need any formal by residents to preserve the plants by means of planting.

Acknowledgment

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Improving the Management of Bitter Honey Production in Loksado South Kalimantan

Trisnu Satriadi[1,2], Yudi Firmanul Arifin[1,2], Siti Hamidah[1,2]

[1)]*Faculty of Forestry Lambung Mangkurat University,Banjarbaru Indonesia*
[2)]*Center of Excellence Research Consortium for Sustainable Tropical Forests Management, Banjarbaru Indonesia*

Email: trisnu.satriadi@unlam.ac.id

ABSTRACT

This article focuses on how to know the problems of bitter honey production managed by local people in mountain forest area of Loksado, South Kalimantan, and its improvement prospect. Problem and prospect identification was carried out by interviewing respondents selected based on snowballing method and analyzed descriptively. Managing bitter honey by local people had 5 problems and 4 prospects. The problems found were peronema flower as beeforage is not available every season, The lack of people's knowledge about management and harvesting method, the low consumption rate of local people at bitter honey due to its bitter taste, unhigienis and unattractive packaging, and insufficien funding.The prospects to improve bitter honey are high demand, high benefit on healhty and economic factors,there are many beeforage substituting sungkai such as swietenia and tristania, the availibity of communication access

Keywords: bitter honey, loksado, problems, prospect

Feasibility Study Agroindustry Cajuput Oil "Burung Kenawai" Upt. Kphl Tarakan

Mohammad Wahyu Agang[1)] Fendi Asrian[2)]

[1)] *Faculty of Agriculture, Borneo Tarakan University, Tarakan Indonesia*
[2] *UPT. Kesatuan Pengelolaan Hutan Lindung (KPHL) Kota Tarakan Indonesia*

E-mail : fendi.asrian@yahoo.com

ABSTRACT

Cajuput Oil is a non-timber forest products, which can be exploited in a sustainable manner without damaging the forest ecosystem. Eucalyptus plants have a huge potential in the field of agro-industry with many eucalyptus forests spread in Indonesia, namely 651.768.9 hectares (97% natural forest outside Java) with an estimated potential of cajuput oil per year to 11 million liters, but this potential can not be done with the maximum. Under UU 41/1999, Article 26 and PP 6/2007, Article 28 of the UPT.KPHL Tarakan managing the utilization in protected forest zones with communities around the forest with the management of eucalyptus, while this study aims to analyze the feasibility of the financial aspects of business cajuput oil and analyze the feasibility based on aspects of non finasial is market aspects, technical aspects, management aspects, legal and social aspects of the business environment cajuput oil by UPT. KPHL Tarakan descriptively. The study was conducted in January-October 2016. Year Results showed that cajuput oil processing is financially viable with a NPV of Rp947.786.096 and B / C ratio of 4.00, from a sensitivity analysis with a reduction of 10% and 15% of business this remains viable. Based on the results of the feasibility analysis of non-financial businesses cajuput oil is also eligible to run.

***Keywords*:** Agroindustry; Feasibility; Financial

The Influence of Organic Additives on Low Cost Flat Membrane Support Fabrication From Clay

Muthia Elma[1)], Yulian Firmana Arifin[2)], Nurhakim[3)], Agus Triantoro[3)], Isna Syauqiah[1)],
Nor Aldina[1)], Hesti Kesumadewi[1)]

[1] *Lambung Mangkurat University, Faculty of Engineering, Chemical Engineering Study Program, Jl. A. Yani KM 36 Banjarbaru, South Kalimantan Indonesia*
[2] *Lambung Mangkurat University, Faculty of Engineering, Civil Engineering Study Program Jl. A. Yani KM 36 Banjarbaru, South Kalimantan Indonesia*
[3] *Lambung Mangkurat University, Faculty of Engineering, Mining Engineering Study Program ,Jl. A. Yani KM 36 Banjarbaru, South Kalimantan Indonesia*

E-mail : *melma@unlam.ac.id*

ABSTRACT

Clay is a cheap material consist of high silica and alumina. These materials are very famous in waste and water treatment especially in separation process employing porous ceramic membranes. This work aims to investigate the influence of organic additives to the pore properties during the fabrication of low cost flat membrane support using extrusion process using clay as raw material. Various compositions of organic additives were prepared and mixed together with various particle sizes of dried clay (60, 80, 100 & 200 mesh) to form paste of mixtures through several steps (dry mixture, wet mixture and paste formation). They were then dried at 60^oC and calcined at 900^oC for 4 hours. The results of surface properties of the bulk flat membrane show the various proportions of macro porosity (average pore size distribution is between 8-12.9 nm). Furthermore, XRF analysis shows the high content of 70% SiO_2 and 19% Al_2O_3 which is very suitable used as a low cost ceramic membrane support applied for water desalination.

Keywords: clay, organic additives, flat membrane support, porous ceramic

INTRODUCTION

Lately, inorganic material is one of the favorite material in many applications especially in separation technology such as inorganic membranes [R.R. Bhave, 1991 ; L. Zhang, *et. al.* 2009], distillation [Alkhudhiri, 2012], absorption-desorption [G. Ortega-Zarzosa *et. al.* 2002 ; A. Tsetsekou *et. al.*], desalination [Burn *et. al.* , 2015 ; J. Cotruvo *et. al.* , 2010] and extraction [M. Fourie *et. al.* , 2016 ; A. Tamayo Tenorio *et. al.* , 2017]. In membrane technology, itself, research and development of porous ceramic support has grown rapidly, however, there is still competitive values and qualities needed for manufacturing due to expensive cost in manufacturing and materials. Several major important factors in fabricating porous ceramic support, i.e., surface quality, pore size distribution, defect free, total porosity, the thickness, selectivity, mechanical strength and performance stability [S. Abate *et. al.* 2009 ; H. Yang *et. al.* , 2017].

On the other hand, the fabrication of ceramic support from natural material (clay from peatland) is rarely investigated and reported. This material is cheap and easily to find in peatland areas. To minimize the cost of membrane fabrication, the using of a cheap membrane from natural inorganic material (clay) is the best way to applicate especially for the industry who has limited in budget. In developing countries, clay is generally used for building construction, handicraft, etc. Few literatures reported of fabricating membranes support from clay [S. Sarkar *et. al., 2012*].

Extrusion method is a conventional method and low cost to fabricate ceramic porous membrane support.

MATERIALS AND METHODS

Material

Clay was taken from peatland areas in South Kalimantan, Indonesia. Clay as raw material was cleaned, dried and sieved in 60-200 mesh in particle sizes.

This raw material was then mixed organic with organic additives i.e., CMC (Carboxy-methyl cellulose) as a binder, methocel as plasticizer, starch as absorbent, aquadest and lastly PEG 400. The ratio of all these organic additives can be seen in Table 1.

Extrusion Process

Dry clay that has a uniform particle sizes (60-200 mesh) were mixed with organic additives with the composition as seen in Table 1 were mixed to form plastic mass (Fig.1). Then, the process is continued by extruding the mixture into membrane press at pressures 60 kg/cm^2, see Fig. 2. extruded mixtures were dried at low temperatures (60^{o}C) for 15 minutes. It then calcined at 900^{o}C for 4 hours.

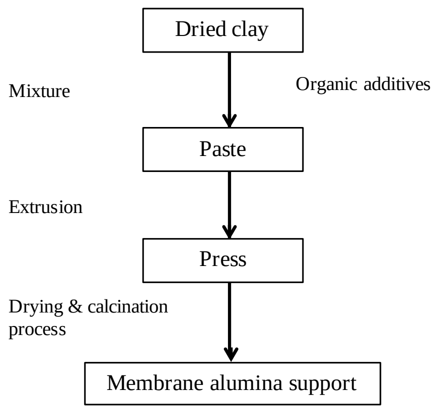

Figure 1. Extrusion process

Fabrication of flat membrane support

When organic additives and all mixtures are mixed homogeneously, the paste is formed and ready to press using membrane press (Fig. 2). The paste is placed in the press plate and covered while pressing simultaneously until forming a membrane plate (the thickness and pressure can be varied).

Figure 2. Membrane press

Composition ratio of clay and organic additives can be seen in Table 1, as follow:

Tabel 1. Composition ratio of mixtures.

No.	Sample Code	Particle Size (mesh)	Clay mass (%)	Pressure (kg/cm^{-2})	Organic Additives				
					PEG 400 (%)	Starch (%)	CMC (%)	*Methocel* (%)	H_2O (%)
1.	A 8	60	49.7	60	0.2	0.1	4	4	42
2.	B 7	80	39.7	60	0.3	2.0	4	4	50
3.	B 8	80	49.7	60	0.2	0.1	4	4	42
4.	B 9	80	57.0	60	0.0	0.0	4	4	35
5.	C 7	100	39.7	60	0.3	2.0	4	4	50
6.	C 8	100	49.7	60	0.2	0.1	4	4	42
7.	D 12	200	57.0	60	0.0	0.0	4	4	35

CMC (carbon methyl cellulose) or methocel content supposed to be constant to to optimise the plasticity of mixture and the others were varied in composition, such as the mass of dried clay, PEG 400, starch and H_2O. This is done applied in order to form homogeneous paste during extrusion process.

RESULTS AND DISCUSSION

Figure 3 shows plate membrane support that has been extruded. Figure 3 (a) shows the plate membrane after pressing and still wet. To avoid curling during drying process, this wet plate membrane support were dried at room temperature for sometimes and then continued by placing in the oven at 60^{o}C for 15 hours. Figure 3 (b) shows the plae membrane support that has been calcined at 900^{o}C for 4 hours. It is clearly seen that the diameter of plate becomes smaller and reduced when compared to plate before calcination (Fig. 3 (a)). It is due to the shrinkage process during calcination and clay will shrink more than 15% [19] when calcined at high temperatures.

(a) (b)

Figure 3. Plate membrane support (a) after being pressed and before calcination (b) after calcined at 900^{o}C for 4 hours

Clay Characterization

XRF Analysis

Table 2 shows the XRF (X-ray fluorescence) analysis to determine the elemental composition of dried clay. It is shows that the highest content of clay is SiO_2 (70.4%) and Al_2O_3 (18.7%). These contents are favorable as raw material to fabricate robust membrane support.

Table 2. XRF analysis of dried clay (200 mesh)

No.	Chemical Composition	Percentage (%)
1.	SiO_2	70.403
2.	Al_2O_3	18.744
3.	Fe_2O_3	6.843
4.	K_2O	1.872
5.	P_2O_5	0.980
6.	Ti	0.840
7.	CaO	0.187

Influence of Organic Additives

Plasticity is one of characteristic of clay. This character is can be continuously secured when pressure applied. In addition, clay has also wide surface areas, stable and robust in high temperature [W.E. Worral *et. al.* , 1968].

Spectrum obtained from a Fourier Transform Infrared spectrophotometer (FTIR) in Fig. 4 show the functional moieties of clay minerals. Stretching of silica and alumina is clearly shown in several wavelengths, such as, 1022, 2018, 3714 cm^{-1}. The stretching region below 1200 cm^{-1} would intense Si-O absorption and –OH bending [M.T. Alresheedi et. al, 2014 ; S. Vercauteren *et. al.* , 1996]. The other –OH bending also form Si-O-Si bonds (1280 cm^{-1}) where this bonds is very important to know the functionalization of silica and silica matrix formation in membrane support. A strong symmetric stretching vibration can be seen at wavelength 3710 cm-1 especially for sample B_7 and D_{12}.

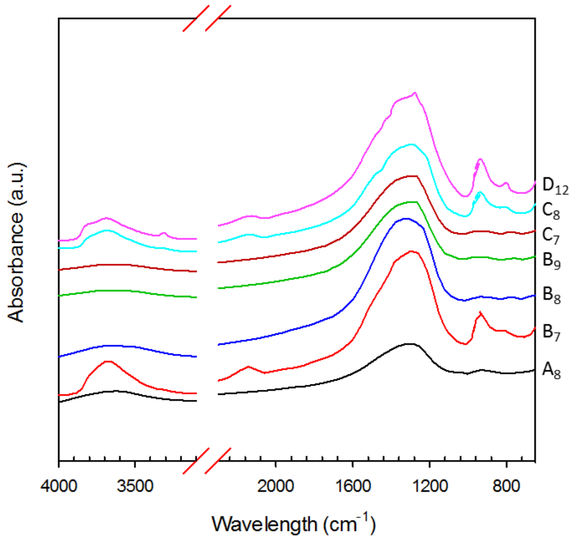

Figure 4. FTIR spectra of bulk calcined clay membrane support

Membrane Support Characterization

Characterization of clay as membrane support

The surface and pore properties of plate membrane support were analyzed by N_2-sorption technique which notify the qualitative information of plate membrane support. From Figure 4 shows the N_2 sorption isotherms of calcined plate membrane support whereas Table 3 shows the surface properties of BET surface areas, total pore volumes and average pore diameters of plate membrane support.

Table 3. Surface properties of membrane support

Sample Code	BET surface area (m^{-2} g^{-1})	Total pore volume (cm^3 g^{-1})	Average pore diameter (nm)
A_8	21.095	0.090	8.5
C_7	12.453	0.081	12.9
D_{12}	10.386	0.064	12.3

Pore diameter of sample D_{12} is lower than sample C_7 (12.3 instead of 12.9 nm, as seen in Table 3). It is due to there was no addition of starch of sample D_{12} functioned as porosity agent. On the other hand, the N_2 isotherm graph between C_7 and D12 was similar type, however, the volume absorbed of sample C_7 is higher 10% compare to sample D_{12}. However, BET surface area for A_8 is much wider compare to sample C_7 and $D_{12,}$ in contrast, the pore diameter is smallest between these two samples due to smallest H_2O content in the mixtures.

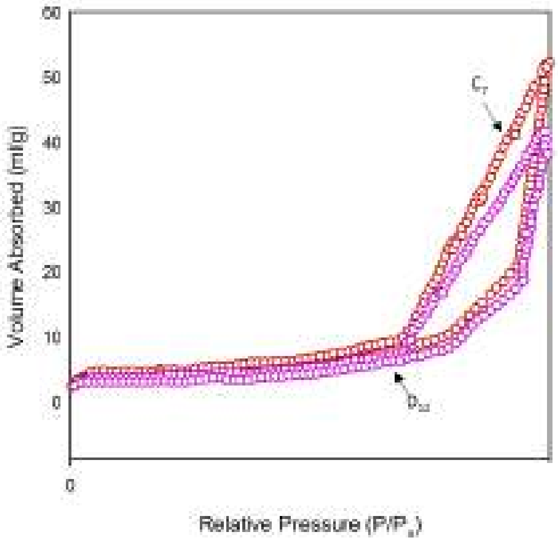

Figure 5. Plot of N2-sorption isotherms of calcined clay membrane support

Morphology of membrane support

Figure 6 shows representative SEM images of top surface of clay membrane support. The surface morphology of membrane support fabricated from clay clearly shows that the surface of macro-porous of clay mixtures as membrane support is rough. However, the mixtures between clay and organic additives appear to be homogenous and plastic.

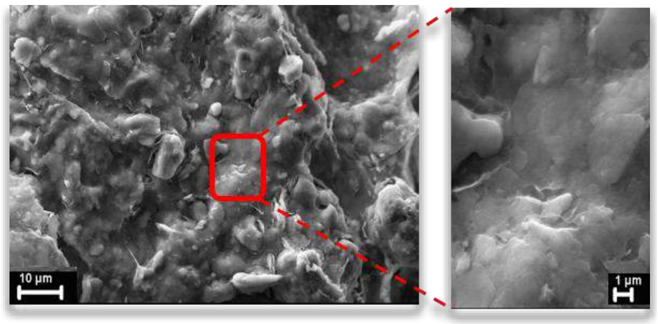

Figure 6. SEM images of top surface of clay membrane support showing the plasticity between mixtures and organic additives

CONCLUSIONS

A new low cost plate membrane support was successfully fabricated using extrusion process sintered at 900^{o}C. The structural properties of plate clay membrane support were macroporous (12-13 nm pore size diameter) which is aimed by as a membrane support applied for desalination.

The result obtained shows the membrane support from peatland clay is a vaporable material to fabricate low cost membrane support.

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What is Pirdot (*Saurauia bracteosa* Dc.)?
(Challenges and Opportunities of Pirdot Development in South Kalimantan)

Sudin Panjaitan[1,2]**Tri Wira Yuwati**[1,2]

[1)]*Researcher at Banjarbaru Environment and Forestry Research and Development Institute (HP. 082155665656), Banjarbaru Indonesia*
[2)]*Center of Excellence Research Consortium for Sustainable Forests Management, Banjarbaru Indonesia*

E-mail : sudinlala@gmail.com

ABSTRACT

Pirdot (*Saurauia bracteosa*) is one of Non Timber Forest Product (NTFP) with many usages especially in the medical world due to its high content of antioxidant. However, it is not yet known up to present. The aim of the paper is to promote Pirdot; its utilization, challenges and opportunities of its development in South Kalimantan. Data collection was carried out through interviews with related stakeholders and desk studies.

Keywords**:** Challenges, opportunities, pirdot development, Kalimantan

INTRODUCTION

Indonesian tropical forest produced timber as the main product and also Non Timber Forest Product (NTFP) with high economy value. Research result showed that currentl forests only produced 10% of timber and 90% others that includes in the NTFP. Considering the huge amount of NTFP from forest, it is necessary to manage and utilize NTFP for increasing local welfare.

According to Ministry of Forestry decree No. 35/ 2007 on NTFP, it was defined as non timber forest product including plants and animals. Indonesia’s forest owns mega-biodiversity especially flora: timber and non timber. The species includes in the NTFP are eagle woods (gaharu), honey, rattan, incense, gemor bark, swift’s nests, bamboo nilam, jelutung/pantung, gulinggang, jungrahab/ujung atap and pirdot (*Saurauia bracteosa* DC.).

Pirdot is a name of a wild plant growing adjacent to water flow and or humid soil. Pirdot is a tree with vulnerable breaking branches. The leaf is wide and has two tones: green at the top surface and brownish at bottom surface. Pirdot has a small edible fruits. The ripe fruit is slimy with small seeds. Pirdot is also called “***buah ingus***” (“**mommon**”) due to its slimy-like flesh. In Girsang, North Tapanuli, North Sumatera it is called “*Garuan*”. Pirdot plant is a wild and multipurpose NTFP; it can cure various diseases. Pirdot has become a herbal cure for diabetes, lowering cholesterol especially the leaves and fruits and liver diseases (Yoganarasimhan, *et al*., 1982; Mun’im, *et al*., 2008; Kadji, *et al*., 2013; Situmorang, *et al*., 2013; Maukar, *et al*., 2013; Muaja, *et al*., 2013), in Ali, C. (2015).

The information regarding the potential of Pirdot, its characteristics including distribution, habitat and its silvicultural techniques are needed in order to develop this plant. The silvicultural techniques are including the techniques of fruit collection, seed selection, seedling production in the nursery, land preparation, planting techniques, tending, harvesting techniques and post harvest handling. The aim of this paper is to provide the benefit, characteristics, challenges and opportunities of Pirdot in South Kalimantan.

Botanical Characteristics Of Pirdot

Pirdot (*Saurauia bracteosa* DC.) is a plant which fruits are edible and the leaves are benefit to fight diabetes. Pirdot is a tree with height 15 -30 m, a vulnerable branches and wide leaf. It grows adjacent to rivers and or moist/humid soil. The fruit is including in the single type, fleshy and round shape with the diameter of $\pm$ 13 mm, dark green when young, yellowish and slimy when ripe.

According to Schmidt (2000), Pirdot fruit is simple, flesh and having a lort of seeds. Squirrels are fond of the fruits. Pirdot (*Saurauia bracteosa* DC.) is one of pioneer species and as an alternative species to rehab degraded land especially with higher altitude. The Pirdot species generally grows in moist condition with altitude of 00-2.100 m dpl (Van Steenis, 2010).

According to Ali, C., (2014) *in* Ali, C., (2015), Pirdot grows in open area and associated with ferns (*Gleichenia linearis*), alang-alang (*Imperata cylindrica*), kirinyu (*Chromolaena odorata*, and sanduduk (*Melastoma malabathricum*) with altitude of $\pm$ 1.450 m dpl.

The Distribution Of Pirdot

Based on data and information through interviews with local people, Pirdot was found adjacent to the rivers in Kawasan Hutan Dengan Tujuan Khusus (KHDTK) Kintap in Desa Riam Adungan, Kintap sub district, Tanah Laut district, South Kalimantan. However, people in South Kalimantan is not familiar with Pirdot and its benefit. Pirodt is abundant in North Sumatera especially in Simalungun district, Humbang Hasundutan district and South Tapanuli (Ali,C., 2015).

Challenges And Opportunities For Pirdot

The information on Pirdot needs to be studied especially in South Kalimantan including identification, potential, characteristics, distribution, phyto-chemical tests, toxicity tests, anti-oxidant test, pre clinical test and chemical physical and mechanical tests for the timber. In order to preserve the existence of the species, silvicultural techniques needs to be understood such as fruit collection techniques, seedling production, land preparation, planting, tending, harvesting technique and post harvest handling.

CONCLUSION

1. Pirdot is a Non Timber Forest Product that herbally can be consume to fight diabetes, lowering cholesterol, and liver.
2. Phytochemical Test, Toxicity Test, Chemical and Physical Characteristics on the timber and silvicultural techniques needs to be carried out to develop Pirdot
3. The information of Pirdot as herbal medicine shall be distributed to the best benefit of local people surrounding Pirdot habitat

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The Potential of Jernang Rattan (*Daemonorops draco)* Development in South Kalimantan

Sudin Panjaitan[1,2)]

[1)]*Researcher at Banjarbaru Environment and Forestry Research and Development Institute (HP. 082155665656), Banjarbaru Indonesia*
[2)]*Center of Excellence Research Consortium for Sustainable Forests Management, Banjarbaru Indonesia*

E-mail :sudinlala@gmail.com

ABSTRACT

Jernang rattan is a species of rattan with high economic value and exported to many countries due to its multiple usage as material for colouring, drugs, antidot, lipstick material, blood coagulant agent. In the international market, jernang latex is called ”Dragon blood”. Due to its high price, the presence of jernang rattan is threatened. Desk study and interviews with relevant stakeholders are the methods of data collection. The silviculture of Jernang rattan starting from fruit collection, seedling production, land preparation, planting techniques, tending techniques, harvesting techniques and after harvesting activities shall be determined to increase its productivity and maintain its sustainability.

***Key words* :** Rattan, jernang, Silviculture, South Kalimantan

Sub-Acute Erythrocytes Toxicity Evaluation of the Aqueous Extract of Leaves of Gemor (*Nothaphoebe coriacea*)

Iskandar Thalib[1)], Purwanto Budi Santosa[2,4)], Eko Suhartono[3,4)]

[1)]*Research Unit of Mutiara Bunda Mother and Child Hospital, Martapura,Jl. Taisir No. 2, Martapura, South Kalimantan Indonesia.*
[2)]*Banjarbaru Environment and Forestry Research Development Institute, Research Development adn Innovation Agency,Minsitry of Environment and Forestry, BanjarbaruJl A. Yani Km. 28.7 Banjarbaru, South Kalimantan Indonesia*
[3]*Department of Medical Chemistry/Biochemistry, Faculty of Medicine, Lambung Mangkurat UniversityJl. A. Yani Km. 36,5, Banjarbaru, South Kalimantan Indonesia*
[4)]*Center of Excellence Research Consortium for Sustainable Tropical Forests Management, Banjarbaru Indonesia*

E-mail : *iskandarthalib@gmail.com ;Pur-balitaman@yahoo.com ; ekoantioxidant@gmail.com*

ABSTRACT

Gemor (N. Coriacea) is one of Non Timber Forest Products (NTFPs) plant species found tropical peatland of Central Kalimantan. It is well known that some parts of these plants like the leaves extract have several medical benefits and contain some phytochemical constituents. However, until now in vivo toxicity tests have not been done. Thus, our study aim to evaluate the sub-acute toxicity effect of aqueous N. Coriacea leaves extract to erythrocytes. The sub-acute toxicity was conducted using male Rattus novergicus rats. In this study, the experimental animals received five different doses of aqueous N. Coriacea leaves extract (0.1 mg, 1 mg, 10 mg, 100 mg, and 1000 mg per day) for 4 weeks via oral route. After treatment, the level of haemoglobin (Hb) and erythrocytes were measured. The results revealed that the administration of aqueous extract of leaves of N. Coriacea not statisctically change the Hb and erythrocyte levels, except at a dose of 1000 mg. It seems at a higher dose the extract could increase the levels of both Hb and erythrocytes cell count. These results demonstrate that, while a short term oral intake of N. Coriacea leaves extract caused no toxicity to erythrocytes up to a dose of 1000 mg.

Keywords : Eythrocytes, Gemor, *N. Coriacea*, Toxicity

INTRODUCTION

Species of the Lauraceae (Laurel Family) are one of the major ecological and economic resources in Southeast Asia as they comprise a major part of almost any forest in the region [RPJ. De Kok, 2015]. Furthermore, in Kalimantan Island, Indonesia, there is a species of the Lauraceae that naturally found and has been exploited since 1970’s for several industries. The species known locally as gemor (*N. coriacea*) [Adinugroho WC, 2011].

N. coriacea is one type of trees that has a high economical value in the world market trading. This is caused by the high demand against the bark gemor both for local and international community such as Taiwan, Singapore, and Japan [PB. Santosa, 2015]. The bark of *N. coriacea* used as the main raw material for mosquito repellent manufacture, incense for rituals and raw materials for glue [PB. Santosa, 2016].

N. coriacea also known has several medical benefits. According to the previous study, the bark of gemor known have viral activity for influenza and herpes virus [Arifin et al., 2015] studies also showed that the different parts of gemor (twig, bark, and leaves) have anti-inflammation activity. It is also reported that the bark, twig, and leaves gemor contain a phytochemical components, such as alkaloid, steroid, flavonoid, saponin, triterpenoid, tannins, and phenolic compounds [PB. Santosa, 2013].

Suhartono et al., [E. Suhartono*et. al.*, 2015] shows that the aqueous extract of bark and leaves of gemor showed significant activity to inhibit the glucose metabolism alteration by Cd in liver homogenate by using in vitro models. Also, in another study, Suhartono et al., reported that t the administration of aqueous extract of leaves of gemor can improve the oxidative stress status in the brain of rats [E. Suhartono*et. al.*, 2015].

However, while voluminous pharmacological studies have been conducted to ascertain the subjective traditional uses of various medicinal plants, including *N. Coriacea*, very few data have been thoroughly evaluated for their detrimental effect. Reports of efficacy are, by far, more numerous than those on toxicity. There is, therefore, a need to further the investigation of herbal remedies and phytochemicals to incorporate the observations toxicity manifestations and to ensure effectual open communication of such findings. Thus, in this present study we investigated the sub-acute erythrocytes toxicity evaluation of the aqueous extract of leaves of *N. coriacea*.

MATERIALS AND METHODS

2.1. Sample Collection and Preparation

The leaves was collected from their natural habitats, mainly in the Forestry Research Area Tumbang Nusa, Central Kalimantan, Indonesia. The exat location where samples was collected according to Global Positioning System (GPS) is 3027’-30 59’ S, 1130 2’ 36”-1140 44’ 00” E. *N. coriacea* leaves was collected on August 2015. A bulk sample of *N. coriacea* leaves was collected from sapling and poles. The collected leaves was air-dried in darkness at room temperature. Then, the dried samples were made into coarse powder using a commercial blender.

The applied method for the extract preparation was decoction-extracting by boiling plant material. 100 g of the shade-dried of each seeds and leaves were boiled for 30 min in 1000 ml of distilled water. Then, the mixtures were allowed to cool at room temperature and filtered through Whatman no. 5 paper. The resulting solutions then used for the experimental protocol section [E. Suhartono*et. al.*, 2015].

2.2. Experimental Animals

Male albino rats (*Rattus novergicus*), weighing 200–250 g with 2-3 months old, were obtained from the Abadi Jaya farm at Yogyakarta, Indonesia in healthy condition. The rats were acclimatized to standard laboratory conditions for at least 2 weeks before treatment. Animals were fed standard rat diet ad libitum and were allowed free access to water. An approval was obtained from the Animal Ethics Committee, Faculty of Medicine, Lambung Mangkurat University, South Kalimantan, Indonesia. The institutional animal ethical guidelines were strictly observed.

2.3. Experimental Design

The experimental animals were divided into five groups of 3 rats each (1 control group and 4 treatment groups). Each group were placed in separate cages. The treatments groups were treated daily with four doses of *N. coriacea* leaves extract (1, 10, 100 and 1000 mg/kg b.w.) for 4 weeks. All treatments were administered via oral gavage.

2.4. Haemoglobin and Red Blood Cell Counts Analysis

On the last day in the 4th week, the animals were fasted overnight and blood samples collected via cardiac puncture. Hematological analysis of the blood samples was performed using an automatic hematology analyzer. The parameters which were evaluated included: red blood cells (RBC) count; hemoglobin (Hb) [I. Bello*et. al.*, 2016].

2.5. Statistical Analysis

Results were expressed as the mean±S.E.M. Statistical analysis was performed using version 16 of the SPSS statistical program. One-way ANOVA test was used for parametric comparisons between the control and the treatment groups. Differences were considered significant when the p value was less than 0.05 ($p < 0.05$).

Results & Discussion

Considering the several therapeutic potentials of *N. coriacea* as an alternative medicine effective for a wide range of diseases, as reported in a number of scientific papers, it is only pertinent that a safety profile of the plant extract be established as a guide for the management of its applications and usage in herbal preparations. This should serve to prevent exposing human subject to potential toxicity-related health risks while using *N. coriacea*. Toxicity studies in appropriate animal models are commonly used to assess potential health risks in humans. Such toxicity studies assess the hazard and determine the risk level by addressing the probability of exposure to that particular hazard at certain doses or concentrations [I. Bello*et. al.*, 2016].

In the present study, we tested the potential toxicity of sub-acute exposure of *N. coriacea* leaves extract to Hb level and RBC count. The results shows in figure 1 and 2, respectively.

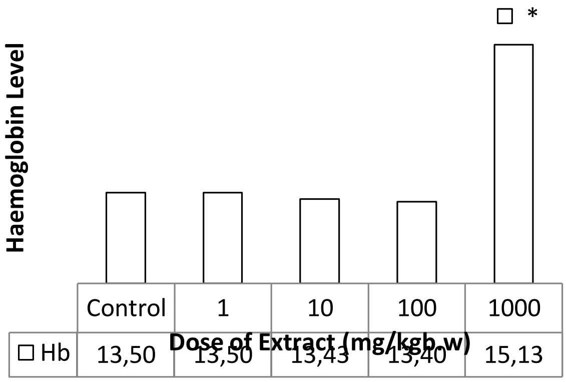

Figure 1: Hb level between group of treatments. Values expressed as mean±SEM from three replicates. * considered significant differences ($p<0.05$) compared to control by using one-way ANOVA.

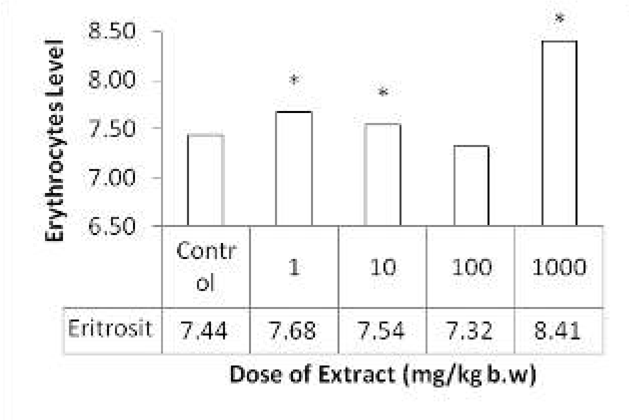

Figure 2: RBC count between group of treatments. Values expressed as mean±SEM from three replicates. * considered significant differences ($p<0.05$) compared to control by using one-way ANOVA.

Analysis of Hb and RBC in animal toxicity studies is important to report alterations in those parameters and evaluate the relative risk to the hematopoietic system especially to erythrocytes. Significant differences in the levels of Hb count was observed only in 100 mg/kg b.w group of *N. coriacea* leaves extract exposure compared with the controls. RBC count levels were increase in the all groups of treated rats, but they were not significantly altered in the group which received the doses of 100 mg/kg b.w.

The results of this present study indicated that the extract interfered with the normal production of Hb but in a bigger concentration. Nevertheless, the values were within the normal ranges of these parameters, which ruled out the possibility of precipitated abnormalities. In addition, the normal value of Hb level is between 11.1-18 g/dl [DA. Widyastuti, 2013]. However, in this present study, the Hb level is betwen 13,40-15,13 g/dl. In this point of view, we can say that the different concentrations of leaves extract of *N. coriacea* does not affect the Hb level.

The result of this present study also show that the exctract affect the RBC count, except at dose of 100 mg/kg b.w. The leave extract could increase the RBC count. However, the values also within the normal range. For best of our knowledge, the normal value of RBC count is between $7.2x10^6$ - $9.6x10^6$ [Y. Fahrimal, Eliawardani*et. al.*, 2014], and the RBC count result in this study is between $7.32x10^6$ – $8.41x10^6$. Also, we can say that the leaves extract of *N. coriacea* is safe and does not affect the RBC count.

CONCLUSION

This study validated the toxic effects of *N. coriacea* leaves extract at the doses of 1, 10, 100 and 1000 mg/kg b.w with sub-acute use. The toxic effects does not comprised changes in the Hb level and RBC count. In other words, we can say that the leaves extract at those concentrations and with sub-acute exposure is safe and does not affect the erythrocytes. Therefore, caution and safety measures should be taken before oral ingestion of *N.coriacea* for therapeutic purposes or for other uses; and prolonged use should be discouraged and lower doses encouraged.

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The Role of Green Tea Bioactive on Tnf-Inducedgrp78endothelial Cell

Oski Illiandri

Department of Anatomy, School of Medicine, University of Lambung Mangkurat Banjarmasin Indonesia

E-mail : oilliandri@unlam.ac.id

ABSTRACT

The endoplasmic reticulum (ER) is an important cell organelles in the protein production chain as the first place for a series of post-translational peptide to obtain a functional form. In certain circumstances, if there is demand for protein (protein demand) increases, the cells work will be more active so that the capacity of chaperone (protein folding) ER for protein folding will lead to increased stress response called the endoplasmic reticulum (ERS). Endothelial cell dysfunction allegedly also triggered by the presence of this ERS. Among the biological markers of the occurrence of ERS is GRP78. Epigallocatechin Gallic (EGCG) is an important bioactive substance which is responsible for the protective function of endothelial cells contained in the tea. It is interest to investigate wether EGCG can decrease the expression of Objective. This study to answer whether EGCG can decrease ERS triggered by inflammatory reactions mediated by TNFα. Method. This study is an exploratory study laboratory in vitro using cell culture Human Umbilical Vein Endothelial Cells (HUVEC) immunostaining GRP78 with the design of post test only control group consisting of three treatment groups with doses of EGCG 1 nM / L, 2 nM / L, and 3 nM / L. Results. Administation TNFα in cultured endothelial cells HUVEC for 2 hours at giving EGCG group had significantly decrease GRP78 at a dose 3 nM / L ($p < 0.05$), and not in dose 1 nM / L and 2 nM / L. Conclusion. Based on the results that has been done, it can be concluded that EGCG can reduce levels of GRP78 in cultured HUVEC cells which were exposed to proinflamatory cytokine TNF-α

Keywords: endoplasmic reticulum stress, endothelial cells, inflammatory, EGCG

INTRODUCTION

For a last decade, researcher has been agreed that endothelial cell (EC) is the strong gate of cardiovascular health. EC become a popular study in cardiovascular research for it was considered as most largest body organ covered the whole internal surface of the blood vessel. Good quality of the blood vessel wall is determined by the quality of endothelial cell. Metabolic perturbance in endothelial cells will lead its dysfunction called endothelial dysfunction (ED). Chronic inflamation is one of the cause of ED and it has many manifestation. Among of its molecular pathway is involvement of the endoplasmic reticulum (ER) organelles disturbance which is called the endoplasmic reticulum stress (ERS) [Wu, S., et al., 2015]. Besides its role in homeostasis regulation in intracellular calcium ion concentration, in the process of apoptosis, sterol biosynthesis and the release of arachidonic acid, ER has a main role in maturation of protein synthesis. Maturation of protein folding and post-translational modifications are placed in its lumen before secreted into the extracellular matrix, membrane structure, membrane lysosom and Golgi apparatus [Sitia, R. and I. Braakman, 2003][Berridge, M.J, 2008]. In the process of protein synthesis, ER responsible for the folding process of proteins produced by the of attached ribosomes in outer layer of ER. ER lumen very sensitive in protein formation changes that disrupt its functionality.. After going through the process of cotranslasional translocation, nascent protein enter the ER lumen which is rich in oxidative environment. Nascent protein begin to folded in its hidrogen and sulfidal bond to get a more stable conformation and low energy. Protein folding in the ER lumen is unique compared to other cellular compartments. In luminal ER, support system of covalent folding machine is more complex consisting of dumping signal sequence, disulfide bond formation, N group glycosylation and glikosilfosfatidilinositol(GPI) group addition. [Berridge, M.J, 2008]. High protein demand and low capacity of ER lead to accumulation of a unfolded protein that is not folded properly lead to RE inability to overcome the high protein demand known as ER stress and elicit a response in the form of the unfolded protein response (UPR) [Li, J., et al., 2008 ; Lindenmeyer, M.T., et al., 2008]. As a result, the nascent protein produced by ribosomes will flood the ER lumen. Homeostatic mechanism increased ER capacity by increasing the amount of protein folding chaperones glucose related protein, GRP78. If this mechanism is uncompensated, then the unfolded protein accumulates in the ER. ER chaperon GRP78 protein bound to the transmembrane proteins were then released from the ER membrane and activate UPR cascade [Xu, C.*et. al.*, 2005]. There are three transmembran proteinact as UPR molecular sensor IRE1, PERK dan ATF6. These protein will release from ER membrane when luminal GRP78 release from the other side of transmembran protein.

Tea (Camellia sinensis) is a popular plant people brewed used to drink from China since 5000 years ago and has long been used by nations, especially nations in Asia as a tonic drink [Wang, H.*et. al., 2003*]. In the 17th century this plant began to spread to Europe and began tradition of tea time. From a traditional tonic drinks, tea began to study its potential in various fields, especially cardiovascular health. Several studies have reported that there are bioactive compounds in tea may have a positive influence in improving the quality of blood vessels [Ou, H.-C., et al., 2010]. Bioactive substance in tea plant that is explored its potencyis epigallopectin catechin gallic (EGCG). EGCG is believed to have a relationship in relation to the low incidence of atherosclerotic disease in populations that [Orozco-Sevilla, V., et al., 2013]. Fresh tea leaves are rich in polyphenolic compounds such as catechins, theaflavins, and thearubigin. There are large report that polyphenols in tea leaves have a good influence on health. Regular tea consumption has a positive correlation to a reduced risk of cardiovascular disease morbidity and mortality [Stensvold, I., et al., 1992]. This good effect is presumably because the content of monomeric flavanol-rich tea called catechins. Several kinds of catechins contained in tea plant is Gallocatechin (GC), catechin (C), Catechingallate (CG), Gallocathecin gallate (GCG), epigallocatechin-3-gallate (EGCG); Epigallocatecin (EGC); Epicatechin (EC); and Epicatechin gallate (ECG) where most EGCG is a polyphenol obtained on tea plant [Wang, H.*et. al., 2003* ;Frei, B. and J.V. Higdon, 2003].

Many studies have revealed the role of EGCG in preventing the occurrence of endoplasmic reticulum stress. However, no study has conduct to understand how this mechanism occurs in the endoplasmic reticulum stress in the endothelium. Therefore this study is conduct to answer whether the mechanism of EGCG vascular protection occurs through the endoplasmic reticulum stress or not.

MATERIALS AND METHODS

Culture HUVEC

Samples were taken from the umbilical cord of newborns baby that have undergone cesarean section in Melati Husada Hospital Umbilical vein were obtained from umbilical cords of patients, after obtaining informed consent. This research was approved by the institutional research ethical committee from the Faculty of Medicine, Brawijaya University, Malang. The cord then cut in aseptic 20 cm length and then soaked in a solution cord in sealed bottles. The cord sterilized with 70% ethanol. Each tip of the cord cutted transversely to exposed its arteries and vein. Vein will be seen to have thicker walls, larger and elastic. A cannule inserted at one tip of the vein (± 1 cm), then tied tightly with string. Vena cleaned with 10 ml PBS with a 20 cc syringe through this cannula. Once it is clean, tie the other end of the umbilicus with strong ties or clamped. Collagenase solution then injected into its vein lumen. umbilicus warmed by way cuddled with both hands or brought closer to the litle flame in order to reach a temperature of 37 ° C for 7 min. Collagenase which already contains endothelial cells then removed from the umbilicus through a syringe which was mounted on the tip of the cannula. Then the collagenase solution is placed in a sterile 15 cc centrifuge tubes. Umbilicus rinsed once or twice with 8 cc PBS solution to flush e endothelial cells remaining and added to centrifuge tubes containing a solution before. Solution which were already contains the endothelial cells were centrifuged at 1000 rpm for 8 minutes. The supernatant was discarded, then added 4 cc of the culture medium into pellet and resuspended in a way so that endothelial cells separate. The solution then transferred into a 0.2% gelatin coate 24 well plate then put in a 5% CO_2 incubator at 37 ° C for 20 minutes. Culture plate take and observed with inverted microscope magnification of 400x if the cell is attached to the base well. Cell culture rinsed with 3cc serum free medium and filtrate. Serum free medium then taken with a sterile syringe and replaced with culture medium 4 cc through a 0.2 mL filter. Culture plate put in an incubator until the monolayer (cobblestone form) approximately 3-4 days and the medium was replaced every 2 days. HUVECs in a 24-well plate then exposed with TNF-α 5ng/L and EGCG at muliple dose after achieving optimal conditions. HUVECs were fixed with methanol in glass slides, then rinsed with phosphate buffer solution (PBS). Normal human serum as blocking agent (1:10 dilution) (MPBio, USA) was applied and incubated for 30 minutes at 37°C. Rabbit anti-human GRP78 antibody (1:100) (Worthington, USA) was applied and the specimens were incubated overnight at 4°C. Labelled anti rabbit IgG-SA-HRP (KPL, USA) was applied for 60 minutes, then substrate-chromogensolution3,3′-diaminobenzidine was added,and the specimens were incubated for 10 minutes. Hematoxylin counterstaining was performed to stain the nucleus. The slides were then covered with cover slips.

Statistical Analysis

Data was analyzed by one-way ANOVA and the difference between groups was analyzed by post hoc LSD comparison test. Data are expressed as mean±standard error of the mean (SEM). p-Values less than 0.05 were considered statistically significant.

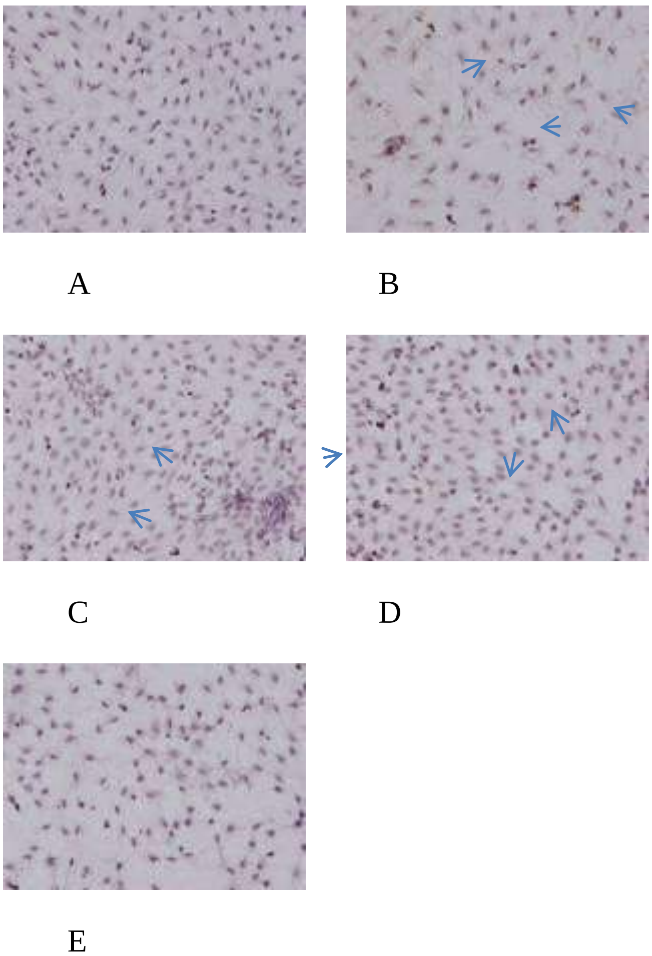

Figure 1. GRP78 immunocytochemistry of endothelial cells TNFα-free control grup (A) and TNFα positive control (B). In EGCG treat at dose 1 nM/L (C), TNFα+ EGCG 2 nM/L (D)

and TNFα+ EGCG 3 nM/L (E). Brown stain in cytoplasmic arrow shows GRP78 expressed cells (magnificication 400X)

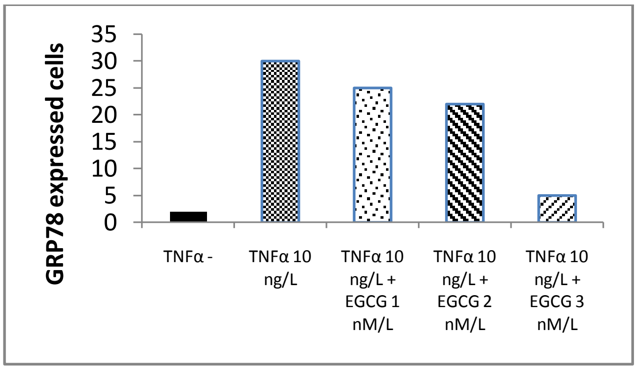

Figure 2. Graphic chart shows GRP78 expressed cells

RESULTS AND DISCUSSION

TNFα in cultured endothelial cells HUVEC for 2 h at EGCG administration group are significantly incrase at 3 nM / L and and 2 nM / L from the control group were given TNFα. This result quite consistent with our hypotheses that EGCG can decrease GRP78 expression. EGCG known have its ability as antioxidative properties as it has phenolic group.GRP78 is the biomarker of endoplasmic reticulum stress and it is induced by high oxidative stress. TNF-α exposure to endothelial cell will lead endothelial cell increase NOX. Inhibition oxidative stress by EGCG might have decrease its oxidattive stress in endoplasmic reticulum.

CONCLUSION

Basefrom the research that has been done, it can be concluded that administration of EGCG can reduce levels of GRP78 in cultured TNF-α exposed HUVEC cells and not obtained a similar result at a dose of 1 nM / L and 2 nM / L. More research is needed to answer the question whether EGCG can reduce the expression of markers of endoplasmic reticulum stress else like ATF6, Perk, IRE1. Therefore, further research is needed to elucidate the effect of EGCG in reducing other markers of endoplasmic reticulum stress such as ATF6, IRE1 in different dose or in different interval.

Aknowledgment

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The Phytochemical Contents of Local Peat Swamp Forest Species in Central Kalimantan

Reni Setyo Wahyuningtyas [1,2)]

[1)]Researcher at Banjarbaru Environment and Forestry Research and Development Institute Banjarbaru Indonesia
[2)]Center of Excellence Research Consortium for Sustainable Forests Management, Banjarbaru Indonesia

Email : reni_forest@yahoo.com

ABSTRACT

In the last decade, the medicinal world was exploring many natural plants with observed their secondary metabolites for medicine purposes. No exception from native species at peat swamp forest (PSF). This aim of this study is to determine some phytochemical content of some native trees from PSF in Tumbang Nusa, Central Kalimantan. Some parts of tree such us: leaves, roots, barks and saps was extracted to identified their secondary metabolite contained. The object of this study are six commercial species at PSF forest i.e gerunggang (Cratoxylum arborescens Bl. Famili Guttiferae), punak (Tetrameristra glabra Miq. Famili Theaceae.), merapat (Combretocarpus rotundatus Miq. Famili Anisphyllaceae), terentang (Campnosperma auriculata (Blume) Hook.f Famili Anacardiaceae) dan jelutung rawa (Dyera popyphylla Miq. Famili Apocynaceae). Sample was analysed by qualitative method to identified phytochemical six compound: alkaloid, flavonoid, steroid, triterpenoid, tannin and saponin. Laboratory analysis indicated that leaves, bark, roots and saps of gerunggang positive contained with six phytochemical compounds above as well as a bark part of punak, merapat, terentang and jelutung trees. A bark of tanah-tanah positive contained with 5 phytochemical compound but negative with triterpenoid. These result usefull for further research especially for identification some chemical compound that can be isolated for medicine

Keywords : phytochemical, peat swam forest

Population Structure of Mahar Plant (*Kleinhovia hospita* L.) in the Forest Batu Tangga Village Batang Alai Timur Sub-Districts Hulu Sungai Tengah Regency

Ema Lestari

State Polytechnic of Tanah Laut, Department of Agriculture Industrial Technology,
Jl. Ahmad Yani, KM 06 Panggung Village, Tanah Laut, South Kalimantan Indonesia

E-mail : emalestari@politala.ac.id

ABSTRACT

South Kalimantan has enormous biodiversity, one of them is the Mahar Plant (Kleinhovia hospita L.). Mahar Plant have benefits that the leaves can be use to prevent the growth of gray hair (white hair) and can also be used as a cure nosebleeds, wood as a knife handle or a so-called "Kumpang parang" in the local language. Studies of population structure in a bid to find out the status of the populations of plants and as a baseline study in conservation efforts. The purpose of this study to determine the structure populations of Mahar plant In The Forest Batu Tangga Village Sungai Alai Sub-Districts Hulu Sungai Tengah Regency. The method used is the method of systematic description by using the technique of transects in an area of 5000m x 150m. The structure of Mahar plants observed number of seedling, sapling, pole and tree. Analysis of the data to calculate the structure of the population using the formula of Odum (1993). The results showed that the structure populations of Mahar plant in forests Batu Tangga village Hulu Sungai Tengah showed high percentages in the younger age groups with a population pyramid structure forms the basis of the width of the status of not rare (128,900 individuals / 1 km2).

Keywords: Population Structure, Mahar Plant, Forestry

INTRODUCTION

South Kalimantan has is very large biodiversity, it can be seen from the diversity of trees. South Kalimantan has a variety of plant species were quite diverse in nature. That richness of biodiversity is a very important source of food and high economic value, as well as a source of germplasm that are valuable to science. However, according Rohliansyah, present vegetation is increasingly scarce, due to forest exploitation on a large scale without convening preservation[Rohliansyah, 2001]. To determine how the status or the state of a population in a habitat can be done through the study population, especially the study of population structure. This is extremely important in efforts to determine the status of the populations of plants and as a baseline study in conservation efforts.

The population is a collective group of organisms of the same species that occupies space and has characteristics that belong to the group [Indriyanto, 2010]. Odum explains that the population is a collective group of organisms of the same species that occupy space or certain places[Odum, Eugene P, 2004]. The properties of the population are density, birthrate, mortality, the spread of age, biotic potential, dispersion and shape of growth and development.

According Riyanto, a population will grow fast when the largest part of the population consists of young individuals[Riyanto*et. al.*, 1985]. a stable population has aged equitable and spread of a shrinking population consisted lot of older individuals. Following that according to Odum (1993) population can be through changes in the age structure without changing the size.

Mahar Plant is an Indonesian natural resources that need to be empowered by their nature, because they contain compounds of natural ingredients that can be used traditionally for the purpose of human life[Yunita*et. al.,* 2009]. Mahar is one of the plants in the family Sterculiaceae besides Erythropsis, Heritiera, Melochia, Commersonia, Abroma and Theobroma. According Steenis, Mahar plant have ovaries and stamens at the base of the pole-shaped flowers[Steenis, 2003].The leaves of Mahar plant leaves can be used for the treatment of liver diseases (yellow / hepatitis), by drinking boiled water[Raflizar & Marice Sihombing, 2009] Also according to Yunita, from the result that the phytochemical screening Mahar plant compounds containing alkaloids, flavonoids and saponins[Yunita*et. al.,* 2009].

In the village of Batu Tangga were found Mahar plant. Based on observations, most people utilize this plant is the leaves to prevent the growth of gray hair (white hair) by using the leaves to wash, its leaves can also be used as a cure nosebleeds and wood as the knife handle, or so-called "Kumpang machete" in the local language. While the trunk is used for firewood. Besides this plant may be useful as barriers to erosion. This study aims to determine the structure of plant populations of Mahar plant in forests village of Batu Tangga, Sub-District of Batang Alai Timur, Hulu Sungai Tengah.

MATERIALS AND METHODS

The method used is descriptive method of research conducted directly into the field or location of study with a systematic data collection methods with techniques transects in the village of Batu Tangga Sub-District of Batang Alai Timur Hulu Sungai Tengah. The population in this study are all Mahar plants contained in the forests of the village of Batu Tangga Sub-District of Batang Alai Timur on an area of 5000m x 150m. The sample in this study is the Mahar plant that was found in the quadrant with a size of 1 m x 1 m for seedlings (seedlings), 5 m x 5 m for the sapling (saplings) and poles (poles), and the square of 10 m x 10 m for the trees (trees). Take measurements of environmental parameters include; Air temperature, air humidity, pH and soil moisture, wind speed, elevation, light intensity, of N, P, K and soil texture.

Population structure was analyzed based on the density of plants from Odum that forms a pyramid with a wide base, a polygon shape of a bell, and the form of bowls or jugs[6].

RESULTS AND DISCUSSION

Result

Based on observation of the population structure of the Mahar plant (Kleinhovia hospita L.) in the village of Batu Tangga Sub-District of Batang Alai Timur Hulu Sungai Tengah at the forest area is found the results as shown in Table 1 below.

Table 1. Population Structure Mahar (Kleinhovia hospita L.) in the forest village of Batu Tangga Sub-District of Batang Alai Timur Hulu Sungai Tengah.

No.	*Growth Level*	*Amount*	*Total Forest Area*	
			Density/m^2	*Density/Ha*
1.	Seedling (1mx1m)	10	0,1	1000
2.	Sapling (5mx5m)	27	0,0108	108
3.	Poles (5mx5m)	40	0,016	160
4.	Tree (10mx10m)	21	0,0021	21

Research data Table 1 shows that the number of seedlings is greater than the number of poles, sapling and trees that form a pyramid jug or bowl. If the created order is based density / hectare age Mahar plant it will look like in figure 1 below:

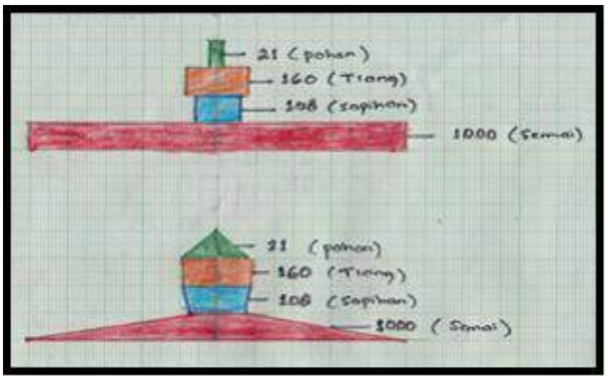

Figure 1: Structure populations of maharplants in the forests of the village of Batu Tangga Sub-District of Batang Alai Timur Hulu Sungai Tengah.

Based on the results of a study of the environmental parameters Mahar plant place to grow in the village of Batu Tangga Sub-District of Batang Alai Timur Hulu Sungai Tengah, obtained as in table 2 below.

Table 2. Environmental Parameters in the forest area in the village of Batu Tangga Sub-District of Batang Alai Timur Hulu Sungai Tengah.

No	*Environmental parameters*	*Research range*	
		Forest Area	*Book*
1.	Air temperature (^{0}C)	29-30	18-32 [5]
2.	Humidity (%)	78-81	15-30
3.	Soil Moisture (%)	100	20-80 [4]
4.	pH Soil	4,9 – 5,2	6-7,5 [5]
5.	Light intensity (Lux)	1100-1300	1500-3000 [5]
6.	Wind velocity (m/s)	0,31-0,46	< 35 [13]
7.	Altitude (mdpl)	79-80	<800 [5]
8.	Soil Nutrient		
	a. N	0,22-0,25	>3 [7]
	b. P (ppm P)	1,583 – 2,437	0,01 – 0,20 [2]
	c. K (cmol (+) /kg)	0,658 – 2,467	0,17 – 3,30 [2]
9.	Soil texture :	Clay argillaceous	Sandy clay loam [5]
	Sand (%)	47,02 – 80,85	
	Dust (%)	13,53 – 27,09	
	Clay (%)	5,62 – 25,89	

explanation :

* Karmawati, dkk (2010)
** Irwanto (2006)
*** Surasana & Taufikurahman (1994)
**** Pusat Penelitian Kopi dan Kakao Indonesia (2004)
***** Buckman & Brady (1982)

Discussion

Based on the results in Table 1, populations of Mahar plant in the village of Batu Tangga Sub-District of Batang Alai Timur Hulu Sungai Tengah in forest areas shows that the number of seedlings were found more than a number of sapling, poles, and trees. According to Odum population structure in such an amount that is pyramid-shaped with a flared base[Odum, Eugene P, 1993]. It shows a high percentage of the younger age group, which means Mahar fastest growing plants characterized by the number of young people more.

Meanwhile, according to Odum, the population structure of plants are suitable for the survival of the plant is number of sapling smaller than the number of poles[Odum, Eugene P, 1993]. But there some region thet number of sapling smaller than the number of poles. It is thought to be caused by the slow growth from phase pole to phase the adult stage. Consequently sapling growing phase into the phase accumulated by the phase pole pole slow start phase grows into a tree. The impact is the phase pole has a larger amount of phase sapling. This is exactly what is thought to be the cause of at least phase of this plant in the region. Consequently sapling growing phase into the phase accumulated with the phase pole slow start phase grows into a tree. The impact is the phase pole has a larger amount of phase sapling. That matter is thought to be the cause of at least phase of this plant in the region.

According to Tati, the minimum density one plant populations vary depending on the place and the plant species[Tati, S, 1998]. For example, for rare plants minimum amount that should be found in the area of 1 km2 is 25 individuals that populations of plants that can keep a presence in the region. The results of the research in the village of Batu Tangga the obtained amount of density of Mahar plant in the forests of the village of Batu Tangga is 1289 trees / ha after being converted into individual every 1 km2 is 128 900 individuals / km2. Thus the scarcity of vegetation status Mahar plant is not rare, because at 1 km2 there are 128,900 individuals.

The populations structure of Mahar plant that has presented above indicates common concept, that is pyramid-shaped with a flared base that shows a fast growing plant Mahar plant, and in terms of status scarcity of plant that is not rare. This condition can be explained by two reasons. First, the impact of environmental conditions on the Mahar plant plants. Second, the impact of human activities on the Mahar plant. Explanation of each of these factors are described below.

First, the impact of environmental conditions Mahar plant. Barbour states that differences in environmental conditions, the availability of the carrying capacity or the resources to survive, ecosystems and disturbances that arise just some of the factors affecting their abundance and distribution patterns[Barbour, M.G., 1987]Environmental conditions that differ not only change the deployment and presence of plant species, but also the growth rate, fertility, luxuriance, branching, spreading leaves, roots reach and size of the individual. Based on the results in Table 2, the structure of plant populations Mahar plant in the village of Batu Tangga District of Batang Alai Timur Hulu Sungai Tengah in forest areas indicate optimal environmental conditions for the growth and development of the plant life of the Mahar plant.

Second, the impact of human activities on the Mahar plant. Based on interviews with residents of surrounding villages Batu Tangga by the number of respondents as many as 10 people. People know about the Mahar plant plants along its usefulness. According to the people, Mahar plant in the forests of the village of Batu Tangga grow naturally, people around utilizing trunk for firewood and building materials, while the leaves are used as medicine nosebleeds and to prevent the growth of gray hair. Along with the Mahar plants continues to be utilized by the community and by the community also has been no replanting efforts, this could lead to extinction in the future.

CONCLUSION

Based on the results of research on plants Mahar plant in the forests of the village of Batu Tangga Sub-District of Batang Alai Timur Hulu Sungai Tengah can be concluded that the population structure of plants Mahar plant pyramid-shaped with a flared base, showing a high percentage of the younger age groups, which means that the population is growing. Based on the status of rarity, Mahar plant in a not rare state because there are 1.128.900 individuals in 1 km2.

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Preliminary Study of Tumbang Nusa Designated Forest for Ecotourism Activities

Safinah S.Hakim[1), Purwanto B. Santosa1[1,2)

[1)Banjarbaru Environment and Forestry Research and Development Institute, Ministry of Environment and Forestry, Jl. Ahmad Yani Km 28,7 Banjarbaru, South Kalimantan Indonesia
[2)Center of Excellence Research Consortium for Sustainable Tropical Forests Management, Banjarbaru Indonesia

E-mail : safinah.hakim@gmail.com, *pur_balitaman@yahoo.com*

ABSTRACT

Tumbang Nusa Designated Forest (KHDTK Tumbang Nusa), which located in Pulang Pisau, Central Kalimantan have been used for research station that studying peatland ecosystem ie; silviculture, natural succession, forest fire and also biodiversity. In 2015, forest fire damaging some area of Tumbang Nusa which burned some research plot and other valuable resources in this designated forest. To support forest sustainability in KHDTK Tumbang Nusa, ecotourism can be one solution that provides economic and ecological benefit. The objectives of this study are to identify the potential resources in Tumbang Nusa to support ecotourism activities. The primary and secondary data used for qualitative analysis during this study. Primary data used during this study were: interview and field observation, while the secondary data were collected from literature (book, journal, report, etc.) review. This study showed that: (a) Tumbang Nusa Designated forest is potential for ecotourism which focusing in peatland tourism (b)some program that can be developd for ecotourism program in KHDTK Tumbang Nusa which are rehabilitation program, vegetation and wildlife observation, peatswamp forest tour, and NTFP Workshop. In general, ecotourism in Tumbang Nusa Designated Forest has potential to be developed as a ecotourism area that support its ecological and social economic sustainability.

Keywords: conservation, peat land, development, sustainability

INTRODUCTION

Tumbang Nusa Designated Forest (KHDTK Tumbang Nusa) is the only peat designated forest in Indonesia. KHDTK Tumbang Nusa is field laboratory that recorded the natural succession of post-fire area up into secondary forest. Unfortunately, in 2015 massive forest fire occurred in KHDTK Tumbang Nusa that burned one-third area in KHDTK Tumbang Nusa. Forest fire in 2015 also burned some important research plots and existing secondary forest which causing biodiversity loss.

To prevent the future post fire incidence, the management of KHDTK Tumbang Nusa initiate some action. Some of the actions are rehabilitation of burned area through rehabilitation and raising community awareness. To rise community awareness, the management of KHDTK Tumbang Nusa developed participatory planting activity and initiating ecotourism program.

Ecotourism is tourism activity to natural area or location which drive ecology and economic benefit to local community [Departemen Kebudayaan dan Pariwisata, 2009]. Ecotourism is also can be seen as an alternative strategy to conserved area, increasing the public awareness about the sustainability, and reduce threats to biodiversity [Drumm, 2002]. KHDTK Tumbang Nusa have many resources that potential to be developed for ecotourism activities. Hence, it is necessary to make ecotourism planning in KHDTK Tumbang Nusa.

This study objectives were to identify the potential resources that can be developed for Ecotourism activity and develop ecotourism program in KHDTK Tumbang Nusa. Through ecotourism development, we expected to increase public awareness to support the sustainability of KHDTK Tumbang Nusa. In addition, it is expected that local people will gain benefit by this development

MATERIALS AND METHODS

Location

This research was carried out in Tumbang Nusa Designated Forest, Pulang Pisau Central Kalimantan during October to November 2016.

Data Collection and Analysis

We collected primary and secondary data during this research. Primary data consisted of infrastructure, ecotourism attraction, visitor, and accessibility. While secondary data consisted of biodiversity, community in KHDTK, and others references that supports this research. Data analysis were done by descriptive method and also SWOT analysis method.

Result And Discussion

Management

KHDTK Tumbang Nusa established according to UU No.41 1999 which stated that KHDTK is forest area that designated for research and development, education, training, religion and cultural needs. Before developed as research station, KHDTK Tumbang Nusa was Forest Production Area (HPH) owned by PT. Arjuna Wiwaha. According to No. SK

Menhut no 76/Menhut-II/2005 KHDTK Tumbang Nusa is covered about 5000 Ha [Santosa, 2016].

KHDTK Tumbang Nusa is managed by one KHDTK Manager, which work under instruction of the Facilities and Infrastructure section and Chief of Banjarbaru Forestry Research and Development . While in the field, KHDTK Tumbang Nusa is managed by two people who act as security and custodian.

Ecotourism attraction in KHDTK Tumbang Nusa

Biodiversity

In early 1997, KHDTK Tumbang Nusa was a bare land that dominated by bushes and some tree pioneer species. Nowadays, Tumbang Nusa is habitat for various flora and fauna. Forty three trees species local were indetified including *S. belangeran*, gemor (*Nothaphoebe coriacea*), gerunggang (*Cratoxylon arborescent*), Jelutung (*Dyera polyphylla*), Meranti Blau (*Shorea parvifolia*), Ramin (*Gonystillus bancanus*), Kapur naga (*Callophyllum macrocarpum*). In addition, KHDTK tumbang nusa is also home for wildlife i.e Alap-alap Capung (*Microhierax fringillarius*), Burung-madu belukar (*Anthreptes singalensis*), Burung-madu Rimba (*Hypogramma hypogrammicum*), Burung-madu sepah-raja (*Aethopyga siparaja*), Pelatuk kundang (*Reinwardtipicus validus*), Orang utan and many insects [Akbar, 2015]. Etnobotanic study in this forest showed that some species are known for its non-timber forest product such as Gemor as mosquito repellent, Akar Kuning as base medicine for Malaria, and Latex of Jelutung which can be used for candy gum and isolator. Recent study, showed that Gemor can be used for Diabetes mellitus medicine [Suhartono, 2015].

Peat swamp Forest

Tumbang Nusa designated forest is well known for its specific characteristic, which is Peat swamp forest ecosystem. KHDTK Tumbang nusa is prominently different with others research forest. Peat swamp forest have unique ecosystem with sponge-like soil characteristic, high acidity soil, and have abundance organic matters. Many local species that could not find in others forest live in the Tumbang Nusa Designated Forest.

Tourism attraction near to KHDTK Tumbang Nusa

Visitor prefer to visit tourism area that near to others tourism attraction. Therefore, information about tourism area near to KHDTK Tumbang Nusa is needed. This information could be benefit for travel agent to create travel package.

Palangkaraya City

Palangkaraya city is the capital of Central Kalimantan Province. In Central Kalimantan, lies two big rivers which are Kahayan and Sebangau River. Visiting these two rivers gives us the unforgettable experience while visiting local community who live near to the river. Palangkraya is dominated by Dayak tribe. There are some tourism attraction that can be visited in Palangkaraya, which are: Palangkaraya City Monument, Balanga Museum, Nyaru Menteng, Kahayan Bridge, Sebangau National Park, and Kereng Bangkirai Pier (https://www.tripadvisor.com).

Jumpun Pambelom

Jumpun pambelom is private forest area that located about 800 m to KHDTK Tumbang Nusa. While visiting this forest, visitors can participate in peat rehabilitation program by joining tree adoption program.

Sebangau National Park

Sebangu National Park is National Park with Peat Ecosystem. This national park offers unforgettable experience to get into the deep of Borneo Forest. From KHDTK Tusa, this national park can be reach by car about 30 m to Kereng Bangkirai Pier and then transferred to boat to reach the National Park.

Accessibility

KHDTK tumbang nusa is very strategic, located near to provincial road. KHDTK Tumbnag Nusa, could be reach from Palangkarya or Banjarmasin. KHDTK Tumbang nusa is 40 km away from Palangkarya and could be reach in 35 minutes from the Tjilik Riwut airport palangkaraya. From Banjarmasin, KHDTK tumbang nusa is about 200 km from Samsudin Noor Airport Banjarbaru or about 5 hours by car. From both cities, road asphalt is in good condition.

Infrastructure and Facilities

Camp and Information Center

KHDTK Tumbang Nusa have main camp which located in main entrance. This camp is equipped with information centre, two rooms, two bathrooms, spacious living room, and kitchen. Fresh water and electricity is available in 24 hours. Visitor who would like to stay overnight can use camp facilities. This camp could accommodate up to 60 persons. In addition, visitor who would like to stay overnight can use these facilities. Parking area also available near to camp, which can accommodate up to 10 cars.

Information center is main part of this camp. Information center was created with unique themed, so that the visitors could feel the peat swamp forest situation while stay in Information center. In the information center, there are books, posters, and others display related to KHDTK Tumbang Nusa. Visitor who would like to get much information about research in Peat swamp forest, particularly in Tumbang Nusa should stay longer in Information Centre.

Pathway and Shelter

There is a pathway along the KHDTK Forest that can be used by visitors. Partly of this pathway is wooden path, but the most of this wooden path is broken and decayed that could endanger the visitors. The pathway length is about 8 meters.

Canteen and Cafeteria

KHDTK Tumbang Nusa located in trans-Kalimantan road. Hence, there are no difficulties to reach canteen and cafeteria around this location. About 20 restaurants located near to KHDTK Tumbang Nusa, and some of them open for 24 hours. Visitors could find various food and beverages menu: pecel ayam, roasted fish, fried rice, soto, rawon and etc. Food and beverage are offered with affordable price. Some restaurant offers local food for example tumis kelakai, and local fish menu.

Community

KHDTK Tumbang Nusa is located Tumbang Nusa village which consisted of 231 household and total population are 943 people [Akbar, 2015]. Most of Tumbang Nusa villagers is work as fisherman or farmer. Due to land condition, it is difficult to cultivated agricultural crop such as paddy or palawija. In Ecotourism, Community play key role in the program implementation. In KHDTK Tumbang Nusa, community could participate in ecotourism development in these following activities:

1. Guide services in ecotourism location
2. Providing seedling for rehabilitation activities
3. Helping to secure and maintain the ecotourism area
4. Food and cafeteria services

Visitor

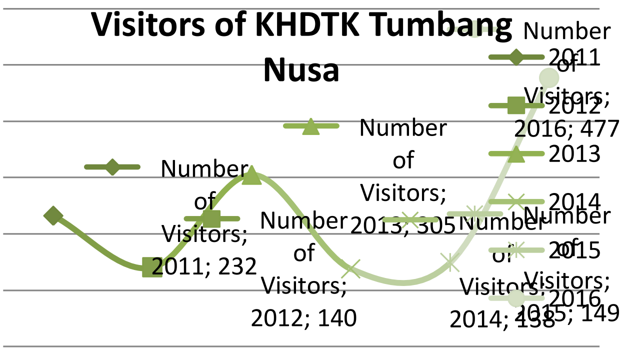

Figure 1. Visitor in Tumbang Nusa (2011- Okt 2016)

Visitors that visited KHDTK Tumbang Nusa came from various City, but mostly from Central Kalimantan province and South Kalimantan Province. Not only domestic visitors, KHDT Tumbang nusa also visited by foreign visitors, for example visitors from Japan, Southeast Asia country, Norway, Uganda and etc. Most visitors who came to Tumbang Nusa came from Academic and research institution background with research and study reason such as: vegetation and wildlife survey, pear learning, in house training, and sampling. Tumbang Nusa is also known for a peer learning site and also training site that represent good ecosystem of peatswamp forest. Therefore many training and peer learning were conducted in KHDTK Tumbang Nusa. There were some training conducted in KHDTK Tumbang nusa: Forest Fire Training, Agroforestry Training, Silviculture Training, Wildlife observation, Training and etc. Most visitors gave good impression after their visit in KHDTK Tumbang Nusa, particularly about the forest condition. In addition, most of visitors expected KHDTK Tumbang NuSa to have better facilities such as wood trail and camp facilities.

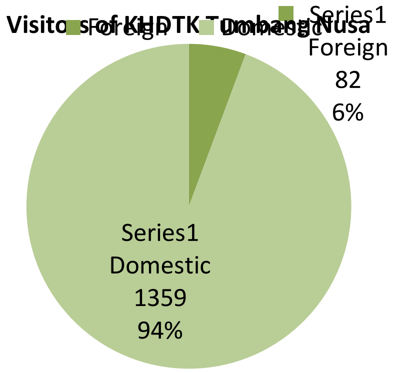

Figure 2. Comparison of Domestic and Foreign Visitors in KHDTK Tumbang Nusa

SWOT Analysis

SWOT analaysis is a tool or device that helps manager to identify strengths, weaknesses, opportunities, and threats. SWOT analysis can be used as a tool to create management strategy [Ommani, 2011]. To develop ecotourism program, SWOT analysis is a common tools used to create ecotourism program. Table 1 mentioned the SWOT analysis of Ecotourism development in KHDTK Tumbang Nusa.

Ecotourism Development Plan

According on the field observation, interview result, community, visitors comments, descriptive analysis and also SWOT analysis, we develop some ecotourism programs that support the sustainability of KHDTK Tumbang Nusa and meet the visitors expectation. The ecotourism program that will be developed will be on the corridor of ecotourism activity that are ecology, community, and economic. Program that will be developed by the management are:

Peat swamp rehabilitation program :Re-Peat

Re-peat is a participatory peatforest rehabilitation program hosted by management of KHDTK Tumbang Nusa management. By joining this program, the organizer will give each visitors seedling and plant the seedling in determined location. During the planting process, each visitors will be assisted by local guide which provided by the organizer. Before tha planting activity, visitors will be given short lectured about peat swamp forest and also sightseeing activity around KHDTK Tumbang Nusa Forest.

Table 1. SWOT Analysis of Ecotourism development in KHDTK Tumbang Nusa

	Strength 1. KHDTK Tumbang Nusa is the only KHDTK with unique peat ecosystem 2. KHDTK Tumbang Nusa is strategic in location.	**Weakness** 1. Lack of interpretation sign 2. Lack of appropriate infrastructure support 3. Lack of promotion
Opportunity **1.** "Back to Nature" trend **2.** Local community support ecotourism program in KHDTK Tumbang Nusa	Developing ecotourism concept with special interest in peat ecosystem with community involvement.	Improving infrastructure in KHDTK Tumbang Nusa which support the ecotourism program
Threats 1. Forest Fire 2. Infrastructure and environment damage as a result of the increasing of visitor 3. Forest encroachment by community	Increasing visitors and community awareness about forest fire protection in KHDTK Tumbang Nusa	Putting more interpretation sign and do more intense promotion through various media.

Vegetation and Wild Life Observation

KHDTK Tumbang Nusa is home for diverse flora and fauna. For visitors with special interest on flora and fauna, KHDTK Tumbang Nusa is best location to study about wildlife and vegetation in Tropical peat swamp forest. For those who have special interest on peat vegetation, visitors can visit some research plot. KHDTK Tumbang nusa is field laboratories that could give complete information about after forest fire succession in peat-swamp forest. For those who have special interest in wildlife, could have wildlife monitoring or bird watching along the forest trail. Visitors can use shelter which located within the forest area for resting or observation spot.

Peat Swamp Forest Tour

Unlike the previous program, this program tend to be general about Peat swamp forest. Visitor which will be guided by local people will take a walk around KHDTK Tumbang Nusa Forest to visit interesting spot such as Jelutung and *shorea belangeran* stands. Not only studying the vegetation, visitor can also studying forest fire protection in peat by joining "sumur bor" making workshop.

Peat Land Non-Timber Forest Product Workshop

To support forest sustainability, Non-Timber Forest Product needs to be developed. Hence, the knowledge about non-timber forest product (NTFP) must be known by many people. To strengthen this idea, workshop in non-timber forest product will be good program in KHDTK Tumbang Nusa. There are two workshop program could be carried out which are composting demo and also wood vinegar demo. Visitors can join the workshop that will be assisted by the organizer and in the end of this program, each visitors will get the sample product as souvenir

CONCLUSIONS

1. KHDTK Tumbang Nusa have potential resources that can be developed as ecotourism area which are : its flora and fauna biodiversity and unique peat swamp ecosystem .
2. There is some program that can be develop for ecotourism program in KHDTK Tumbang Nusa which are rehabilitation program, vegetation and wildlife observation, peatswamp forest tour, and NTFP Workshop

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Rattan Management in Central Kalimantan Indonesia

Basir

Faculty of Forestry, Lambung Mangkurat University, Banjarbaru Indonesia

E-mail : basir.achmad@unlam.ac.id

ABSTRACT

Central Kalimantan was one of the main rattan producer regions in Indonesia. It was estimated there were more than 24,000 tons of dry rattan annually. There was a long history of cultivation of small diameter rattan species (up to 12 mm of diameter), whereas large diameter rattans (up to 70 mm of diameter) came almost entirely from natural forest. Rattan plantations had provided income for many local people in Central Kalimantan. Small diameter rattans have been important in the local market, and they had been used as household products. The main commercial rattan species in Central Kalimantan, which were estimated to comprise more than 90% of the volume of traded rattan, were: irit (*Calamus trachycoleus*), taman (*Calamus caesius)*, and manau (*Calamus manan*).

Yet, condition of rattans in the garden and in the forest was very poor. Rattan plantations in the garden had poor maintenance because rattan price was very low. That was the reason why the local community had low motivation to maintain their rattan. Likewise, rattans collected from the forest, especially the big diameter rattan such as manau rattan (*Calamus manan*) started to be extinct because local community just collected them without a specific method or rule that ensures a sustainable harvesting. In addition, rattan with big diameter was not cultivated yet by the community because of lack technology, and they believed that manau rattans were difficult to cultivate. Therefore, in this paper, the rattan problems were solved through rattan management encompassing planning, organizing, leading/motivating and controlling/monitoring.

Keywords: Local community, Central Kalimantan, rattan management.

INTRODUCTION

Background

Central Kalimantan was one of the main rattan producer regions in Indonesia with an estimated production of more than 24,000 tons of dry rattan annually. There was a long history of cultivation of small diameter rattan species (up to 12 mm of diameter), whereas large diameter rattans (up to 70 mm of diameter) come almost entirely from natural forest. Rattan plantations provided income for many local people in the past. Small diameter rattans have been important in the local market, where they have been used for household products. Traditional rattan producers in Central Kalimantan have not utilised large diameter rattan, but they were important as raw material of rattan industries.

Export of unprocessed cane was banned in 1986 in order lift the price of raw material. However, the good intentions of this policy were offset by the monopolised rattan trade in the late 1980's. The monopoly pushed down the price of raw rattan to a level that made rattan cultivation unattractive for the farmers. Many shifting cultivators still continued planting rattan on their lands. Rattan was planted under rubber trees or belukar before the farmer moved to a new place. However, these plantations have not been maintained. Therefore, productivity of these plantations was obviously below their true potential. Although rattan trade was freed in 1998, rattan farmers and gatherers have not benefited from this yet. Price of all kinds of raw rattans was still too low to make cultivation attractive. As in the past, parties that benefit most from rattan business were the industry sector and the rattan traders. Another problem was rattan quality. Based on information from rattan mills, quality of rattan from local community was very low because they did not process the rattan based on rattan mill requirement.

There was a rapid increase in capacity of rattan-based furniture industry in the 1990's, which increased the demand of large diameter rattan. Although a few plantations of large diameter rattans exist, their role was insignificant. Collection from natural forest had increased to a level where there was a concern that along with improved accessibility the resources of large diameter rattan will be depleted in the near future.

Overcoming the existing problems in cultivation and marketing need close cooperation among the main stakeholders: producers, rattan industry and relevant government institutions. The producers or local community and rattan industry should make a direct contact so that the price of rattan at community level can be increased. Likewise, the government, including universities and research organisations, should contribute to developing marketing systems and training that would benefit the communities. Those problem solving will be arranged through rattan management that will ensure sustainable rattan production in Central Kalimantan.

Objectives and Benefit

The objectives of this paper were (1) to describe condition of rattans in Central Kalimantan comprising market chains, rattan prices, rattan potential, rattan problems, and (2) to determine management system suitable for rattan sustainability. Benefit of this paper was to provide information about sustainable rattan management to related stakeholders.

MATERIALS AND METHODS

Location

The project location was Central Kalimantan, Indonesia. Central Kalimantan was one of provinces in Indonesia that produces many kinds of rattans. This was because most Kalimantan areas were grown over with huge natural forests where rattans could grow well.

Data Collection

This paper was supported by secondary data cited through some literature. The main source data was cited from Basir's survey report in 2001 in Central Kalimantan. In addition, data were collected through some reports from forestry institutions in South and Central Kalimantan, and from some research reports through the Internet. Collected data encompassed rattan trade in South and Central Kalimantan, and rattan potential in the gardens and in the forests in Central Kalimantan.

Data Analysis

Analyses used in this paper were qualitative and quantitative methods. Qualitative method analyzed rattan trade conditions consisting of the chains of rattan supply in South and Central Kalimantan, ranging from the field to the rattan mills, and problems and constraints encountered in rattan utilisation efforts including regulations. Quantitative method analyzed rattan trade and rattan potential in the forests and in the gardens, i.e. price of rattan at different levels and locations, and the potential of rattans in the gardens and in the forests.

RESULTS AND DISCUSSION

Based on rattan survey conducted by Basir (2001), patterns of rattan trade, rattan price, and total volume of rattan were explained below:

Pattern of Rattan Trade

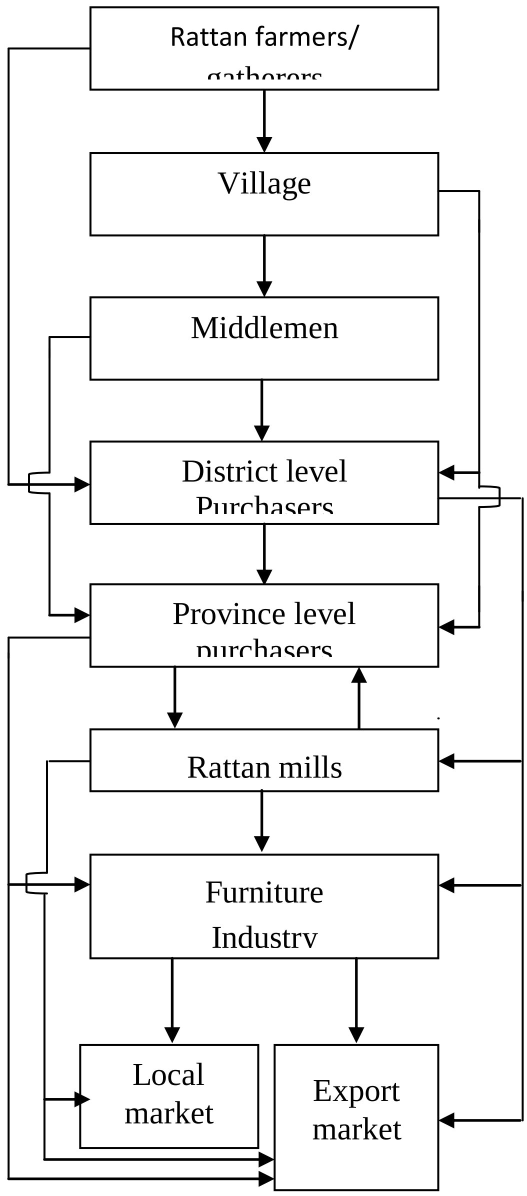
The chains of rattan trade from producers (farmers and gatherers) through traders to the end users (rattan mills and furniture industries) were complicated. As a whole, rattan trade can be divided into following components: (1) farmers (petani) and gatherers (pengumpul), (2) village buyers/processors (Pedagang pengumpul), (3) middlemen (Perantara), (4) district level purchasers/processors (Pedagang penampung I), (5) province level purchasers/processors (Pedagang penampung II), (6) rattan mills in Kalimantan (Pabrik), and (7) rattan-based furniture industries (Industri).

Not all rattans went through all stages but the pattern of the trade varied based on places. This was mainly due to the following factors: (1) accessibility to the places of rattan markets, (2) level of knowledge and availability of capital among the village buyers, and (3) the availability of labour in each stage and the individual's priorities of use of time. The pattern of the rattan trade was shown in Figure 1, and the most common trade systems among the components were discussed below.

Rattan Farmers and Gatherers

Rattan farmers (petani) were people in the villages who cultivated and harvested rattans from plantations. Rattan gatherers (pengumpul) were those who collected rattans from natural forests. Farmers and gatherers brought rattans to the market place in the village buyers or store them in a place easily accessible by traders. Rattans were sold to village buyers/processors (pedagang pengumpul) or sometimes directly to district level purchasers (pedagang penampung I). Rattans were usually transported by boat to the trading places and rattan farmers and collectors take care of these transport costs. Farmers and gatherers do not usually apply any treatment. As people in the villages prefer cash payment, volumes of rattans harvested greatly depend on money available.

Figure 1.Trade flow of rattans in Central and South Kalimantan.



Village Buyers/Processors

Village buyers/processors collect rattans from a group of rattan farmers and gatherers and then sell larger amount to middlemen or to district level purchasers, or even directly to province level purchasers. Village buyers/processors usually apply a simple treatment before they sell their products. It may take several days to collect an amount worth transporting and treatment was required for rattan species that cannot be stored without quality losses. Treatment includes peel removal and fumigation, depending on the species. Drying was necessary for almost all species. Though specific treatment was not applied for red lalun/pulut merah, the canes were placed under the sun. Drying does not affect pricing of lalun, because the species was sold per piece. Drying/storing of lalun was shown in Figure 2 (left). Large diameter rattans, like manau and minong, were not processed or treated by village buyers/processors. Manau rattans were shown in Figure 2 (right).

Figure 2.Lalun rattans (left) and manau rattans (right).

Sometimes village buyers/processors buy rattans from farmers and gatherers at the site, sometimes farmers and gatherers bring rattans to the agreed purchase locations. Village buyers, when selling rattans to middlemen, pay the cost of transport. However, there were also those who wait middlemen to come and buy rattans at their place. Village buyers/processors may receive financing from a middleman. In these cases rattans were, of course, sold to the middleman who provided the money. Village buyers/processors sold rattans also directly to province level purchasers (Pedagang penampung II), who operated in Banjarmasin. In this case, the village buyer was not just a rattan trader but also a trader of various other goods. The village buyer brought goods from Banjarmasin that was needed for daily life and sold them in up the villages while buying rattans.

Middlemen

Middlemen were traders who purchased rattans from village buyers/processors and then sold it to next levels. Middlemen used to buy only rattans that have been processed. Once they had collected certain amount of rattans, they transport it to district and province level purchasers. The number of middlemen was relatively small, since village buyers tried sell rattans directly to district and province level purchasers whenever possible. The middlemen level existed because some village buyers/processors said that they had too little experience in marketing, administrative matters and/or they did not have money for transport.

District Level Purchasers

District level purchasers were traders who operate outside the cities of Banjarmasin and Sampit. These two cities serve as gates from which rattans were shipped outside from Central Kalimantan. District level purchasers traded considerable amounts, up to hundreds of tons, of dry rattans every month. Besides purchasing rattans from middlemen and village buyers, district level purchasers also obtained rattans directly from rattan farmers and gatherers. Some purchasers preferred to go up and buy rattans at trading places in the field whereas some receive rattans in their shops. District level purchasers had contacts both with the mills in Kalimantan and the rattan furniture industry in Java. Export of semi-processed material was also done. Transport within Kalimantan was done by road or by river. Standard sea containers were used for shipping to Java and export. District level purchasers processed rattans into product known as washed & sulphurized (W&S) rattan. Large amounts of rattans were processed and more sophisticated methods were used than the village buyers/processors apply. Treatments were needed because canes purchased from the villages were of uneven quality and need to be re-processed in order to comply with the standards set by the market.

Province Level Purchasers

Province level purchasers were traders that were found in Banjarmasin only. As they reside in the big city, they were mobile, and have good information systems to follow development of prices of various rattan types, making them able to quickly respond to changes. These traders purchased and sold rattans, either raw material or semi-finished products, from almost anywhere and to anywhere. Sometimes raw material was sold to rattan mills and semi-finished products were bought from the mills. Volumes traded were not as high as in the district level trade. Quick sales with profits guide the activities.

Rattan mills

Rattan mills in this context referred to factories that further processed cane into semi-processed rattans for furniture industry. They also made finished rattan products. These mills were located around Sampit, Banjarmasin and Banjarbaru. The mills purchased raw material from various sources such as district and province level purchasers. Semi-processed rattans include core and peel. Finished products included rattan carpets (lampit), rattan mats (sabrina), and webbed rattans (anyaman). Semi-processed rattans were sold to province level purchasers and to industries in Java. Some amount was also exported, main destinations being Taiwan, Malaysia, Hong Kong and France. Finished products were sold both in domestic and export markets. Domestic markets included Sulawesi, Sumatra, Kalimantan and Java. Rattan products were exported mainly to Japan, France, China, Hong Kong, Taiwan, Bangladesh, Malaysia and Singapore. The mills also applied various treatments such as drying and fumigation for the rattans they bought, material quality largely determined the quality of the final products. Rattans as raw material were usually kept in the storage for a relatively long time, both before and after processing. This was done in order to reach low moisture content (kering gudang) that was required for high quality. Besides the above processing, the mills also sold round rattans for both domestic or export markets.

Before shipping, cores of rattan produced by the mills were sorted into different sizes according to buyers' request. Cores of rattans were wrapped with plastic since they were no more covered with peels, making them susceptible to water and humidity. Another interesting activity carried out by rattan mills was upgrading local quality lampit for export. Lampits for upgrading came mainly from small factories in Amuntai in South Kalimantan, which in turn got raw material from East and South Kalimantan. Very little cane for this production came from Central Kalimantan.

Rattan Market

International Market

Since trade of all kinds of rattan products was freed as a result of the Government of Indonesia's commitment to the agreement with the International Monetary Funds (IMF) in 1998, export of rattans and rattan products had been continuously increasing. This had been supported by the government policies put forward in the Decree of Ministry of Forestry and Estate Crops No. 512/KPTS-II/1998 concerning the Provisions on the Rattan Export, Decree of Director General of Forest Utilisation No. 137/KPTS/IV-PPHH/1998 concerning Implementing Directives on Rattan Export, Decree of Ministry of Industry and Trade No. 87/MPP/Kep/ 4/1998 concerning Provisions on Export Rattans, and Decree of Ministry of Finance No. 567/km.017/1999 concerning Tariff of Export Tax for Certain Commodities.

Based on the decree of the Ministry of Finance, export of all types of rattans, raw material, peeled rattans, cleaned, fumigated using sulphur, polished rattans, core and peel of rattans, or others, were subject to a 15% tax from a base price. The base prices for the rattan products were set by the Ministry of Industry and Trade. The prices were revised every three months. The above new legislation allowed district and province level purchasers, rattan mills, and industries to freely export rattans and rattan products upon the demand from abroad.

Domestic Market

The largest domestic market for rattans and rattan products were Java Island, North Sumatra, South Sulawesi, South Kalimantan and Bali, respectively.

Rattan Price

Based on Basir's survey in 2001, within the chain of rattan trade, price depended on a number of factors: rattan species and size, location of transaction, rattan quality related to size: moisture content, colour and cleanness. Breakdown of prices of the main traded rattan was presented below.

<u>Manau (*Calamus manan*)</u>

Prices at Village Level

As manau was collected from natural forest, volume of trade varied depending on season and other work opportunities in the villages. Outside harvesting season people have time and the number of rattan gatherers increases. However, compared to many other businesses, rattan collection was less profitable for the gatherers. If other work, such as mining or (illegal) logging, was available, people tended to postpone rattan collection. In detail, prices of manau bought by village buyers and middlemen from gatherers in the village Laung Tuhup, Barito Utara district, were presented in Table 1.

Table 1. Sales prices of manau at the village level (when sold to village buyers/processors and middlemen)

Class	Diameter (cm)	Price/4 m piece (Rp)	% of sales
A	> 3.5	4,000	40
B	3 – 3.5	2,000	20
C	2.5 – 3	300	25
D	< 2.5	Non-commercial*	15

* = Not purchased by village buyer/no price.

Table 1 showed that manau was grouped into several classes according to the diameter. The diameter of rattans is smallest in the base, increasing in the middle parts of the stem and then decreasing again up on the top. Local people estimated that from the rattan collected, the proportions of the classes were: A (40%), B (20%), C (25%), and D (15%). Class D has no price but village buyers/processors received it without pay, as it had sales value later. Manau was not processed nor dried at this stage. It was sold by pieces of 4 meter long.

In areas such as Lahai, and Sabuh, Barito Utara District, there were no village buyers or middlemen. District level purchasers came from Muara Teweh and purchased rattans directly from the gatherers. Price level was higher than in the cases rattan passes village buyers/processors and middlemen. However, the difference was not big since district level purchasers had to pay higher costs and took higher profits than if they bought rattans from the village buyers.

Before going to the forest to collect rattans, gatherers made an agreement with the purchasers regarding the time and place of purchase. Price was also agreed in advance. Rattan prices in this case were presented in Table 2.

Table 2.Sales prices of manau at the village level (when sold to district level purchasers)

Class	Diameter (cm)	Price/4 m piece (Rp)	% of sales
A	> 3	5,000	60
B	2.5 – 2.9	2,500	25
C	1.8 – 2.5	500	15
D	< 1.8	Non-commercial *	

* = Not purchased by district level purchasers / no price.

Class A comprised about 60%, class B 25%, and class C 15% of the rattans. Class D was rarely found. By selling directly to district level purchasers, the rattan gatherers obtained two advantages: higher unit price and smaller accepted diameter. Accessibility and locations, and personal relations between gatherers and traders largely determined how sales were done.

Prices at village buyers/processors

Some village buyers/processors sold their products to middlemen. The village buyers/processors took some profit from processing as seen by comparing prices in Table 1 and to obtain deals with gatherers.

Table 3. Most village buyers seem to be having a problem of lack of money and this limits the amount of rattan purchased. People would be willing to collect more if payment is secured. Some village buyers manage to borrow money from middlemen to obtain deals with gatherers.

Table 3. Sales prices of manau at the village buyer/processor level

Class	Diameter (cm)	Price/4m piece (Rp)	% of sales
A	> 3.5	5,000	40
B	3 – 3.5	2,500	20
C	2.5 – 3	500	25
D	< 2.5	250	15

Prices at Middlemen Level

Middlemen purchase rattans using diameter classes shown in Table 1 and Table 3. As seen in the Table 4, middlemen sell rattans according to the diameter classes of district level purchasers with the exception that class D was omitted. The middlemen seem to be able to use the classifications change to make some additional money. Middlemen sell their rattans to district level purchasers.

Table 4. Sales prices of manau at the middleman level

Class	Diameter (cm)	Price/4 m piece (Rp)	% of sales
A	> 3	6,000	60
B	2.5 – 2.9	3,000	25
C	1.8 – 2.5	700	15

District Level Purchasers

At this level, manau was processed as described in Section 3.1.4 to obtain higher quality. After processing the traders transport rattans to Banjarmasin. In Banjarmasin manau was sold at the price of Rp3,000/kg, regardless of the diameter. Weight based prices were converted into piece prices in Table 5. It appeared that these traders make a considerable profit.

Table 5. Sales prices of manau at the district level purchaser

Class	Weight/ 4 m piece (kg)	Price/kg (Rp)	Price/4 m piece (Rp)	% of sales
A	2.75 – 3	3,000	10,062.5	60
B	1.50	3,000	5,250.0	25
C	0.80	3,000	2,500.0	15

Province Level Purchasers

As mentioned before, the province level purchasers buy and sell rattans and rattan products whenever profitable. Table 6 showed an example of rattan prices in Surabaya.

Table 6. Sales prices of manau at the province level purchaser (including transport to Surabaya)

Class	Weight per piece (kg)	Price per kg (Rp)	Price per piece (Rp)	Percentage (%)
A	2.75 – 3	4,000	11,500	60
B	1.50	4,000	6,000	25
C	0.80	4,000	3,200	15

Prices of Taman and Irit Rattans

Taman and irit have the largest trading volumes of rattans in Central Kalimantan. Both species have been cultivated for hundreds of years. They were usually mixed in same bundles, especially in areas where these two species produced and used the same way. Sizes and forms of both rattans were almost the same and pricing in local market was not very different, although if sold for the same purpose, taman should fetch higher price. However, taman grows upstream on dry lands as it does not withstand flooding, while irit usually occurs downstream of the river and riversides. Irit has then shorter transportation distance than taman and as a result, prices were relatively similar in the local market.

Sales Prices at the Farmer Level

The price of wet taman at farmer level ranges from Rp600 to Rp800/kg depending on the level of accessibility. The further up in the river the lower the unit price. The price of wet taman, in Muara Laung region, Barito Utara District, for example, was about Rp650/kg and in Tumbang Samba Rp600/kg. Closer to market in Barito Selatan or Kapuas, the price of wet taman reaches Rp800/kg. Similarly, the price of wet irit varies according to the location. The range was between Rp700 to Rp750/kg. In Baru Village, South Barito region, the price was about Rp700/kg, while in Mengkatip and Kapuas Hilir, the price was about Rp750/kg.

Sales Prices at the Village Buyer/processor Level

The village buyers/processors sold both taman and irit at the same price because they were mixed together in the bundles. In areas such as Muara Laung and Tumbang Samba where irit was not found, the price of taman ranged between Rp2,000 and Rp2,100/kg of dry rattans. Although these unit prices were much higher than that the farmers get, there was not much profit as weight was reduced up to 60% after rattans were processed and dried. For irit, the reduction may even reach 63%.

Sales Prices at the Middleman Level

The prices of taman and irit at the middlemen level varied according to the location of transaction. In Central Kalimantan, there were two markets, Banjarmasin and Sampit. These two serve as gates in Central Kalimantan from which rattans were shipped to other islands or exported overseas. Sales prices in Banjarmasin and Sampit were Rp2,700/kg and Rp2,400/kg, respectively. The tax in Sampit apparently explained the price difference.

Sales Prices at the District Level Purchaser

Prices at district level varied widely according to the locations. Highest price offered, method of payment, and the buyer's strictness in quality determined the final sales price. Generally, taman and irit were divided into quality classes of jahab/kooboo I, kooboo II, and uitsschort. These were the same for the mills, industries and export. Average prices of taman and irit at this level were shown in Table 7.

Table 7. Sales prices of taman and irit at district level purchaser

Class	Diameter (mm)	Price per kg (Rp)	Location of sale
Kooboo I/jahab (A)	08 – 11	3,400	Surabaya
Kooboo II (A)	04 – 08	3,300	Surabaya
Soft I (B)	08 – 11	3,100	Surabaya
Soft II (B)	04 – 06	3,500	Cirebon
Tiger/uitsschort (C)	-	1,100	Amuntai

In Banjarmasin, the district level purchasers used to sell rattans without quality classification at an average price of Rp2,700/kg. It should be noted that rattan price was greatly affected by its water content. Special skill was required to determine the correct price.

Sales Prices at the Province Level Purchaser

Similar to above, prices at this level varied widely. However, as these traders domiciled in Banjarmasin, they received information and found the market more quickly. The province level purchasers used to sell raw material to a mill and buy something else from the mill that would be traded to Surabaya or to be exported. Table 8 presented an example of taman and irit prices.

Table 8.Sales prices of taman and irit at province level purchaser

Class	Diameter (mm)	Price per kg (Rp)	Location of sale
Soft *)	-	3,500	Surabaya, Jakarta
Sega **)	04 – 07	3,450	Surabaya, Jakarta
Sega	08 – 11	3,100	Banjarmasin

* From top parts of the rattan stem that partly contains silicate.

** Old rattan, surface cleaned but skin not removed.

Sales Prices at the Rattan Mills

Prices of rattan products at the mills varied depending on locations of sale, product types, and the size of the products. An example of prices of different rattan products was shown in Table 9.

Table 9. Sales prices of taman and irit semi-processed rattans and rattan products

Types of products	**Diameter (mm)**	**Price**	**Location of sale**
Peel *)	04 – 05 (W), 0.9 – 01 (T)	Rp13,000/kg	Surabaya, Jakarta
Core	2.5; 2.8; 3; 3.5	Rp13,000/kg	Banjarmasin, Surabaya, Jakarta
Sabrina	-	USD $2/m2	Taiwan/Malaysia
Plaited	-	USD $15/m2	Taiwan/Malaysia

* Most of this was used for sabrina and plaited rattans, W = width, and T = thick.

Small size peel and core were more expensive per kg than the larger ones because more work was needed to make them. Any extra processing increased costs and reduced yields. Another thing that increased the cost was that high quality raw material was required to produce small size peel that did not break when being processed.

Potential of Rattan in Central Kalimantan

<u>Natural rattan</u>

Inventories carried out by Ministry of Forestry had provided information about the amount of rattan in Central Kalimantan. The results of these inventories were shown in Table 10.

Table 10. Volumes of rattans in selected locations in Central Kalimantan

Time of survey	Institution	Area surveyed, ha	Locations	Number of stems per ha	Weight kg/ha (fresh rattan)
1985	Directorate of Forest Product & IPB	-	KPH Barito Selatan	-	675
December 1996	BIPHUT	120	HPH PT Inhutani III Unit Sampit, Kota Waringin Timur District	46	40
February 1998	BIPHUT	60	HPH PT Austral Byna; Barito Utara District	96	63
February 1998	BIPHUT	60	HPH PT Inhutani III Administrative Seratu; Keramuan River Forest	202	197

			Group		
September 1998	BIPHUT	80	HPH PT Lam Jaya; Kelua Besar River Forest Group; Kota Waringin Timur District	15	48

Sampling intensity in the surveys was 0.5%. In terms of species, weight of rattan and number of stems per ha, quantities varied considerably depending on locations. It was also probable that the highest volumes (675 and 197 kg/ha) recorded in KPH Barito Selatan and in Keramuan River Forest Group were in fact planted rattan. Most of the rattans by weight in Table 10 were non-commercial species.

There were a number of problems that made estimating rattan volumes difficult. Compared to estimating timber stock, it was much more difficult to estimate whether a forest has rattan, as the plants cannot be identified from either aerial photos or satellite images. Rattans ware unevenly distributed, growing sporadically in clusters and were difficult to find since the plant was creeping up the host trees.

No comprehensive and reliable inventory of different rattan species existed in Central Kalimantan. Total volumes of rattan in natural forests in Central Kalimantan can be roughly estimated by taking a conservative figure of commercial rattan from the table above and then multiplying this with the remaining forest area. As rattans grew mainly on dry land, only those areas should be included.

To obtain a view of natural rattan, a quick inventory was carried out by Basir (2001) in two HPH companies. In these HPH areas, locations with relatively low human disturbance were selected. Companies selected were PT Austral Byna, located in CDK Teweh Tengah, Barito Utara District and PT Dwimajaya Utama, located in CDK Katingan Hulu, Kotawaringin Timur District,Central Kalimantan Province. The results were shown in Table 11.

Table 11. Volumes of natural rattan in PT Austral Byna

Rattan species	Commercial/non-commercial	No. of clusters	No. of stems	Length (m)	Weight of stem (g/m)	Weight (kg/ha)
Bambulau (*Daemonorps mirabilis*)	Non-commercial	22	210	22	180	832
Mea/merah (*Korthalsia echinometra*)	Non-commercial	16	112	24	125	336
Dahanan (*Korthalsia rigida*)	Non-commercial	12	22	16	300	106
Semboli (C*alamus pseudoculor*)	Non-commercial	12	64	20	77	98
Lalun (*Korthalsia scaphigera*)	Commercial	64	350	10	22	77

Taman (*Calamus caesius*)	Commercial	10	39	19	32	24
Minong/sidung (*Calamus ornatus*)*	Commercial	2	4	37	1.250	185
Siit (*Daemonorops marginatus*)	Non-commercial	9	14	11	90	14
Tapa (*Calamus axillaris*)	Non-commercial	2	16	12	30	6
Anak/cacing (C*alamus laevigatus*, *mucronatus*)	Commercial	3	17	9	21	3
Getah (*Daemonorops* aff.D.draco)	Non-commercial	3	13	20	20	5
Total	1,686					

* = Found only in one plot.

Table 11 indicated that the amount of natural rattan reaches about 1,686 kg/ha of wet rattan and was dominated by non-commercial species such as bambulau, mea/merah, dahanan, semboli, siit, tapa, and getah. The amount of non-commercial rattan species reached 1,397 kg/ha, while the commercial ones like lalun, taman, minong, anak/cacing weighed only 289 kg/ha. The low volume of commercial species was assumed to be due to that the species had already been harvested to some extent. Manau was not found in this survey.

Inventory of rattan within PT Dwimajaya Utama concession area was made in Camp Kecubung, the tributary of Eling River, Tumbang Manggo Village, Senaman Mantikau Sub District, Kota Waringin Timur District, Central Kalimantan. The inventory data produced were shown in Table 12.

Table 12. Volumes of natural rattan in PT Dwimajaya Utama

Rattan species	Commercial/ non-commercial	No. of clusters	No. of stems	Length of stem (m)	Weight of stem (gr/m)	Weight (kg/ha)
1. Germ Plasm Plot (Plot 1)						
Dahanan (*Korthalsia rigida*)	Non-commercial	30	90	18	93	151
Putit (*Korthalsia scaphigera*)	Commercial	26	194	16	23	71
Ahas (*Korthalsia angustifolia*)	Non- commercial	6	24	28	66	44
Anak (C*alamus laevigatus*, *mucronatus*)	Commercial	14	92	13	18	21
Nyamu	Non-commercial	22	42	6	35	9
Nyeli	Non-commercial	12	36	7	13	3

T o t al (1)	299					
2. Logged over area (Plot 2)						
Ahas (*Korthalsia angustifolia*)	Non-commercial	10	154	23	66	234
Gelang (*Daemonorops sabut*)	Non-commercial	20	72	11	167	132
Putit (*Korthalsia scaphigera*)	Non-commercial	56	546	9	23	113
Nyamu	Non-commercial	34	102	12	35	43
Anak (C*alamus laevigatus*, *mucronatus*)	Commercial	12	60	11	18	12
Manta	Non-commercial	4	16	15	62	15
Bajungan	Non- commercial	8	8	4	243	8
Dahanan (*Korthalsia rigida*)	Non- commercial	8	12	7	93	8
Taman (*Calamus caesius*)	Commercial	8	18	14	30	8
Nyeli	Non- commercial	2	2	-	-	-
T o t a l (2)	573					

Table 12 showed that the amounts of rattan in the germ plasm area and logged over area were different. This might be because germ plasm area was relatively dense and rattan did not grow well. According to Alrasyid (1986), rattan grew well in light intensity of around 50%. Höyhtyä *at al*. (1997) reported that in their trials, plots of 40% canopy cover were more suitable for rattan than plots that had 65% and 95% canopy cover. Manau was absent in this survey as well.

Based on rattan inventories, which were carried out by the writer himself or those by other parties indicated that potential of natural rattan varied markedly from one location to another. It was closely related to the level of area accessibility, which would affect the intensity of rattan collection by local people. In addition, distribution and growth of the rattan itself would also affect that.

According to Janomindro (2000), some factors affecting the growth of rattan were related to vegetation conditions in each location. These included light intensity, shading, humidity and temperature. In addition, elevation also affected the growth of rattan through environmental factors like temperature and humidity. Other factors were the presence of support plants and genetic properties of the rattan itself. Furthermore, Rombe (1986) explained that rattans were a tropical plant species that naturally grew in primary and secondary forests, including in logged over areas and shrubs. Rattan can grow in various conditions such as swamp, low and mountainous dry lands, sandy dry land, and sandy clay soils which were periodically inundated or completely free from inundation. Soil types in which rattan can grow included alluvial (usually along the river, latosol and regosol). However, rattan can best grow in the hill slopes in relatively humid conditions at theelevation of 0 - 2,900 m above sea level, within wet climate (type A and B) or wet to dry climate (types A, B, C and D).

Rattan Plantations

Rattan species mostly cultivated by communities in Central Kalimantan were taman (*Calamus caesius*) and irit (*C. trachycoleus*). These rattans were growing along both large and small rivers. Taman normally was growing in dry lands, while irit rattan was distributed over areas that were frequently inundated.

To compare the volumes of planted rattan and natural rattan, a quick inventory has been conducted by Basir (2001) in a rattan plantation in Baru village, Dusun Selatan subdistrict, Barito Selatan district, Central Kalimantan, Indonesia. The location lied at the elevation of 43 m above sea level. The survey included both taman and irit plantations. The present owner families had inherited these plantations, which, according to them, had been established during the Dutch occupation. Irit had been planted on the lowlands subject to flooding while taman was grown on the higher places. Rattans were not planted as mixed species, but some natural rattans usually spread to plantations by animals.

In the surveyed plantation, fresh weight of harvestable taman was about 5,660 kg/ha while irit reached 4,314 kg/ha. Spacing in the tamanplantation was 5 m x 8 m or 250 clusters per ha. The average number of stems per cluster was 18, totalling 4,488 stems per ha. The average weight of taman was 1.26 kg with the average length of 13 m. Growth habit of irit differed from taman. New suckers shoots that grew from the base of irit developed into stolons (stems that grow along the surface of the ground), which might be several meters long. These stolons produced new shoots and finally irit might be evenly spread all over the plantation. In total, 5,502 irit stems per ha were measured in the survey with an average weight of each stem 0.78 kg and length 14 m. Table 13 presented details of the inventory.

Table 13. Results of rattan plantation inventory in Central Kalimantan

Planted rattan species	No. of clusters	No. of stems	Length of stem (m)	Weight of stem (gr/m)	Weight (kg/ha)
Taman (*Calamus caesius*)	250	4.488	13	97	5,659
Irit (*Calamus trachycoleus*)	Not clear	5,502	14	56	4,314

The results in Table 13 only represented this particular area, where rattan plantations were old and therefore dense. It was not known how intensively these plantations were maintained in their early stages. Average yield in this location was 4 to 5 tons. Taman rattan was used to harvested every three years, while irit rattan could be harvested every second year. The first harvest of irit can be done at 7-10 years old, while taman can be harvested after 10 years old.

In many other areas, new rattan plantations have been established in old shifting cultivation areas. Here rattan was planted under old rubber tree plantations or belukar, just before the site was abandoned. These plantations received little or no maintenance and were likely to be much less productive. These plantations were found in Laung Tuhup, for example. Based on interviews with rattan farmers, a taman plantation would only yield 2-3 tons of wet rattan per ha in one harvest. Interval of harvests was between 2-3 years.

Rattan production in Central Kalimantan was estimated at 24,000 tons of dry rattan per year. Most of this was taman and irit. Assuming that 1 ton of wet rattan was equivalent to about 400 kg of dry rattan, the total area of taman and irit plantations in Central Kalimantan cover some 70,000 ha. The size does not far differ from the estimated 65,000 ha by Rombe (1986).

Figure 3. Harvesting taman rattans (left) and the results of three days work (right).

Problems

Manau rattans were likely to be extinct because of over exploitation. This can be seen from the results of surveys curried out by Basir (2001) and Forestry Institutions (1985, 1996, and 1998). From the two surveyors, manau rattans were not found anymore. This indicated that potential of manau rattan in the forests had been depleted. Another problem of manau rattans was the local community did not cultivate them. This made condition of manau rattans worse. That was why other rattans like taman and irit were not considered in dangerous condition because the local community had cultivated them, though their production were not satisfactory because of lack maintenance.

There were several reasons why the local community did not cultivate manau rattans:

- Manau rattans have relative big stem, so they can destroy the host trees
- Manau rattans are solitary
- Price of manau rattans at community level was very low.

If I connect the statement of local community was that manau rattan would destroy the host trees, it was likely true. According to my observation when I curried out rattan surveys in rattan plantations, the local community used old rubber trees as host trees for rattans. In such condition, manau rattans were not appropriate to be planted in old rubber tree plantations. This was because stems of manau rattans are big and longer comparing to other rattans.

Regarding the solitary characteristic of manau rattans, local people were reluctant to cultivate them. This meant that manau rattans were not profitable because the local community had to grow seedlings to supply the continuity of manau rattan production. This was different from taman and irit rattans, on which the local community only planted or grew once. After that they just waited for harvesting. This was because stolons of the two rattan species were able to grow continuously.

Another serious problem was low price. Based on the survey done by Basir (2001), price of manau rattan at community level was much lower than the price of manau rattan at trader or industry levels. If I calculated the price of manau rattans at community level (Table 1), the price of the rattans was Rp2,075 per length on average, whereas at district level purchaser was Rp7,725 per length on average. The different prices were caused by long trade steps, i.e. sales prices of manau at the village level (when sold to village buyers/processors and middlemen), sales prices of manau at the village level (when sold to district level purchasers), sales prices of manau at the village buyer/processor level, sales prices of manau at the middleman level, and sales prices of manau at the district level purchase.

Problem Solving

To solve manau rattan problems, the problems were addressed as the followings: Regarding the first problem – manau rattans will destroy the host trees; this can be solved by choosing strong trees or iron wood to support manau rattans. According to Wan Razali *et al*. (1992), with using iron wood arranged properly, manau rattan will crawl following the wood. As such direction, manau rattans will be easy to harvest.

Regarding solitary characteristic, this even gives opportunity to the growers in arranging manau rattan planting particularly in spacing and time of planting. This has been explained by Wan Razali *et al.* (1992). With this system, manau rattan will produce 11,500 m of remarkable manau at the age 15 years. This was roughly equivalent to 8-9 tons per ha or 0.8-0.9 tons per ha annually. If these products were assumed to be sold at district level purchaser, the local community will get money as much as Rp6.3 million per year. We can compare with taman rattans that produce only 900 kg dry rattan per ha annually with price Rp2,500 per kg. The value was Rp2,250,000 per ha annually. This was much lower than the value of manau rattan.

In addition, manau rattans always bear fruit every year that can produce a lot of seeds. And manau rattan seeds are easy to grow and have high percentage in germination. I could conclude that manau rattans do not have any technical problem if the local communities are trained to cultivate the rattans.

Actually, the local community had been trained on manau rattan cultivation. The training materials started from fruit collection, seed cleaning, seed sowing, prickling, until to seedling planting in pilot projects. Based on my evaluation, the local communities were very enthusiastic in doing manau rattan development. In addition, I have facilitated collaboration between Palangkaraya University, rattan industry (PT. Yama Mutiara Rotan and PT. Findora Internusa based in Cirebon) and local community in a small-scale pilot project on cultivation of manau rattan in Pahu Palawa Village, Central Kahayan Sub District, Kapuas District, Central Kalimantan. Besides, I have facilitated the university and the rattan industries in establishing collaboration through a memorandum of understanding in rattan trade. In this case, the follow up from related stakeholder are needed to continue the collaborations.

Overcoming the manau rattan problem regarding low prices, this can be done by reducing, if necessary, cutting the existing rattan chains. This can be done by facilitating the two parties (local community as rattan producer and rattan mills as rattan buyers) in order that they can make direct contact in rattan trade. With this system profit from rattan trade will go to the local community instead of middlemen. In this case, the local community as rattan producers should meet the rattan mill quality requirement. Therefore, they should be provided training in both rattan cultivation and processing.

In managing the problem solving above, cooperation among the main stakeholders were needed. Stakeholders that were very relevant to involve in managing the rattan cultivation were agriculture, forestry, and industrial institutions and universities. They can provide training regarding manau rattan cultivation and processing. In rattan processing training, rattan industries can also be involved because they have capacity whether from financial aspect or from technical skill one. That is one of the advantages if the local community make direct contacts with the rattan industries. They can make useful communication related to rattan quality and rattan price. The stakeholders can also facilitate relationship between the local community and rattan mills or industries in rattan trade. Yet, in this case, monitoring and supervising from the government for all the activity should work. This is related to regulations and other policies that will make local community and industry activities more fluent.

CONCLUSIONS

1. Manau rattans in the forests had been depleted.
2. Based on the calculation of production, manau rattan should be managed properly because they have higher benefit than other rattan species.
3. To well manage the manau rattan, stakeholders should collaborate in facilitating training and establishing direct relationship between the local community as manau rattan producers and the rattan industries as rattan buyers.
4. The government should supervise and monitor the collaboration, so that the collaboration can run well and continuously. This is related to the regulations and policies regarding rattan plantations and rattan trade.

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Agroforestry of *Cinnamomum burmanii* Blume: Farmer Livelihoods Strategy in Merangin Regency, Jambi Province

Sri Lestari, and B. Tejo Premono

Environment and Forestry Research Institute of Palembang, Ministry of Environment and Forestry Jl. Kol. H. Burlian Km 6.5 Puntikayu Palembang, South Sumatra Indonesia

E-mail : [1] lestari @iuj.ac.jp, [2]btejoprem80@gmail.com

ABSTRACT

Agroforestry is one form of land use optimization which not only benefits the farmers as a source of livelihood but also broadly beneficial to the environment. Farmers carried out agroforestry system by mixing some commodities that has economics value on the same land with the aim to maximize land productivity. Consequently it can serve as a source of household livelihoods. This study aimed to determine the purpose of Cinnamomum burmanii Blume agroforestry management by farmers, identify agroforestry models developed by farmers, as well as calculating the financial analysis of agroforestry models. Farming by farmers were highly vulnerable to risk and uncertainty, because the productivity of agricultural crops greatly influenced by climate and market. Farmers anticipated this condition by planting more than one type of commodity that has economics value. Therefore, agroforestry of cinnamon can be a solution to the optimization of land use and livelihood strategies for the farmers. Agroforestry of cinnamon can generate cash income and also can be used as savings. Based on the analysis results, agroforestry of cinnamon with coffee and rubber plants were able to provide the feasibility of farming. Agroforestry coffee with cinnamon had NPV Rp. 39,150,048 48,505,252.40, BCR 2.08, and IRR 34% while rubber agroforestry had NPV Rp. 1,400,648, BCR 1.04 and IRR 11%. From the analysis of financial feasibility, cinnamon that grown in monoculture system was less profitable but could provide the greatest amount of revenue. This was caused by the presence of a long harvest time and the absence of intermediate results during the waiting time. Cinnamon cultivation pattern selection by farmers depended on the socio-economic condition of households and the perspectives of farmers in the planting pattern.

Keywords: Agroforestry, cinnamon, financial feasibility, land optimization.

INTRODUCTION

Agroforestry is defined as the practice of farming with intensive land management by combining timber plant with agricultural crops or livestock (Gold and Garret, 2009). Agroforestry is one form of optimization and efficiency of land management that aims to maximize profits (Molua, 2005), reducing the risk (safety nets) (Lin, 2011; Nguyen, *et al*., 2013) and improve environmental quality (Place & Otsuka, 2002; Dahlquist *et al*., 2007) soil conservation (Pretty *et al.*, 2011), soil carbon (Saha, *et al*., 2009; Thangata & Hildebrand, 2012) so as to support the sustainability of production and sources of income for farmers. Agroforestry practices carried out by the farmer households were chosen to provide the diversity of the results and also reduce the risk and uncertainty in farming. Agroforestry cinnamon (*Cinnamomum burmanii* Blume) done by many people on the plateau in the Merangin Regency especially Muara Siau, Lembah Masurai and Jangkat.

Based on Permenhut No. P.35/Menhut-II/2007 about non-timber forest products, cinnamon (*Cinnamomum burmanii* Blume) categorized in a drug-producing plants utilization in the form of extracts of Centella asiatica. Indonesia become an exporter of cinnamon in the world with some destination country such as America, the Netherlands, Brazil, Thailand, Germany, India, and so on in which the volume is reaching 45.7 thousand tons in 2011. The cinnamon was exported in the form of dried cinnamon bark and processed products like cinnamon powder, essential oils and oleoresin which has a variety of uses both in the food and beverage industry, pharmaceuticals and cosmetics. Cinnamon sticks which is a waste can be used as the ISO-standard particle board (Abdurachman and Hadjib, 2011). In addition, the waste rod can also be used as firewood and charcoal that have good quality.

Cinnamon is one of the commodity in Jambi province, especially in Merangin and Kerinci regency in which the price was depends on the market, so that the price was unstable. In 2006, the price of cinnamon bark at the farm level dropped into Rp 3,000 per kilogram. Therefore, many farmers replaced it with other commodities that more profitable. But in reality, people still grow cinnamon in their land though not in large numbers as before. Based on the condition above, this study aims to find out why people was still grow cinnamon in their land, how was the planting patterns and how was the feasibility of their business.

MATERIALS AND METHODS

Location and Time of Research

The study was conducted in Lembah Masurai Subdistrict, Merangin Regency which is one of the producing regions of cinnamon in Jambi province (Figure 1). Lembah Masurai Subdistrict have varied altitude > 300 meters above the sea level and slope of 15-40%. Lembah Masurai was also produce coffee and rubber. Cinnamon grown in agroforestry pattern with a commodity that has economic value and some farmers also planted in monoculture system. The study was conducted in October, 2016.

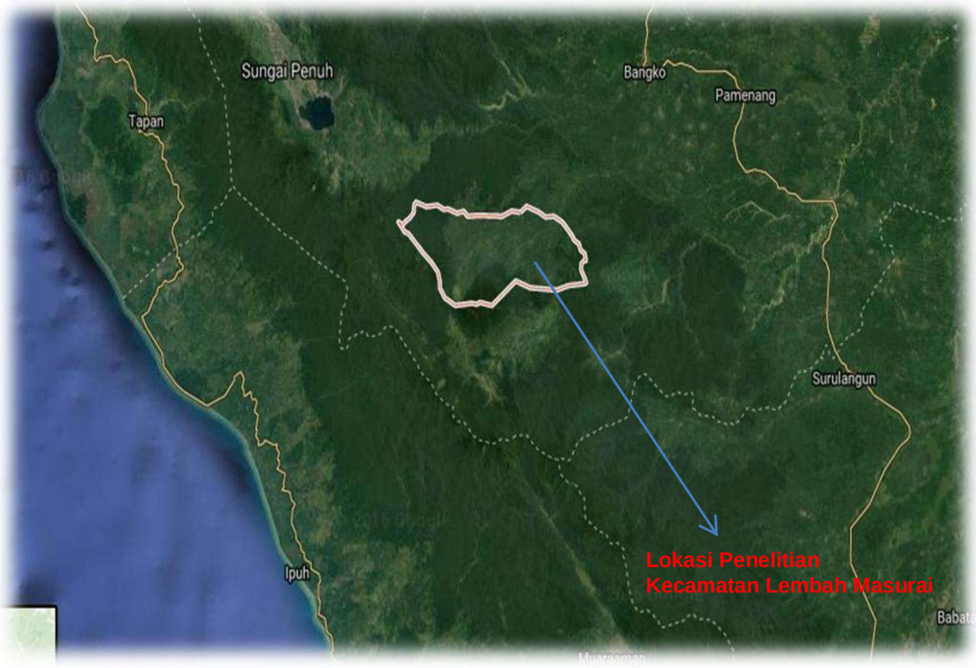


Figure 1. Research location

Data Collection

This research was conducted by collecting primary and secondary data. The method used in this study was survey of households and the market with questionnaires; in-depth discussion with the cinnamon growers, processors, and collector to gather deeper information; and field observation. Respondents were selected deliberately that is farmers who was planting cinnamon and cinnamon market actors. Primary data collected include household characteristics, types of plants in the land, the costs and prices of commodities, harvesting time, and also land management practices as well as other supporting data. Secondary data were obtained from the literature and BPS data.

Data Analysis

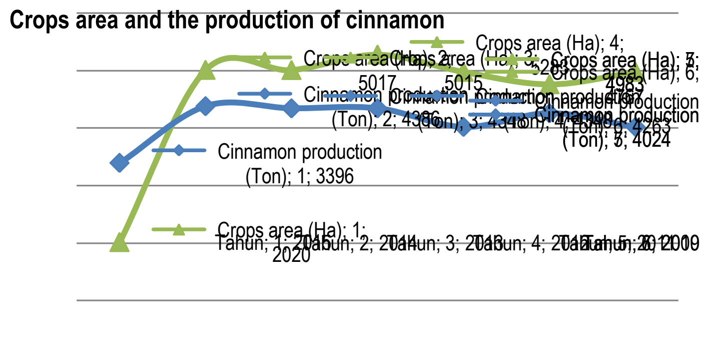
The primary data obtained from interviews with respondents were tabulated and analyzed descriptively both qualitative and quantitative. Results obtained through the discussions are used to deepen the analysis results. Qualitative analysis is used to identify and describe the land management of cinnamon agroforestry that was done by farmers. Quantitative analyzes devoted to the financial analysis of cinnamon agroforestry and also monoculture as the comparison by calculating the NPV, BCR and IRR.

RESULTS AND DISCUSSION

Land Use Pattern of Cinnamon Agroforestry

Agricultural land in Merangin Regency 600 thousand hectares in which the plantation area reached 49.8 percent (BPS, 2016). The main commodity that was planting were oil palm, coffee, rubber and cinnamon. Based on the from plantation and forestry Department, rubber and coffee production volume in 2015 increased, while palm oil and cinnamon had a decline. Overall, agriculture was the highest contributor to GDP at basic prices prevailing in 2015 that is 47.75%. Cinnamon production in 2015 reached 3,396 tons or about 67.920 billion (BPS, 2016). Crop area and production of cinnamon fluctuate each year that can be seen in Table 1.

Table 1. Crops area and the production of cinnamon



	1	2	3	4	5	6	7
Crops area (Ha)	2020	5017	5015	5283	4983	4767	4983
Cinnamon production (Ton)	3396	4386	4348	4348	4024	4263	4024
Tahun	2015	2014	2013	2012	2011	2010	2009

Source: *BPS of Merangin Regency, 2016

Coffee, rubber and cinnamon were commodities that was becoming a major income source of the most people in Muara Siau, Lembah Masurai and Jangkat Subdistrict. Coffee is still the main choice of farmers due to the stability of prices in the last few years compared with rubber plant that the price is still low. Cinnamon is also an option for farmers because cinnamon was generally planted in a mixed pattern or agroforestry together with coffee and rubber. The planting of cinnamon in monoculture system was only done by a small part of society, especially farmers who are classified as rich peasants and has a wide land area. In some cases, planting a tree is one of the strategies because of the scarcity of labor (Godoy, 1992; Frayer, *et al*., 2014) mainly in the area in which the wage of the labor was relatively high.

The pattern of land use by farmers was still traditional and based on the knowledge and ability of farmer's households. Farmers planted more than two of the main species in order to maximize the free space in the land garden. The use of production inputs such as fertilizer and medicine was not well applied. Maintenance of the plants and land was only done by weeding and pruning the plants that are disturbing the main species. The pattern of cultivation by the farmers was coffee with cinnamon and rubber with cinnamon. They also added some plants to support their life (MPTS) such as durian, jengkol (jering), and banana. Farmers also grow seasonal crops such as vegetables, peppers, beans and potatoes under the main plants when the canopy has not closed.

Although this kind of land use was often does not provide maximum results, it was still maintained by farmers. They assume that this form of land use was more profitable and able to deliver sustainable results. Results from the garden can be partially used to meet their daily needs and indirectly can reduce the expenditure of farm households. Moreover, diversification of revenue can reduce poverty (Sultana, 2015).

Nowdays, coffee plants become a major source of income for farmers because of the prices was relatively high, ranging between Rp 19,000-20,000 per kilogram. This price was stable, eventhough the harvesting time was not throughout the year, compared with the price of rubber that was only range from Rp. 6,500-7,000 per kilogram. According to the farmers, the ideal price of rubber latex was arround Rp 10,000 per kilogram because by having this price, farmers can fulfill their needs from their own gardens. In recent years, farmers who have some landa area and other income source do not harvest their rubber because the price was very low. They prefer to look for other jobs such as farm laborers on other people's land to raise cash income. Initially, farmers already had adaptation strategies to meet the needs because of the risk to life. Murdoch (1995) called this strategy as "income smoothing".

Rational consideration of farmers to grow a certain commodities on their land was the market and prices because the market became an incentive for farmers to grow a commodity (Current and Scherr, 1995; Russell & Franzel, 2004). Moreover, Dewees and Saxena (1999) revealed that the decision of farmers for cultivating and managing trees are not only based on the timber market but also because of the perspective of costs and benefits in the cultivation. Market for coffee, rubber and cinnamon has a perfect market structure in which many traders could buy these commodities at competitive rates. Traders and farmer activities related to cinnamon in Merangin Regency can be observed in Figure 2 and 3.Traders of farm production in the village and sub-district helped the farmers to sell their product and get a good price for their crop. Good infrastructure such as roads had an impact on the connection of rural and urban areas so that can reduce the transaction costs (Sultana, 2015). Therefore, farmers can buy all things that they need in the production process and sell the results at a competitive prices.

Figure2: A farmer processed the cinnamon in their home

Figure 3. The small scale traders of cinnamon

The Meaning of Cinnamon Plants in the Planting Pattern

Farmer's decision to adopt a form of planting pattern was based on complex considerations that are often irrational. In fact, that was the actual farmer rational thinking based on their ability and knowledge. The orientation was not only to maximize their profits but also to take an advantage from the free space on their land. In addition, in some cases farmesr also had other special considerations in which every farm household has a different thought and consideration.

Table. 2 The views of farmers on the existing land use patterns

Land use patterns with cinnamon		**Agroforestry of coffee and cinnamon**	**Agroforestry of rubber and cinnamon**	**Monoculture of cinnamon**
Economy	Giving the increase of income that relatively high	++	+	+/-
	Reduce the risk of crop failure	++	+	-/+
	Cinnamon as savings	++	++	++
	Open market	++	++	++
	Driving the regional economy	+	+	+
	Does not require a lot of labor	+	+	++
	Does not interfere other crops	+	+	++
	Fuel wood reserves	++	+	+/-
Socio-cultural	Cinnamon plants become a marker with other land	+	+	+
	Cinnamon plants has become a cultural tradition	++	+	+
	Secured the environment	+	+	+
	Create employment opportunities for others	+	+	-
	Seeing other people who plant cinnamon			
Ecology and environment	Improve soil vertility	++	+	+/-
	Reduce pest	+/-	+/-	+/-
	Reduce erosion	++	++	++

	Improve the microclimate	++	++	++

Land use patterns with cinnamon plants both in the form of agroforestry and monoculture had a different view from the aspects of economic, social, cultural and ecological and environmental. Ecological and environmental aspects of agroforestry patterns was better because it can improve soil fertility and canopy closure (Rao, et al, 1998)

Finansial Analysis of Cinnamon Agroforestry

The financial feasibility of agroforestry patterns for commercial commodity mixed with cinnamon carried out by analyzing the cash flows (cash flow analysis) of income and expenditure in the agricultural business. Revenues earned from the sale of farming production crops and cinnamon by using prices prevailing at the time of the study. Income from farming crops of MPTS such as durian, jengkol, banana and others, as well as from a seasonal crop at the beginning of planting such as peppers, eggplant, beans and others were not taken into account because the detailed of data was not obtained. This was because the majority of the results was used for their own needs. The expenditure was calculated from the entire costs incurred such as land clearing, maintenance, harvesting costs of the crops and cinnamon.

Farm income depends on the productivity of plants and the price of commodities such as rubber, coffee and cinnamon. The productivity of crops affected by plant age, plant maintenance, season, pests and environmental conditions.

In agroforestry patterns of coffee with cinnamon, coffee productivity was calculated up to 18 years in which the rejuvenating coffee plants was every 7 years. Coffee began to bear fruit at the age of 1.5-2 years and the gratest harvest was at the age of 3-4 years. Spacing of the coffee plants and cinnamon was 1,5x1,5 m and spacing of cinnamon was 7x9. Therefore, the number of cinnamon plants in one hectares was 150. In this case, cinnamon was used as a plant shader. Cinnamon was harvested at the age of 7 years when the replanting of coffee was done so that the harvesting process of cinnamon can be easier. At the age of 7 years, each tree of cinnamon will produce 4-4.5 kg of cinnamon bark. Cinnamon has a pretty good coppice after felled so that farmers will usually maintain two coppices as the main stem for the next harvest.

In agroforestry of rubber and cinnamon, rubber productivity was up to 20 years and began to be tapped at the age of 6-7 years. Rubber plants species that grown by the farmers were generally not superior rubber so that the production was relatively low. Additionally, maintenance system in this agroforestry was not good enough. General space of rubber was 4x6 m so that it had 400 rubber plants in one hectares while the number of cinnamon was 100 in the border of the land and also between the rubber plant. In this pattern the growth of cinnamon was not good enough because there was competition for nutrients and light from rubber trees.

In the monoculture system, spacing of cinnamon was 4x4 so that there were 625 of cinnamon in one hectare area. Monoculture planting was done by farmers who have more than one site area so that they classified as rich farmers. Cinnamon was used as a savings or the fulfillment of immediate needs such as school fee of children, hospital cost, the cost of child marriage and so on. Nowdays, cinnamon plantation with monoculture system was difficult to find because the price of cinnamon had been ever at the lowest point, that was Rp.5000,00 per kilogram. Consequently, many farmers replaced the cinnamon with other crops. When the price of cinnamon improved up to Rp 20,000 - 22000.00 per kilogram, the farmers were encouraged to grow cinnamon back.

The calculation at the interest rate of 11% showed that agroforestry of coffee with cinnamon and rubber with cinnamon were financially viable. On the other hand, cinnamon plants in monoculture system declared unfit eventhough at the last periods of harvest the benefits were greatest. Further results can be seen in Table 3.

Table 3. Financial analysis of land use patterns

Lnad use pattern	**(Interest rate) (%)**	**Nominal value**			**Discounted value**		**NPV (Rp)**	**BCR**	**IRR (%)**
		Total Cost (Rp/Ha)	**Total Benefit (Rp/Ha)**	**Profit (Rp/Ha)**	**Total Cost (Rp/Ha)**	**Total Benefit (Rp/Ha)**			
Agroforestry of coffe and cinnamon	11	61,260,000	175,100,000	113,810,000	36,133,984	75.284.032	39,150,048	2.08	34
Agroforestry of rubber and cinnamon	11	58,485,000	121,748,000	63,233,000	36,874,354	38..275.002	1,400,648	1.04	11
Cinnamon (monoculture system 4x4 m)	11	50,917,083	168,437,500	117,490,416	33,319,475	22.589.905	-10,729,567	0.68	6

The proportion of income from agroforestry of coffee and cinnamon, respectively was 86.81% and 13.19%, while agroforestry of rubber and cinnamon was 86.45% and 13.55%. Farmers' income was still depends on coffee and rubber crops because the income of cinnamon was relatively small. However, according to the farmers, the income that comes from cinnamon can be used as a savings for unexpected needs when the cinnamon was ready to harvest. According to Avelino, *et al.*, (2011), the benefits from timber crops can be used as a buffer of revenue in case that there were crop failure (Avelino et al, 2011).

CONCLUSION

Agroforestry is a form of optimizing land use by mixing some commodity that has economic value. Agroforestry can help the adaptation of farmers to overcome all forms of threats and also becomes a strategy of farmers as a source of livelihood. Agroforestry was developed by following the needs and culture of the people. One form of agroforestry that was developed by the communities in Lembah Masurai, Merangin Regency.Cinnamon (*Cinnamomum burmanii* Blume) were planted by the communities in which coffee and rubber became the main source of income of farmers.

The revenue from cinnamon became additional income for farmers. Eventhough the price of cinnamon was often fluctuate, the farmers was still motivated to grow cinnamon.

Farmers had a good perspective about cinnamon when it was developed in agroforestry system in terms of economic, social and cultural as well as ecological and environmental. Agroforestry pattern of cinnamon with rubber and coffee is financially feasible to be developed compared with monoculture system of cinnamon. Agroforestry coffee with cinnamon had NPV Rp. 39,150,048 48,505,252.40, BCR 2.08, and IRR 34% while rubber agroforestry had NPV Rp. 1,400,648, BCR 1.04 and IRR 11%.Although the proportion of revenue that came from cinnamon was relatively small the role of cinnamon in agroforestry patterns can be used as a safety for the livelihood of farmers.

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The Product Diversification of Palm Sugar to Improve the Welfare in the Lok Tunggul Village

Dina Naemah[1,2]) , Adistina Fitriani1,[1,2]),and Emmi Winarni[1)]

[1)]*Faculty of Forestry Lambung Mangkurat University,Banjarbaru Indonesia*
[2)]*Center of Excellence Research Consortium for Sustainable Tropical Forests Management, Banjarbaru Indonesia*

E-mail: dina_naemah@yahoo.com

ABSTRACT

Palm trees produce sap that can be processed into palm sugar. One of palm sugar production centers is in Pengaron District in the Lok Tunggul Village. The palm sugar farmers only produce printed palm sugar, there is still no development about this product, such as *gula semut* (crystal palm sugar) or small size of palm sugar with various flavors. The aim of this dedication is improving the skills of sugar farmers to diversify palm sugar product such as crystal palm sugar and small size palm sugar with a various flavors (such as original,ginger,cinnamon).The methods that is used are counceling, discussion, production training and monitoring. The results of this dedication ran smoothly. Counseling and training on processing of palm sugar diversification has received positive responses from palm sugar farmers. Processing diversification product of palm sugar is quite interesting for the participants, especially when processing the crystal palm sugar, which still new for them. Processing small size of palm sugar also got an enthusiastic response because until this time, palm sugar farmers only produced large size palm sugar. Beside that, this training opened their minds and give the information that palm sugar can be mixed with a various flavors such as cinnamon, ginger and other flavors. Palm sugar farmers acquire more knowledge and skills to produce some diversification products and to improve product packaging of palm sugar that can improve the welfare of farmers of the palm sugar.

Keywords: palm sugar, product diversification, Lok Tunggul Village

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INTRODUCTION

Lok Tunggul Village is located in the district Pengaron Banjar Regency, South Kalimantan. This village is one of the central producer for palm sugar. The palm trees are tapped then processed into printed palm sugar. The Potential of palm sugar and spices could help the economy of the Lok Tunggul Village, which is also become livelihood, in addition of farming and fruit orchards. The villagers do not do it by themselves, sometimes they only sell nira's water to other citizes who also cultivate printed palm sugar or to the collectors of sap water that comes to the Lok Tunggul village.The prices of niras's water is about Rp. 1000-2000 / l, while the price of printed palm sugar is aboutRp. 13000-16000 / kg.

Farmers Group ofBerkat Sepakat and Setia Kawan are partner of activity of IbM dedication team. The members of the group sell the sap of palm sugar and processing neera of palm sugar into printed palm sugar as a source of family income in addition to other crops such as fruits and spices. The neera of aren is tapped every day, but the palm sugar can be processed when the neera is quite enough, usually after 2-3 days, palm sugar is produced using a large mold of wood or coconut shell. Printed palm sugar is packed using dried banana leaves and sold in the local market and to the collectors who come to the village of Lok Tunggul.

The Potential of palm neera has not been processed optimally by the farmers' group of Berkat Sepakat and Setia Kawan. Palm neera can be processed into brown sugar palm or mini printed palm sugar with variety of flavors such as ginger, cinnamon, *temulawak* etc. This potential is good to be developed because it can help to improve the economy of the family members of farmers group of IbM partners. The price of brown palm sugar is about Rp.40.000-70.000 / kg while the price of mini printed sugar palm is about Rp. 30,000-50,000 / kg. The packaging product of brown palm sugar and mini printed palm sugar should be attractive so the consumen is interested to buy the product.

The turnover of printed palm sugar approximately is about Rp. 2,000,000-Rp.4.000.000 per each month. Members of the group did not brave enough to cultivate palm sugar in a large scale because the packaging is very simple.

Business management has not been implemented by members of farmers because its still a family business. Fund and the benefits are not managed by themselves and still build together in family finances. Partners of IbM is very interested to get the training of diversification of palm sugar into brown palm sugar.

The training of brown sugar and mini printed sugar palm that has a variety of flavors, instant herbal beverage processing is really helpful because it can solve the production problems that they face. Based on the analysis of the problems, there are many ways to get through it, including the training of product diversification and management training.

Figure 1. The traditional palm sugar

MATERIALS AND METHODS

This study was conducted the village of **Lok Tunggul Pengaron** for 8 (eight months) start from preparation to evaluation activities.

Several phases of the activity methods that will be applied for success activities are including

Counseling and discussion

Providing information about the importance of diversification of palm sugar processing towards the development and advancement village communities in **Lok Tunggul Pengaron village**. The counseling about management is also needed.

Production training

Provide production training for brown sugar palm and printed palm sugar with variety of flavors.

Assistance

Provide mentoring during the production training up to 2 months after the training ended in order to provide an opportunity for partners to obtain guidance and monitoring so that the partners could give product diversification.

Monitoring and evaluation

Monitoring and evaluation, from the beginning, middle and end of the program.

RESULTS AND DISCUSSION

Preparation

Preparation of implementation soon to be done after the signing of the contract in *Lembaga Pengabdian masyarakat Unlam*. The activities are included the first meetings that was attended by all of members of dedication team in order to establish the work plan, implementation strategy, identification and inventory of materials and equipment, and also establish a division of labor among the implementation team**.**

The preparation is also needed according to the coordination towards the headman of tra Lok Tunggul Pengaron Village and its partners. Determine time and place for counseling and training**.** On that meeting, the date that was chosen was on 23-25 August 2016 in one of villager's home.

Counseling

In counseling sessions the participants were given the motivation to actively participated in improving the welfare of the community, especially the welfare of his family. This was revealed because the participants wanted to improve the welfare of his family by utilizing the potential nature of palm trees. The members of the group, including fathers, mothers and young girls can do positive activities such as processing palm nectar into a brown sugar palm, and mini printed sugar palm with various flavors such as original, ginger and cinnamon that does not require complicated technology and time-consuming .

Beside the motivation of good and right entrepreneurship, they also give the counseling on marketing strategy and business management. Marketing strategy can be done by creating a unique and attractive packaging, words by mouth, brochures and sell it via souvenir shop. Business management is also very important, so the participants can manage their business well, such as separating the household finances and business finances, record ing expenses and income in a simple cash book, etc.

In the discussion session, the participants actively providing various questions about motivation, entrepreneurship, business management and processing of palm juice. Almost 65% of the participants actively asking a various questions, such as how to prepare raw materials, using the equipments, tips for success to eliminatie the fear of starting a business, preservatives that can be used, expiry date of products, promotion, marketing strategy, etc. They were really enthusiastic and interested in starting a business.

Training

The training activities ran so well. Participants played an active role in preparing some materials and equipments that are needed. Participants can controlled almost 70% of a given skill. Devotion Team consisted of faculty staff and students that were very happy to give an example, direction and guidance in this training session.

The diversification of processing the pals sugar is very interesting for the participants. Participants is really interested in brown palm sugar, but has not been informed how to process it. Mini printed palm sugar processing also got enthusiastic response because the participants only used a larger container such as the former soap containers and coconut shell.

Mold for mini printed palm sugar that can be used are bamboo mold, ice-cube trays or small cookie cutters. The flavors that they made before is only original flavor, but this training opened their minds that palm sugar can be mixed with a variety of flavors such as cinnamon, ginger and other flavors.

Figure 2. Counseling and Training in processing brown palm sugar and mini printed palm sugar

Assistance

The assistance is needed to motivate the participants to develop the cottage industries or business activities even in small-scale production. Mentoring session ran quite smoothly. The production of palm sugar and mini printed palm sugar palm print are not entirely sold by participants. The marketing of the products can be done by words by the mouth or through the exhibition as a media campaign. The price of brown palm sugar is about Rp.40.000-70.000 / kg while the price of mini printed sugar palm is about Rp. 30,000-50,000 / kg.

Monitoring and Evaluation

This event was held in LPPM Unlam and in the community (partners). The products have the potential to be developed. Hard work, attractive product packaging and promotion are really needed in developing a business. These businesses provide broad benefits for both farmers and medicinal palm. Partners should continue to support this, especially in terms of business management and expansion of marketing, so the product diversification efforts could bring prosperity to the farmer's group in the village of Lok Tunggul. Partners also hope the cooperation would run continuesly so that the potential that exists in the village of Lok Tunggulcan be explored optimally.

Figure 3. Product diversification of palm sugar in the village of Lok Tunggul Pengaron

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

Processing brown sugar palm and printed palm sugar in mini size witht a variety of flavors is one of the appropriate alternative in order to improve the welfare of the IbM partners in village of Lok Tunggul Pengaron. The knowledge and skills of partners to diversify the product of palm sugar is increased. Manufacture of these products by using the simple technology simple could be developed as a product of home industry.

Suggestions

Small business development in the village of Lok Tunggul Pengaron need to be encouraged in order to improve the welfare of the family can be reached. The obstacles that they face must be addressed and resolved by the government agencies.

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Optimization of Non Timber Forest Product: Innovated Bee Culture to Increase Welfare in Tabukan Barito Kuala South Kalimantan

Arfa Agustina Rezekiah[1,2]), Basir[1]), Anna Maria Makalew[3]), Ratna[3])

[1)]*Faculty of Forestry, Lambung Mangkurat University, Banjarbaru Indonesia*
[2)]*Center of Excellence Research Consortium for Sustainable Tropical Forest Management, Banjarbaru Indonesia*
[3)]*Faculty of Agriculture, Lambung Mangkurat University, Banjarbaru Indonesia*

Email: aarezekiah@unlam.ac.id

ABSTRACT

Research of the first year showed that non timber forest product (NTFP) honey bee in Tabukan Barito Kuala South Kalimantan was potential to be sustainable developed. Especially in Tamba Jaya Village, it was revealed that through traditional culture the contribution of NTFP to the income of community was about 17 %. Financial analysis using BEP and marketing using farmer share. Therefore, the activities of this year was aimed to innovate the technology and good marketing of bee culture to increase forest community welfare. Introducing of several technologies in bee culture were conducted through counselling and training. It was found that the innovated technologies could increase total harvest and bring diversification harvests, honey and royal jelly, that can increase the income significantly. Financial analysis and marketing showed that the income of the community could increase 100 â€“ 150 %. It is expected that the next year activities could find investor to develop sustainable industry of bee products such as honey, royal jelly, bee pollen, propolis, and wax

Keywords: non timber forest product

Carrying Capacity of Tabunio Watershed in Tanah Laut Regency

Syarifuddin Kadir[1,3)], Badaruddin[1,3)], Nurlina[2)], dan ichsan Ridwan[2)]

[1]*Faculty of Forestry, Lambung Mangkurat University, Banjarbaru Indonesia*
[2]*Faculty of Mathematics and Natural Sciences, University of Lambung Mangkurat. Banjarbaru 70714, South Kalimantan, Indonesia*
[3)]*Center of Excellence Research Consortium for Sustainable Tropical Forests Management, Banjarbaru Indonesia*

E-mail: odeng1987@yahoo.com

ABSTRACT

Natural resources have been utilized as the main capital in the economic growth and development in Tabunio Watershed. The natural resources and environmentalmanagement not carried out in accordance with the carrying capacity can have an impact on food, water, energy and environment.
The purpose of this study was to determine the carrying capacity of Tabunio watershed. The result is expected to be a reference for determining the direction of Tabunio watershed restoration. The research method used in the study was an ecological regional approach of watershed, and theprocess and presentation of the analysis wereperformed spatiallythrough geographic information system.
The results of the study: **1)Clean water supply**: low (1,538.63ha); medium(36,898.31 ha); high(23,771.42ha); very high (350.20 ha). **2)Food supply**: low (21,243.89 ha); medium (6,195.53); high (22,851.89 ha); very high (12,267.25 ha). **3)Genetic Resource supply**: low (12,822.08ha); medium(14,240.34 ha); high (31,712.71 ha); very high (3,783.44 ha). **4)Biodiversity supply**: very low (12,822.08 ha); low (3,334.65ha); medium(42618.40 ha); (3,783.44ha). **5) Housing and Living Space**: very low (1,131.19ha); low (1,373.38ha); medium(3,668.54ha); high (16,382.75ha); very high (40,002.70 ha). **6) Recreation and ecosystem**: very low (37,265.27ha); low (16,350.41ha); medium(3,714.37ha); high (1,388.82ha); very high (3,839.69ha).

Keywords: carrying capacity, watershed

INTRODUCTION

Background

Natural resources have been utilized as the main capital in economic growth and development in the watershed Tabunio. Management of natural resources and the environment that are not carried out in accordance with the carrying capacity can have an impact on food, water, energy and the environment.

Agency research and development area of South Kalimantan (2010) states that in 2007 to 2010 in Tanah Laut regency there are events of flooding of 22 villages. an increased vulnerability to flood an area 157.971.40 ha.

Hall watershed management Barito (2009) states that that particular watershed Tabunio with 242.442.5 ha area are critical land area of 56.881.6 ha. whereas in 2013 there were critical land area of 66.966.6 ha, an increase of 17.7%, which cause abnormal discharge fluctuations in the availability of water for domestic use and for agricultural wetlands. Tabunio watershed is one of the watersheds that have peranan very important to the availability of water for agriculture, plantation and domestic indtri in Tanah Laut. Carrying capacity of the environment is the ability of the environment to support humans, other living beings and the balance between the two. Furthermore, the environmental carrying capacity is the ability of the environment to absorb substances, energy, and / or other components into or incorporated into it.Liu and Chen (2006) suggests that the forest cover and a thick grass vegetation types are more effective in controlling runoff and erosion, when compared with multi-cropping, crop corn and other agricultural crops.

the restored watershed carrying capacity is watershed land conditions as well as quantity. quality and continuity of water, socio-economic, investment waterworks and spatial use is not working properly. whereas that needs to be preserved is a watershed that is still functioning properly and to realize the improvement of people's welfare can be achieved. Based on the above, then in order to utilize, prevention, pengedalian and maintenance of natural resources, it is necessary to determine the carrying capacity and the capacity of watersheds Tabunio to realize the conservation of natural resources that can ensure the balance of environment and water management as well as providing social and economic benefits real for the community.

Objectives and Benefits

The purpose of watershed Tabunio Tnah District Seafood aims to Determine the carrying capacity and environmental carrying capacity Tabunio watershed. The results of this study are expected to be useful as a reference in order to rehabilitate forests and land (watershed restoration Tabunio)

MATERIALS AND METHODS

Places and Objects Research

Place of research can be conducted in the watershed Tabunio in Tanah Laut regency area of 62.558.56 ha which is geographically located at 30 44 '14:47 "LS and 1140 37' 2:25" BT. Tabunio watershed consists of 44 villages. Location of the study are presented in Figure 1.

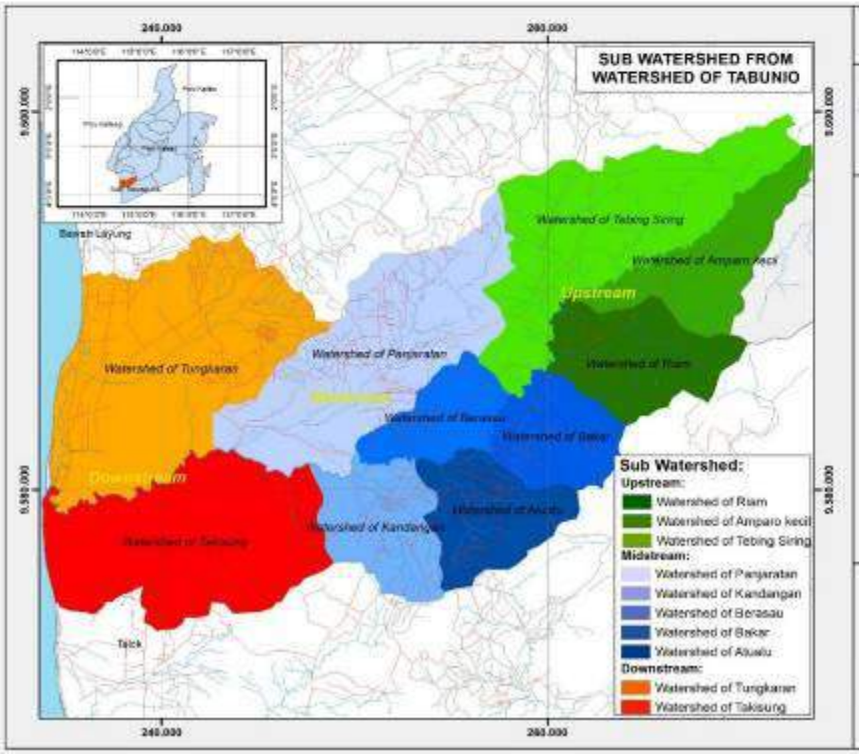

Figure 1. Location of the watershed study Tabanio Tanah Laut

Materials and Equipment

Materials and tools are well-prepared in order to study the carrying capacity of the watershed Tabunio determination are as follows:

a. Teridiri map above; Map Morphology DAS. Administration. Citra SRTM (Shuttle Radar Topography Mission).

b. Hardware: The computer (CPU, monitor, Plotter, Printer)

c. Software: Arc GIS 9 ArcMap version 9.3. Global Mapper 11 and. Simulation Model DAS to conduct hydrological modeling and for the modeling of watersheds.

d. Currentmeter to determine the flow of water in a watershed

e.Water level to determine changes in water level

f. GPS (Global Positioning System) and Stop watch to count time

g. Meter to measure the distance

h. Computer and printer for infut data. processes and analyzes the data and print out.

i. Camera for documentation and stationery

Technical Data and Parameter

This study uses the watershed ecosystem approach that the process of analysis and spatial presentation done by utilizing the technology of Geographic Information Systems (GIS).

Capability and Capacity of water service provision availability

Ecosystems provide the benefits of clean water supply is the availability of clean water that comes from surface water and groundwater (including its storage capacity), even rain water to water availability is presented in Table 1.

Table 1. Parapemeter Capability and Capacity Water Availability

No	Morphology	Slope	Ch (mm)	Land use	Land systems (Ground water)	Capability and Capacity Availability of water Value	Score
1	Mountain / Mountains and Hill / Hills	>40%	1750	Primary forests (dry land, mangrove)	None or Slight	Availability of water is very low	1
2	Mountain / Mountains and Hill / Hills	25-40%	2250	Secondary forest (dry land, mangrove swamp)	>400 ppm NaCl	Availability of water is low	2
3	Hill/Hills	15-25%	2750	Forest plantations, plantation, scrub, dry land agriculture mixed scrub, scrub swamp	250 - 400 ppm NaCl	Availability of water is Moderate	**3**
4	Sloping	2-15%	3250	Dryland farming	<250 ppm NaCl	Availability of high water	4
5	Flat	0-2 %	3750	Open, Rice, ponds, settlements, mining, transmigration, Body of Water, Swamp	<250 ppm NaCl		5

Capability and Capacity Environment and Ecosystem Services Provider Food

Food is a basic need for every living creature to survive. This makes the availability of food in an area is important and must always be guaranteed availability. Parameter Capability and Capacity Availability of Food are presented in Table 2.

Table 2. Parameters Capability and Capacity Availability of Food

No	Land systems	Land Suitability For Foodstuff	Capability and Capacity Availability of Land Food	Score
1.	Kahayan	S2	Availability of Food High	5
2.	Lawanguwang, Kapor, Bakunan, Tanjung, Rangankau	S3		4
3.	Pakau, Klaru, Barah	S3	Availability of Food Moderate	3
3.	Puting, Kajapah	N1	Availability of Food Low	2
5.	Maput, Bukit Pandan, Beriwit, Pendreh, Teweh, Lohai, Luang, Mantalat, Sungai Seratai, Okki, Pakalunai, Honja, Gambut, Mendawai, Telawi, Tewai Baru, Gunung Diangan	N2	Availability of Food Very Low	1

a. Capability and Capacity Provisioning Ecosystem Services Genetic Resources

Ecosystems provide a variety of genetic resources are abundant and economically valuable and beneficial to human welfare. The availability and distribution of genetic resources is determined by the type of ecosystem, ie bentangalam ecoregions and land cover in particular vegetated areas. Parameters of carrying capacity and the capacity of ecosystems to Genetic Resources are presented in Table 3.

Table 3. Parameter Capability and Capacity Impacts Genetic Resources

No	Land Use	Capability and Capacity Availability Genetic Resources	Score
1	Primary forests (dry land, mangrove)	Availability of Genetic Resources is High	5
2	Secondary forest (dry land, mangrove swamp)		4
3	Scrub, dry land agriculture mixed scrub, scrub swamp	Availability of Genetic Resources is Moderate	3

No	Land Use	Capability and Capacity Availability Genetic Resources	Score
4	Plantation, Plantations, dry land agriculture	Availability of Genetic Resources is Low	2
5	Open, Rice, ponds, settlements, mining, transmigration, Body of Water, Swamp		1

Capability and Capacity Services Delivery of Biodiversity

Biodiversity is the diversity among living organisms from all sources including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which are part of the diversity; this includes diversity within species, between species and of ecosystems. Parameters of carrying capacity and carrying capacity Biodivesrtias presented in Table 4.

Table 4. Parameters Capability and Capacity Biodiversity

No	Land Use	Capability and Capacity Biodiversity	Score
1	Primary forests (dry land, mangrove)	Availability od Biodiversity is high	5
2	Secondary forest (dry land, mangrove swamp)		4
3	Forest plantations, plantation, scrub, dry land agriculture mixed scrub, scrub swamp	Availability of Biodiversity is Moderate	3
4	Dryland farming	Availability of Biodiversity is Low	2
5	Open, Rice, ponds, settlements, mining, transmigration, Body of Water, Swamp		1

Capability and Capacity Dwelling and Living Space

Ecosystems provide positive benefits for humans, especially space to live and prosper. Ecosystem services as shelter and living space are socially influenced by the physical and geographical environment and regional development opportunities greater. Parameters of carrying capacity and carrying capacity of Housing and Living Space are presented in Table 5.

Table 5. Parameter Capability and Capacity Dwelling and Living Space

No	Mophology	Slope	Capability and Capacity Housing and Living Space	Score
1	Mountain / Mountains and Hill / Hills	>40%	Availability of Housing and Living Space is very low	1
2	Mountain / Mountains and Hill / Hills	25-40%	Availability of Housing and Living Space Low	2

No	Mophology	Slope	Capability and Capacity Housing and Living Space	Score
3	Hill/Hills	15-25%	Availability of Housing and Living Space Moderate	3
4	Sloping	2-15%	Availability of Residential and High Life Lounge	4
5	Flat	0-2 %		5

Capability and Capacity Recreation and Ekotorisme

Ecosystems provide landscaping features, uniqueness of nature, or specific values that became a tourist attraction. Variations bentangalam greatly affect the value of recreation and cultural services ekotorisme. Parameters of carrying capacity and carrying capacity of Recreation and Ekotorisme presented in Table 6.

Table 6. Parameters Capability and Capacity Recreation And ekotourisme

No	Morphology	Slope	Land Use	Capability and Capacity Recreation And Ecosystems	Score
1a	Mountain / Mountains and Hill / Hills	>40%	Primary forests dry land	Availability of Recreation and Ecosystem Very High	5
1b	Sloping Hill/Hills Mountain/Mountains	2-15% 15-25% 25-40%	Karst, (all vegetative cover on karst	Availability of Recreation and Ecosystem Very High	5
1c	Flat	0 – 2 %	Beach (all vegetative cover on the beach)	Availability of Recreation and Ecosystem Very High	5
2	Mountain / Mountains and Hill / Hills	25-40%	Secondary forests, drylands	Availability of Recreation and Ecosystem High	4
3	Hill/Hills	15-25%	Forest plantations, plantation, scrub, mix the dry land agriculture shrubs	Availability of Recreation and Ecosystem Moderate	3
4	Sloping	2-15%	Dryland farming	Availability of Recreation and Ecosystem Low	2
5	Flat	0-2 %	Open, Rice, ponds, settlements, mining, transmigration, Body of Water, Swamp, scrub marsh, swamp forests are secondary		1

RESULTS AND DISCUSSION

Carrying Capacity Water Supply

watershed Tabuniobenefit is the availability of water supply clean water that comes from surface water and groundwater (including its storage capacity), even rain water can be used for domestic purposes, agriculture, industry and services. In addition to foodstuffs other thing which is also a major requirement for humans is the availability of clean water. Naturally, the clean water may come from surface water, such as rivers and lakes as well as from ground water. Capability and Capacity provider of water supply are presented in Table 7.Zhao et al. (2012) states that the land cover change in a watershed can affect the height of runoff during the rainy season, which may cause fluctuation abnormal and causes flooding, hence this change in use ahan according southwest dakung and environmental capacity for governance arrangements water availability of clean water.

Table 7. Capability of water supply

No	Sub DAS	Level of Capability and Capacity Water Supply					Total (ha)
		Very Low	Low	Moderate	High	Very High	
1	Amparo kecil	-	26,71	3.427,89	453,62	4,66	3.912,88
2	Atuatu	-	-	3.265,90	410,96	-	3.676,86
3	Bakar	-	370,15	2.131,71	659,49	-	3.161,36
4	Berasau	-	26,74	1.608,73	913,18	-	2.548,65
5	Kandangan	-	-	3.017,92	631,46	2,19	3.651,57
6	Panjaratan	-	113,35	5.435,18	4.303,26	45,26	9.897,05
7	Riam	-	247,15	3.654,23	387,53	-	4.288,91
8	Takisung	-	-	3.956,35	5.721,82	96,94	9.775,12
9	Tebing Siring	-	754,52	4.952,23	3.583,52	50,77	9.341,04
10	Tungkaran	-	-	5.448,18	6.706,57	150,38	12.305,14
	Total	**-**	**1.538,63**	**36.898,31**	**23.771,42**	**350,20**	**62.558,56**

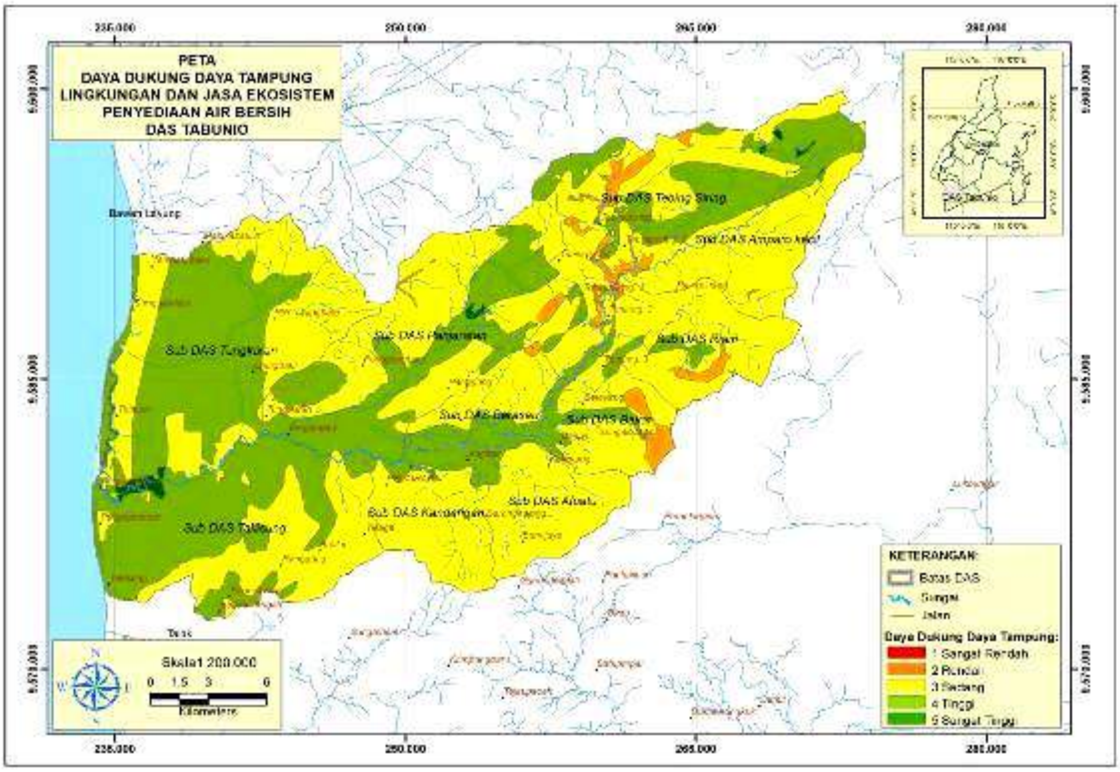

Figure 2. The carrying capacity of water supply capacity

In Tebel 7 shows that the carrying capacity and the capacity of water supply in the watershed Tabunio lower classification 1538.63 ha and 350.20 ha very high classification. Map carrying capacity and the capacity of water supply. presented in Figure 2.Sajikumar and Remya (2015) considers that there are effects of land use and land cover on the characteristics of surface runoff that can affect water quality on every river in a watershed. Fox, et al. (2012) the impact of changes in land cover and management of drainage channel to discharge runoff.

Capability and Capacity Provisioning food

Natural resources in the watershed Tabunio benefit provision of food yaitusegala something that comes from biological sources (plants and animals) danair (fish), whether treated or untreated, which is applied as a food or beverage for consumption manusia.Jenis-type food in Indonesia varied such as rice, maize, cassava, wheat, corn, all kinds of fruit, fish, meat, eggs and so forth. The provision of food by the ecosystem can be derived from agricultural and plantation, livestock food products, marine products and include food from the forest

Kadir (2014) reported that the rehabilitation of mined land vegetative including food crops and mechanically is one of the best alternatives to control the level of vulnerability to flooding biophysical and economic improvement of public welfare

Table 8. Capability and Capacity Provisioning food

No.	Sub DAS	Level of Capability and Capacity provision of food					Total (ha)
		Very Low	Low	Moderate	High	Very High	
1	Amparo kecil	-	2.769,96	-	1.142,91	-	3.912,88
2	Atuatu	-	1.394,03	-	2.084,12	198,71	3.676,86
3	Bakar	-	1.326,40	-	1.834,95	-	3.161,36
4	Berasau	-	165,00	-	2.174,64	209,01	2.548,65
5	Kandangan	-	394,85	-	2.658,44	598,28	3.651,57
6	Panjaratan	-	3.444,39	-	4.098,36	2.354,30	9.897,05
7	Riam	-	3.117,70	-	1.171,21	-	4.288,91
8	Takisung	-	772,17	3.270,11	2.822,70	2.910,14	9.775,12
9	Tebing Siring	-	7.622,46	-	1.718,58	-	9.341,04
10	Tungkaran	-	236,92	2.925,43	3.145,98	5.996,81	12.305,14
	Total	**-**	**21.243,89**	**6.195,53**	**22.851,89**	**12.267,25**	**62.558,56**

In Tebel 8 shows that the carrying capacity and carrying capacity of the food supply in the watershed Tabunio lower classification and the classification of 21243.89 ha ha very high 12267.25.

Food sector is a basic necessity for human life so that the availability of foodstuffs into aspects penting.Ekosistem benefit provision of food is everything that comes from biological sources (plants and animals) and water (fish), whether treated or untreated, which applied as a food or beverage for human consumption. Sriwongsitanon and Taesombat (2011) found a significant correlation between the type of land cover to the behavior of rainfall-runoff for flood events and the impact on food crops.Map carrying capacity and the capacity of the food supply is presented in Figure 3.

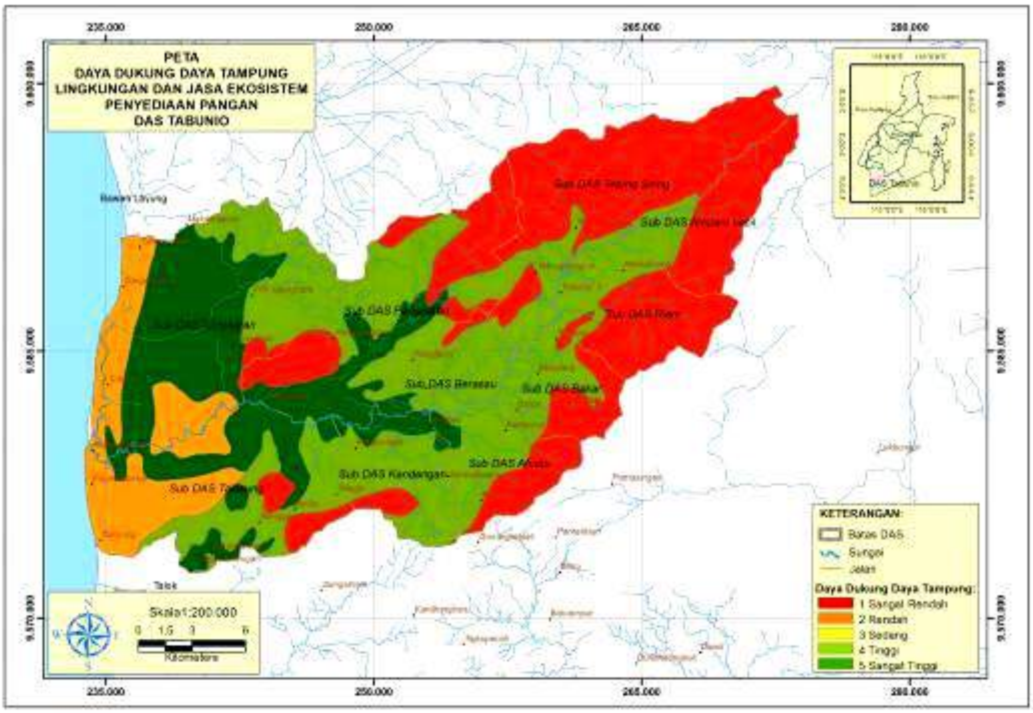

Figure 3. The carrying capacity of the capacity to provide food

Capability and Capacity Provisioning Genetic Resources

The result of the calculation of the carrying capacity of the environment with the capacity genetics genetics ecosystem services in South Kalimantan can be shown in Table 9.

In Tebel 9 shows that the carrying capacity and the capacity of providing genetic resources in the watershed Tabunio very low classification 12822.08 ha and higher classification 3.783,44ha. Peng and Shi-jie Wang (2012) found that the amount of runoff and loss of soil on the hillside karst turned out to be very small compared to the area of non-karst, this happens because the structure of the hydrology double in karst areas, including the quality of the soil and drainage system underground , can influence the process of infiltration (infiltration) and the formation of rain water runoff.

These findings provide a more thorough understanding of the influence of the type of land cover against flooding behavior in a variety of soil moisture conditions and rainfall intensity level. This can be useful in program piñata-use of land and watershed flood management and provision of genetic resources (Sriwongsitanon and Taesombat, 2011).Map carrying capacity and the capacity of providing genetic resources is presented in Figure 4.

Table 9. Capability and Capacity Provisioning Genetic Resources

No.	Sub DAS	Level of Capability and Capacity Provision of Genetic Resources					Total (ha)
		Very Low	Low	Moderate	High	Very High	
1	Amparo kecil	149,71	872,16	1.904,66	986,34	-	3.912,88
2	Atuatu	198,29	218,15	3.260,42		-	3.676,86
3	Bakar	32,51	175,87	2.749,27	203,71	-	3.161,36
4	Berasau	341,27	932,78	1.274,61		-	2.548,65
5	Kandangan	598,51	74,83	2.978,23		-	3.651,57
6	Panjaratan	2.590,14	3.362,99	3.462,87	481,05	-	9.897,05
7	Riam	153,37		3.092,82	1.042,71	-	4.288,91
8	Takisung	1.503,78	3.816,83	4.263,25	191,26	-	9.775,12
9	Tebing Siring	1.894,77	2.020,78	5.073,63	351,87	-	9.341,04
10	Tungkaran	5.359,73	2.765,95	3.652,95	526,50	-	12.305,14
	Total	**12.822,08**	**14.240,34**	**31.712,71**	**3.783,44**	**-**	**62.558,56**

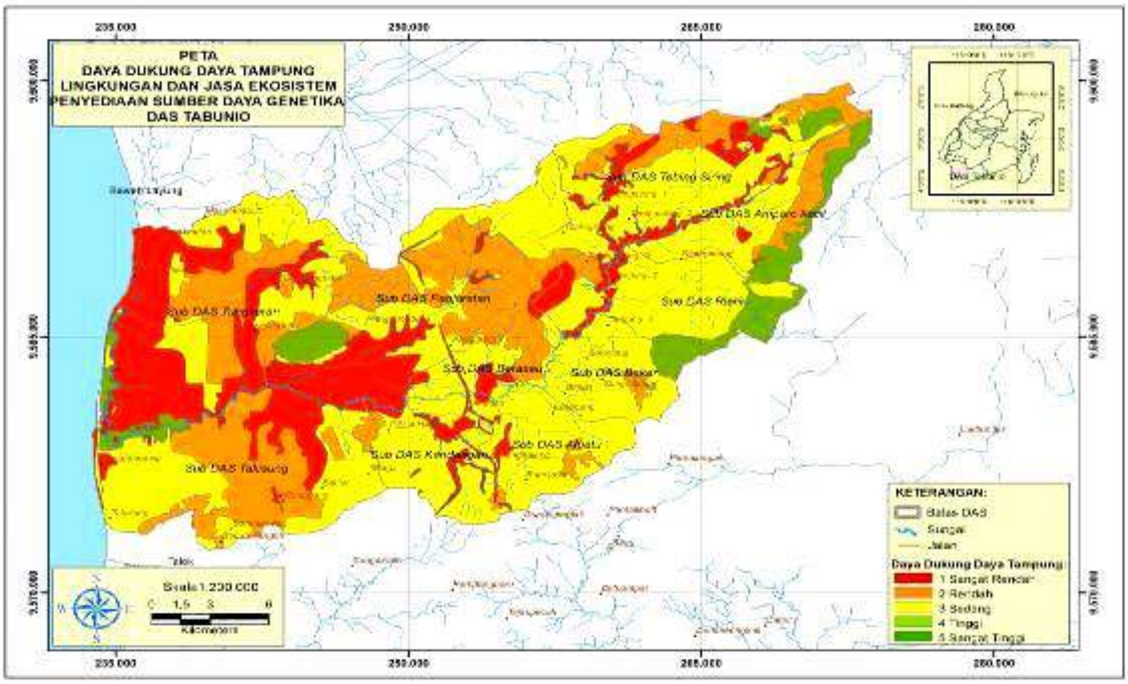

Figure 4. The carrying capacity of the supply capacity of genetic resources

Capability and Capacity Provisioning Biodiversity

Based on the results of the analysis of Capability and Capacity Provisioning Biodiversity of the determination of parameters as shown in Table 10.

Table 10. Capability Provisioning Biodiversity

No	Sub DAS	Level of Capability and Capacity provision of Biodiversity					Total (ha)
		Very Low	**Low**	**Moderate**	**High**	**Very High**	
1	Amparo kecil	149,71	84,31	2.692,51	986,34	-	3.912,88
2	Atuatu	198,29	218,15	3.260,42	-	-	3.676,86
3	Bakar	32,51	175,87	2.749,27	203,71	-	3.161,36
4	Berasau	341,27	-	2.207,39	-	-	2.548,65
5	Kandangan	598,51	21,78	3.031,28	-	-	3.651,57
6	Panjaratan	2.590,14	9,77	6.816,09	481,05	-	9.897,05
7	Riam	153,37	-	3.092,82	1.042,71	-	4.288,91
8	Takisung	1.503,78	2.270,49	5.809,58	191,26	-	9.775,12
9	Tebing Siring	1.894,77	554,27	6.540,13	351,87	-	9.341,04
10	Tungkaran	5.359,73	-	6.418,90	526,50	-	12.305,14
	Total	**12.822,08**	**3.334,65**	**42.618,40**	**3.783,44**	**-**	**62.558,56**

In Tebel 10 shows that the carrying capacity and the capacity of providing biodiversity. in DAS Tabunio very low classification and classification very high 12822.08 3783.44 ha ha. Analysis of carrying capacity with high category can be determined by land use by primary forests such as: upland and mangrove. Mainuri and Owino (2014) study the relationship between landscape and land use, land degradation, it is stated that the difference temapat and altitude affect solum differences that may affect the availability of biodiversity. Aspects of the slope proved to have a major impact on the rate of soil erosion, and the slopes exposed to the sun appeared to have a greater erosion than the shaded slopes, especially for agricultural land (Li et al., 2010).

Map carrying capacity and the capacity of the supply capacity of the supply of biodiversity is presented in Figure 5.

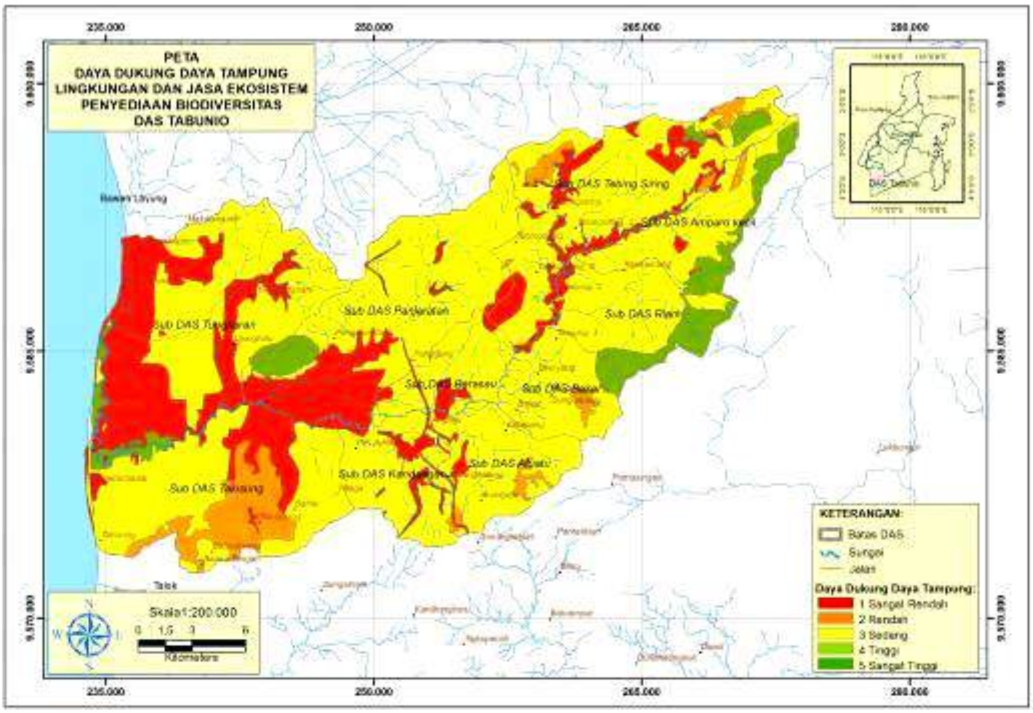

Figure 4. The carrying capacity of the supply capacity biodiverstas

Capability and Capacity Provision of Housing and Living Space

Based on the carrying capacity of the environment and ecosystem services provision of shelter and living space can be seen when the area is in the provision categorized as very low and low then the area has a tendency morphology of natural physical form of the mountainous area and per hills. Carrying capacity and the capacity of providing shelter and living space are presented in Table 11.

Lee (1986) states that the differentiated infltrasi capacity based on the condition of land cover. Land cover is one of the factors that affect infiltration capacity, so the vulnerability of flood control measures for the provision of shelter. Infiltration is a process to reduce runoff, so the higher the lower the infiltration capacity of runoff that can increase the availability of settlement (Asdak, 2010).

One technique to reduce surface runoff of rain water in urban areas is increasing soil infiltration capacity. Olson et al. (2013) investigated the tillage and the addition of compost to improve the capacity and infiltration, and to assess the effectiveness of rehabilitated land for availability pemukimnan residence.

Tabel 11. Capability and Capacity Provision of Housing and Living Space

No.	Sub DAS	Level of Capability and Capacity Provision of Housing and Living Space					Total (ha)
		Very Low	Low	Moderate	High	Very High	

1	Amparo kecil		166,31	1.234,62	2.511,94		3.912,88
2	Atuatu			249,67	645,29	2.781,91	3.676,86
3	Bakar	572,23	106,35	216,47	959,39	1.306,91	3.161,36
4	Berasau		3,30		201,99	2.343,36	2.548,65
5	Kandangan					3.651,57	3.651,57
6	Panjaratan			274,99	2.334,12	7.287,95	9.897,05
7	Riam	558,96	920,02	385,49	2.383,15	41,29	4.288,91
8	Takisung					9.775,12	9.775,12
9	Tebing Siring		177,40	1.307,30	7.346,88	509,46	9.341,04
10	Tungkaran					12.305,14	12.305,14
	Total	**1.131,19**	**1.373,38**	**3.668,54**	**16.382,75**	**40.002,70**	**62.558,56**

in Tebel 11 shows that the carrying capacity and the capacity of providing shelter and living space in the watershed Tabunio 1131.19 ha classification is very low and very high classification 40002.70 hectares. Map carrying capacity and the capacity of providing shelter and living space are presented in Figure 6.

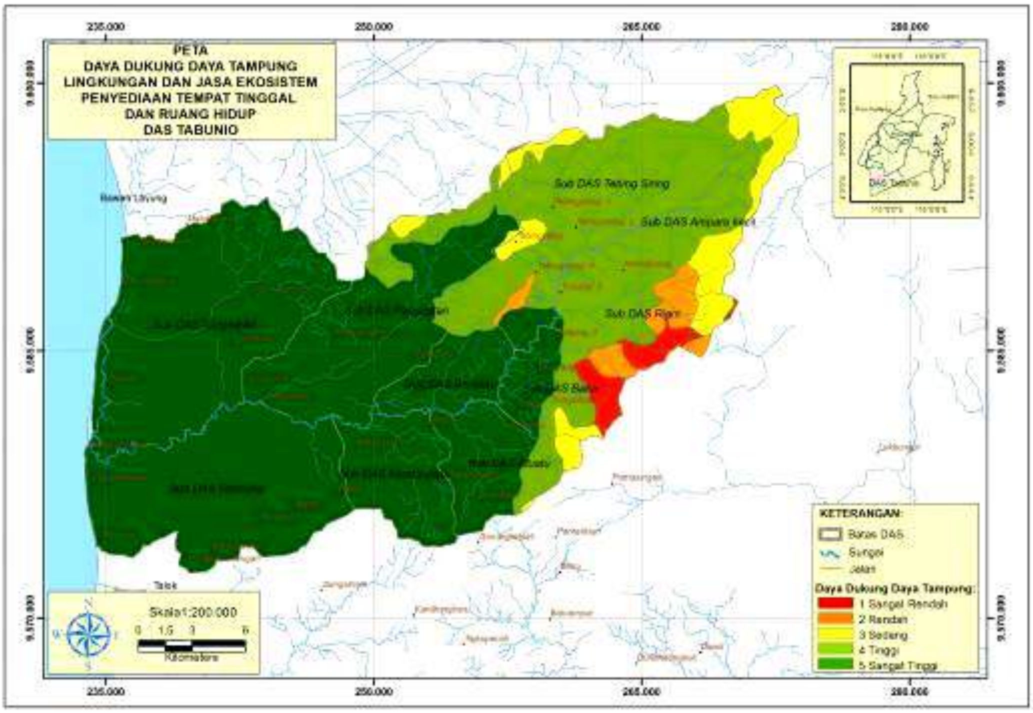

Figure 6. Map of the carrying capacity and the capacity of providing shelter and space life

Capability and Capacity Provisioning Recreation and Ekoturime

Ecosystem recreation and ecotourism are ecoregion high mountains, hills, coastal plains and plains structural. Pegunungan biasanya area has a dominant land cover in the form of forests, thus providing a beautiful view and have air and refreshing atmosphere. Capability and Capacity Provisioning Recreation and Ecotourism presented in Table 12.

Response hydrology and soil erosion on a variety of land use and types of vegetation were analyzed to determine the effect of the variability and the characteristics of the land surface, and to assess the efficiency of alternative land uses in terms of behavior hidrogeomorfisnya to the availability of a tourist destination or recreation (Nunes, Almeida and Coelho, 2011).

Table 12. Capability Provisioning Recreation and Ecotourism

No.	Sub DAS	Level of Capability and Capacity Provision of Recreation and Ecosystems					Total (ha)
		Very Low	Low	Very Low	Low	Very Low	Low
1	Amparo kecil	-	2.497,52	1.244,64	170,71	-	3.912,88
2	Atuatu	2.775,79	647,26	253,81	-	-	3.676,86
3	Bakar	1.299,05	955,26	220,77	103,80	582,47	3.161,36
4	Berasau	2.339,59	204,98	-	4,08	-	2.548,65
5	Kandangan	3.651,57	-	-	-	-	3.651,57
6	Panjaratan	7.257,28	2.353,99	285,78	-	-	9.897,05
7	Riam	39,60	2.372,78	378,62	922,59	575,31	4.288,91
8	Takisung	9.069,56	-	-	-	705,56	9.775,12
9	Tebing Siring	504,04	7.318,62	1.330,76	187,63	-	9.341,04
10	Tungkaran	10.328,78	-	-	-	1.976,35	12.305,14
	Total	**37.265,27**	**16.350,41**	**3.714,37**	**1.388,82**	**3.839,69**	**62.558,56**

InTabel 12 shows that the carrying capacity of providing recreation and ecotourism in the watershed Tabunio very low classification and classification 37265.27 ha ha very high 37265.27. Map carrying capacity of providing recreation and ecotourism is presented in Figure 7. Moghadam et al. (2015) investigated the impact of land management practices and land use on the spark erosion in semiarid regions in Iran, stated that the availability of grass plants reduce erosion splash, it increases the availability of land for recreation.

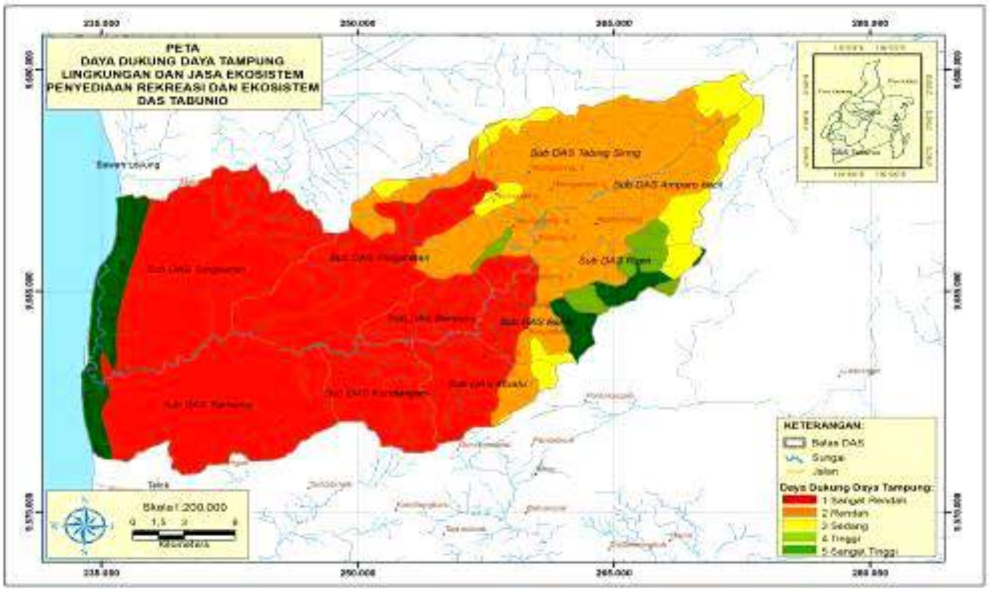

Figure 7. Map carrying capacity and eco-tourism provision rekereation

CONCLUSIONS

1. Clean water supply: low (1,538.63 ha); medium (36,898.31 ha); high (23,771.42 ha); very high (350.20 ha).
2. Food supply: low (21,243.89 ha); medium (6,195.53); high (22,851.89 ha); very high (12,267.25 ha).
3. Genetic Resource supply: low (12,822.08 ha); medium (14,240.34 ha); high (31,712.71 ha); very high (3,783.44 ha).
4. Biodiversity supply: very low (12,822.08 ha); low (3,334.65 ha); medium (42618.40 ha); (3,783.44 ha).
5. Housing and Living Space: very low (1,131.19 ha); low (1,373.38 ha); medium (3,668.54 ha); high (16,382.75 ha); very high (40,002.70 ha).
6. Recreation and ecosystem: very low (37,265.27 ha); low (16,350.41 ha); medium (3,714.37 ha); high (1,388.82 ha); very high (3,839.69 ha).

In the framework of watershed restoration suggested Tabunio be integrated multi-stakeholder, cross-regional, integrated destination for ecological and economic recovery do berdasarkana carrying capacity of the considerable ecological and economic interests

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The Possibility of Gel from the Leaves Used As an Additive Peat Forest Fire Fighting Water

Acep Akbar[1,2)]

[1)] Environment and Forestry Research and Development Institute, Ministry of Environment and Forestry Banjarbaru, South Kalimantan Indonesia
[2)]Center of Excellence Research Consortium for Sustainable Tropical Forests Management, Banjarbaru Indonesia

E-mail : acep_akbar@yahoo.com

ABSTRACT

Fire in peat swamp forests always have two types of fire namely surface fire and ground fire of peat. When fire fighting done, surface fire of ferns fuel and shrubs will be put out directly, but the ground fire frequently still exist as remining fire. When the water has evaporated, fuel is still smoldering and produce flame back that spread to all directions. Outage using only water has been proven to be less effective because the water disappears very quickly, while the fuel is still smoldering. Adding gel into water will slow down evaporation and water loss, so that the coals will be extinguished as a result of ambient conditions which kept moist by a mixture of gel and water. The results of laboratory experiments showed that of the five types of leaves are tried, leaf hibiscus and gardenias become the most potent leaf gel material used for fire extinguisher. Parameter that supports the feasibility gel as solute include viscosity, long evaporation, penetration of material into the peat, and the adhesion of material on the fuel. Further research is needed on the manufacture of the gel material in powder form that can be applied for fire fighting.

Keywords: Fire, water, additives material, gel.

Habitat of Local Medicine Plants Based on Geospatial Information at Sub-District Mandiangin South Kalimantan

Wahyuni Ilham

Faculty of Forestry, Lambung Mangkurat University

Email: wfcilham@yahoo.de

ABSTRACT

Nowadays, a big number of local medicine plants had been known more than 243 species in South Kalimantan. It needs to develop, introduce and empower communities to create as socio-entrepreneurship products. This study aimed to analyze the spatial distribution of medicinal plant species based on the characteristics of the habitat of plants in various positions slopes.Getting information and efficiencies for characteristic of habitat of plants must be combined the terrestrial ground survey data and remotely sense data thru object segmentation classification. From the results of satellite imagery SPOT analysis showed there were 6 main categories of land cover associated with the characteristics of 12 species of local medicinal plants in the Hill Mandiangin. Based on the land cover and the contours of local medicinal plants distribution, found in the forest medium density and an altitude of 80 m until - 85 m above sea, and from the slope of the ramps (8-15%). However there are some strong indicators of important properties in case to integrated the socio-entrepreneurship at Sub-District Mandiangin which can be used as a parameter for connecting between land cover with the potential of local medicinal plants: forest density, various of slopes, species and type of satellite imageries.

Keywords: local medicinal plant, socio-entrepreneurship, geospatial information

Strategy of Non Timber Forest Product (Ntfp) Development on Barito Timur District, Central Kalimantan

Hamdani Fauzi[1,4], Mugarni[2],Mahrus Aryadi[1,4], Taufik Hidayat[3]

[1]Faculty of Forestry, Lambung Mangkurat University, Banjarbaru Indonesia
[2]Forestry Services Barito Timur Regencey, Indonesia
[3]Faculty of Agriculture, Lambung Mangkurat University, Banjarbaru Indonesia
[4] Center of Excellence Research Consortium for Sustainable Tropical Forest Management, Banjarbaru Indonesia

E-mail: hamdani.fauzi@unlam.ac.id

ABSTRACT

Non Timber Forest Products (NTFPs) have important social and economic values for society by utilizing NTFPs for their livelihood. The purpose of this research was to make aninventory and to identify NTFPs that has been managed dan utilized by community, to determine superior NTFPs of Barito Timur Regency, to analyze the stake holder's tasks, functions, and rolesin the NTFPs development, and to formulate the development strategy of NTFPs. The research was carried out in selected locations of Barito Timur Regency, Central Kalimantan Province. The data were obtained withindepth interviews tothe key informants and villagers and through surveying the potential of NTFP. Development Strategy was formulated with SWOT analysis.. Primary and secondary data were collected through observation method. The findings showed that the commodity of NTFP in Regency Barito Timur were rattans, agar wood, bamboos, and palm sugar. Rattan was featured NTFP of Regency Barito Timur with the value 68.15. Based on the result of the analysis of Matrix SWOT diagram, the development position of Barito Timur Regency was in quadrant I that showed the coordinate (1,132 and 0,988). It means that the position has strengths and opportunities to make it possible to develop and achieve progress. The stake holders are government, enterpreneurs, and farmers. The development strategies for maximizing the use of rattans were to develop rattan production source by cultivation, developing cooperative businesses as an attempt to increase the use of rattans, to develop the marketingof rattan, and to develop the role of stake holders.

Keywords: Non Timber Forest Product, Development; Strategy

INTRODUCTION

In order to develop non-timber forest products so that its utilization more concerted and focused and sustainable, the government encourages the development of products Non Timber Forest Products (NTFP) featured, both for national, provincial, and local district/city. The Indonesian government has made policies to regulate this timber forest products is through Permenhut No P.35 / Menhut-II / 2007 on Timber Forest next government issued regulation No. P21 / Menhut-II / 2009 concerning the establishment of criteria and indicators type timber forest products featured. The development of non-timber forest product utilization can be done if the existence of non-timber forest products both farmed and which still exist in natural forests is known. Data existence of non-timber forest products that will comprehensively facilitate calculate the potential of non-timber forest products and then mapped spread.

In Central Kalimantan potential timber forest products are dominant such as some species of rattan, jelutung sap, resin, tallow seeds, bark Gemor, aloes, shingle and bird nests. Until now it has collected information leading commodity distribution timber forest products per Province and for the Province of Central Kalimantan, namely aloes, seeds and sap jelutung tallow. Based on the results of the inventory Pilot Project KPHP in Central Kalimantan which implemented United Kingdom - Indonesia Tropical Forest Management Programme (UK-ITFMP) in 1994-1997, in addition to the types Timber Forest is dominant, forest in Central Kalimantan also has considerable potential promising form of medicinal plants, such as *Pasak Bumi, Saluang Belum, Akar Kuning, Akar Ginseng, Sintuk, dan Penawar Bisa*.

East Barito District itself until now known not yet determine the types of non-timber forest products featured. The development of non-timber forest products featured region is needed as a source of livelihood, in exploring the region in the development of non-timber forest products as alternatives to support the availability of food sources, sources of medicine, fiber and other sources. Timber forest products are also featured national policy support in developing and improving the production of non-timber forest products, create new jobs, increase incomes and welfare. Hopefully, by the determination of the types of non-timber forest products are excellent, illustrating that the commitment of the Regional Government in developing the potential of Non-Timber Forest featured East Barito District so it can compete with other top products from outside the region.

Prospects for Non-Timber Forest in the future are expected to increase along with limits on harvesting of timber as the main forest commodities. Utilization of Non-Timber Forest have only relied on the production of Non Timber Forest nature and not in cultivation patterns in an increasing number of products and the sale value of the results of any commodity Timber Forest. This needs to get the attention of various parties to encourage the development of NTFP in order to improve the welfare of society, especially farmers NTFP. Seeing the potential economic value provided by NTFP, it is necessary for a better handling of NTFP, planned, intensive, and synergy of all stakeholders. Looking at the above, it is necessary to conduct research on NTFP featured in East Barito District and strategies pengembangannya.Dengan thus leading commodity NTFP development has economic value and competitiveness is high, and the preservation of the environment in accordance with the physical, social and economic and local culture.

This research aims to inventory and identify Timber Forest Products (NTFP) which has been managed and used by the community in East Barito District. Further development of strategies compiled against Timber Forest Products (NTFP) featured in Barito Timur.

MATERIALS AND METHODS

This research was conducted in the district of East Barito, Central Kalimantan Province. The time required is for 3 months, from May to July 2015.

Types of data collected in order to inventory the potential of NTFPs in the form of primary data and secondary data. The primary data required are crops NTFP inventory data on natural forests and the spread of NTFP. Secondary data needed in inventory of NTFP crops include maps of vegetation or forest cover, administrative district maps, profiles / provincial and reports from the agencies concerned.

Methods of data collection for the inventory and identification methods used in the context of primary data collection include the implementation methods inventory plants NTFP-producing potential and method of determining the type of NTFP featured. Implementation of the inventory carried out by using the method of purposive (intentional) and implementation of identification with the approach P21 / Menhut-II / 2009.

In this study the determination subyekdilakukan purposively or intentionally. Subjects were sampled include collecting society, middlemen and processors or in other words the stakeholders involved in NTFP use in the study area. Subjects were selected as a whole based on the type of NTFP has been managed and used by the public as the champions in East Barito District.

The research subjects consisted of community leaders, civil servants Forestry and Plantation East Barito District, employees of Planning and Regional Development, staff of Department of Cooperatives and SMEs, Trade and Industry and activists / entrepreneurs. In determining the key informants, researchers used a purposive sampling techniques, while defining a regular informant associated with technique of accidental sampling.Data strategy determination obtain in-depth interviews (depth interview) of all the parties associated with this research.

Analysis of the data for the first goal is a descriptive qualitative by identifying the type of NTFP potential which has been managed and used by the community. Further implemented NTFP identification with the approach of Regulation P21 / Menhut-II / 2009. The development strategy NTFP Non-Timber Forest Products featured in East Barito District using SWOT analysis.

RESULTS AND DISCUSSION

Inventory and Identification of Non-Timber Forest

In this study, various types of non-wood forest which are managed and used by the community in Barito Timur, namely rattan, agarwood, palm and bamboo.

Rattan

Rattan known Calamus sp botanists and East Barito District community knew him by name uwei area / paikat. Based Data Rotan potential in East Barito District forest area for Rotan that has been cultivated by the public area of 4,580 ha with a production of 680 tonnes per month) with the type Rattan Rattan garden and Irit. Most distribution area in the district of Causeway Karau. The rattan group grows in natural forests and secondary forests mixed with rubber trees and fruits. To reach the location of the rattan plant more boats with a distance of ± 1 km from the village. Harvesting rattan in the forest is usually done alone or also by hiring others because of limited manpower and time it takes quite a long time from the beginning of the harvest grow to 2.5 years.

The tools used in the collection of rattan is a machete and rope. Usually cane itself is used as the strap. How rattan collection is quite simple, namely, the selection of which is considered quite old trunks, felled pulled and cleaned spines, cut according to the size of the order is then tied, then released into the road to facilitate transportation. Rattan owned by individuals and then sold to collectors. Rattan has been sold to a collector and then scrubbed and cleaned later smoked with sulfur in order to be good and durable until it becomes semi-finished rattan with a slightly yellow color. Fumigation is done so that the color wicker yellow uniform and shiny. Fumigation is done on dry cane is still crusted (naturally) fumigation is essentially a process of oxidation rattan with sulfur (SO2 gas) so that the color of the skin becomes more white rattan. Curing time of about 12 hours and spent about 7.5 kg of sulfur, or 1.8 g / rattan sticks (Jasni, 2005). Event processing into semi-finished rattan is usually done by hired labor with a wage of Rp. 22.000 - Rp. 27,000 per quintal of cane. The role of rattan for the local community is for own use, such as for the manufacture of wicker or for binder Tornado. Rattan processing businesses in East Barito District more manageable by individuals, not the form of cooperatives or groups. Rattan prices ranging between Rp. 1.5 million - 1.8 million per ton. Rattan prices are determined by agreement between the buyer and rattan seekers. Obstacles encountered in the use of rattan is the absence of rattan processing industry in the area, so that people have not been able to process rattan directly to increase the added value of the rattan. Mastery of the community towards processing technology is still low. Factors that cause this is the absence of standards governing all matters related to rattan, and infrastructure / facilities development is still minimal and simple.

Agarwood

Agarwood is a plant cultivated by the people of East Barito and can be found in the District of Hamlet East (Village Tamiang Layang, Dayu, Jaweten, Coral Sky, Haringen, Didi, Magantis, Sarapat, Jaar), District Awang (Village Hayaping, Apar Batu, Bangkirayen, Mungkur Nanakan) Sub Hamlet Central (village Rodok and Competitiveness), District Raren Batuah (Village Lenggang, Unsum, and Baruyan), District Causeway Karau (Village Bambulung, Muruduyung and Lebo), District Paju Epat (Village Balawa and Telang Siong), District of Patangkep Tutui (Bentot village), Sub Continent Lima (Village Taniran, Bagok and Tewah Canto).

Eaglewood in East Barito District, the average age of 6-8 years are planted on the sidelines of the rubber plant. Forms of participation of governments and other institutions are in the form of training inoculation Agarwood, the participation in the exhibition, CSR program between PT Adaro Indonesia with the Department of Forestry and Plantation in Activities Inoculation Agarwood, as well as cooperation with third parties sharing system of 60: 40 for the injection process. Even since the beginning of planting, the local government has taken a very important role. Beginning of planting Agarwood in the Eastern District is of the Forest and Land Rehabilitation Movement (Gerhan) starting in 2004. The plant's overall Eaglewood not yet ready to be harvested so that the potential market is unknown. Some of the village that has been harvested in between the village and the village of Karang Jaweten Sky (District of East Hamlet) and Kandris (Subdistrict Paku) with the result of 3-4 kg of pig aloes per tree with the price of Rp. 3 million per kg (price of middlemen / collector). In the future, this potential can be developed to serve as local superior products.

In this cultivation, almost all the people involved or average has a garden that has been planted with aloes with development facilities owned still local scale. With regard to the fact that happened lately, the rate of utilization of agarwood is more intensive than conservation efforts in the wild. The entry of agarwood from Borneo in Appendix II of CITES, the pressure that all the species to Appendix II Agar incorporated with limited production arrangements and the implementation of the quota system as well as licensing CITES in agarwood trade, is a testament to the potential of agarwood keterancaman natural habitat.

Obstacles faced by society today is the lack of capital for inoculation aloes which inokulannya that is quite expensive per tree. For farmers, Agarwood their capabilities are still limited in terms of cultivation of Agarwood.

Palm Sugar

Palm trees in East Barito District grow in District Central Dusun (village Ampah, Urup, and Putai). During this deployment happen naturally, even as a wild plant alone or forest plants. Palm cultivation is still very rare for research activities for these crops is limited and not continuous as a consequence of a lack of attention to the development of the commodity. From interviews in the field, known to one tree can produce an average of 10 liters per day, with a flowering period of ± 5 months. In addition to as food, namely sugar and flour, the alcohol content also potentially be used as bioethanol. It made the name of the plant which has the Latin name Arenga pinnata Merr sticking out as a plant that could produce alternative fuels in recent years. In addition, the palm tree can mengkonserservasi land for its ability to bind to the surface of the water.Aren besides tapped, also produces kolang forth from the female flowers as a food ingredient for mixed refreshment or snacks such as fresh fruit compote. The new sugar plant began producing sap at the age of 8-10 years with productive period of 2-4 years. Farmers need to be bound every day to tap the sap in the morning and afternoon. Because, if not done tapping, palm will stop producing sap. In some areas aren been exploited, there are taken flour, processed into beverages with a certain level, and now the technology has made it possible to process it into fuel.

Palm sugar is a product of palm sugar concentration with heat (Cooking) until the moisture content is very low (<6%) so that when cold hardened product. In the manufacture of palm sugar heating is carried out until the volume is less than 1/10 of its original volume. Manufacture of palm sugar is quite easy and can be done using simple equipment.

Bamboo

Bamboo is known as botanists Bamboosa sp, where people often call paring. Spread evenly in the village Haringen Eastern District of Hamlet and grows naturally inside and outside the community garden. Utilization of bamboo has been done for generations. The role of bamboo for the people has not been widely used, usually used for his own purposes. The use of bamboo for its own purposes, among other home furnishings, manufacturing warehouse rice, cottage, wicker, binders, chicken coops, fences, fishing traditional (tangguk), materials for making a kite, push to tap rubber, as well as special bamboo telang / bamboo reed to cook lamang (sticky rice). Ridge bamboo are also consumed as a vegetable kind Paring Manis.

The results of calculations leading values of the four types of NTFP. This can be seen in Table 1. Based on Table 1, rattan belonging to the non-timber forest products featured 2 with a total value of seed (TNU) = 68.15. Based Permenhut P21 / Menhut-II / 2009 on Criteria and Indicators Stipulation of Non-Timber Forest seed, then rattan commodity into a commodity NTFP featured in Barito Timur (NU 2) which can be the initial basis for the intensely developed , NTFP else can be seeded with a total value that is Agarwood seed (TNU) 2 = 57.17. Market prospects for agarwood until now it was tempting, but the maintenance costs up to produce the resin is quite expensive. The time required to reach the stage of harvesting any time between 6-8 years after planting.

Table 1. Values NTFP seeded East Barito District

Criteria	Indicator	Rattan	NIT	Agarwood	NIT	Palm Sugarn	NIT	Bambo o	NIT
I. Ekonomi	1. Export Trade	1	21,65	1	16,67	1	13,33	1	16,67
	2. Local Trade lokal	3		1		2		1	
	3. Marketing Scope	2		1		1		1	
	4. International Market Potency	3		3		1		3	

	5. Marketing Chain	1		1		1		1	
	6. Bussines Scope	2		1		1		1	
	7. Investmen	1		2		1		1	
II. Biophysic and Environment	1. Plant Potency	3	14	3	13	1	9	2	10
	2. Distribution	2		2		1		1	
	3. Conservation Status	3		2		3		3	
	4. Shifting	3		3		1		1	
	5. Accessibility	3		3		3		3	
III. Institutions	1. Amount of Bussines Unit	1	10	1	10	1	6,67	1	8,88
	2. Association of Bussines Unit	1		1		1		1	
	3. Role of the Game	3		3		1		3	
	4. Role of Institusions	2		3		1		1	
	5. Commodity Standart	1		1		1		1	
	6. Facilities / Amenities development commodities	1		1		1		1	
IV. Social	1. Community Participation	3	12,5	3	12,5	2	10	1	7,5
	2. Property	2		2		2		2	
V. Technology	1. Shifting Technology	2	10	1	5	1	5	1	5
	2. Product Technology	2		1		1		1	
	TNU		**68,15**		**57,17**		**44,00**		**48,05**
	Provision		NU 2		NU 2		NU 3		NU 3

Development Strategy Non-Timber Forest Products Featured

Based on the results of interviews conducted to the respondents and secondary data collection, it can be seen the power - the power of internal lock which plays an important role in the preparation of commodity development strategies NTFP featured in East Barito District, among others:

Potential

The extent of forest area located in Barito Timur, so it is still possible the rattan cultivation program in this area. Rattan can grow and fertile in areas that are generally high, normal growth in areas that are not too wet or dry. Based on interviews with farmers and rattan collectors in the area of research known that they use the plant rattan is already growing in the forest since decades - twenty years ago by itself. This indicates that the commodity rattan is very suitable to grow in the area of research both in terms of soil and climate conditions that support the growth of rattan well. Rattan is not included in the appendix of CITES means rattan commodity does not have to be used and trade barriers associated with the threat of extinction.

Production Factor

Most rattan potential in East Barito District can be found in the village of Muara Plantau District of Causeway Karau area of 900 ha of 4580 ha in East Barito District. Based on the data, the number of rattan production 680 tons / month. Rattan is a mainstay of society and natural farming is done.

Economy Factor

Rattan is a source of community income which almost all members of the community in the district of Causeway Karau use rattan as one source of income. To grow well rattan plants do not require intensive soil tillage and maintenance costs are relatively cheap. Maintenance is performed just clearing weeds around the plant, while the parent tree trimming when light intensity is less than 80% only done until the age of 2 years. Efforts to anticipate the economic factors of farmers, it is necessary to capital strengthening measures. The form of capital gains in question is the provision of such groups through revolving credit schemes or assistance from the government, banks or industrial management in the form of partnership.Faktor Sumber Daya Manusia

Of the 13 villages in the district of Causeway Karau, 10 villages are known to utilize and manage rattan. Rattan also grows in some areas of other districts. This indicates that the rattan demand by the public. With the people who use this cane is an asset that can be used for future development of rattan. Society can be built to utilize and cultivate cane through ongoing coaching and mentoring.

Marketing Factor

Rattan grows in areas of research, including the type of commercial rattan cane that Irit (Calamus trachycoleus) and Rattan Garden (Calamus roius). Both types of rattan that has a good quality. Indonesian state has a variety of types of rattan from Indonesia around 312 species consist of 8 genera from 13 genera of rattan in the world (Rachman and Jasni, 2006) in (Sahwalita, 2014).

Based on interviews and secondary data collection, it is known weaknesses - weaknesses internal key that plays an important role in the preparation of commodity development strategies NTFP featured in East Barito District, among others :

Cultivation technology

Rattan can grow naturally without the need to be given a lot of treatment. The limited human resources master the skills and knowledge of the cane so the adoption and use of technology is still low.

Facilities and Infrastructure Support

The condition of roads and inadequate transportation tool, but still drivable vehicles, such as cars and motorcycles for transport, but to the location of the rattan plants typically use boats because rattan is rarely found near the settlement must find away from the settlement. According to a statement in which farmers and gatherers based on interviews, these conditions hamper the process of collecting rattan in the forest so it takes a long time.

The lack of variety of products

Ineffectiveness of rattan processing industry in the district so that the cane sold by collectors to wholesalers in Banjarmasin (South Kalimantan) shaped semi-finished rattan grouped by type per kwintalnya. Rattan can be processed into various products crafts or furniture (finished products) that can provide added value to increase the selling price. Based on interviews, it is known that in the East Barito District has built Rattan Processing Industry Development Center by the local district government, but this facility is not used anymore and there is no continuation of rattan processing industry today. The absence of rattan processing technologies that are sold only limited to semi-finished rattan.

Institutions Companion

KUD has not played an active role to help the stakeholders rattan in East Barito District. Based on interviews with village traders note that the village traders using their own capital to buy cane from farmers gatherers in their village. This is because in the village, where they stayed no active cooperatives to help them. Particularly in terms of capital assistance to businesses selling - buying cane in the village. Meanwhile, the gatherers interviewed stated that they provide their own venture capital.

Access to markets and weak pricing information

Rattan cane farmers in the market to rely more on middlemen, thus more advantages enjoyed by merchants. The sale price obtained by gatherers they have yet to meet the needs of everyday life people in this area, this is the case in the absence of a farmers' association collectors or traders in East Barito District useful for making rattan prices to be stable.

Here are some quantitative strategy planning in order to support the development of superior commodities markets wicker district east barito covers: (1) Development of rattan production through aquaculture resources, Program to increase community interest in the cultivation of cane with extension activities regarding the role of rattan cultivation in increasing revenue and forest preservation, (2) Development of a joint effort by business groups to expand by utilizing rattan cane processing industry that already exist. (3) Determination of national standards rattan prices in accordance with its type, access and convenience to traders rattan in Kab. East Barito to sell cane produced to a wider market, Build a better road facilities and adequate to pass. (4) Establish association of cane farmers and traders in East Barito District. Establish a special KUD handle rattan trade, making it easier for stakeholders to get a loan, (5) Provide competent forestry extension in the cultivation and processing of rattan in East Barito District, Provide socialization and counseling about the cane, To collaborate with research bodies and national rattan development in East Kab.Barito. (6) Inventory and identify the entire production of rattan Creating a development plan NON-WOOD FOREST PRODUCTS featured, and Involve the participation of local authorities and relevant agencies in the rattan trade system so as to reduce the role of middlemen.

CONCLUSION

NTFP commodity that has managed and used by communities in East Barito District are: Rattan (Calamus sp), Agar (Aquilaria malacensis), Palm (Arenga pinnata) and Bamboo (Bamboosa sp).

Based on the calculation approach Permenhut P21 / Menhut-II / 2009, Rattan is a leading commodity district of Non-Timber Forest Products (NTFP) in East Barito District classified as category Value Commodity Two (NU2) with a value of 64.63. Based on the results of the analysis of non-wood forest development strategy (NTFP) featured in Barito Timur, known that the IFE matrix analysis and matrix EFE senilai3.502 worth 1,841 are in quadrant VII. The matrix analysis results indicate that the NTFP seed cane in East Barito District are in the stage of maturation, step right strategy to be applied is the market penetration strategy or product development strategy. SWOT analysis is derived from the analysis of the determination of the key success factors (CSFs) showed that the results of SWOT analysis of the strategies contained in the quadrant with the Supreme Power Score value = Top = 72.02 92.11.Skor Weaknesses, Opportunities Top Score = 96.75dan Threat Score Highest value = 67.49. This shows bahwastrategi that can be implemented for the development of superior commodities forest instead of wood looking at strengths and opportunities that exist in East Barito District is to develop a source of rattan production through the cultivation of cane in the form of program marketing development outcomes with value adding activities revenue through marketing results.

SWOT Analysis with the analysis of strategic planning quantitative (QSPM) which menunjukanjumlah overall score of the appeal total amounted to 640.91 and 605.56, which indicates that the strategy plan of quantitative need to choose a market development strategy as a plan alternative strategies, with some planning support for the development of commodity markets rattan featured in Barito regency east.

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Screening of Anti-diabetes Activity of Agarwood Extracts from *Gyrinops versteegii* (Gilg.) Domke in Lombok island, Indonesia

Agus Sukito & Saptadi Darmawan

Research and Development of Non-Timber Forest Product Technology Unit, Forestry Research and Development Agency (FORDA), Ministry of Environment and Forestry, Mataram City, 83111, Indonesia

Email: sukitokun@gmail.com; sukitosan@forda-mof.org

ABSTRACT

Gyrinops versteegii is an endemic plant in Lombok Island, West Nusa Tenggara, which can produce agarwood. In vitro anti-oxidant and anti-diabetes activities from several extracts of agarwood produced by G. versteegii were investigated. The α-glucosidase inhibitory activity assay was conducted to determine the anti-diabetes activity. The toxicity test using brine shrimp lethality test (BSLT) and phytochemical analysis were also conducted in this experiment. As the results, the aseton extracts of agarwood had the α-glucosidase inhibitory activity with the IC_{50} value of 53.46 µg/mL. The toxicity test to the sample shows the high toxicity with the LC_{50} values of 15.44 µg/mL, respectively. The high anti-diabetes activities in aseton extract of agarwood may be caused by their high content of total phenolic (12.75 and 9.17%, respectively) and total flavonoid (19.96 and 14.34%, respectively). This is the first study to investigate the anti-diabetes activity in agarwood extracts produced by G. versteegii from Lombok Island.

Keywords: agarwood, *Gyrinops versteegii*, anti-diabetes activity

Essential oil of *Actinodaphne* sp

Harlinda Kuspradini, Farida Fitriani Purba, Irawan Wijaya Kusuma

Faculty of Forestry, Mulawarman University.
Jl. Ki Hajar Dewantara, PO Box 1013, Gunung Kelua, Samarinda Ulu, Samarinda-75123, East Kalimantan, Indonesia.
Tel./Fax: +62-541-749160.

Email: hkuspradini@fahutan.unmul.ac.id

ABSTRACT

This study investigate the essential oils of Actinodaphne sp. Essential oils were obtained by steam distillation method. The oils were tested for their antimicrobial activity against Gram + ve, Staphylococcus aureus, using agar difussion method. Minimum inhibitory concentration (MIC) was determined. The antibiotic susceptibility test was performed against the test organisms by well diffusion method. The chemical and bioactivity profile of Actinodaphne sp leaves oil were established to investigate its potential uses. The essential oil was evaluated for physical and chemical characteristic such as color, yield, refractive index and solubility in ethanol. A. glomerata has a light yellow color and 0.23% yield. The refractive index value and ratio of oil and ethanol were 1.42 and 1 : 1.2, respectively. Twenty three compounds of Actinodaphne sp leaves oil were identified by gas chromatography. The main compounds were linoleic acid chloride, β-sitosterol and spathulenol. The results showed that Actinodaphne sp oil was found effective against Staphylococcus aureus.

Keywords: *Actinodaphne* sp, essential oil, *Staphylococcus aureus*

Potency of Mangrove Medicinal Plant of Baluran National Park

Susy Andriani

Banjarbaru Environment and Forestry Research and Development Institute
Jl. A. Yani km 28,7 Banjarbaru, South Kalimantan 70721 Indonesia

E-mail : d_vetho@yahoo.com

ABSTRACT

Mangrove has many potential that can be utilized, such as a source of medicine. People in some areas in Indonesia and foreign countries have been using mangrove plants for traditional medicine. Baluran National Park has a fairly extensive mangrove areas. Retrieval activities by communities around taking mangrove wood has threatened the existence of mangrove species. Mangrove plant used for medicinal purposes usually the leaves or bark which are relatively not harmful for mangrove ecosystem. Limited use of mangrove species for medicinal treatment caused by limited knowledge about the benefits of mangroves for medicinal uses. This study aims to determine the potential of mangrove medicinal plants in Baluran National Park. The method used was vegetation analysis and literature study of mangrove species medicinal content. The study was conducted in the mangrove areas of Batu Sampan, Bama Resort, Baluran National Park. The study result stated that in the mangrove areas Batu Sampan, Baluran National Park, there were mangrove species can be used for medicine in seedling, sapling, pole, and tree level. These species included Avicennia marina, Bruguiera gymnorrhyza, Ceriops decandra, Ceriops tagal, Phempis acidula, Rhyzophora apiculata, Rhyzophora mucronata, Rhyzophora sylosa, and Sonneratia alba.

Keywords: mangrove, medicinal plant, Baluran National Park

INTRODUCTION

Mangrove is a unique ecosystem that is extremely fragile. Mangrove forest is a general term used to describe a variety of tropical coastal communities are dominated by a few species of trees or shrubs that have the ability to grow in the salty waters [Nybakken,1992]. The mangrove forest includes trees and shrubs are classified into eight families, and consists of 12 genera of flowering plants: Avicennia, Sonneratia, Rhyzophora, Bruguiera, Ceriops, Xylocarpus, Lummitzera, Laguncularia, Aegiceras, Aegiatilis, Snaeda, and Conocarpus. Mangrove plants can grow well in tropical and subtropical regions that lie between 25º North and 25º South [Kennish, 1990]. In Baluran National Park, mangrove forests are spread almost throughout the coastal region. Mangrove forests dominate the coastal forests of this national park [Sudarmadji, 2000]. Mangrove forest vegetation in Indonesia consisting of trees (14 families), shrubs (4 family), Terna (5 family), liana (3 family), epiphytes (10 family), and parasites (1 family). For Rhizophoraceae family, who are all members consist of tree cover *Bruguiera cylindrica*, *B. exaristata*, *B. gymnorrhiza*, *B. sexangula*, *Ceriops decandra*, *C. tagal*, *Kandelia candel*, *Rhizophora apiculata*, *R. mucronata* and *R. stylosa* [Kartawinata, 1979], and Baluran National Park mangrove has 22 family, the family Rhizophoraceae that has the most numerous species [Sudarmadji, 2000]. Species of family members Rhizophoraceae in TN Baluran consists of: *Bruguiera cylindrica* (L.) Lamk., *Bruguiera gymnorrhiza* (L.) Lamk., *Bruguiera sexangula* (Lour.) Poir., *Ceriops decandra* (Griff.) Ding-Hou., *Ceriops tagal* (Perr.) CB Rob., *Rhizophora apiculata* Blume, *Rhizophora lamarckii* Montr., *Rhizophora mucronata* and *Rhizophora stylosa* Lamarck Griff.

Mangrove utilization as a source of wood should be thought out very carefully. We should think about the other benefits of mangroves. Mangrove has a lot of potential that can be utilized by humans, one of them as a source of medicine. People in some areas in Indonesia and in foreign countries have been using the mangrove plants for traditional medicine. Medicinal purposes of mangrove usually use leaves and bark which were relatively harmless for mangrove ecosystem. The less of mangrove utillization as madicine was caused by limited information and knowledge about mangrove benefits for medicinal purposes. In Baluran National Park itself, the uses of mangrove for medicine was still rare. This study aimed to find out the potency of Baluran National Park mangrove and their medicinal uses and content.

MATERIALS AND METHODS

The study was conducted on February to April 2012 in mangrove area of Tanjung Batusampan, Bama Resort, Baluran National Park, East Java. The data collection of mangrove potention used vegetation analysis with plot size of 2 m x 2 m for seedlings, 5 m x 5 m for sapling, 10 m x 10 m for poles and trees. Then, from data collected analysed to get Frequency (F), Relative Frequency (RF), Density (Den), Relative Density (RDen), Dominancy (Dom), Relative Dominancy (RDom), and Important Value Index (IVI).

The method used in the form of terraced line method. Observations and measurements were performed on the banks of the river/sea towards the land. Determination of the number of sample points and data collecting was done by systematic sampling, which plots laid along the path from the mangrove on the riverbank toward the ground or perpendicular to the beach/sea. The number of plots in this study was 60 plots divided into five lines with number of sample plots for each track as many as 12 plots. The distance between the plots was 50 m, while the distance between the lines was 100 m. Medicinal content of mangrove species found out by literature study.

RESULTS AND DISSCUSSION

Mangrove Diversity of Baluran National Park

Seedling

There were not very abundant of seedling present in the study site. There were only 1—3 individual or even none of seedling found in a plot. Vegetation analyses result of seedling can be seen in Table 1. Below:

Table 1. Important value of seedling in mangrove area ofBatusampan, Bama Resort, Bekol, Baluran National Park.

Species	*Family*	*F*	*RF (%)*	*Den*	*R Den(%)*	*IVI (%)*
Avicennia marina	Avicenniaceae	0.02	5.88	83.33	6.67	12.55
Bruguiera gymnorr-hyza	Rhizophoraceae	0.03	11.77	250.00	20.00	31.77
Ceriops tagal	Rhizophoraceae	0.07	23.53	291.67	23.33	46.86
Pemphis acidula	Lythraceae	0.02	5.88	41.67	3.33	9.22
Rhizophora apiculata	Rhizophoraceae	0.12	41.18	500	40.00	81.18
Rhizophora stylosa	Rhizophoraceae	0.03	11.76	83.33	6.67	18.43
		0.28	100	1250	100	200

Sapling

In sapling level, there was only Rhizophoraceae family existed. Sapling species list can be read in Table 2.

Table 2. Important value of sapling in mangrove area of Batusampan, Bama Resort, Bekol, Baluran National Park

Species	*Family*	*F*	*RF (%)*	*Den*	*RDen (%)*	*IVI (%)*
Bruguiera gymnorr-hiza	Rhizophoraceae	0.03	7.41	13.33	3.51	10.92

Ceriops decandra	Rhizophoraceae	0.03	7.41	33.33	8.77	16.18
Ceriops tagal	Rhizophoraceae	0.10	22.22	80	21.05	43.28
Rhizophora apiculata	Rhizophoraceae	0.12	25.93	86.67	22.81	48.73
Rhizophora mucronata	Rhizophoraceae	0.05	11.11	26.67	7.02	18.13
Rhizophora stylosa	Rhizophoraceae	0.12	25.93	140	36.84	62.77
		0.45	100	380	100	200

Pole

Pole level consisted of Rhizophoraceae family with Rhizophora stylosa in the first place of the highest important value index. List of pole can be seen in Table 3.

Table 3. Important value of pole in mangrove area of Batusampan, Bama Resort, Bekol, Baluran National Park

Jenis	*Famili*	*Dom*	*R Dom (%)*	*F*	*RF (%)*	*Den*	*R Den (%)*	*IVI (%)*
Bruguiera gymnor-rhiza	Rhizo-phoraceae	0.15	8.59	0.02	3.45	8.33	8.48	20.52
Ceriops decandra	Rhizo-phoraceae	0.21	11.9	0.02	3.45	15.00	15.25	30.58
Ceriops tagal	Rhizo-phoraceae	0.75	33.2	0.13	27.6	31.67	32.20	93.01
Rhizophora apiculata	Rhizo-phoraceae	0.3	17.2	0.12	24.1	13.33	13.56	54.93
Rhizophora mucro-nata	Rhizo-phoraceae	0.22	12.5	0.09	17.2	11.67	11.86	41.65
Rhizophora stylosa	Rhizo-phoraceae	0.29	16.5	0.12	24.1	18.33	18.64	59.32
		1.73	100	0.48	100	98.33	100	300

Trees

Rhizophora stylosa had the highest important value index for tree level in study site. The whole species presented can be seen in Table 4.

Table 4. Important value of tree level in mangrove area of Batusampan, Bama Resort, Bekol, Baluran National Park

Species	*Family*	*Dom*	*R Dom (%)*	*F*	*RF (%)*	*Den*	*R Den (%)*	*IVI (%)*
Avicenia marina	Avice-	0.06	0.69	0.02	1.14	1.67	0.84	2.67

	nniaceae							
Bruguiera gymnorrhiza	Rhizo-phoraceae	0.08	10.66	0.20	13.64	20.00	10.08	34.38
Pemphis acidula	Lyth-raceae	0.16	1.75	0.27	1.14	1.67	0.84	3.73
Rhizophora apiculata	Rhizo-phoraceae	3.06	33.37	0.47	31.82	68.33	34.45	99.64
Rhizophora mucronata	Rhizo-phoraceae	1.06	11.52	0.17	11.36	23.33	11.77	34.65
Rhizophora stylosa	Rhizo-phoraceae	3.23	35.14	0.53	36.36	76.67	38.66	110.2
Sonneratia alba	Rhizo-phoraceae	0.63	6.87	0.07	4.55	6.67	3.36	14.78
		9.16	100	1.47	100	198.33	100	300

Potency of Mangrove medicinal Plant of Baluran National Park

Medicinal properties of mangrove plants have been discovered centuries ago, for example, a physician in Cali, Colombia, reported to cure throat cancer, with gargles of mangrove bark, meanwhile, bark of red mangrove trees have been used in folk remedy for a wide array of diseases which associated with the common cold such as nasal congestion, bronchial congestion, runny nose and many more [Duke,2005], [Premanathan,1999]. Mangrove plants had long known as phytochemical or bioactive source [Bandaranyake, 1995]. Traditional uses of mangroves recently attracted the scientific communities to find out the pharmaceutical products to combat a number of serious diseases [Hsu, 1999]. Mangrove plants are a rich source of steroids, triterpenes, saponins, flavonoids alkaloids, phytosterol (isoprenoid) and tannins [Han, 2007]. Phytochemical content like alkaloid, tannin, flavonoid and sugar in mangrove plant extract had antibacterial activities [Fennel, 10]. The mangrove plants and their associates possess a strong antioxidant activity as they grow in the stressful environment conditions.

The hypocotyls of *R. apiculata*, *A. marina* and *R. mucronata* appear to have broad spectrum of antibacterial activity. Marine halophytes are already known for antimicrobial activity [11—12] traceable to the presence of constituents unique to these groups of plants [Ravikumar, 1993] (Ravikumar et al., 1993). Flavonoids are phenolic structure containing one carbonyl group complexes with extra cellular and soluble protein and with bacterial cell wall [Cowan, 1999], thus exhibits antibacterial activity through these complexes. All the plant extracts are having sugar compounds except the *R. apiculata* bark, it is possible that, the presence of sugar somehow facilitated the growth of the microorganisms and hence antagonizing the antibacterial activity of active compounds in the extracts [Arwa, 2008].

Benefits and active content of Baluran National Park mangrove were as listed below:

Avicenia marina

Avicennia marina (Forssk.) Vierh. (Avicenniaceae) has received some attention in determining its important chemical constituents. A napthoforan compound with phytoalexin activity has been isolated[16—17], and fatty acids, sterols and hydrocarbons studied in relation to their chemotaxonomic significance in eleven mangrove species including *A. marina*[Hogg, 1984]. The presence or absence of an iridoid glucoside 2′-cinnamoyl mussaenosidic acid from *A. marina* extracts can be used in subspecific chemotaxonomy[Mélou, 1998]. In vitro antimalarial activity and cytotoxicity of *A. marina* have also been reported and flavonoid glycosides having preliminary anticancer activity isolated[Sharaf, 2000]. Recently, chemo-preventive activity (anti-tumor promoters) of some naphthoquinones and their analogs isolated from *Avicennia*plants was noted [Itiogawa, 2001]. The bark and roots of *A. marina* are known to contain the tannin lapachol [Tomlinson,1994]. The bark, leaves and fruits of A. *marina* are used in folk medicine to treat skin diseases.

Flower and bark functioned as analgesic and antiviral activity [Bandarnayake, 2002]. *A. marina* was endowed with fragments by which found to be able to inhibit replication of HSV of syphilis disease [Nazami, 2013]. *A. marina* had antioxidant activity. Twelve naphthoquinones isolated from the mangrove *Avicennia marina* exhibit strong anti-proliferative activities against L-929 mouse fibroblasts and K562 human chronic myeloid leukemia cell lines [Konoshim, 2001]. Ethanolic extract of *Avicennia marina* plant parts (hypocotyls, collar, bark and flower) had antibacterial activity against the Urinatery Track Infectious pathogens [Ravikumar, 2010].

Avicennia marina extracts showed antimicrobial activity against pathogenic strains including antibiotic resistant strains. The effectiveness of the active compounds present in plant extracts cause the production of growth inhibition zones that appear as clear areas surrounding the wells. Antibacterial activity may be due to active components which are present in plant extracts. However, some plant extracts were unable to exhibit antibacterial activity against tested bacterial strains. These bacterial strains may have some kind of resistance mechanisms e.g. enzymatic inactivation, target sites modification and decrease intracellular drug accumulation [Schwarz, 1999]or the concentration of the compound used may not be sufficient. Crude methanolic extracts of *A. marina* showed better inhibition against all tested bacterial strains, indicating that active ingredients in plant materials could be extracted into methanol. However, highest antibacterial activity was observed against *Erwinia caratovara*. according to the studies the presence of secondary metabolites such as alkaloids, flavonoids and steroids may exert antibacterial activity against tested bacterial strains[Bobbarala, 2009]. Secondary metabolite content in *Avicennia* spp. tisue had potention as *Aeromonas hidophyla* antibacteria [Darminto, 2009].

Avicennia marina can be used to fight trichodiniasis effectively at 20% concentration of A. marina extract in 4 hour of submersion. Leukosit of *Trichodina* sp. invected goldfish had an increasing in neutrofil, eotrofil and monosit cells, and also limfosit cell decreasing from normal limit [Afifah, 2014].

Bruguiera gymorrhyza

Bruguiera gymnorrhiza possess the free radical scavenging and antioxidant activity. *B. Gymnorrhyza* also exhibit the antioxidant and cancer chemoprevention activity [Uddin, 2007].

Ceriops tagal

C. tagal possess the free radical scavenging, antioxidant and cancer chemoprevention activity [Uddin, 2007].

Ceriops decandra

Traditionally, *C. decandra* were used for hepatitic treatment. In the last research proved that *Ceriops decandra* leaf has hepatoprotective activity against carbon tetrachloride induced heaptotoxicity in Wistar albino rats [Gnanadesigan, 2016].

C. decandra possess the free radical scavenging and antioxidant activity. *C. decandra* had a hight lignin content that proved to have antioxidant activity. [Nabeel, 2010] stated that extract of *C. decandra* can control glukose level in diabetic treatment by increasing glycolysis and decreasing gluconeogenesis by modulasion of key enzimes activities in glycolysis. Extract of *C. decandra* part like hypocotil bark were also potencial to be developed as antibakteria [Ravikumar,2010] dan antiviral. Effect of black tea extracted from the mangrove plant *C. decandra* was proved to be anti-oral cancer by Khatiresan et.al. in 2011 [Gnanadesigan, 2016].

Pemphis acidula

An infusion of the sap plus a handful of bark has been drunk as an abortifacient. A filtered infusion of the bark was used as an abortifacient. The bark was also used to treat stomatitis. The bark contains 19 - 43% tannin. In-vitro tests of the bark showed an increased activity on the amplitude and frequency of uterine contractions, which confirms the traditional use in Vanuata as an abortifacient [Bourdy, 1992]. Bark extracts were found to have antibacterial, antioxidant and topoisomerase I inhibitor activities. Four galloyl flavonol glycosides with antioxidant activity have been isolated from leaf extracts. Along the East African coast the bark has been used for tanning. The bark contains 19 - 43% tannin. The rotting wood, mixed with coconut oil, is used as a cosmetic. The scraped bark yields a red dye.

Rhyzophora apiculata

Karang Gading and East Langkat people have used leaves and fruits of *R. Apiculata.* The leaves for stomach ache and wound medication, fruits are for healing mother after birth process. *R. apiculata* has antioxidant and radical scavanger activities.

Hypokotil, collar and barks have larvicidal, antifungal, antifeedant, antimicrobial activity, antiviral properties against human immuno deficiency [Bandarnayake, 2002]. While petroleum eter extract of *Rhizophora apiculata* was the most effective to fight *Culex quinquefasciatus* mosquito larva [Thangam, 1997].

Rhyzophora mucronata

R. mucronata has radical scavanger and anioxidant activities. Hypocotile and barks has antiviral activity, anti HIV activity, growth hormone tests on plants, biotoxicity on fingerlings of fish [Bandarnayake, 2002]. Ethanolic extract of *Rhizophora mucronata* plant parts (hypocotyls, collar, bark and flower) had different antibacterial activity against the Urinary Track Infectious pathogens [Ravikumar, 2006].

Polar extract of *R. mucronata* is a potencial larvaside to fight *Spodoptera litura* instar II larva as it can kill 50% of population in 24 hour treatment with konsentration of 83,4586% [Chalista, 2010].

Rhyzophora stylosa

Rhyzophora stylosa (red mangrove) was one of mangrove species that abundantly present in Eastern Indonesia island. Bark of Rhizophora genus had been used traditionally for many disease. In India, *Rhizophora mucronata bark* has been used for diabetic, and *astringent* for diarhoea. Extract of this species has been reported to have anti bacteria, anti imflamation activities, and protect from mitocondrian disfunction by naphthalene induction, and has radical scavanger and antioxidant activities. Isolated *R. stylosa* was toxsic, and effective to kill *Aedes aegypti mosquito* [Zulkarnaen, 2012].

Sonneratia alba

S. alba exhibit the antioxidant and cancer chemoprevention activity [Uddin, 2007]. Extract of *S. alba* had secondar metabolites that were confirmed to have a weak antibiotic activity againts multidrug-resistant *Staphylococcus aureus*.

CONCLUSION

In the mangrove area of Batu Sampan, Baluran National Park, there were mangrove species can be used for medicine in seedling, sapling, pole, and tree level. These species included *Avicennia marina*, *Bruguera gymnorrhyza*, *Ceriops decandra*, *Ceriops tagal*, *Pemphis acidula*, *Rhyzophora apiculata*, *Rhyzophora mucronata*, *Rhyzophora sylosa*, and *Sonneratia alba.* Mangrove plants are potencial medicinal source due to their active compounds of steroids, triterpenes, saponins, flavonoids alkaloids and tannins.

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The Use of Sawdust and Rice Husk in Cultivating Oyster Mushroom (*Pleurotusostreatus*) at Karang Intan District Banjar Regency

Abdi Fithria[1,2], Siti Saidah[1], FauziRahman[1]

[1]Faculty of Forestry, Lambung Mangkurat University, Banjarbaru Indonesia
[2] Center of Excellence Research Consortium for Sustainable Tropical Forest Management, Banjarbaru Indonesia

E-mail: abdifithriasylva9999@gmail.com

ABSTRACT

This community service activity in KarangIntanDistrictwas aimed to (1) provide technical guidanceabout simple technology and counseling about the use of sawdust and rice husk in cultivating oyster mushrooms; (2) inform the technology of oyster mushrooms cultivation as one of business diversification; and (3) empower the people to develop oyster mushrooms cultivation by using local resources of sawdust and rice husk. This activity includes introduction and technical guidance of oyster mushroom by using sawdust and rice husk, which involved 20 citizens of Mandiangin Barat Dalam Village, KarangIntan District, Banjar Regency, South Kalimantan. The activity was started from lecture activities (counseling) about the use of sawdust and rice husk in cultivating oyster mushroom. The further field activities include the demonstration of making “kumbung” to house the cultivation of oyster mushroom, the preparation of growth medium, the making of bag log, upkeep, and harvesting. Based on the early evaluation about the knowledge they have it can be concluded that their knowledge on the use of sawdust and rice husk in cultivating oyster mushroom was very low. Most of them only heard about it, without further knowledge. This can be seen from average score per respondent per question at early evaluation (0,322), but after evaluation the score went up to 3,156. The people gave their positive responses to learn about marketing the product and their eagerness to find out about the more profitable end result to earn extra income. The abundance of unused rice husk is also a potential for further development.

Key words: sawdust, rice husk, oyster mushroom

INTRODUCTION

In an effort to support government programs to build national economy using optimized natural resources, one of them is by minimizing wasted resources. The optimized resource usage can be performed by usage saving, efficient processing, product diversification, and waste/residue usage. Those steps were done in order to obtain resource usage efficiency, sustainable yields, improve added values of natural resources, which eventually isexpected to increase the income/improve the economy of the people.

One of forestry activities' byproducts is the sawdust. Several research results indicated that the sawdust can have added value for the development of farming commodities because it is very suitable as a growth medium of mushrooms, especially oyster mushroom (*Pleurotusostreatus*). Oyster mushroom has already become popular as delicious and nutritiousfoodstuffbecause it contains relatively high protein, fat, iron, phosphor, thiamin, riboflavin, niacin, calcium, potassium, and sodium. The demand of this kind of mushroom from the market keeps increasing, but its cultivation technique was little known by the people.

As a medium for cultivating oyster mushroom, sawdust is mixed with several fibrous additives like bran, cotton fiber waste, sugar cane waste, reed, and even husk. KarangIntan District is a rice granary of the area, which makes it highly potential to produce husk and bran that all this time only become the waste of rice milling industry. KarangIntan District is one of highly potential districts in Banjar Regency for farming development.

Based on the above situation, simple technology adoption of using sawdust and rice husk in an effort to introduce oyster mushroom in KarangIntan District is highly needed. The result of these activities is expected to become a business diversification for the people of KarangIntan in order to increase the income and welfare of KarangIntan District people.

One of the efforts to optimize the use of forest resource is by minimizing yields of all stages of forestry activities, including the use of the sawdust. On factory level, the sawdust has become an export commodity and is used as the substance for particle boards, bricks, etc. For traditional sawmill level, sawdust is commonly traded as swamp or road filling.

Several research results indicated that sawdust can have added value because it is very suitable as a growth medium of farming commodities like mushrooms, in this case oyster mushroom (*Pleurotusostreatus*). Oyster mushroom is a kind of mushroom with higher nutrition than other kinds of wood mushrooms. Oyster mushroom has also become popular among people as a delicious and nutritious foodstuff that the market demand of this kind of mushroom keeps increasing.

Despite the fact that it has been known as delicious and nutritious foodstuff, the cultivation of oyster mushroom itself was little known by the people. Whereas this mushroom cultivation technique is even more simple and can become business diversification for the people. The ingredients needed for growth media are relatively easy to get and the upkeep is not difficult. For the medium we can use wooden log or sawdust. To become a good medium, sawdust must be mixed with some fibrous additives such as bran, cotton fiber waste, sugar cane waste, reed, and even husk.

In KarangIntan District, sawdust was only used as swamp filling in building constructions, making yards and roads. Whereas the abundant husk since this district is a rice granary of the area, only becomes rice milling industrial waste. The bran, which can also be used as additive ingredient in oyster mushroom cultivation, in this district was only used as animal feed.

To date, there was no activity of utilizing sawdust and rice husk as cultivation media on oyster mushroom cultivation, therefore it is necessary to introduce simple cultivation technique that utilize unused local resources in order to optimize those resources, increasethe added value of the waste, as a business diversification which eventually can improve income of the people.

The lack of local resources utilization to develop oyster mushroom cultivation was due to:

- Generally people were unaware of resource efficiency, that they did not think of utilizing forestry and farming activities waste as useful or valuable materials;
- Generally people only got information that oyster mushroom is edible and delicious foodstuff but they never tried it before;
- People did know about the rich and healthy nutrition contained in oyster mushroom, as food diversity, and culinary riches;
- There was reluctance or even worriesof food poisoning when consuming mushrooms. These worries were caused by the lack of knowledge and some misinformation;
- The technique of utilizing sawdust and rice husk in oyster mushroom cultivation was unknown;
- People did not know that the oyster mushroom cultivation business is not difficult and time-consuming, can become a business to increase income, and is potential to become main source of income.

This activity is aimed to:

1. providetechnical guidance on simple technology and counseling about the use of sawdust and rice husk in cultivating oyster mushrooms in KarangIntan District.
2. inform the technology of oyster mushrooms cultivation as one of business diversifications;
3. empower the people in KarangIntan District to develop oyster mushrooms cultivation by using local resources of sawdust and rice husk.

The benefits of this Community Service Activity is:

1. The technical guidance and counseling will provide practical knowledge about local resource utilization of sawdust and rice husk as growth media in oyster mushroom cultivation business.
2. This activity will add the value of sawdust and rice husk from wastes to main ingredients for farming commodities.

3. The awareness of people will be raised to be more creative in developing business diversification in order to improve their economy and living standard.
4. The income of the people will increase from the marketing of oyster mushroom cultivated.

MATERIAL AND METHODS

This activity includes introduction and technical guidance of oyster mushroom cultivation by using sawdust and rice husk, while adopting technological package already tested by Tim PengabdiUnlam. It is expected that this program can develop the effort to utilize sawdust and rice husk in Mandiangin Barat Dalam Village KarangIntan District. The result of these activities is expected to become business diversification for Mandiangin Barat Dalam Village KarangIntan District in order to improve their income and welfare of the citizens in KarangIntan District. This activity is one of the contributionsand concerns of *Tim PengabdianFakultasKehutananUniversitasLambungMangkurat*as the application of *Tri Dharma PerguruanTinggi*.

Target Audience

The target audience of this activity is the members of society (group) in Mandiangin Barat Dalam Village KhalayakKarangIntan District, Banjar Regency South Kalimantan Province. This group is expected to become motivators for the entire people of other villages in socializing the use of sawdust and rice husk in oyster mushroom cultivation business.

Methods of Activity

This Community Service Activity was conducted using active demonstrative method which involved 15 members of society in Mandiangin Barat Dalam Village KarangIntan District. The application of this activity included the stages of:

Preparation

<u>Initial Meeting</u>

The meeting was held between L2PM Team of UNLAM Lecturers and The Target Group,Forestry Service Staff and Agricultural Service Staff, intended to coordinate in utilizing available farming resources.

<u>Potential and Problem Identification</u>

Tim PengabdianPadaMasyarakatTenagaDosenwith the village officials and Agricultural PPL went to the location to see directly the potential that can be utilized to overcome existing problems and any countermeasures that had been performed.

<u>Evaluation and Interpretation of Initial Data</u>

All kinds of data and information gathered from the field were evaluated and interpreted into activity planning.

Program Socialization

This activity consists of approach and counseling to the people about the purpose and benefits of the program to the people's income level.

Program Application

Assessment (Research)

Action (The Study Result Application to the People)

The study result application to the people was socialized in the form of lecturing (counseling) about the use of sawdust and rice husk in oyster mushroom cultivation business from production process until marketing process, such as the habitat for oyster mushroom, growth, upkeep, harvesting, and product marketing. In the field, the demonstrations of preparing growth medium, upkeep and harvesting were carried out.

Monitoring and Evaluation

This activity was monitored from the beginning, the process, and the end result of the program. Whereas the application to the target audience was evaluated from the knowledge and skill levels before and after the activity, whether they improved significantly. The testing was carried out by comparing the knowledge and skill before and after the activity. The comparison was done by using two tailed t-test according to Sudjana (1984) with the equation:

$$t = \frac{y - x}{S\sqrt{1/n_1 + 1/n_2}}$$

Test criteria:
Ho is accepted if $t_1 - ½\ a < t < t_1 - ½\ a$
Ho is rejected for other values of t.

To obtain data about supporting and obstacle factors in this activity, direct observations were carried out to the situation and condition of the objects, and the target audience were interviewed directly.

Evaluation Design

1. *Initial Evaluation*

In the initial evaluation, the local potential was assessed including: human resources about the knowledge in using natural resources, wastes, and the utilization of sawdust and rice husk waste in the oyster mushroom cultivation activities.

2. *Process Evaluation*

The process evaluation consisted of:

a) Assessment to find out the technique of utilizing sawdust and rice husk as the growth media in oyster mushroom cultivation.

b) The application of the assessment result (action) to the people were done by counseling (lecturing) and field demonstration so that the result can be accepted and adopted by target audience.

3. Final Evaluation

The final evaluation consisted of:

a) The improvement of people's knowledge about the techniques in using sawdust and rice husk as the growth media in oyster mushroom cultivation.

b) Monitoring the skill of the people in Mandiangin Barat Dalam Village KarangIntan District in utilizing sawdust and rice husk as the growth media in oyster mushroom cultivation.

III. RESULT AND DISCUSSION

Service Activity

This activity is the socialization and technical guidance of oyster mushroom cultivation system by using sawdust and rice husk, and the adoption of technological package already tested by Tim PengabdiUnlam, involving 20 citizens of Mandiangin Barat Dalam Village KarangIntan District South Kalimantan.

To socializethe utilization of sawdust and rice husk in order to introduce oyster mushroom cultivation in KarangIntan District, the lecture (counseling) and the action research were carried out directly. This socialization activity took place at Mandiangin Barat Dalam Village Meeting Hall.

Initially, the activities done were in the form of lecturing (counseling) about the use of sawdust and rice husk in oyster mushroom cultivation. The process stages were also described, from the cultivation, production until the marketing process, like oyster mushroom habitat, the growth, upkeep, harvesting and the marketing (of the products).

The field activity were done by demonstrating the construction of kumbung for housing the oyster mushroom, the preparation of growth medium, the making of bag-log, upkeep, until the harvesting.

Based on the initial evaluation about the knowledge they had, it can be concluded that the use of sawdust and rice husk in oyster mushroom cultivation was very low. Generally they have only heard a bit, without further knowledge. This is indicated from the average score per respondent per question in initial evaluation that only reached 0,322, while after evaluation the score rose to 3,156.

Supporting and Obstacle Factors

The internal supporting factor from Tim PengabdianUnlam for this activity is the available fund to carry out the community service. The external supporting factor from the target counseling audience is the high enthusiasm from the citizens to increase knowledge about utilizing sawdust and rice husk in oyster mushroom cultivation, and the help from all parties in accomplishing this activity. The villagers showed positive attitude to learn about product marketing and eagerness to find out the more profitable end products to increase earnings. The abundant yet unused husk in the area is also potential for further development.

The obstacle factor is the inappropriate timing of the activity, since it was carried out during dry season. Technical obstacles and constraints in implementing the activity are caused by the environmental factors, such as hot temperature due to the long dry season that when the mycelium was already filled in the bag-logs and the bag-logs were opened, they dried very quickly. The dryness of these bag-logs needs extra watering treatment. The watering treatment must also be conducted with extra care because if the water hit the mushroom nodules, it would cause decaying/the mushroom failed to grow. The overheated ambient temperature also inhibited the growth of mycelium to become mushroom even though the humidity of the kumbung had been set accordingly.

Other problems are time and funding allocations of the activity. The activity would be more effective if the funding couldbe given until the development and training activities. Since this activity needs skills and knowledge transfer that requiretraining and development ina longer duration and funding that more likely to support the implementation of the activities.

CONCLUSIONS

From the service activities conducted it can be concluded that:

1. The utilization of sawdust and rice husk as additive ingredients for the medium of oyster mushroom cultivation yielded a relatively good mushroom growth. This indicated that KarangIntan region is relatively suitable as a place of oyster mushroom cultivation.
2. Before the activity, most of the people did not know much about the utilization of local rice husk as an additive ingredient for the medium of oyster mushroom cultivation. The activity gave the people better understanding of the issue.

SUGGESTION

The appropriate timing should be taken into consideration in developing oyster mushroom cultivation in KarangIntan District, so that the risk of ineffective cultivation yields due to the environmental factor could be reduced.

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POSTER

Growth Variation of Bitti *(Vitex cofassus)* Seedling from Several Families

C. Andriyani Prasetyawati1[1)] and Purwanto Budi Santosa[2)]

[1)] *Makassar Environment and Forestry Research Development Institute*
Makassar, Sulawesi Selatan Indonesia
[2)] *Banjarbaru Environment and Forestry Research Development Institute*

E-mail : andriyani_pras@yahoo.co.id

ABSTRACT

Timber exploitation without replanting could extinct some of certain commercial species. Establishment of forest plantation is urgently needed. Genetic diversity has a key position in the breeding program because there are opportunities to perform gene selection for desirable traits. The aim of the research was to investigate the variation of seedling growth of bitti which is influenced by gen. The research method was using Completely Randomized Design (CRD). There were 17 families of bitti seedling from Bulukumba Regency and 11 families from Bone Regency. Each family has 40 seedling. Bitti seedling originated from Bulukumba Regency at the age of 9 months in nursery, have significant differences between families at variable height, diameter and seedling robustness value. Highest seedling obtained by BK 8 with an average height 50.05 cm and an average diameter of 4.35 mm. Robustness fairly balanced seedlings obtained by family of BK 12 with a value of 8.50 seedlings robustness. Bitti seedling originated from Bone Regency at the age of 7 months in the nursery, have significant differences between families which were tested at variable height, diameter and robustness of seedlings. Highest seedling BN obtained by 23 families with an height average 33.41 cm and the largest diameter of the BN 08 family with average of 4.15 mm. Optimal robustness seedlings obtained by families BN 5, BN 17, BN 08 and BN 21, which is value between 6.95 to 7.84.

Keywords: Bitti, growth, robustness seedlings, genetic variations

Utilization Potential of Famili Palmae Plants in the Bajuin Waterfall Area Tanah Laut Regency

M. Arsyad

Faculty of Teacher Training and Education, Lambung Mangkurat University,Banjarmasin Indonesia

E-mail: muhammadarsyad@unlam.ac.id

ABSTRACT

Palmae is one family of plants that can be found in tropical and subtropical regions, in the mountains and on the coast. Bajuin waterfall area is one of the areas there are several species of famili Palmae. Mostly part of famili palmae plants can be used, for example fruit and stem of Cocos nucifera. The Objectives of the research to determine utilization potential of the plant famili Palmae by people in the Bajun waterfall area. The method used is direct observation with inventory species of famili Palmae that exist in the Bajuin waterfall area. Information and data about utilization potential of plant family Palmae obtained for interviews and supported by secondary data from literature. The results showed there were 8 (eight) famili Palmae species were found, 7 (seven) of them have potential utilization. Species of famili Palmae that have potential utilization in the form of the stem are Caryota monostachya, Calamus ovoideus, Cocos nucifera, and Areca catechu. Species of famili Palmae that used the leaves is Cocos nucifera. Species of famili that used the fruit are Salacca edulis, Cocos nucifera, and Areca catechu. Species of famili Palmae that utilized part of the sap is Arenga pinnata.

Keywords: Utilization Potential, Famili Palmae, Bajuin Waterfall

Medicinal Plants of the *Litsea* Genus from Indonesia

Dewi Alimah

Banjarbaru Environment and Forestry Research Development Institute, South Kalimantan Indonesia

E-mail: dewi_alimah@yahoo.com

ABSTRACT

The Litsea genus is one of the most diverse genera of evergreen trees belong to Lauraceae. Litsea species is an indigenous widely grown species on secondary forest and wetland in Indonesia. These genus can also be found in peat swamp forest, particularly in Kalimantan and Sumatra. The genus have been used globally in traditional medicine for treatment of variouse diseases including influenza, stomach aches, diarrhea, diabetes, vomiting, bone pain, inflammation, and other ailment. In Indonesia, utilization of Litsea have not being widely known yet. This paper aims to provide information about ethnobotany, pharmacology properties, and evaluate potential utilization related active compound of Litsea. Information on the Litsea species was collected via electronic search (using Pubmed, SciFinder, Google Scholar, and Web of Science) and a library for articles published in peer-reviewed journals. The result showed that 6 plants of genus Litsea from Indonesia were found to be potential medicinal plant. The crude extracts and the isolated metabolites of these species have exhibited in vitro and in vivo pharmacology effect, including antimicrobial activity, antioxidant activity, anti-inflammatory activity, antiasthmatic activity, anticholelithogenic activity, as well as function on central nervous system.

Keywords: Litsea, medicinal plant, ethnobotany, pharmacology

INTRODUCTION

The *Litsea* genus is one of the most genera of evergreen trees belonging to family Lauraceae. In Indonesia, *Litsea* distributed abundantly across secondary forest and wetland, including peat swamp forest in Kalimantan and Sumatra(I.T.C. Wibisono. *et al*, 2005), (C. Ali. *et al*, 2008), (S. Rahayu, *et al*, 2011). Plants of the *Litsea* genus includes lesser known species and the utilization is still limited. In Indonesia, *Litsea* have been known as one of essential oil and the cultivation have been studied. From many these genus, only *Litsea cuceba* which have been used as traditional spasmolitic (called oils of massage) since a long time by ethnic of Dayak [4].

Plants of the genus *Litsea* have been used globally in traditional medicine for thousand of years [5]. Even 20 plants of these genus are found to be important traditional medicine in China [6]. In China and other countries such as Japan, Malaysia, India etc the ethnobotany and pharmacology from various *Litsea* have been studied. Moreover, the chemical constituents of these genus have been studied since 1889 [5]-[7]. The information about the genus *Litsea* for these properties is very low, although it as medicinal plants have been known. This paper aims to provide information about ethnobotany, pharmacology, and evaluate potential utilization related active compound of *Litsea*.

METHODS AND MATERIALS

The compilation of vernacular names and traditional uses of litsea species from different region of the country was actualised by systematically searching the scientific literatures including Indonesian herbal classics, scientific data bases (using Pubmed, SciFinder, Google Scholar, and Web of Science) and a library for articles published in peer-reviewed journals.

RESULTS AND DISCUSSION

Ethnomedicinal Uses

Some studies reported about 400 or 622 species in this genus, mostly in tropical Asia but with a few species in the island of the Pacific, Australia, and in North and Central America [8]-[11]. The most significant recently published regional revisions are for China with 74 species [12], Nepal with 11 species (Pendry, 2011), and in Indonesia with 22 species [13].

On the basis of our investigations, there are 7 plants species of the genus *Litsea*, which are grown in Indonesia have been reported as important traditional medicines. The medicinal plants of genus *Litsea* used in traditional medicine system of the world are listed in Table 1. The information indicates that Indonesian people use two species, mainly for medicinal purpose. *Litsea cuceba* (Lour.) Pres is in the most demand as a spice, and it is sold in rural and urban markets. However, *L. odorifera* is also locally used and commercialized as spices in localities, particularly in Madura [14].

Regarding ethnomedical application, *L. cuceba* was the species most quoted, especially as a flavoring and herbal medicine, followed by *L. glutinosa, L. odorifera*. As a flavoring, *L. cuceba* gives a unique flavor enhancer in food, cosmetics, and cigarettes [5],[15]. *L.cuceba* locally known as Balanga, by the people of East Kalimantan especially Dayak Kenyah tribe use as

Tabel 1. Medicinal Plants of the Genus *Litsea* Used

No.	Species	Vernacular Names	Medicinal Part	Ethnomedical uses	Utilization	References
1	*L. cuceba* (Lour.) Pers.	Balanga/apokayan (East Kalimantan), ki lemo (Sunda), krangean (Java)	fruits	Relieving pain, promoting blood circulation, as well as treating stomach distension, asthma, emesia, diarrhea, turbid urine, and traumatic injury	Essential oils	[16]-[19]
			Roots	Treating cold, stomachache, headache, dermatophytosis, and arthralgia		
			Leaves	Promoting blood circulation, treating mammitis, as well as externally used for hemostasis, sores furuncle, insect and snake bites		
2	*L. elliptica* Blume	Trawas, prawas (Melayu), ajau galung, medang, medang pasir, medang pawas, medang pirawas, medang selampate, pirawas, tonsod onsod (Kalimantan)	Leaves	Headache, Stomach ulcers and fever, insect repellent	Unknown	[20]-[25]
3	*L. garciae* S. Vidal	Engkala (West Kalimantan), Kalangkala (South Kalimantan)	Fruits	Food, antifungal, antioxidant	Unknown	[26]-[27]
			Bark	Cure cartepillar stings, as antidote on snakebite wounds, for muscular pains and sprained ankles and knees		
			Leaves	Treating Skin burn, skin diseases and infection of the palms,		
			Root bark	As a poultice for sprains		
4	*L. odorifera* Val.	Perawas (Indonesia)	Leaves	Anti HSV-1, helping a woman regaining their health after pasturition for promoting lactation, and heal boils and furuncles	Decoction, herbs in pill form	[14]
5	*L. chinensis* (Gaerthn.) Sonner/*L. glutinosa* (Lour.) C.B. Rob./*L. sebifera* Pers.	Unknown	Fruit, leaves, stem, bark	Emultion and mild astringent for leucorrhea, diarrhea, and dysentery, for poulticing sprains and bruises the oil extraxted from the seed for rheumatis, treating furuncle and traumatic injury	Essential oils, decoctions, juice, pounded	[16], [28]-[30]
6	*L. resinosa* Blume	Huru leksa (West Java)	Leaves	Lack of appetite		[17], [31]
7	*L. polyantha*	Huru koneng/huru manuk/huru pinggan (Sunda), gempur/wuru dedek/wuru kunyit (Jawa)		To treat diarrhea	Unknown	[32]

traditional medicine to cure for coughs, colds, migraine headaches, skin diseases, pain relieve, diarrhea, fever, aromatherapy, and even benefit as seasoning (spices) and believed to have an antibacterial activity [33]. In China, the seeds are eaten to promote digestion and treat cough and bronchitis. In Vietnam, Cambodia, and Laos, a decoction of the plant is used to treat mental disorders such as hysteria and forgetfulness. In Taiwan, the plant is used to treat athlete's foot and other skin diseases [34].

Litsea odorifera Val., or *medang pawas* (Indonesian), is a tree that grows in Indonesia and eastward to Papua New Guinea. *L. odorifera* is used as one of ingredients in manufacturing decoctions of traditional medicine in Madura, Indonesia. Leaves of the plant is commonly prescribed medicine part for the treatment of post-natal recovery. These are effective in helping a woman regaining their health after pasturition for promoting lactation, and heal boils and furuncles [14]. The pharmacological potential of this plant is unexplored, and it would be interesting to know whether further study reveals evidence of nitric oxidase inhibition [34].

In Indonesia, *L. elliptica* crushed leaves were applied around the forehead for treatment headache [35]. In other country, especially in Thailand, these species has been proved to have chemopreventtatives activities, thus explain the reduced incidence of gastric cancer [21]. While in Malaysia, the species was reported have potential insecticidal activity using its essential oils [22]. This report then supported by reseach founding of its repellence properties againts *Aedes aegypti* bites [23]. The recent studies on the insecticidal properties also shown that methanol extracts of *L. elliptica* leaves has a significant effect as larvacidal and adulticidal [24],[36].

Litsea garciae Vidal or also known as Engkala is a native of Kalimantan in Indonesia, Sarawak and south-west Sabah regions in Malaysia, and the Philippines [27]. The species is among of the indigenous edible fruits that can be found in Kalimantan and Sarawak [26]. These highly seasonal fruits are very popular among local people. In Indonesia, the utilization of the species have not being investigated yet. Traditionally, the bark of *L. garciae* is used to treat skin burn [37], lightly burned bark is used to cure cartepillar stings and the oil is extracted from the seeds to make soaps and candles [27]. The extracts of these leaves are used in traditional native herbal medicine to treat ail- ments such as stomach ulcers, fever, and headache, as well as an insect repellent [20]. The study on *L. garciae* was conducted to investigate the alkaloidal contents. The study led to the isolation of bases namely laurolitsine, actinodaphnine, (+)-reticuline, isodomesticine and boldine [38].

There is not much studie published regarding *L. resinosa* except from the large amount of essential oil constituent in it [39]. In fact, most essential oils from plants have been revealed to be vastly effective againts food bornepathogens [40]. The hexane extracts from the stem and chloroform extracts from the inner barks showed potent antibacterial assay on gram negative bacteria *Escherichia coli* and gram positive bacteria Bacillus subtilis respectively with their inhibition on it [41].

In Bangladesh, the bark of *L. chinensis* or *L. glutinosa* have been used as mix in manufacturing decoctions to treat leucorrhea disease. The formula of these decoctions are 10 g bark of *Azadirachta indica* A. Juss, 15 gr each of whole plants of *Asparagus racemosus* Willd. and *Tinospora sinensis* (Lour). Merrill, 10 g bark of *Litsea chinensis* Lam., 10 g root *Bombax ceiba* L. and 10 g root of *Erythrina indica* L. is mixed with water and salt and taken for 7 days on an empty stomach. If the problem is severe, this should be taken for 14 days [29]. The leaves of these species can also be diarrhea medicine with the formula is Juice obtained from macerated leaves of *Litsea chinensis* Lam. is taken with honey. In Burma and Philippines, the species is used to stop dysentry. The roots and leaves are used to soothe sprains and bruises. In China, the pounded leaves are applied externally to treat skin diseases. In Vietnam, the pounded bark is used to heal boils [30].

L. glutinosa (Lour.) C.B.Rob. is an evergreen medium-sized tree. Its barks and leaves are used as a demulcent and mild astringent in the case of diarrhea and dysentery, the roots are used for poulticing sprains and bruises, and the oil extracted from the seeds is used to treat rheumatism in China [16], [28]-[30]. *L. glutinosa* produces a eudesman sesquiterpene called verticillatol and the lignan (+)-demethoxyeoiexcelsin which inhibit the replication of the Human Immunodeficiency Virus with IC50 of 34,5 mg/mL and 16.4 mg/mL respectively [42].

In many case, different part of the plant as well as the whole plant are used for management of various ailment. The most commonly used plant parts are leaves, followed by roots, fruits, bark and stem. The most preferred modes of preparation are in the form of decoctions, poultices, oils, and preparation with other traditional medicines.

Pharmacological Properties

Antimicrobial activity

The antibiotic functions of *L. cubeba* oil are attributable mainly to citral, which amounts to 60%–80% of the essential oil [43]. The *L. cuceba* leaves oil demonstrated potent inhibitory effects against eight skin pathogens, including *Crytococcus neoformans, Sporothrix schenckii, Microsporum lanosum, M. Gypseum, Aspergillus niger, A. flavus, Rizopus nigricans,* and *Chaetomium globosum*, with MIC values ranging 0.003-1.0 µg/ml [44].

The antifungal effect in vivo of the *L. cubeba* fruit oil has been studied using the mice infected with *Candida albican.* The result revealed that treatment with 40mg/kg *L. cubeba* oil prolonged median survival time of infected mice and reduced the colony count in the kidney of mouse [45]. The essential oil extracted from *L. cubeba* fruits showed good fungicidal activity for *Thanatephorus cucumeris* and *Sclerotinia sclerotiorum* at a concentration of 300 µg/mL with IC_{50} values of 115.58 and 151.25 µg/mL, respectively, using carbendazim as a positive control [46]. Essential oils from the leaves and fruits of *L. cuceba* collected from Northeast India were evaluated for their antimicrobial effect on *S. aureus, L. monocytogenes, Escherichia coli, P. aeruginosa, Candida albicans*, and *Aspergillus niger*. All microbial strains were found to be sensitive to the cytotoxic effect of the essential oils being studied. Leaf and fruit oils showed different levels of inhibition depending on their particular chemical composition [47].

The antimicrobial activity of *L. resinosa* and *L. elliptica* was evaluated by an agar well diffusion assay and a mycelial radial growth assay. Essential oils from the root of both species showed significant antifungal activities with inhibition rates of 80.11% and 66.85%, respectively [41]. The essential oils of *Litsea chinensis* with synonim *L. glutinosa* displayed pronounced antibacterial activity against *P. solanacearum* and *C. diphtheriae* [28].

The antibacterial effect of MeOH extract have investigated from the bark of *L. glutinosa* against 16 bacteria using the agar diffusion method. This MeOH extract inhibited both Gram-positive and Gram-negative bacteria, with the zones of inhibition in the range of 6.5–13.5 mm, which was comparable to the positive control chloramphenicol [48].

Anti-inflammatory activity

A number of extracts from *Litsea* species have shown anti-inflammatory activity in different test models. L. *cuceba* has been traditionally used in herbal medicine for treating inflammation including gastroenterologia, edema, and rheumatic arthritis. The anti-inflammatory activity of the bark of *L. cuceba* was reported. A methanolic extract of bark of *L. cubeba* (Lour.) Pers. and its fractions (0.01 mg/mL) from bark inhibit NO (nitric oxide) and PGE2 production in LPS-activated RAW 264.7 macrophages without significant cytotoxicity at less than 0.01 mg/mL concentration. The methanol extract decreased the enzymatic activity of myeloperoxidase (0.05 mg/mL). These findings suggest that *L.cubeba* is beneficial for inflammatory conditions and may contain compound(s) with anti-inflammatory properties [49]. NO is a very toxic free radical that can cause substantial tissue damage in high concentrations, especially in the brain. In stroke, for example, large amounts of NO are released from nerve cells to cause damage to surrounding tissues including neurones and myocytes. NO is also released during inflammation and is involved in the growth of tumors; it is understood that endogenously formed NO induces the malignant transformation of mouse fibroblasts [34]. Prostaglandin E2 (PGE2) is a principal mediator of inflammation in diseases such as rheumatoid arthritis and osteoarthritis [50]. The pharmacological potential of *L. odorifera* is unexplored, and it would be interesting to know whether further study reveals evidence of nitric oxidase inhibition [34].

The anti-inflammatory activity of *L. glutinosa* have been investigated using the rat paw edema model. The aqueous extract of L. glutinosa leaves inhibited edematous response with inhibition rates of 46%, 35%, and 43%, respectively, at a dose of 500 mg/kg body weight in carrageenan, histamine and dextrin induced rat paw edema assay [51].

Antiasthmatic activity

Therapeutic effect of *L. cubeba* on asthma has been intimately known by local residents in many regions of China, and was confirmed by guinea-pig models in vitro and in vivo. The essential oil of *L. cubeba* at a concentration of 90 μg/mL inhibited histamine and/or acetylcholine induced guinea-pig tracheal smooth muscle contraction in vitro [52]. It is citral to be the dominant component of the *L. cuceba* was identified. That citral was able to prolong incubation period and inhibit smooth muscle constriction of guinea pig induced by acetylcholine, as well as prolong the coughing incubation period and reduce coughing frequency caused by ammonia [53].

Antioxidant activity

The MeOH extracts of the root and stem of *L. elliptica* and *L. resinosa* exhibited high antioxidant activity with regard to DPPH radicals with EC_{50} values of 23.99, 41.69, 11.22, and 33.48 mg/L, respectively,comparable to standard butylated hydroxytoluene [41]. The essential oil and bioactive compound of *L. cuceba* was shown potential as antioxidant. The methanol extract, $CHCl_3$ fraction, and buthanolic fraction Ied to 89-90% inhibition of lipid peroxidation in TBA method (Thiobarbituric acid test) [54],[55]. The bark extract of *L. glutinosa* had a antioxidant activity, which showed higher metal chelating activity with IC_{50} values 15.25 mg/mL [56].

Insecticidal activity

The essential oil of *L. cuceba* was found to exhibit insecticidal activity as well as a repellent effect on several insects. The essential oil of *L. cuceba* showed a strong repellant effect on *Sitophilus zeamais* and *Tribolium castaneum* even at low concentrations, with more a marked effect on the latter. The *Litsea cuceba* essential oils (LCEO) also showed more susceptible contact and fumigant toxicities for *S. zeamais* than *T. castaneum* [57].

The essential oil of *L. cuceba* fruits showed strong contact toxicity in adult cigarette beetles (*Lasioderma serricorne*) and the booklouse *Liposcelis bostrychophila*, with LD_{50} values of 27.33 μg/adult and 71.56 $\mu g/cm^2$, respectively. This oil also showed strong fumigant toxicity against the two stored product insects with LC_{50} values of 22.97 and 0.73mg/L, respectively [58].

Neuropharmacological activity

The LCEO was found to show neuropharmacological activity in ICR mice [59]. Oral administration of 100, 300, and 500 mg/kg of LCEO significantly prolonged pentobarbitone-induced sleeping time in mice by 20.0%, 110.8%, and 159.6%, respectively. In a tail-flick test, LCEO exhibited potent anxiolytic activity after treating mice with 500mg/kg of LCEO, compared to 90mg/kg of the positive control acetaminophen. Thus, LCEO showed apotent effect on the central nervous systemofmice, which is consistent with its traditional use as an analgesic.

The methanol extract of *L. polyantha* bark showed significant antidepressant effects. The results of the forced swimming test re- vealed a significant decrease ($P<0.05$) in the swimming and climbing behavior of animals treated with 50, 75, and 100 mg/kg of the extract compared to the control [60]-[61].

Antinociceptive effects

L. polyantha was used as an analgesic in Indian folk medicine. GC–MS studies on the bark extracts of L. polyantha revealed the presence of eugenol, chalcone, and its derivatives. Eugenol was found to possess analgesic properties [32]. The crude extract of *L. glutinosa* leaves showed the highes pain inhibitory activity was observed at a dose of 500 mg/kg (15.54±0.37s), which differed significantly ($P<0.01$) with that of the standard ketorolac (16.38±0.27s). These studies justify the traditional use of these plants as analgesic agent [62].

Miscellaneous activity

LCEO is widely used as a flavor enhancer in cosmetic products and as a popular skin-care agent in southern China with citral (57.4%) as a major component. LCEO exerted a potent inhibitory effect on tyrosinase (IC_{50} value of 100 g/mL), good antioxidative activities (IC_{50}: 17.75 mg/mL for ABTS(+.), 10.2 mg/mL for O_2^-), and an apparent protective effect on UV–TiO_2–NO_2^-induced protein oxidation at 0.01mg/mL and tyrosine nitration at 0.1 mg/mL [55]. Citral, the dominant constituent of the *L. cubeba* oil, possessed antiarrhythmic function in vivo. Oral administration of 0.2 mL/kg citral relieved $BaCl_2^-$ and aconitine-induced rat arrhythmia, and inhibited $CaCl_2$ and digoxin induced cardiac toxicity in rat [63]. The essential oil of *L. cuceba* was reported have a potential as anticholelithogenic activity.

It has been reported the aphrodisiac activity of the ethanol extract of the bark of *L. glutinosa*. The bark extracts were evaluated for their aphrodisiac and anti-infertility activities in normal and immobilization stress-induced male Wistar albino rats.The EtOH (300 mg/kg) and H2O extracts (500 mg/kg) showed significant ($P<0.05$) aphrodisiac activity, compared with normal animals [64].

Immunomodulation is also reported as a potential activity in these species. Arabinoxylan, a polysaccharide from the leaves of *L. glutinosa* stimulated the proliferations of splenocyte and thymocyte, and promoted NO production in macrophages at tested concentration ranging from 25 to 100 μg/mL [65]. These species is also sugested as a promising phytomedicine for the therapy of osteoporosis. Oral administration of food containing 5% the bark of *L. glutinosa* significantly inhibited ALP and TrACP in rat (biomarkers for osteoporosis), and notably improved the quality and micro-architecture of bone, which were benefit for bone remodeling [66]

The leaves of *L. glutinosa* were adopted for the treatment of traumatic injury in traditional medicine [16]. Its action on wound healing using excision and incision wound models in rat was evaluated. Ointment with 4% EtOH extract of *L. glutinosa* leaves significantly promoted wound healing by expediting wound contracting and increasing tensiles trength [51].

Toxicology

The oil of *L. cuceba* and L. elliptica has been evaluated for its acute toxicity. The oil of *L. cuceba* is pungent for skin, leading to the skin inflammatory response of guinea pig [67].

Budin et al. [68] evaluated the acute and subacute toxicities of *L. elliptica* essential oil by oral gavage in female SD rats.The *L. elliptica* essential oil was administered in doses ranging from 500 to 4000 mg/kg (singledose)for the acute toxicity study, and in doses of 125,250, and 500 mg/kg for the subacute toxicity test for 28 consecutive days. The *L. elliptica* essential oil caused dose dependent adverse behaviors and mortality in the acute toxicity study with a median lethal dose value of 3488.86 mg/kg and an acute non-observed-adverse-effect level of 500 mg/kg.

CONCLUSION

According to the research data, studies on the ethnomedicinal uses and pharmacology properties of *Litsea* genus which have growth in Indonesia are limited. Among the species, only *L. cuceba* and *L. odorifera* were used as traditional medicine in Indonesia. *L. cuceba* was the species most quoted, especially as a flavoring and herbal medicine, followed by *L. glutinosa,* and *L. polyantha.* The third of the Litsea genus were studied frequently and in depth. Some plants, such as *L. odorifera, L. elliptica, L. resinosa,* and *L. garciae* have documented ethnomedicinal uses, but it is poorly in investigated for pharmacologycal activity or chemical profile. Pharmacological studies indicated that these plants possessed various biological activities, especially in the area of antimicrobial, anti-infammatory, antiasthmatic, neuropharmacological, and antioxidant. Studies on 7 species of the *Litsea* species have revealed the promising pharmacological activities and potential for drug research and development of related extracts and/or some pure chemicals and supports the future clinical use of *Litsea* species in modern medicine.

Characteristics of Crystal Palm Sugar in the Batang Kulur Village

Yuniarti[1,2], Fatriani[1], Henni Aryati[1]

[1]*Faculty of Forestry, Lambung Mangkurat University, Banjarbaru Indonesia*
[2]*Center of Excelletnce Research Consortium For Sustainable Tropical Forest Management ,Banjarbaru Indonesia*

E-mail: yuyun_aep@yahoo.com

ABSTRACT

The purpose of this research is to determine karakterisistik shape, flavor and smell, color as well as to determine the chemical composition of crystal sugar palm in the Batang Kulur Kiri village, Kandangan, Hulu Sungai Selatan, which include water content, Sucrose, Sugar Reduction, Fat, Protein, total minerals, calcium, and phosphorus. The research method includes the preparation of tapping sugar palm sap, processing crystal palm sugar and testing of palm sugar, the organoleptic test include shape, taste, smell and color, chemical composition testing includes water content, Sucrose, Sugar Reduction, Fat, Protein, calcium, and phosphorus use test methods SNI. 01-2894-1992. The results of data crystal palm sugar test will be tabulated and descriptively summarized. The results showed that produced crystal sugar palm have a soft dry granular, a sweet taste and aroma typical crystal palm sugar and yellow to brownish. The water content of crystal palm sugar ranged between 3.72 to 5.24%, the reducing crystal palm sugar is 2.53 to 3.61%, while the sucrose content of 64.99 to 70.19%. The protein content in sugar ants all three samples ranged between 1.31 to 1.66% and fats 0.10 to 0.16%. The mineral content of potassium ranged between 1.31 to 1.46 mg / kg dry weight, while the phosphorus ranges from 1.132 to 1.148 mg / kg dry weight.

Keywords: characteristics, chemical composition, crystal palm sugar

INTRODUCTION

Crystal palm sugar is a sweetener that is used by the community, both as a sweetener in foods, beverages, cakes, snacks and various other food preparations. Crystal palm sugar produced from the evaporation of sap juice of the palm family tree, such as coconut and palm. Crystal palm sugar from palm sap juice is preferred by the people of Banjar because it tastes sweeter and distinctive, as well as a darker color than sugar from coconut sap. Crystal palm sugar as a sweetener in foods has the advantage, in addition to it's unique, brown sugar has many health benefits compared to sugar cane. In addition to providing sweetness (but low-calorie) safe diabetics, crystal palm sugar contains mineral salts, rich in nutrients and beneficial for anemia, cough, typhoid, leprosy, and so forth.

Batang Kulur village is a center of palm sugar industry in South Kalimantan. Some sugar palm farmers in the village of Batang Kulur became interested cultivate and process palm sap juice into crystal palm sugar. But the composition of the crystal palm sugar in the village of Batang Kulur Left is not yet known.

Objective

The purpose of this research is to determine characteristics of crystal palm sugar in the Batang Kulur Kiri village, Kandangan, Hulu Sungai Selatan which include shape, flavor, smell, color, water content, sucrose, reducing sugar, fats, potassium and phosphors.

MATERIALS AND METHODS

The materials used in this study is a palm sap from Batang Kulur village, Hulu Sungai Selatan district, South Kalimantan, Indonesia.

The research method includes the preparation of tapping sugar palm sap, processing crystal palm sugar and testing of palm sugar. The organoleptic test include shape, taste, smell and color, chemical composition testing includes water content, protein, sucrose, sugar reduction, fats, potassium, and phosphorus use test methods SNI. 01-2894-1992. The results of data crystal palm sugar test will be tabulated and descriptively summarized

RESULTS

Crystal palm sugar of the village of Batang Kulur Kandangan made in the traditional way, using a wood stove and stirring is done manually by human power.

Table 1. Test result of characteristics of crystal palm sugar (*Arenga pinnata*) from the village of Batang Kulur Kandangan

No.	The parameter	Test result		
		Crystal palm sugar 1	Crystal palm sugar 2	Crystal palm sugar 3
1.	Shape, taste, smell and color	soft dry granular, a sweet taste and aroma typical crystal palm sugar and yellow to brownish	soft dry granular, a sweet taste and aroma typical crystal palm sugar and yellow to brownish	soft dry granular, a sweet taste and aroma typical crystal palm sugar and yellow to brownish
2.	Water content (%)	4,88	3,72	5,24
3.	Protein (%)	1,66	1,46	1,31
4.	Reducing sugars (%)	3,61	3,06	2,53
5.	Sucrose (%)	69,75	64,99	70,19
6.	Fats (%)	0,16	0,14	0,10
7.	Potassium (mg/kg)	1,46	1,31	1,42
8	Phosphor (mg/kg)	1,148	1,132	1,141

The results of characteristis of crystal palm sugar research can not yet meet all the quality requirements SNI 01-3743-1995 palm sugar, but it can still be produced to be consumed. Improving the quality of sugar produced crystal palm sugar do start early stages when tapping palm sap that is doing preservation to prevent damage to palm sap add preservatives such as lime and sodium metabisulfite (Sardjono and Dachlan, 1988). The water content of crystal palm sugar can also be reduced through the drying process. In terms of the reducing sugar content, crystal palm sugar was safe to be consumed primarily to maintain stable blood sugar in the body.This crystal palm sugar have a sweet taste and a very distinctive taste and very practical use is good for sweetening breads, cakes, tea and coffee drinks trap.

CONCLUSSIONS

Crystal palm sugar have a soft dry granular, a sweet taste and aroma typical crystal palm sugar and yellow to brownish. The characteristid of crystal palm sugar had water content 4.613%, protein 1.477%, the reducing sugars 3.067%, sucrose 68.310%, fats 0.133%, potassium 1.397 (mg/kg) and Phosphor 1.140 (mg/kg).

Acknowledgments

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Model Operasional Infrastructure Development of Special Economic Zones Tanjung Api-Api

Dinar Dwi Anugerah Putranto

Faculty of Engineering, Sriwijaya University, Palembang Indonesia

E-mail : dwianugerah@yahoo.co.id

ABSTRACT

Special Economic Zones (SEZ) of Tanjung Api-api is the economic region that has been set through the South Sumatra Goverment's decision to serve as an integrated area development industry in South Sumatra. This area is located in the basin Musi Downstream, an area with a height of less than 16 m above sea level, is largely a swampy area, composed of soil type associations Glei humus and organosol, as well as alluvial soil as deposition of sediment Banyuasin river, Telang rivers and the Musi river in downstream. Isue and dimension of decision in the analysis of land use requires the contribution of various disciplines. What is desired, is called the power to change the direction in the concept of land use, which requires interdisciplinary, and will play a vital role in any given decision.
The conceptual framework of decision support system for land development decision making formula consists of three main components, namely the analysis of land resources, evaluation of the ecological impact assessment in environmental conservation and decission supports. To perform the analysis and assessment approach used GIS and MCE (Multi Criteria Evaluation). GIS as a tool that systematically be used to present the spatial appearance of the area of study and prediction of impact. While the MCE is an approach to assessing the impact of alternative decisions and plan for the future (predictions). This technique will give a great contribution in maintaining a database of environmental conditions early, up to monitoring and provide preliminary analyzes to predict the consequences of failure would be a change, as well as an operational tool in spatial planning and development of regional infrastructure Economic in Tanjung Api-api area

Keywords: special economic zone, GIS, MCE

Formulation And Evaluation Of Herbal Body Wash Containing *Lepisanthes Amoena* Leaves Extract

Husnul Warnid, Sapri, Titin Hartini, Feni Hadiwiyono, Yullia Sukawaty

Samarinda Pharmacy Academy, Indonesia

E-mail: hwarnida@gmail.com

ABSTRACT

Empirically, people of Kutai and Dayak Tunjung in East Kalimantan, Indonesia, have been using kokang (*Lepisanthes amoena* (Hassk.) Leenh.) leaves for skin care especially acne treatment. The objective of the study was to formulate and evaluate the anti-acne herbal body wash containing *Lepisanthes amoena* leaves ethanolic extract. Antimicrobial test of *Lepisanthes amoena* leaves ethanolic extract in varied concentration (6%, 12%, and 24%) toward *Staphylococcus epidermidis*, an acne-related bacteria, were carried out *Lepisanthes amoena* leaves ethanolic extract was formulated into a liquid body wash with potassium salt of fatty acid as surfactant. Evaluation of *Lepisanthes amoena* leaves ethanolic extract liquid body wash including organoleptic characteristics, pH, free caustic alkali, density, and foam volume. The result showed that *Lepisanthes amoena* extract has antimicrobial activity and herbal body wash containing *Lepisanthes amoena* leaves ethanolic extract has a good physicochemical quality.

Keywords: anti acne, herbal body wash, *Lepisanthes amoena*, liquid body soap, *Staphylococcus epidermidis*

Introduction

Acne is a chronic inflammatory disease of the pilosebaceous unit resulting from androgen-induced increased sebum production, altered keratinisation, inflammation, and bacterial colonisation of hair follicles on the face, neck, chest, and back [1]. *Propionibacterium acnes* and *Staphylococcus epidermidis* have been recognized as pus-forming bacteria triggering an inflammation in acne. *Propionibacterium acnes* has been described as an obligate anaerobic organism. It is implicated in the development of inflammatory acne by its capability to activate complements and by its ability to metabolize sebaceous triglycerides into fatty acids, which chemotactically attract neutrophils. On contrary, *Staphylococcus epidermidis*, an aerobic organism, usually involves in superficial infections within the sebaceous unit [2].

Antibiotics have remained the most common prescribed agent for treating acne. The use of antibiotics as first choice of acne treatment should be re-evaluate to limit the development of antibiotic resistance [3]. There were very few resistant strains of *Propionibacterium acnes*, but many of *Staphylococcus epidermidis*. More than 30% of the *Staphylococcus epidermidis* isolates were resistant to erythromycin, roxithromycin, and clindamycin [4].

The continuous search for new drugs is needed to counter the challenge posed by resistant strains. Natural products have served as an important source of drugs and cosmetics since ancient time. Empirically, people of Kutai and Dayak Tunjung in East Kalimantan, Indonesia, have been using kokang (*Lepisanthes amoena* (Hassk.) Leenh.) leaves for skin care especially acne treatment [5]-[6]. Extract of *Lepisanthes amoena* leaves has activity against *Propionibacterium acnes* [7]. On the other hand, its activity against *Staphyloccus epidermidis* has not established yet.

The cosmetics preparations for acne come in many forms including cream, gel, lotion, solution, and soap. In recent years, herbal cosmetics have gained much recognition and demand for herbal cosmetics is increasing. The natural or herbal body wash does not contain synthetic detergents and other chemical additives such as commercial body wash. The objective of this research was to evaluate the potential antibacterial activity of *Lepisanthes amoena* extract on *Staphyloccus epidermidis*. Moreover, we investigated the possibility to formulate an herbal body wash for acne treatment using potassium salt of fatty acid as surfactant.

Materials and Methods

Sample collection

Lepisanthes amoena was obtained from Senoni village, Kutai Kartanegara district, East Kalimantan, Indonesia and was identified and authenticated by a botanist of Mulawarman University.

Microorganisms and media

The test organism used in this study was *Staphylococcus epidermidis* (ATCC 14990) from Microbiology Laboratory FMIPA Mulawarman University. Nutrient Agar media was used for the growth of bacteria. Clindamycin was used as positive control.

Pharmaceutical excipients

Pharmaceutical excipients used for preparation of body wash such as potassium hydroxide, coconut oil (*oleum cocos*), castor oil (*oleum ricini*), rose fragrance oil (*oleum rosae*), distilled water (*aqua destillata*) were of Farmakope Indonesia quality.

Extraction of Plant Material

Lepisanthes amoena leaves were air-dried at room temperature for 2 weeks and was grinded to a coarse powder (mesh 40). The ethanol extract was prepared by maceration 250 g dry powdered of *Lepisanthes amoena* leaves in 2.5 L of ethanol 95% at room temperature for 48 hours. The extract was filtered concentrated using a rotary evaporator with the water bath set at 50°C to obtain semi solid mass.

Phytochemical screening

Phytochemical screening were perfomed using standard procedures [8].

Test for alkaloids

0.5 g of extract was diluted to 10 ml with acid alcohol, boiled and filtered. To 5 ml of the filtrate was added 2 ml of dilute ammonia. 5 ml of chloroform was added and shaken gently to extract the alkaloidal base. The chloroform layer was extracted with 10 ml of acetic acid. This was divided into two portions. Mayer's reagent was added to one

portion and Draggendorff's reagent to the other. The formation of a cream (with Mayer's reagent) or reddish brown precipitate (with Draggendorff's reagent) was regarded as positive for the presence of alkaloids.

Test for flavonoids

Three methods were used to test for flavonoids. First, dilute ammonia (5 ml) was added to a portion of an aqueous filtrate of the extract. Concentrated sulfuric acid (1 ml) was added. A yellow coloration that disappear on standing indicates the presence of flavonoids. Second, a few drops of 1% aluminum solution were added to a portion of the filtrate. A yellow coloration indicates the presence of flavonoids. Third, a portion of the extract was heated with 10 ml of ethyl acetate over a steam bath for 3 min. The mixture was filtered and 4 ml of the filtrate was shaken with 1 ml of dilute ammonia solution. A yellow coloration indicates the presence of flavonoids.

Test for saponins

5 ml of distilled water added to 0.5 g extract in a test tube. The solution was shaken vigorously and observed for a stable persistent froth. The frothing was mixed with 3 drops of olive oil and shaken vigorously after which it was observed for the formation of an emulsion.

Test for terpenoids (Salkowski test)

2 ml of chloroform added to 0.5 g extract. Concentrated H_2S0_4 (3 ml) was carefully added to form a layer. A reddish brown coloration of the interface indicates the presence of terpenoids.

Test for tannins

About 0.5 g of the extract was boiled in 10 ml of water in a test tube and then filtered. A few drops of 0.1% ferric chloride was added and observed for brownish green or a blue-black coloration

Antimicrobial susceptibility testing

Staphylococcus epidermidis was inoculated into nutrient agar medium in test tubes and grown to stationary culture for 24 h at 37◦C. Inoculated bacteria taken with a sterile loop and transferred into normal saline. The suspension density was adjusted equal to McFarland standard (10^6 cell/ml). 20 ml of nutrient agar was poured into sterile plates and allowed to solidify. The 100µl of inoculated bacteria suspension was then swabbed over the solid media. Sterile paper discs were impregnated with *Lepisanthes amoena* leaves extract and the discs were placed on the agar. Plates were then incubated at 37◦C for 72 h under anaerobic conditions.

Formulation of herbal body wash

Coconut oil, canola oil, and castor oil were mixed and heated to 70C. Potassium hydroxide added into the water with gentle stirring until completely dissolved. The solution slowly poured into the oils. The mixture was stirred with stick blender until turning creamy, opaque, and thick. The mixture was heated another hour until the clear soap was obtained. The final volume was made to 100 ml with water. The soap was stored for 48 hours, after which the herbal extract and fragrance were added. The formula is shown in Table 1.

Composition of herbal body wash

Materials	**quantity (% w/v)**		
	formula A	**formul a B**	**formula C**
Lepisanthes amoena leaves extract	6	6	6

coconut oil	30	20	10
canola oil	15	25	35
castor oil	5	5	5
potassium hydroxide	12.05	11.35	10.65
rose oil	1	1	1
purified water qs to	100	100	100

Evaluation of herbal body wash

Physical appearance/visual inspection

The formulation prepared was evaluated for the clarity, color, odor and homogeneity [9].

Determination of pH

Soap sample weighing 150 mg was mixed in 15 ml distilled water without producing much lather. It was kept undisturbed for 24 h for maximum dissolution. Then the pH of sample was measured [10].

Determination of free caustic alkali

A modified method was used [11]. Five gram soap was weighed and dissolved in 100 ml of ethanol. Few drops of phenolphthalein indicator were added. The resulting solution was titrated against HCl 0.1 N

Determination of density

The density and viscosity of herbal body washes was measured using pycnometer at 25 C according to SNI 06-3532-1994 [12].

Test to evaluate foaming ability and foam stability

Foaming ability was determined by using cylinder shake method. Briefly, 50 mL of the 1% body wash solution was placed into a 250 mL graduated cylinder; it was covered with one hand and shaken 10 times. The total volume of the foam content after 1 min of shaking was recorded [9].

RESULTS AND DISCUSSION

Phytochemical screening of *Lepisanthes amoena* leaves extract revealed the presence of alkaloid, flavonoids, saponins, and tannins (table 2).

Table 2 Phytochemical constituents of *Lepisanthes amoena* leaves extract

Test	***L. amoena* leaves extract**
Alkaloids	+
Flavonoids	+
Saponins	+
Tannins	+

Table 3. Antibacterial activity of *Lepisanthes amoena* leaves extract against *Staphylococcus epidermidis*

Samples	**Inhibition zone (mm)**
Lepisanthes amoena leaves extract 6%	1.75 $\pm$ 1.25
Lepisanthes amoena leaves extract 6%	2.16 $\pm$ 1.23
Lepisanthes amoena leaves extract 6%	2.55 $\pm$ 0.5
Positive control	15.08 +0.80

Lepisanthes amoena leaves extract exhibited antibacterial activity toward *Staphylococcus epidermidis* (table 3). The presence of alkaloid, flavonoid, saponin and tannin in the plant is likely to be responsible for the inhibition zone observed. Flavonoid activity is bacteriostatic. Flavonoids are not killing bacterial cell but merely inducing the formation of bacterial aggregates and thereby reducing the numbers of CFUs in viable counts [13]. Tannins have been reported to be bacteriostatic or bactericidal against Staphylococcus aureus. They act on the membrane of the organism [14]. Most studies indicated that alkaloids are bactericidal. Alkaloids in indolizidine class act by inhibiting nucleic acid synthesis, as they inihibit the enzyme dihydrofolate reductase in cell-free assay [15]. Saponins exhibit antibacterial and antifungal activities that make them important ingredients of cosmetic applications [16].

Soap is a sodium or potassium salt of fatty acid produced by saponification reaction. Soap is an anionic surface active agent (surfactant). The fatty acids such as stearic, myristic, lauric, and oleic acids contribute to lathering and cleaning properties of soap [11]. These fatty acids are abundance in vegetable oils. Lauric and myristic acids were found in coconut oil in the amounts of 47.7% and 19.9%. 63.3% of oleic acid and 19.6% linoleic acid were found in canola oil [17]. The ricinoleic acid content in castor seed oil was varied between 84.2 – 94.0% [18]. Unlike detergent, soap is considered an eco-friendly surfactant. Hence, to formulate an herbal body wash, soap surfactant is preferred.

Table 4 Physicochemical evaluation of herbal body washes

Characterization	Formula A	Formula B	Formula C
Color	light brown	light brown	light brown
Transparency	transparent	transparent	Transparent
Odor	aromatic	aromatic	aromatic
pH	9 ±0	9 ±0	9 ±0
Density	1.03 ±0	1.03 ±0	1.03 ±0
Free caustic alkali	0.019 ±0.0025	0.023 ±0.0035	0.019 ±0.0069
Foam volume (ml)	76.48 ±0.78	75.06 ±0.91	74.24 ±0.99

A body wash like any other cosmetic preparation should have good appealing physical appearance. The herbal body washes was transparent, light brown, and had a good aromatic odor. No organoleptic difference was observed between formula A, B, and C.

The pH of herbal body washes was found within the SNI range, between 8 and 11 [12]. The body washes were slightly alkaline due to the presence of soap surfactant. The slightly alkaline pH was an added value for herbal body wash since the added preservative is unnecessary. In recent years, the public concern regarding preservatives, especially the parabens, has been raising. Parabens are p-hydroxybenzoic acid ester compound widely used as preservatives in foods, cosmetics, toiletries and pharmaceuticals. These compounds exert a weak estrogenic activity. Propyl paraben and butyl paraben adversely affect the hormonal secretion and the male reproductive functions in rats and mice [19]-[20]. Paraben metabolites may play a role in the endocrine disruption seen in experimental animals [21].

The free caustic alkali is the amount of alkali free to prevent soap from becoming oily [11] SNI require soap to have free alkali less than 0.1% [12]. The experimental value is lower than standard, indicating a good quality soap. The data of free caustic alkali were statistically analyzed using one-way ANOVA. There was no significant difference between formula A, B, and C.

The density of herbal body washes was measured using pycnometer. All herbal body washes had density within the SNI range (1.01- 1.10) [12]

Foaming or lathering is very important to the consumer and therefore, it is considered as an important parameter in evaluation of body wash. The good foaming ability of herbal body wash may be due to the high lauric acid content in coconut oil [22]. The presence of saponins in *Lepisanthes amoena* leaves extract contributed to the foaming property since saponins are natural non-ionic surfactants, widely used as emulsification and foaming agents [23]. The data of foam volumes were statistically analyzed using one-way ANOVA. There was no significant difference between formula A, B, and C.

Herbal body wash contains *Lepisanthes amoena* leaves extract has a good physicochemical properties. Hence, a new way can be found to combat antibiotic resistance of bacteria and to provide safe and eco-friendly living. But further research and development is required to improve the stability of herbal body wash.

CONCLUSIONS

Extract of *Lepisanthes amoena* leaves has antibacterial activity against *Staphylococcus epidermidis*. The phytochemical constituents in extract may be contributed to its antibacterial activity.

Herbal body washes containing extract of *Lepisanthes amoena* leaves have good physicochemical properties. Further research is required to improve the body wash stability.

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Development Silvofisheries Cultivation Brackish Water as it Shrimp Windu (*Penaues monodon*)

Rukmini

Faculty of Fisheries and Marine, Lambung Mangkurat University, Banjarbaru Indonesia

E-mail: rukmini_bp@yahoo.com

ABSTRACT

Silvofisheries is a form of business integrated between the cultivation of trees mangroves and fisheries brackish water . Integrated approach to conservation and the use of resources mangrove forest provided an opportunity to sustain forest area stay well while cultivation brackish waters can produce economic benefits. As the early stages of the utilization of the system silvofisheries this we need to do engineering technology specific, so that it can be developed by the community . The purpose of this trial is to find feasibility of engineering silvofisheries technology.Research sites done in Kuala Lupak ponds village Tabunganen Batola Kal-Sel for 3 months. The results of the tryouts maintenance shrimp windu in farms with the system silvofisheries obtained data: on average weight early individual get 1,43 g and weights the end of 23,86 g with rapidity of growth relatively heavy is 1583,55 %.The average score conversion feed 1,38 with survival rate 81.8 %. Maintenance business shrimp windu in fishponds with a system of silvofisheries worth doing, because more expedite the growth shrimp and minimize conversion feed value compared with maintenance without system silvofisheries

Keywords: silvofisheries, brackish water, shrimp

APPENDIX

COMMITTEE OF INOVCOM – FP 2016

KEMENTERIAN RISET, TEKNOLOGI & PENDIDIKAN TINGGI

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SURAT PENUNJUKAN
Nomor: 5061/UN8/TU/2016

Dalam rangka kegiatan **Seminar Internasional " The 1st International Conference on Innovation and Commercialization of Forest Product"** yang diselenggarakan oleh Pusat Unggulan Iptek Konsorium Riset Pengelolaan Hutan Tropis Berkelanjutan (PUI KR PHTB) pada Bulan Nopember 2016, maka perlulah disusun "**Panita Seminar Internasional** "" sebagai berikut:

Pengarah	:	Rektor ULM & Dekan Fakultas Kehutanan ULM
Penanggung jawab	:	Ketua PUI PT KR PHTB
Ketua	:	Dr. Hamdani Fauzi, S.Hut, M.P.
Wakil Ketua-1	:	Dr. Acep Akbar, M.P.
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Bendahara	:	Hj. Arfa Agustina Rezekiah, S.Hut, M.P.
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Sie Acara, Materi & Protokoler	:	1. Dr. Ir. Mahrus Aryadi, M.Sc 2. Dr. Hafizianoor, S.Hut, M.P. 3. Dr. Drs. Eko Suhartono, M.Sc 4. Dr. Yusanto Nugroho, S.Hut, M.P.
Sie Transportasi & Akomodasi	:	1. Dr. Abdi Fitria, S.Hut, M.P 2. Dr. Badarudin, S.Hut, M.P. 3. Ir. Budi Sutiya, M.P.
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Demikian Surat Penunjukkan ini dikeluarkan dan disampaikan kepada yang bersangkutan untuk dilaksanakan sebagaimana mestinya.

Banjarbaru, Agustus 2016
Rektor,

Prof. Dr. H. Sutarto Hadi, M.Si.,M.Sc.
NIP. 196603311991021001

REKTOR

SCHEDULE OF INOVCOM – FP 2016

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Time (Wita)	Activities	Place
22 Nopember 2016		
07.15-08.15	Registration	Hortensia Ballroom (4th floor)
08.15-08.30	Pre-Conditions participants in the Main Room Seminar	Hortensia Ballroom (4th floor)
08.30	Minister of Environment and Forestry to enter the Main Room Seminar	Hortensia Ballroom (4th floor)
08.30-08.45	Indonesian National Anthem	Hortensia Ballroom (4th floor)
08.45-09.00	Speech from Rector ULM	Hortensia Ballroom (4th floor)
09.00-09.15	Reports of the Chairman of the Committee	Hortensia Ballroom (4th floor)
09.15-09.30	Chanting Prayer	Hortensia Ballroom (4th floor)
09.30-10.00	Coffee Break	Hortensia Ballroom (4th floor)
10.00-10.15	Keynote Speaker (Ministry of Environment and Forestry)	Hortensia Ballroom (4th floor)
10.15-10.30	Keynote Speaker (Ministry of Industry)	Hortensia Ballroom (4th floor)
10.30-10.45	Keynote Speaker (Bupati Tanah Laut)	Hortensia Ballroom (4th floor)
10.45-11.00	Keynote Speaker (Business Practitioner of Forest Products)	Hortensia Ballroom (4th floor)
11.00-11.15	Speakers from ICRAF (Dr Gerhard Manurung)	Hortensia Ballroom (4th floor)
11.15-11.30	Speakers from ICRAF (Dr. Meine Van Noordwijk)	Hortensia Ballroom (4th floor)
11.30-11.45	Speakers from Utsunomiya Univ. (Associate Prof. Dr. Futoshi Ishiguri)	Hortensia Ballroom (4th floor)
11.45-12.00	Speakers from Bogor Agriculture Institute/IPB (Prof. Dr. Ir. Fauzi Febrianto, M.Sc)	Hortensia Ballroom (4th floor)
12.00-12.15	Speaker of the Center of Excellence of KR PHTB (Prof. Dr. Yudi Firmanul A.)	Hortensia Ballroom (4th floor)
12.15-12.30	Speaker of the Center of Excellence of KR PHTB (Dr. Mahrus Aryadi)	Hortensia Ballroom (4th floor)
12.30-13.00	Discussion	Hortensia Ballroom (4th floor)
13.00-14.00	Break	
14.00-15.30	Papers Group Session I A. Field of Policy Polling & Development of Forest Product B. Field of Innovation & Commercialization of Timber Product C. Field of innovation & commercialization of Non Timber Forest Product D. Business meeting	Ercila Room (4th floor) Dufalia Room (4th floor) Grandia Room (4 th) Hortensia Ballroom (4t floor)
15.30-16.00	Coffee Break	
16.00-17.30	Papers Group Session II A. Field of Policy Polling & Development of Forest Product B. Field of Innovation & Commercialization of Timber Product C. Field of innovation & commercialization of Non Timber Forest Product D. Business meeting	Ercila Room (4th floor) Dufalia Room (4th floor) Grandia Room (4 th) Hortensia Ballroom (4t floor)
17.30-18.00	The Announcement of Results of Conference	Hortensia Ballroom (4t floor)
18.00-18.30	Closing	Hortensia Ballroom (4t floor)
23 November 2016		
07.00-07.30	Preparation Field Trip Gathered in the front of building 1 (Opposite Hotel Rodhita)	Rodhita Hotel
07.30-08.00	Coordinating field trips & Coffee Break	Rodhita Hotel
08.00-10.00	Departure to Tanah Laut (Kampung Apisilvikultur)	Tanah Laut
10.00-12.00	Meeting and discussion with farmers, wholesalers and small businesses non timber forest products	Telaga Langsat, Tanah Laut
12.00-13.00	Break	
13.00-15.30	To visit the location of agroforestry, apiculture and energy village	Batatrung Kabupaten Tanah Laut
15.30-17.30	Return to Banjarbaru	Tebing Siring Tanah Laut
		Banjarbaru

PARTICIPANT OF INOVCOM – FP 2016

THE PARTICIPANT IN THE 1ST INTERNATIONAL CONFERENCE ON INNOVATION AND COMMERCIALIZATION OF FOREST PRODUCT" (INOVCOM-FP 2016)

PRESENTER

No	Name	Institution	E-mail
1	Ahmad Jauhari	• Faculty of Forestry, Lambung Mangkurat University • Center of Excellent Research Consortium for Sustainable Forest Management	ajauhari@unlam.ac.id
2	Aminuddin Prahatamaputra	• Faculty of Teacher Training and Education, Lambung Mangkurat University	aminuddinpatra@unlam.ac.id
3.	Alpian	• Department of Forestry Faculty of Agriculture, University of Palangkaraya	alpianmeran@yahoo.com
4	Adistina Fitriani	• Faculty of Forestry, Lambung Mangkurat University • Center of Excellent Research Consortium for Sustainable Forest Management	afitriani@unlam.ac.id
5	Ahmad Yamani	• Faculty of Forestry, Lambung Mangkurat University	yaman.banjar@gmail.com
6	Arfa Agustina Rezekiah	• Faculty of Forestry,Lambung Mangkurat University • Center of Excellent Research Consortium for Sustainable Forest Management	aarezekiah@unlam.ac.id
7	Acep Akbar	• Research and Development Institute of Environment and Forestry at Banjarbaru • Center of Excellent Research Consortium for Sustainable Forest Management	acep_akbar@yahoo.com
8	Agus Sukito	• Research and Development of Non-Timber Forest Product Technology Unit, Forestry Research and Development Agency (FORDA), Ministry of Environment and Forestry,	sukitokun@gmail.com

		Mataram City, 83111, Indonesia	
9	AbdiFithria	• Faculty of Forestry,Lambung Mangkurat University • Center of Excellent Research Consortium for Sustainable Forest Management	abdifithriasylva9999@gmail.com
10.	Agus Purnomo	• University of Malang	Agus.purnomo.fis@um.ac.id
11.	Bakti Nur Ismuhajaroh	Faculty of Agricultur Lambung Mangkurat University	muhajaroh@yahoo.com
12.	Basir Achmad	• Faculty of Forestry, LambungMangkurat University, Banjarbaru	basir.achmad@unlam.ac.id
13.	Bunda Halang	• Lambung Mangkurat University	dahlan.unlam@gmail.com
14	Badaruddin	• Faculty of Forestry,Lambung Mangkurat University • Center of Excellent Research Consortium for Sustainable Forest Management	ibad_sylva@yahoo.co.id
15.	C. Andri Yani	• Makasar Environment and Forestry Research Development Institute	Andriyani-pras@yahoo.co.id
16.	Dina Naemah,	• Faculty of Forestry, ,Lambung Mangkurat University • Center of Excellent Research Consortium for Sustainable Forest Management	dina_naemah@yahoo.com
17.	Dharmono	• Biology Education of Faculty of Teacher Training and Education, Lambung Mangkurat University	maulanakriefani@unlam.ac.id
18.	DewiAlimah	• Research and Development Institute of Environment and Forestry at Banjarbaru	dewi_alimah@yahoo.com
19.	Dinar dwi anugerah putranto	• Faculty of Engineering, Sriwijaya University	dwianugerah@yahoo.co.id
20.	Enih Rosamah	• Faculty of Forestry, Mulawarman University	enihros@yahoo.com
21.	Eko Suhartono	• Faculty of Medicine, Lambung Mangkurat University • Center of Excellent Research Consortium for Sustainable Forest Management	ekoantioxidant@gmail.com

22.	Eva Prihatiningyas	• Faculty of Forestry, Lambung Mangkurat University	eprityas@yahoo.com
23.	Ema Lestari	• State Polytechnic of Tanah Laut, Department of Agriculture Industrial Technology,	*emalestari@politala.ac.id*
24	Edi Sukaton,	• Faculty of Forestry, Mulawarman University	edisukaton53@gmail.com
25	FutoshiIshiguri	• Faculty of Agriculture, Utsunomiya University, Utsunomiya 321-8505, Japan	
26	Golar	• Faculty of Forestry, Tadulako University, Palu Indonesia 94117	golar_untad@yahoo.co.id
27	Heni Fitriani	• Civil Engineering, Faculty of Engineering,Sriwijaya University,	Henifitriani79@yahoo.com
28	Hamdani Fauzi	• Faculty of Forestry, Lambung Mangkurat University • Center of Excellent Research Consortium for Sustainable Forest Management	danie.bastari@gmail.com
29.	Husnul Warnida	• Academy of Pharmacy Samarinda	hwarnida@gmail.com
30.	Harlinda Kuspradini	• Faculty of Forestry, Mulawarman University	alinkuspra@gmail.com
31.	Husnul Warnida	pharmaceutical academy of Samarinda	hwarnida@gmail.com
32.	IsmiRajiani,	• Lambung Mangkurat University • University Teknikal Malaysia Melaka, Malaysia	izmi_rajiani@yahoo.com
33.	Iskandar	• Research Unit of Mutiara Bunda Mother and Child Hospital, Martapura, South Kalimantan, Indonesia	iskandarthalib@gmail.com
34.	Jumri	• Faculty of Agriculture Forestry Department at the University of Palangkaraya	*jumridulamin@yahoo.co.id*
35.	Junaidah	• Research and Development Institute of Environment and Forestry at Banjarbaru	junaidah_btr@yahoo.co.id
36.	JokoTriwanto	• Forestry Departement University of Muhammadiyah Malang	joko.fppumm@gmail.com

37	Jailani Husain	• Sam Ratulangi University Manado	jailanihusain@yahoo.com.sg
38	Kissinger	• Faculty of Forestry, ,Lambung Mangkurat University • Center of Excellent Research Consortium for Sustainable Forest Management	durror2ali@yahoo.com
39.	Krisdianto	• Faculty of Mathematics and Natural Sciences, LambungMangkurat University	krisdianto@unlam.ac.id
40.	Merryana Kiding Allo	• Research and Development Center for Environment and Forestry Makassar	merrymakassar@gmail.com
41.	Muhammad Hudaya	• Faculty of Economics and Business, University of Lambung Mangkurat Banjarmasin	rnovriyandana@unlam.ac.id
42.	Mohammad Wahyu Agang	• Borneo University, Tarakan Indonesia	wahyoe_89@ymail.com
43.	Muthia Elma	• Chemical Engineering Study Program, , Faculty of Engineering, Lambung Mangkurat University	melma@unlam.ac.id
44.	M. Arsyad	• Lambung Mangkurat University, Faculty of Teacher Training and Education,	muhammadarsyad@unlam.ac.id
45.	Muhammad Rahmattullah, Fatimah, Ellyn Normelani		sarangtiung@gmail.com
46.	Naning Yuniarti	• Forest Tree Seed Technology Research & Development Centre, Bogor	dida_syam@yahoo.co.id
47.	Nasrul Latif	• Chemistry Education Department, Palangka Raya University	nani12412@gmail.com
48.	Naning Yuniarti	• Forest Tree Seed Technology Research & Development Centre Bogor	Dida.syam@yahoo.co.id
49.	OskiIlliandri	• Faculty of Medicine, Lambung Mangkurat University	oilliandri@unlam.ac.id
50.	Purwanto Budi	• Banjarbaru Environment and Forestry Research and	pur_balitaman@yahoo.com

	Santosa	Development Institute • Center of Excellent Research Consortium for Sustainable Forest Management	
51.	Rukmini	• Faculty of Fisheries and Marine, Lambung Mangkurat University	rukmini_bp@yahoo.com
52.	Reni Setyo Wahyuningtyas	• Research and Development Institute of Environment and Forestry at Banjarbaru • Center of Excellent Research Consortium for Sustainable Forest Management	reni_forest@yahoo.com
53.	Retno Agnestisia	• Chemistry Education Department, Palangka Raya University	r_agnestisia@yahoo.co.id
54.	RahmatYunus	• Department of Chemistry, Faculty of Mathematics and Natural Sciences, LambungMangkurat University	rhmtyunus@gmail.com
55.	Sari Mayawati	• Agriculture, Forestry Department at the University of Palangkaraya	mayajumri@yahoo.co.id
56.	Safril Kasim	• FHIL Halu Oleo University	safrilkasim1970@gmail.com
57	Syaiful Hifni	• Economics and Business Faculty, Lambung Mangkurat University	shifni@yahoo.com
58.	Sri Lestari,	• Environment and Forestry ResearchInstitute of Palembang, Ministry of Environment and Forestry	lestari@iuj.ac.jp
59.	Siti Hamidah,	• Faculty of Forestry, Lambung Mangkurat University • Center of Excellent Research Consortium for Sustainable Forest Management	reylitahadi@gmail.com
60.	Shinso Yokota	• Faculty of Agriculture, Utsunomiya University, Utsunomiya 321-8505, Japan	
61.	Sudin Panjaitan	• Research and Development Institute of Environment and Forestry at Banjarbaru • Center of Excellent Research Consortium for Sustainable	sudinlala@gmail.com

		Forest Management	
62.	Safinah S.Hakim	• Research and Development Institute of Environment and Forestry at Banjarbaru	safinah.hakim@gmail.com
63.	Sri Lestari	• Environment and Forestry ResearchInstitute of Palembang, Ministry of Environment and Forestry	btejoprem80@gmail.com
64.	Syarifuddin Kadir	• Faculty of Forestry,Lambung Mangkurat University • Center of Excellent Research Consortium for Sustainable Forest Management	odeng1987@yahoo.com
65.	Susy Andriani	• Research and Development Institute of Environment and Forestry at Banjarbaru	d_vetho@yahoo.com
66.	Tri WiraYuwati,	• Banjarbaru Environment and Forestry Research and Development Institute • Center of Excellent Research Consortium for Sustainable Forest Management	yuwatitriwira@gmail.com
67.	TrisnuSatriadi	• Faculty of Forestry,Lambung Mangkurat University • Center of Excellent Research Consortium for Sustainable Forest Management	trisnu.satriadi@unlam.ac.id
68.	Tien Wahyuni	• Centre for Dipterocarps Forest EcosystemsResearch and Development	*yunitien@hotmail.com*
69.	Wahyudi	• Department of Forestry, Palangka Raya University	wahyudi888@yahoo.com
70.	Wiwin Tyas Istikowati	• Faculty of Forestry,Lambung Mangkurat University, Banjarbaru, Indonesia	wien.tyas@gmail.com
71.	WahyuSupriyati	• Department of Forestry Faculty of Agriculture, University of Palangkaraya	wahyu_plk@yahoo.com
72.	WahyuniIlham	• Faculty of Forestry, Lambung Mangkurat University	wfcilham@yahoo.de
73.	Yudi Firmanul Arifin	• Faculty of Forestry,Lambung Mangkurat University	yudifirmanul@yahoo.com

		• Center of Excellent Research Consortium for Sustainable Forest Management	
74.	YusantoNugroho	• Faculty of Forestry, Lambung Mangkurat University • Center of Excellent Research Consortium for Sustainable Forest Management	yusant_1977@yahoo.co.id
75.	Yuniarti	• Faculty of Forestry,Lambung Mangkurat University • Center of Excellent Research Consortium for Sustainable Forest Management	yuyun_aep@yahoo.com

GENERAL PARTICIPANTS

No	Name	Institution	E-mail/HP
1.	Abdul jafar Maring	• Balai Litbang Hasil Hutan Bukan Kayu, Mataram, Indonesia	
2.	Abdul Karim	• Dinas Tanaman Pangan & Peternakan, Banjarbaru, Indonesia	
3.	Adnan Ardhana	• Banjarbaru Environment and Forestry Research and Development Institute , Indonesia	
4.	Agil Ramanda Raytody	• Lambung Mangkurat University, Indonesia	
5.	Agus Purnomo	• KPHP Model Banjar	
6.	Agus Supriyanto	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
7.	Ahmad Ali Musthofa	• Banjarbaru Environment and Forestry Research and Development Institute , Indonesia	
8.	Ahmad Rifai	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
9.	Ahmad Effendi	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
10.	Alfian	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
11.	Alisa	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru,	

		Indonesia	
12.	Anak Agung Ayu Ratih Frismanti	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
13.	Anna Marya Makalew	• Faculty of Agronomy, Lambung Mangkurat University, Banjarbaru, Indonesia	
14.	Arnolz Reksi Surya Mandala	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
15.	Asysyifa	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
16.	Burhanudin Nur Efendi	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
17.	Beni Iskandar	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
18.	Beny Rahmanto	• Banjarbaru Environment and Forestry Research and Development Institute , Indonesia	
19.	Dahlena Ariyani	• Faculty of Math and Science, Lambung Mangkurat University, Banjarbaru, Indonesia	
20.	Dahniar	• Fakulty Economy & Bisnis, Lambung Mangkurat University, Banjarmasin, Indonesia	
21.	Daniel Itta	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
22.	Darni Subari	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
23.	Dea Karmila	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
24.	Derris Dwi Ambar Waty	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
25.	Dewi Aminah	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
26.	Dewi Kartika Sari	• Agro Technology Departement, Faculty of Agriculture, Lambung Mangkurat University, Banjarbaru, Indonesia	
27.	Dewi	• Faculty of Math and Science,	

	Umaningrum	Lambung Mangkurat University, Banjarbaru, Indonesia	
28.	Dwi Pustipa Sari	• Faculty of Forestry, Lambung Mangkurat University	
29.	Dwi Rasy Mujiyanti	• Lambung Mangkurat University	
30.	Eka Sapitri	• Faculty of Forestry, Lambung Mangkurat University	
31.	Eko Ade Irawan	• Faculty of Forestry, Lambung Mangkurat University	
32.	Ellyn Normelani	• Departement of Geography Education, Lambung Mangkurat University, Banjarmasin, Indonesia	
33.	ELMI	• PT Arutmin Indonesia	
34.	Emmy Winarni	• Faculty of Forestry, Lambung Mangkurat University	
35.	Endang Retno Rindasari	• Faculty of Forestry, Lambung Mangkurat University	
36.	Eny Dwi Pujawati	• Faculty of Forestry, Lambung Mangkurat University	
37.	Erna Maulidah	• Faculty of Forestry, Lambung Mangkurat University (Alumni)	
38.	Eva Prihatiningtyas	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
39.	Fahlianti	• Faculty of Forestry, Lambung Mangkurat University	
40.	Faiqotul Alfiyah	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
41.	Fajar Lestari	• Banjarbaru Environment and Forestry Research and Development Institute , Indonesia	
42.	Fathul Umar Aditya	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
43.	Fatriani	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
44.	Fendi Asrian	• UPT KPHL Tarakan, North Kalimantan, Indonesia	
45.	Gt. Ahmad Erfani	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
46.	Habibi	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	

47.	Haruna AISO	• Utsunomiya University, Jepang	
48.	Hemy Sriana	• Faculty of Agriculture, Lambung Mangkurat University, Banjarbaru, Indonesia	
49.	Heny Aryati	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
50.	Heru Iswahyudi	• PT. Inhutani III	
51.	Husnul Chotimah Hasibuatn	• Postgraduate, Lambung Mangkurat University	
52.	Isna Yuniar Wardhani	• Faculty of Forestry, Mulawarman University, Samarinda, Indonesia	
53.	Jainudin	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
54.	Jefri H Simamora	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
55.	Jhon Peterson SP SIhotang	• Balai Pemantapan Kawasan Hutan Wil V, Banjarbaru Indonesia	
56.	Kamila Mustikasari	• Faculty of Math and Science, Lambung Mangkurat University, Banjarbaru, Indonesia	
57.	Lia Yunita	• BPHP Wilayah IV, Indonesia	
58.	Lisani Nuura Aulia	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
59.	Luciasih Agustini	•	
60.	Mahe Hendra	• Faculty of Agronomy, Lambung Mangkurat University, Banjarbaru, Indonesia	
61.	Maimunah	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
62.	Maria Dewi Astuti	• Faculty of Math and Science, Lambung Mangkurat University, Banjarbaru, Indonesia	
63.	Maulid Hidayat	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
64.	M. Aini	• Lambung Mangkurat University, Banjarbaru, Indonesia	
65.	M. Ade Rusmana	• KPHP Model Banjar	
66.	M. Angga	• Faculty of Forestry, Lambung	

	Prabowo	Mangkurat University, Banjarbaru, Indonesia	
67.	M. Fazrul Rahman	• Lambung Mangkurat University	
68.	M. Febri Hamdani	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
69.	M. Hudaya	• Fakulty Economy & Bisnis, Lambung Mangkurat University, Banjarmasin, Indonesia	
70.	M. Noor Isnaini	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
71.	M. Nur	• Pemprov Kalsel	
72.	M. Shobir	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
73.	M. Tarmizi	• APHI Komda Kalsel	
74.	Mulyani	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
75.	Munandar Ramadani	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
76.	Nida Hasanah	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
77.	Nita Rahayu	• Balitbang P2B Tanah Bumbu, South Kalimantan, Indonesia	
78.	Noor Komalasari	• Faculty of Agriculture Lambung Mangkurat University, Banjarbaru, Indonesia	
79.	Noor Laili Aziza	• Agroecotechnology Departement, Faculty of Agriculture, Lambung Mangkurat University, Indonesia	
80.	Normela Rahmawati	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
81.	Nur Fatiah	• Fakulty Economy & Bisnis, Lambung Mangkurat University, Banjarmasin, Indonesia	
82.	Nurrohim	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
83.	Purnomo	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	

84.	Radna Nurmasari	• Faculty of Math and Science, Lambung Mangkurat University, Banjarbaru, Indonesia	
85.	Rahma Yasmine	• Faculty of Engineering, Lambung Mangkurat University, Banjarbaru, Indonesia	
86.	Rahmi Zulhidiani	• Faculty of Agriculture, Lambung Mangkurat University, Banjarbaru, Indonesia	
87.	Ratna Sari Dewi	• PT. Aya Yayang Indonesia	
88.	Ratri Y. Lestari	• Baristrand, Banjarbaru, Indonesia	
89.	Rawintan EB	• Fakulty Economy & Bisnis, Lambung Mangkurat University, Banjarmasin, Indonesia	
90.	Riana Rusida	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
91.	Ridayat	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
92.	Rifki N	• Fakulty Economy & Bisnis, Lambung Mangkurat University, Banjarmasin, Indonesia	
93.	Rilo Nurrohman	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
94.	Riza Adrianoor Saputra	•	
95.	Rizqun Akbar	• Faculty of Math and Science, Lambung Mangkurat University, Banjarbaru, Indonesia	
96.	Roby Arni	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
97.	Rodinah	• Faculty of Agriculture, Lambung Mangkurat University, Banjarbaru, Indonesia	
98.	Rosalyne Clara VP	• Faculty of Agriculture, Lambung Mangkurat University, Banjarbaru, Indonesia	
99.	Rosidah	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	rosidahkehutanan@gmail.com
100.	Rosidah	• Fakulty Economy & Bisnis, Lambung Mangkurat University, Banjarmasin, Indonesia	

101.	Rudi Cahyo Purnomo	• Faculty of Agriculture, Lambung Mangkurat University, Banjarbaru, Indonesia	
102.	Rukmini	• Faculty of Fisheries, Lambung Mangkurat University, Banjarbaru, Indonesia	
103.	Rusmana	• Banjarbaru Environment and Forestry Research and Development Institute , Indonesia	
104.	Saipul Anwar	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
105.	Shafwan Hamidi	• Faculty of Fisheries and Marine, Lambung Mangkurat University, Banjarbaru, Indonesia	
106.	Sigit Krisyanto, S.Hut	• Banjarbaru Environment and Forestry Research and Development Institute , Indonesia	
107.	Siti Qomariah	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
108.	Siti Raihanah	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
109.	Siti Ramlah	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
110.	Siti Saidah	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
111.	Sri Hartatik	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
112.	Sri Setyati	• Balitbangda, Kalsel, Indonesia	
113.	Subaidi	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
114.	Subairi	• Agroecotechnology Departement, Faculty of Agriculture, Lambung Mangkurat University, Banjarbaru, Indonesia	
115.	Sulaiman	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
116.	SulaimanBakri	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	

117.	Sunardi	• Faculty of Math and Science, Lambung Mangkurat University, Banjarbaru, Indonesia	
118.	Susilawati	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
119.	Syaifuddin	• Banjarbaru Environment and Forestry Research and Development Institute , Indonesia	
120.	Tri Sulityawati	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
121.	Titin Maryati	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	
122.	Ulfa Ftriati	• Lambung Mangkurat University, Banjarbaru, Indonesia	
123.	Yusuf Effendi	• Faculty of Forestry, Lambung Mangkurat University, Banjarbaru, Indonesia	

DOCUMENTARY OF INOVCOM – FP 2016


INTERNATIONAL SEMINAR

THANKS to: