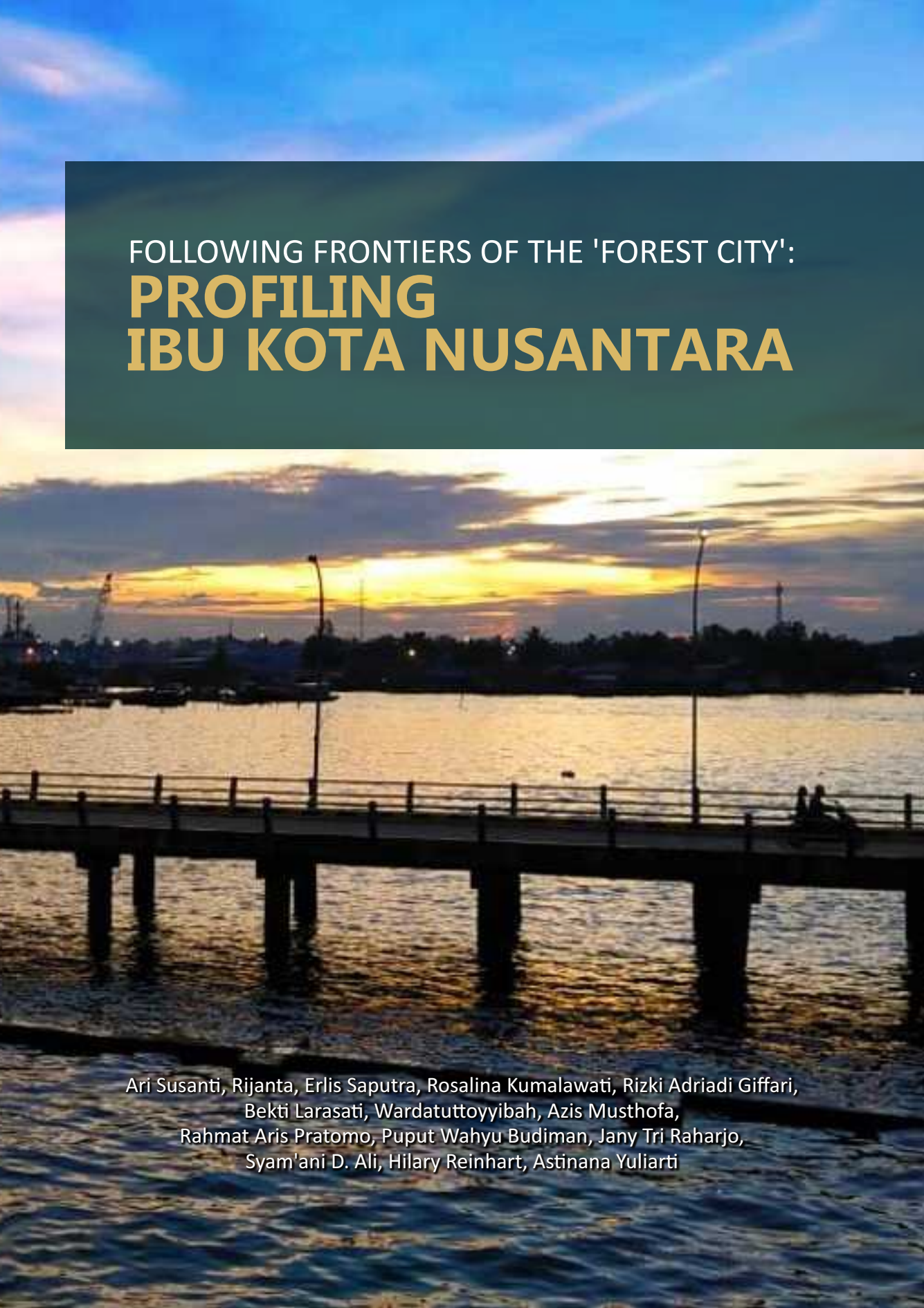
FOLLOWING FRONTIERS OF THE 'FOREST CITY':

# PROFILING IBU KOTA NUSANTARA



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MEGA CAKRAWALA

FOLLOWING FRONTIERS OF THE 'FOREST CITY':

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**Authors:**
Ari Susanti, Rijanta, Erlis Saputra, Rosalina Kumalawati, Rizki Adriadi Giffari, Bekti Larasati, Wardatuttoyyibah, Azis Musthofa, Rahmat Aris Pratomo, Puput Wahyu Budiman, Jany Tri Raharjo, Syam'ani D. Ali, Hilary Reinhart, Astinana Yuliarti

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Sepaku Landscape
Photo credit: Ogi Elian Aziz Arrifqi

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Dryland agriculture in Sepaku
Photo credit: Ogi Elian Aziz Arrifqi

# Preface

The Following Frontiers of the 'Forest City' Towards Sustainable and Inclusive Urbanization in Kalimantan and beyond or Forest City consortium is an example of multi-disciplinary research collaboration. This consortium received financial support from the Indonesia Research Council (BRIN) and the Netherlands Research Council (NWO) through the Merian Fund Cooperation Indonesia-The Netherlands on Regional Planning and Sustainable Urbanization.

The 'Forest City' consortium aims to generate and apply knowledge on the consequences of the city and the future Indonesian capital city to be built in the forest highlands of Kalimantan. This research uses multi-dimensional perspectives to analyze the process and the consequences of the Forest City development beyond the planned area.

This research also provides information on the first-year research activities of the Indonesia consortium. Moreover, this is a part of the knowledge products to inform the consortium members and the broader public. The consortium members will also publish other scientific publications.

The authors are grateful to all the consortium members, research partners, stakeholders, and respondents who helped and provided valuable support during the implementation of the first-year research activities.

Authors

# 1 Introduction

## 1.1 The relocation of the capital city of Indonesia

On 26th August 2019, the President of Indonesia, Joko Widodo announced the relocation of the national capital from Jakarta to eastern Kalimantan (Figure 1). In the announcement, the President highlighted over-population, over-burden, and the threat of climate-related disasters in the capital city. A previous report has shown that the population of Java Island in 2020 was approximately 150 million, where more than 10 million were in Jakarta. Jakarta is a global city that serves various local and international services such as governments, businesses, finances, and trades, and also has the largest airport and harbor, namely Soekarno-Hatta and Tanjung Priok, respectively. The city has been experiencing different environmental-related disasters induced by climate change such as pollution, water shortage, extreme heat, land subsidence, and flooding which is the most prominent and systemic environmental problem. Moreover, the solution for this problem is beyond the city's administrative boundaries because there is a need to involve the upper catchment areas to improve the hydrological system.

Monas Jakarta
Photo credit: Raymond Matthijs


N
THAILAND
Da Nang
Bangkok
VIETNAM
CAMBODIA
Phnom Penh
Ho Chi Minh City
Andaman Sea
Gulf of Thailand
George Town
Bandar Seri Begawan
BRUNEI
Medan
MALAYSIA
Shah Alam
Kuala Lumpur
Singapore
Kuching
Padang
Karimata Strait
Palembang
Banjarmasin
±1200 Km
Java Sea
Jakarta
Bandung
Surabaya
Denpasar
Tekukmaga
North Jakarta
West Jakarta
Jakarta
Central Jakarta
East Jakarta
Ciputat
Cileug
Kuningan
South Jakarta
Bekasi
Pondokgede
Serpong
Pamulang
Sawangan
Gunung Putri
Sumber (Source):
UU No. 3 tahun 2022 tentang Ibu Kota Negara
Rupa Bumi Indonesia, BIG, 2021
World Topographic Map, Esri, 2021
Keterangan (Legend)
Batas Laut Teritorial (Territorial Sea Boundary)
Batas Landas Kontinen (Contiguous Zone Boundary
Zona Ekonomi Eksklusif (Exclusive Economic Zone


**Figure 1.** Map of capital city relocation from Jakarta to Kalimantan

The relocation of the capital city from Jakarta to Kalimantan intends to distribute economic development outside Java, as Kalimantan is at the center of the archipelago(Farisa, 2021). The new establishment centers will emerge in the adjacent regions of the novel capital city, specifically along the corridor between Balikpapan and Samarinda (Adyatama, 2019). Geologically, Kalimantan is relatively stable and seldom experiences seismic activities(Putri, 2022). The new capital city also called Forest City or Ibu Kota Nusantara (IKN) will become a national identity to show Indonesia's commitment to climate mitigation as IKN will run on renewable energies (Sekretariat Kabinet Republik Indonesia, 2022). The planning process of the new capital city conforms to government policies on SDGs institutionalization into national and subnational entities as well as planning (Government of Indonesia, 2019).

However, the relocation plan has received criticism for its potential to damage Kalimantan's unique ecosystem and societies while doing little to solve Jakarta's complex problems

Eucalyptus Plantation in Sepaku
Photo credit: Ogi Elian Aziz Arrifqi

(Saputra, 2019). The Kalimantan forest ecosystems play the world's lung and a crucial role in climate mitigation (Aurora, 2012). Moreover, the impacts of the relocation announcement are already evident in Kalimantan as land prices are skyrocketing, attracting people to speculate on land banking. East Kalimantan province has always been a favorite destination of migrants, which received more than 12 million migrants in the last four decades(BPS, 2022a). The current infrastructural developments such as toll roads will attract more migrants to the regions and contribute to the economic activities. This migration and increasing economic activities can stimulate a resource boom and accelerate forest encroachment in the resource frontier areas (Susanti and Maryudi, 2016). IKN is also expected to encounter many social, economic, and environmental trials. Therefore, a systemic framework is required to monitor and evaluate the intention of inclusive and sustainable urbanization in the new capital city.

## 1.2 About this research and consortium

This research aims to establish a framework to systematically examine whether IKN addresses SDGs and builds synergies between different SDGs as well as targets (Renaud et al. 2020) for sustainable and inclusive urbanization (SDG11). It also analyzes the ecological sustainability and related disasters beyond the city's boundaries (SDG15.9 and SDG13.2). It also promotes long-term inclusive decision-making (SDG16.7) by developing a co-created learning lab for students from the consortium universities, citizens, and stakeholders with similar interests.

**This research aims to establish a framework to systematically examine whether IKN addresses SDGs and builds synergies between different SDGs as well as targets**

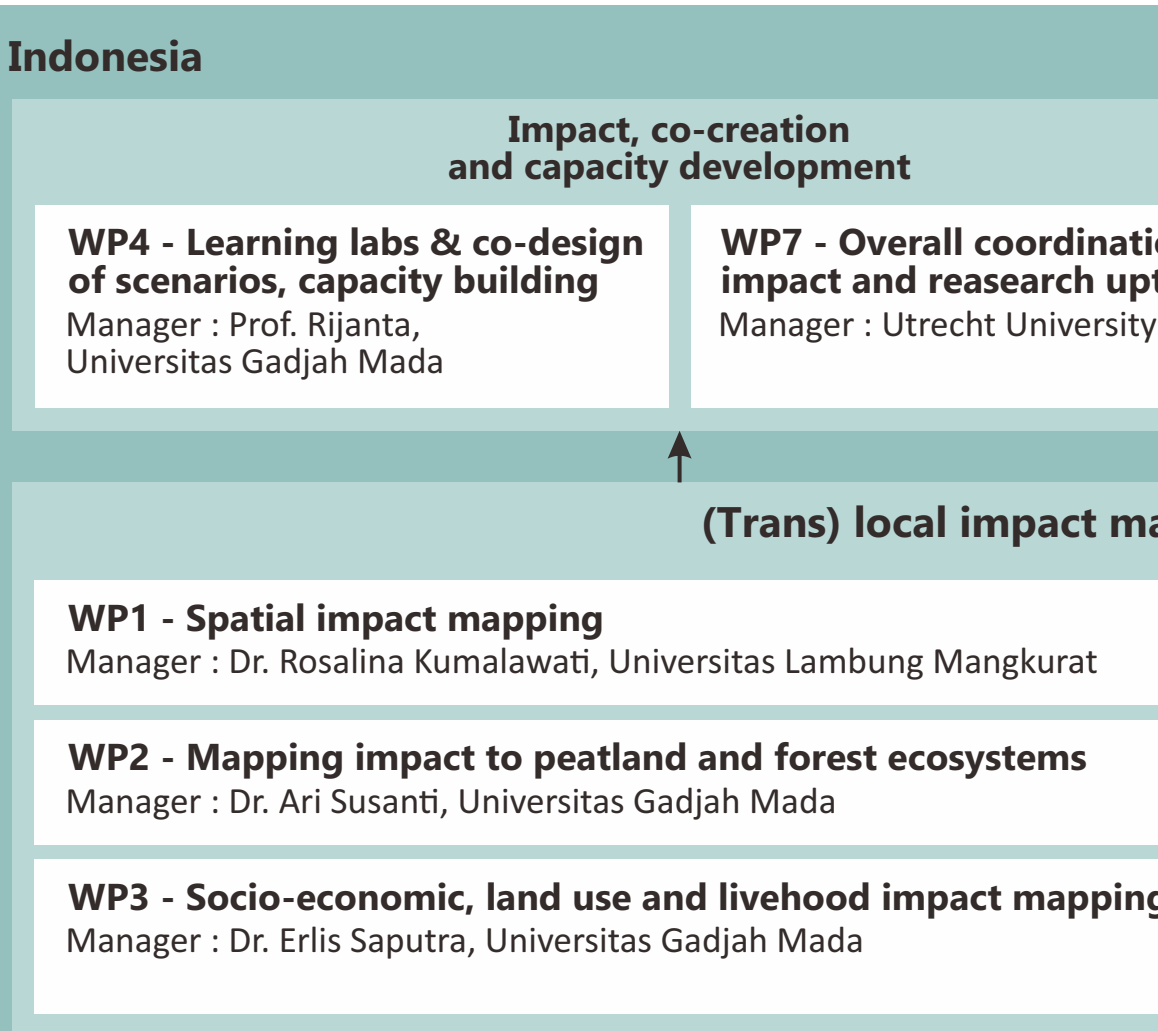
Therefore, this research deploys 7 work packages (WPs) with specific focuses that are inter-linkages (Figure 2) to achieve the proposed objectives. Figure 2 shows that the Indonesian Universities will lead WP1, WP2, WP3, and WP4, while Dutch Universities are expected to lead WP5, WP6, and WP7. This consortium was built

Eucalyptus plantation
Photo credit: Moh. Syahrul Irfan Fahmi

upon collaboration with government agencies in the country (BRGM, Balitbangda of East Kalimantan Province) and the private sector (Royal Haskoning DHV). Table 1 lists the consortium members.

The consortium of the Indonesia side has started in 2021, while the Dutch side began in 2022, which leads to the project administration system in both countries. For the Indonesia side consortium, adjustments should also be made for the second

**Figure 2.** The deployment and inter-linkages of the work packages



and the following years to meet the new regulation of the research grant scheme. These adjustments are explained in the associated sections.

This publication aims to inform the consortium members and stakeholders about the first year of the research activities that were carried out by the Indonesia side consortium. Other results will be published in scientific journals or other means of communication for a broader audience.

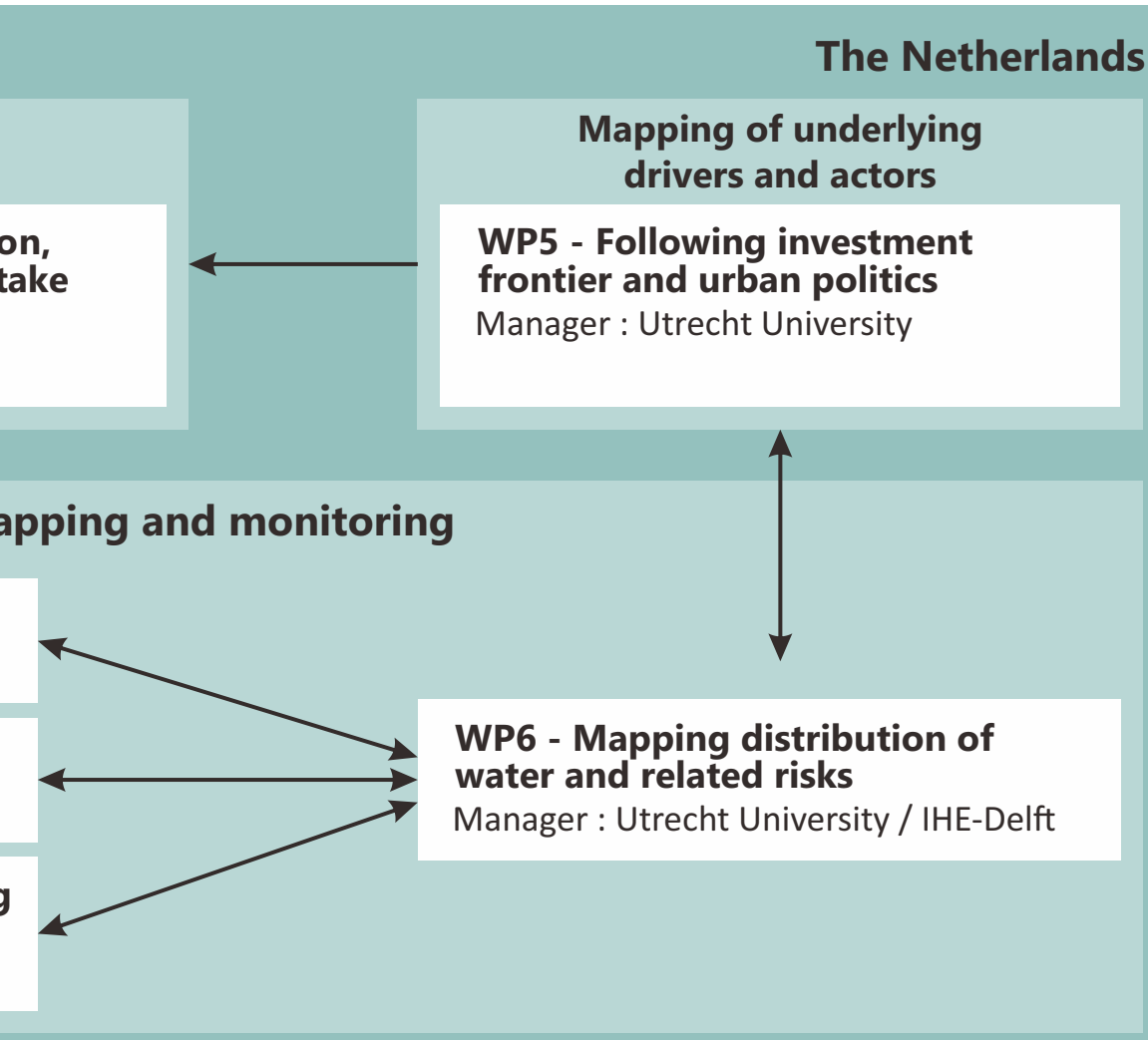


**Table 1.** List of consortium members

| Name | Gender | Position | Organization |
|---|---|---|---|
| Prof. Dr. Rijanta | M | Indonesia PI & WP Manager 4 | Faculty of Geography, Universitas Gadjah Mada (FGE-UGM) |
| Dr. Rosalina Kumalawati | F | WP Manager 1 | Faculty of Social and Political Sciences Universitas Lambung Mangkurat (ULM) |
| Dr. Ari Susanti | F | WP Manager 2 | Faculty of Forestry, Universitas Gadjah Mada (FKT-UGM) |
| Dr. Erlis Saputra | M | WP Manager 3 | Faculty of Geography, Universitas Gadjah Mada (FGE-UGM) |
| Rahmat Aris Pratomo, M.Sc | M | Co-applicant | Department of Urban and Regional Planning, Institut Teknologi Kalimantan (ITK) |
| Puput Wahyu Budiman, ST, M.URP | M | Collaboration Partner | Research and Development Agency of East Kalimantan Province (Badan Penelitian dan Pengembangan Daerah Provinsi Kalimantan Timur - Balitbangda) |
| Jany Tri Raharjo., S.Hut, M.ec Dev., MPP | M | Collaboration Partner | Indonesia Peatland & Mangrove Restoration Agency (Badan Restorasi Gambut & Mangrove - BRGM) |
| Rizki Adriadi Ghiffari, ST., M.Sc | M | Research Assistant | Faculty of Geography, Universitas Gadjah Mada (FGE-UGM) |
| Bekti Larasati, S.Hut., M.Sc., M.Agr.Sc. | F | Research Assistant | Faculty of Forestry, Universitas Gadjah Mada (FKT-UGM) |
| Dr. Wardatutthoyyibah, S.Hut | F | Research Assistant | Faculty of Forestry, Universitas Gadjah Mada (FKT-UGM) |
| Azis Musthofa, S.Si | M | Research Assistant | Faculty of Geography, Universitas Gadjah Mada (FGE-UGM) |
| Elinda Tria Wati, S.Pd. | F | Research Assistant | Faculty of Geography, Universitas Gadjah Mada (FGE-UGM) |

| Name | Gender | Position | Organization |
|---|---|---|---|
| Hilary Reinhart, S.T., M.Sc. | M | Research Assistant | Faculty of Geography, Universitas Gadjah Mada (FGE-UGM) |
| Syam'ani, S.Hut., M.Sc | M | Research Assistant | Faculty of Forestry, Universitas Lambung Mangkurat (ULM) |
| Astinana Yuliarti, S.S., M.I.Kom | F | Research Assistant | Faculty of Social and Political Sciences Universitas Lambung Mangkurat (ULM) |
| Stevie Vista Nissauqodry, S.Hut., M.Sc. | F | Administration/ finance staff | Faculty of Forestry, Universitas Gadjah Mada (FKT-UGM) |
| Fitria Dewi Rahmawati, S.S. | F | Administration/ finance staff | Faculty of Forestry, Universitas Gadjah Mada (FKT-UGM) |
| Ria Aryanti, S.Si. | F | Administration/ finance staff | Faculty of Geography, Universitas Gadjah Mada (FGE-UGM) |
| Andri Widayanti, S.Sos. | F | Administration/ finance staff | Faculty of Geography, Universitas Gadjah Mada (FGE-UGM) |
| Novia Nour Halisa, S.Si.,M.Si | F | Administration/ finance staff | Faculty of Social and Political Sciences Universitas Lambung Mangkurat (ULM) |
| Dr. Kei Otsuki | F | Netherlands PI | Department of Human Geography and Spatial Planning, Faculty of Geosciences, Utrecht University |
| Dr. Femke van Noorloos | F | Co-applicant | Department of Human Geography and Spatial Planning, Faculty of Geosciences, Utrecht University |
| Dr. Michelle Kooy | F | Co-applicant | Water Governance Department, IHE-Delft |
| Margriet Hartman, MSc. PGcert. | F | Collaboration partner | Royal Haskoning DHV |
| Vandy Yoga Swara, B.A., M.A. | M | PhD Students | Utrecht University/ IHE-Delft |
| Dr. Bosman Batubara, S.T., M.Sc. | M | Postdoc | Utrecht University |

# 2 RESEARCH CONTEXT

## 2.1 Research area

Kalimantan Island has vast natural resources and several characteristics of a resource frontier area. Apart from the mining of coal, oil, and gas, it also hosts larger forest-covered and plantations areas as shown in . Based on the national spatial plan (Government Regulation No 13/2013), this island has become a crucial part of the national policy on environmental sustainability since at least 45% of its area conforms to the condition, characteristics, and ecosystem functions. Furthermore, the 5 provinces in this island significantly contribute to the national gross domestic product (GDP). East Kalimantan Province has the highest per capita gross regional domestic product (GRDP) in Indonesia , which mainly comes from the extractive industries.

The indigenous people of East Kalimantan belong to the Dayak tribes(Bock, 1985), however, the current population is a mix of indigenes and migrants from global origins who iteratively come through various trajectories. The support for migrants as mining workers started during the Dutch colonial period, followed by timber extraction, and agricultural expansion such as rubber and oil palm (Pandu Permana, 2012). The

Teluk Dalam Landscape
Photo credit: Genta Sena Santosa

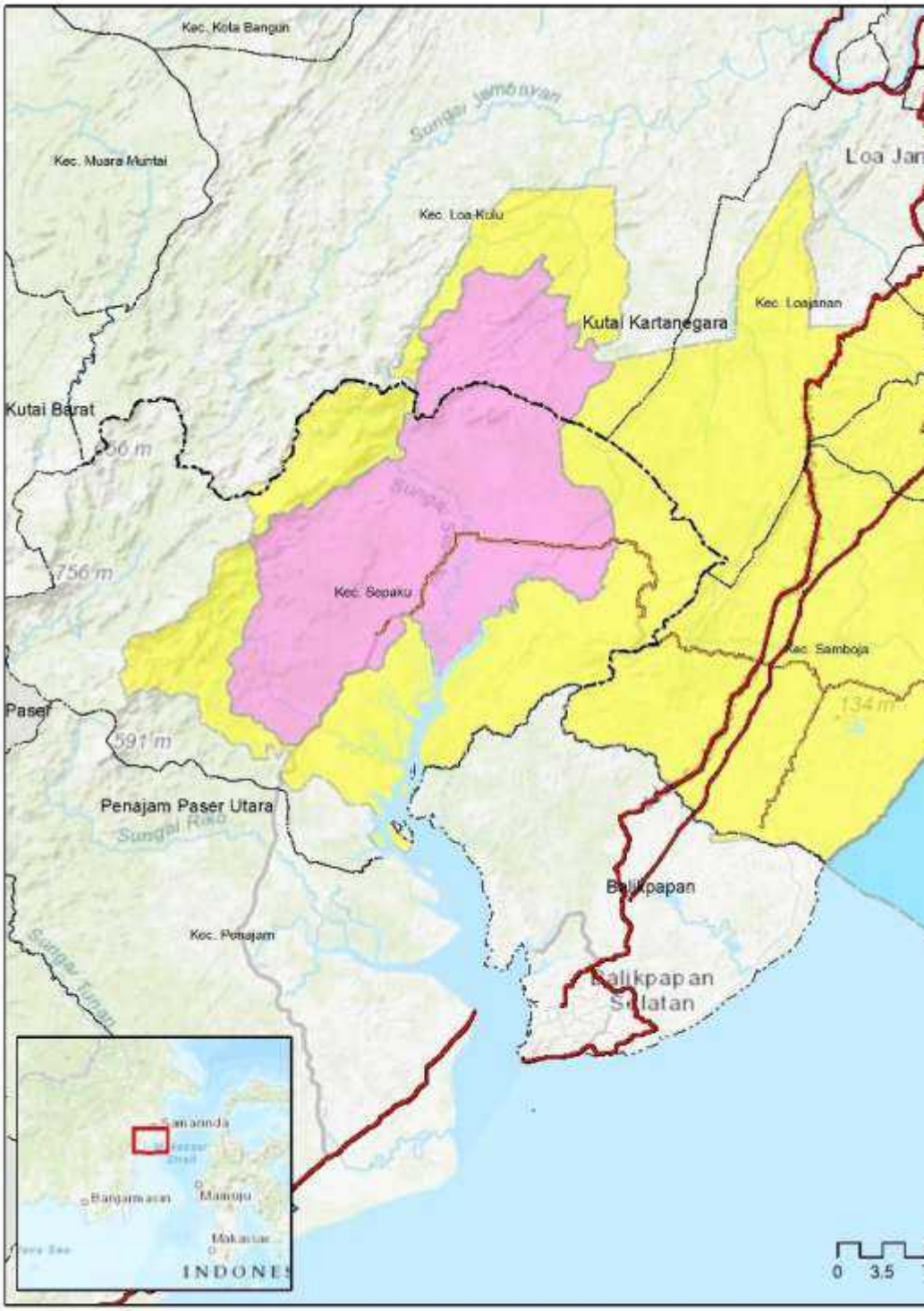

Kec. Kota Bangun
Kec. Muara Muntai
Kec. Loa Kulu
Kutai Kartanegara
Kec. Loajanan
Kutai Barat
Kec. Sepaku
Kec. Samboja
Paser
Penajam Paser Utara
Balikpapan
Kec. Penajam
Kalikpapan Selatan
Samarinda
Banjarmasin
Makassar
INDONES
0 3.5


**Figure 3.** Delineation of the new capital city based on Law No 3/2022 on IKN

**Table 2.** Major land cover in Kalimantan in 2021. Source: (BPS, 2022c)

| Province | Land cover (x1000 ha) | | | | | |
|---|---|---|---|---|---|---|
| | Forest | Oil palm | Coconut | Rubber | Coffee | Cacao |
| West Kalimantan | 13,289.5 | 2,039.2 | 106.4 | 391.7 | 11.6 | 10.4 |
| Central Kalimantan | 560.0 | 2,018.7 | 34.8 | 293.4 | 2.5 | 2.9 |
| South Kalimantan | 731.1 | 497.3 | 40.1 | 200.8 | 3 | 0.7 |
| East Kalimantan | 3,802.4 | 1,313.6 | 21.5 | 72.6 | 1.2 | 7.5 |
| North Kalimantan | * | 157.7 | 1.2 | 2.2 | 1.5 | 2.6 |

* East Kalimantan data is a combination of East and North Kalimantan Provinces

lucrative financial benefit has attracted independent migrants to the region. Due to this migration, East Kalimantan experience high population growth, which is above the national average growth (BPS, 2022a). In 2020, it was reported that East Kalimantan experienced an average growth of 2.24%, which is almost twice the national population growth (BPS, 2022d).

The new capital city IKN lies in the existing Penajam Paser Utara (PPU) and Kutai Kartanegara (Kukar) Districts and spreads across 10 watersheds. Based on Law No 3/2022, IKN consists of 68,189 ha of water and 256,142 ha of land area, where 56,180 ha is designated for the city, while 199,962 ha is for expansion (Table 4).

## 2.2 Selection of villages

This research purposively selected 4 villages, namely Pemaluan, Sepaku, Teluk Dalam, and Babulu Darat in East Kalimantan to analyze and follow the impacts of the IKN development in the planned areas and beyond. For the new grant scheme regulations, 4 villages, which include Kariangau,

Babulu Laut, Anggana, and Kutai Lama were added for the second and the following years to factor in the future road corridor between Balikpapan and Samarinda (Figure 4). Table 3 summarizes the characteristics of the selected villages.

**Table 3.** Characteristics of the selected villages

| No | Village | Zone | Characteristic |
|---|---|---|---|
| 1 | Pemaluan | IKN Zone | Peatland (43 ha), mangrove forests (largest), forest fires, infrastructure corridors (road, fiber optic, and energy). |
| 2 | Sepaku | IKN Zone | Mix tribal and transmigrant communities, landslides (slope > 40%), infrastructure corridors (road, fiber optic, and energy). |
| 3 | Teluk Dalam | Expansion Zone | Peatland (2.886 ha), mangrove forests, conservation area (Bukit Soeharto), forest fires, infrastructure corridors (road, fiber optic). |
| 4 | Babulu Darat | Corridor Balikpapan-Samarinda | Mix tribal and migrant communities, plantations (oil palm), and food production areas (East Kalimantan food bag). |
| 5 | Kariangau* | Corridor Balikpapan-Samarinda | Mix migrant communities, conservation areas (Sungai Wain), mangrove centers, and industrial areas. |
| 6 | Babulu Laut* | Corridor Balikpapan-Samarinda | Mix tribal and migrant communities, mangrove forests, food production areas (seafood), and abrasion/seawater intrusion. |
| 7 | Anggana* | Corridor Balikpapan-Samarinda | Mix tribal and migrant communities, plantations (oil palm), and mangrove forests. |
| 8 | Kutai Lama* | Corridor Balikpapan-Samarinda | Tribal communities, plantations (oil palm) mangrove forests. |

* Additional villages for the second and the following years

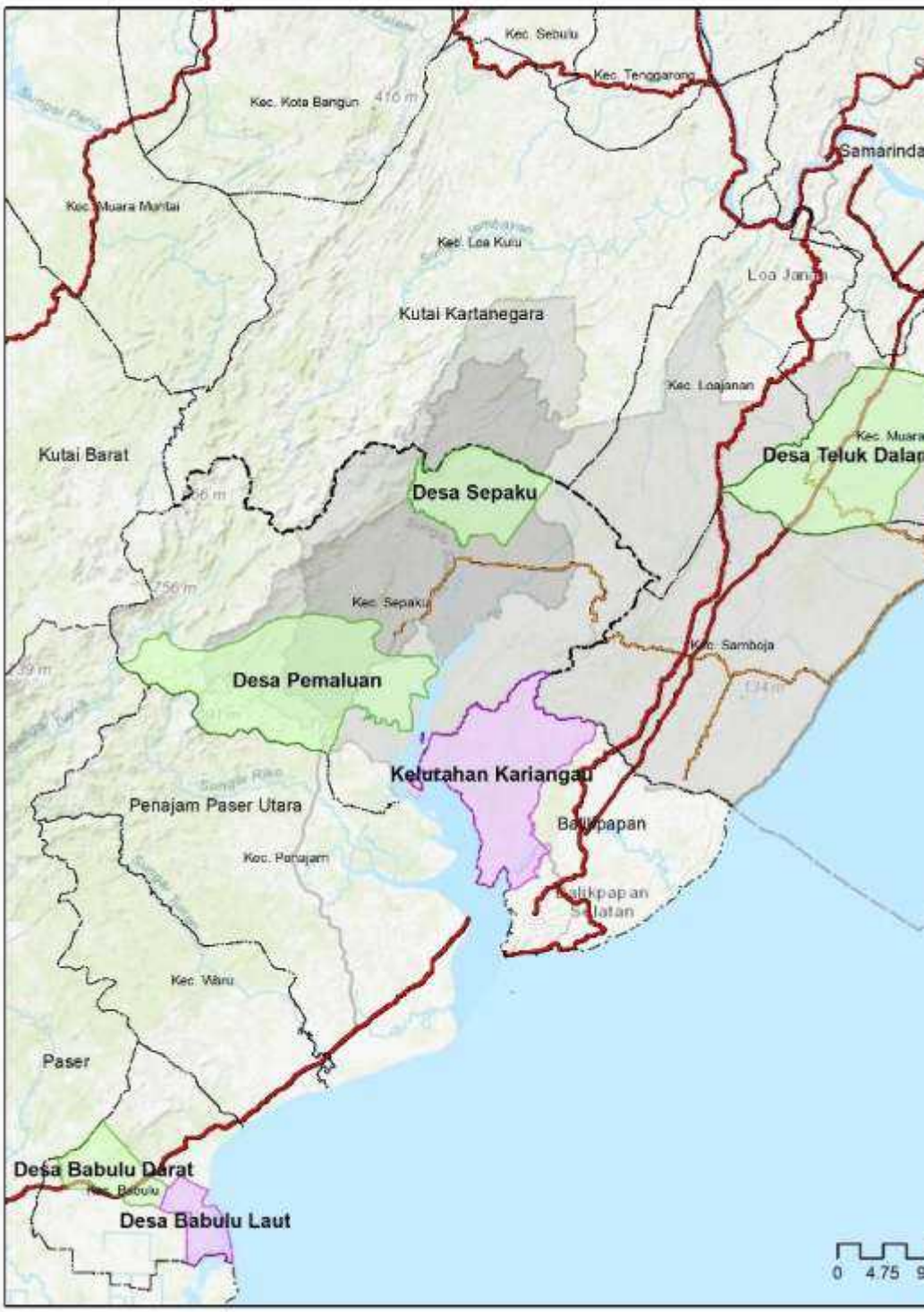

Kec. Sebulu
Kec. Tenggarong
Kec. Kota Bangun
Samarinda
Kec. Muara Muntai
Kec. Loa Kulu
Loa Janan
Kutai Kartanegara
Kec. Loajanan
Kutai Barat
Desa Teluk Dalam
Desa Sepaku
Kec. Sepaku
Kec. Samboja
Desa Pemaluan
Kelutahan Kariangau
Penajam Paser Utara
Balikpapan
Kec. Penajam
Balikpapan Selatan
Kec. Waru
Paser
Desa Babulu Darat
Kec. Babulu
Desa Babulu Laut
0 4.75


**Figure 4.** Research area

# 3 DATA COLLECTION

This research is designed in a multi-disciplinary and complex situational setting using hybrid methods and a convergent parallel data collection strategy. The quantitative and qualitative data are collected simultaneously and are separately analyzed according to the specific purposes. At the end of the research, all information is expected to feed the synthesis of the whole project.

The implementation of the first-year research was between 19 August and 16 November 2021 according to the Indonesia fiscal year. All research activities need to be executed and reported to BRIN during this period. However, the execution of several activities such as traveling to the Netherlands was impossible due to the Covid-19 pandemic.

The consortium set up a WhatsApp Group (WAG) with a weekly online meeting to communicate and prepare this research. This includes the recruitment of personnel, namely research assistants, field researchers, and administrative/finance staff as well as the fieldwork design. Each WP also recruited 2 research assistants, 4 field researchers (surveyors), and 2 administrative/finance staff. The field researchers' recruitments also involve students/fresh graduates from partner

Erosion in Teluk Dalam
Photo credit: Wardatutthoyyibah

universities (ULM and ITK). The field researchers and their institutions are summarized in Table 4 below.

**Table 4.** List of field researchers (surveyors) and their institutions

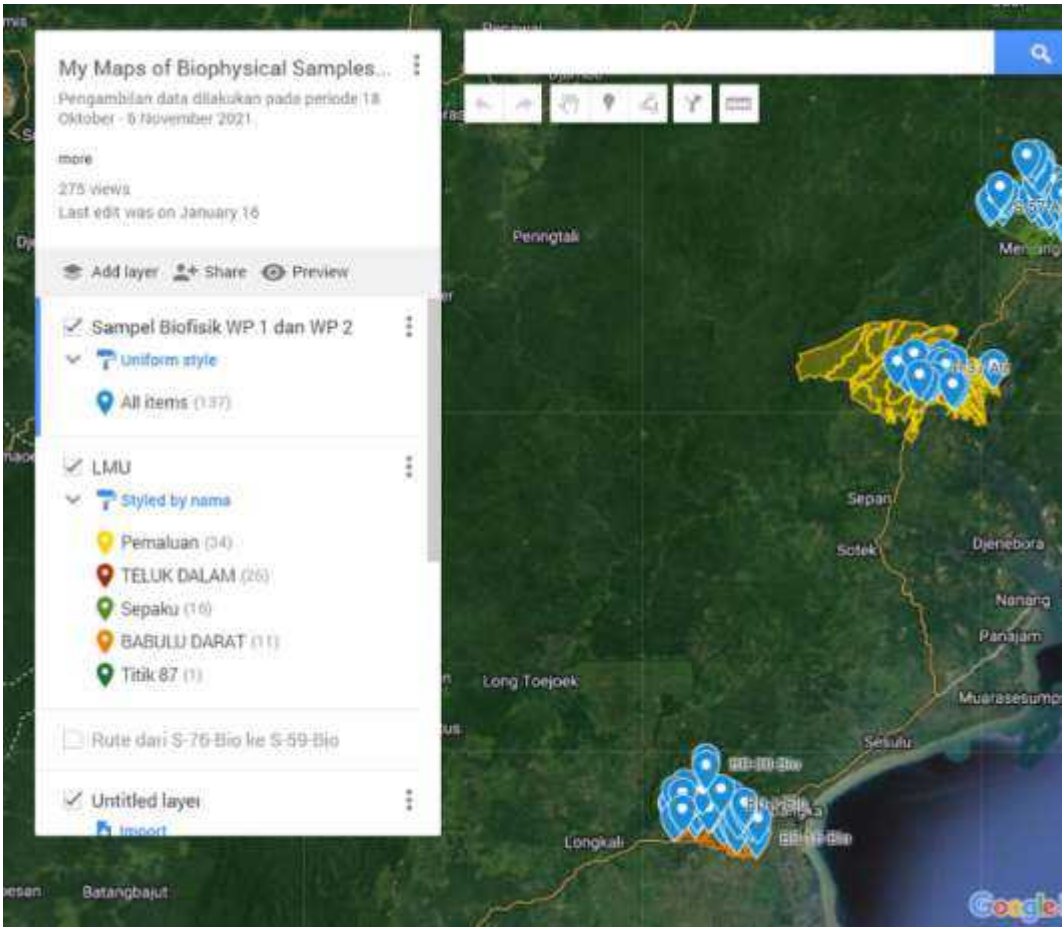
| No | Name | Gender | Institution |
|---|---|---|---|
| 1 | Ikrima Barrorotul Farikhiyah | F | FGE-UGM |
| 2 | Moh. Syahrul Irfan Fahmi | M | FGE-UGM |
| 3 | Ahmad Mukhlis Nur Cahyanto, S.Hut. | M | FKT-UGM |
| 4 | Genta Sena Santosa, S.Hut. | M | FKT-UGM |
| 5 | Al Faridzy Satya Nugraha | M | ITK |
| 6 | Debby Aulia Rabe, S.P.W.K | F | ITK |
| 7 | Muhammad Ari Adha Saputra | M | ITK |
| 8 | Nanda Tri Andini, S.P.W.K | F | ITK |
| 9 | Niron Meliana Berekina, S.P.W.K | F | ITK |
| 10 | Purris Rachelina Girsang, S.P.W.K | F | ITK |
| 11 | Trisna Adji Setyawan | M | ITK |
| 12 | Zumrotul Islamiah, S.P.W.K | F | ITK |
| 13 | Abd Rahman | M | ULM |
| 14 | Ogi Elian Aziz Arrifqi | M | ULM |

The consortium formulated 4 hypotheses to be addressed during the fieldwork as summarized in Table 5. It also prepared research instruments such as tally sheets for biophysical measurements and questionnaires for the socio-economic appraisals. Due to Covid-19, there was a planned detailed mobility and risks mitigation for the fieldwork.

**Table 5.** The hypothesis and its associated WP

| WP | Hypothesis |
|---|---|
| WP1 | The IKN area is geo-physically suitable for urban development |
| WP2 | IKN lies in a disaster-free area |
| WP3 | Indigenous people in East Kalimantan will be marginalized by the development of the new capital city |
| WP4 | East Kalimantan and its population is not ready to address sustainability issues |

Riverbanks of Pemaluan
Photo credit: Rizki Adriadi Ghiffari




## 3.1 Primary data collection

The primary data includes biophysical such as soil, water, vegetation, and socio-economic, namely socio-culture, disaster-related, knowledge and perception of capital city relocation, knowledge, skills, and practices on sustainability. In this research, a field team of biophysical and socio-economic surveyors was assigned to each village. The fieldwork instruments and data are stored in the clouds system and accessible to all consortium members.

The biophysical data were collected in 10 land mapping units


| Village | Zone |
|---|---|
| Sepaku | IKN Zone |
| Pemaluan | IKN Zone |
| Teluk Dalam | Expansion Zone |
| Babulu Darat | Corridor Balikpapan- Samarinda |

**Figure 5.** The distribution of sample plots in 4 selected villages

(LMUs), distributed in the 4 selected villages (Table 6) using a consolidated tally sheet for all variables (Figure 6 and Figure 7). Subsequently, a total of 122 plots of vegetation characteristics together with 14 soil and water samples were measured. Figure 5 shows the distribution of the sample plots in the selected villages. Household surveys (Figure 8), FGDs/group meetings (Figure 9), and in-depth interviews with relevant informants for socio-economic appraisals were also carried out. A consolidated structured questionnaire was used to interview 262 households in 4 villages.

**Table 6.** Characteristics of each LMU

| No | LMU | Soil type | Erosion sensitivity | % slope | Slope class | Rainfall intensity (mm/yr) | Rainfall intensity class |
|---|---|---|---|---|---|---|---|
| 1 | T1S2CH1 | Aluvial | Not sensitive | 2-8% | Flat | 2200 - 2500 | Very high |
| 2 | T1S4CH1 | Aluvial | Not sensitive | 16-25% | Rather steep | 2200 - 2500 | Very high |
| 3 | T1S5CH1 | Aluvial | Not sensitive | 26-40% | Steep | 2200 - 2500 | Very high |
| 4 | T2S4CH1 | Red Yellow Podzolic complex, Latosol & Litosol | Slightly sensitive | 16-25% | Rather steep | 2200 - 2500 | Very high |
| 5 | T2S5CH1 | Red Yellow Podzolic complex, Latosol & Litosol | Slightly sensitive | 26-40% | Steep | 2200 - 2500 | Very high |
| 6 | T4S2CH1 | Red Yellow Podzolic | Sensitive | 2-8% | Flat | 2200 - 2500 | Very high |
| 7 | T4S4CH1 | Red Yellow Podzolic | Sensitive | 16-25% | Rather steep | 2200 - 2500 | Very high |
| 8 | T4S5CH1 | Red Yellow Podzolic | Sensitive | 26-40% | Steep | 2200 - 2500 | Very high |
| 9 | T4S6CH1 | Red Yellow Podzolic | Sensitive | >40% | Very steep | 2200 - 2500 | Very high |
| 10 | T6S1CH1 | Peaty soil | Very sensitive | 2% | Flat | 2200 - 2500 | Very high |

(a)

(b)

(c)

(d)

(e)

(f)

**Figure 6.** Biophysical data collection (a) plot establishment in oil palm plantation - Photo credit: Abd Rahman, (b) tree height measurement - Photo credit: Ogi Elian Aziz Arrifqi, (c) water pH measurement - Photo credit: Ogi Elian Aziz Arrifqi, (d) water sample collection - Photo credit: Ogi Elian Aziz Arrifqi, (e) soil sample collection - Photo credit: Ogi Elian Aziz Arrifqi, and (f) wind speed measurement - Photo credit: Genta Sena Santosa

(a)

(b)

(c)

(d)

**Figure 7.** Several land cover types (a) oil palm plantation in Sepaku - Photo credit: Ogi Elian Aziz Arrifqi, (b) Eucalyptus plantation forest in Pemaluan - Photo credit: Moh. Syahrul Irfan Fahmi, (c) agroforestry in Teluk Dalam - Photo credit: Genta Sena Santosa, and (d) paddy field in Babulu Darat - Photo credit: Azis Musthofa

(a)

(b)

(c)

(d)

**Figure 8.** Household survey in (a) Sepaku - Photo credit: Purris Rachelina Girsang, (b) Pemaluan - Photo credit: Moh. Syahrul Irfan Fahmi, (c) Teluk Dalam - Photo credit: Wardatutthoyyibah, and (d) Babulu Darat - Photo credit: Genta Sena Susanto


Focus Group Discussion

**Figure 9.** FGD with local stakeholders - Photo credit: Wardatutthoyyibah

## 3.2 Secondary data collection

In this research, the secondary data includes spatial and non-spatial. The spatial data consists of maps and satellite images, the basic maps were downloaded from the relevant providers, while thematic maps were requested from the government agencies at local and national levels. Similarly, the satellite images are obtained from BRIN (LAPAN) or vendors when they are not available at BRIN. Meanwhile, the non-spatial data consists of regulations, technical, and other relevant documents, which were downloaded from appropriate websites when available, or requested by the agencies when they were not available online. The secondary data collection can be time-consuming because it involves some administrative procedures. At this point, the collection of secondary data is still in progress.

**Table 7.** List of secondary data

| No | Data | Sources |
|---|---|---|
| 1 | Administrative map | Badan Informasi Geospasial |
| 2 | Soil type map | Badan Perencanaan Pembangunan Daerah Prov. Kalimantan Timur |
| 3 | Rainfall map | Badan Perencanaan Pembangunan Daerah Prov. Kalimantan Timur |
| 4 | Topography map | Badan Perencanaan Pembangunan Daerah Prov. Kalimantan Timur |
| 5 | Land use map 2020 | Kementerian Lingkungan Hidup dan Kehutanan |
| 6 | Hot spots distribution 2000-2021 | https://firms.modaps.eosdis.nasa.gov/download/ |
| 7 | Peat land maps (East Kalimantan) | Balai Besar Penelitian dan Pengembangan Sumber-daya Lahan Pertanian, Kementerian Pertanian |
| 8 | IKN zone | Badan Perencanaan Pembangunan Nasional (Bappenas) |
| 9 | Disaster risks (East Kalimantan) | https://inarisk.bnpb.go.id |
| 10 | Watersheds | Pusat Data dan Teknologi Informasi, Kementerian PUPR |
| 11 | Conservation areas | World Database on Protected Areas (http://www.protectedplanet.net) |

Settlements along the river in Teluk Dalam
Photo credit: Wardatutthoyyibah

# 4 EMERGING ISSUES

The Indonesian Government is eager to relocate the Capital City to IKN because the existing one, Jakarta, is no longer capable of supporting essential activities. Some of the factors that motivated the government to move the capital city include annual floods, heavy traffic congestion, land subsidence, and air pollution. The government also intends to place the capital city in the center of Indonesia, about 5000 km from the west and east, therefore, East Kalimantan was elected as the most appropriate region. They envisage the lush and green forest of this province, relatively low disaster risk, and centrality of its position will enable the efforts to create a great, modern new capital city to support government functions and become a majestic symbol of the nation. Moreover, it is time to build the new city because the design and regulations are already in place.

Based on preliminary observation, a total of 4 emerging issues related to the hypotheses were formulated (Table 8). The issues need further investigation, which will be addressed in the subsequent years of the research project. They can also be resolved in different directions based on the dynamics in the fields. The sections below elaborate on the emerging issues for each hypothesis.

Oil palm plantation in Sepaku
Photo credit: Abd Rahman

**Table 8.** Emerging issues from the fields

| Hypothesis | Preliminary observation | Remarks |
|---|---|---|
| The IKN area is geo-physically suitable for urban development | a. The results of population projections show that there will be a continuous increase in IKN's water needs, thus requiring alternative sources of water.<br>b. The location of IKN is mostly in areas with flat and gentle slopes, therefore, it is predicted that there will be more settlements, and become densely populated areas.<br>c. The geological distribution of research area in Kutai Kartanegara Regency and North Penajam Paser Regency is dominated by coal carriers, located in folded hills composed of sandstone and clay.<br>d. IKN locations almost 50% of the area of each sub-district already have a mining permit area.<br>e. The results of mapping the distribution of hotspots from Terra Aqua Modis and S-NPP VIIRS from 2012 to 2021 show that Kutai Kartanegara Regency has a high potential for fires.<br>f. The result of land deformation showed that there are several areas experiencing land surface subsidence outside the core and the IKN buffer zones. | a. IKN locations require alternative water sources.<br>b. The government must plan the location of settlements and spatial planning appropriately.<br>c. Detailed scale mapping of land suitability needs to be carried out to know the potential of each region. Subsequently, proper planning can be carried out to support the success of development in IKN locations.<br>d. Improving the preparedness of the government and the community toward potential disasters at IKN locations. |

| Hypothesis | Preliminary observation | Remarks |
|---|---|---|
| IKN lies in a disaster-free area | Disaster events such as landslides and forest fires occurred in research areas, however, the magnitude and the intensity are low. Climate change can intensify the immensity and frequency of disaster events. | This research will further explore disaster risks and mitigation such as knowledge, urgency, and action in the area, specifically those that are related to the changes in the forest ecosystem. |
| East Kalimantan and its population is not ready to address sustainability issues | East Kalimantan Province is among the successful Indonesian provinces in implementing sustainable development goals. Out of the 14 objectives of sustainable development goals measured by the National Statistical Board (BPS), East Kalimantan Province demonstrates 11 achievements, which is above the national and the interprovincial average. The only lower score of SDG achievement is in its preparedness to respond to climate change. Knowledge of the local people in form of sustainable development and urbanization is limited when not negligible. However, their attitudes towards and practices of sustainable development have been in line with local wisdom in resource management and environmental protection. | Further exploration of the practices of local wisdom in resource management and environmental protection is needed to assess the prospects of sustainability in the development of the new capital. |
| Indigenous people in East Kalimantan will be marginalized by the development of the new capital city | Large-scale developments have iteratively marginalized the indigenous people in East Kalimantan | This research will observe the dynamics of the spatial pattern of those impacted by the development of the new city, including the indigenous people. |

## 4.1 The geo-physical conditions

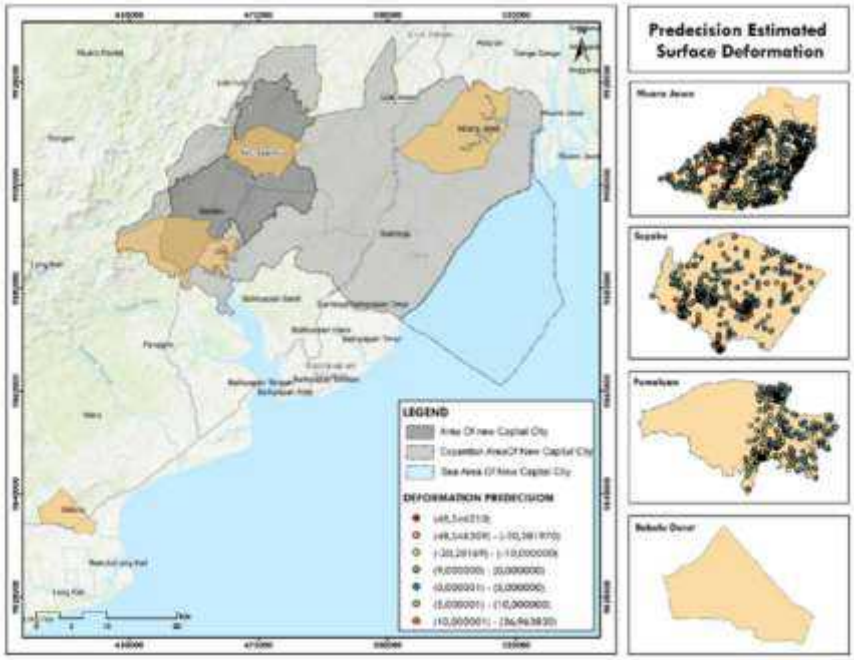
### 4.1.1 Land surface deformation

This research uses persistent scatterer or constant backscatter overtime of the PS-InSAR to calculate land surface deformation. The method is effective and accurate for solid objects such as buildings, concrete fields, or paved roads. Since the vegetation and water change with time for several reasons such as wind, the measurement of land surface deformation over vegetation or water levels is inaccurate with unreliable results. Moreover, the information on land surface deformations on settlements or infrastructures is available for further use, while the deformations in the forest or above the water surface are not immediately usable.

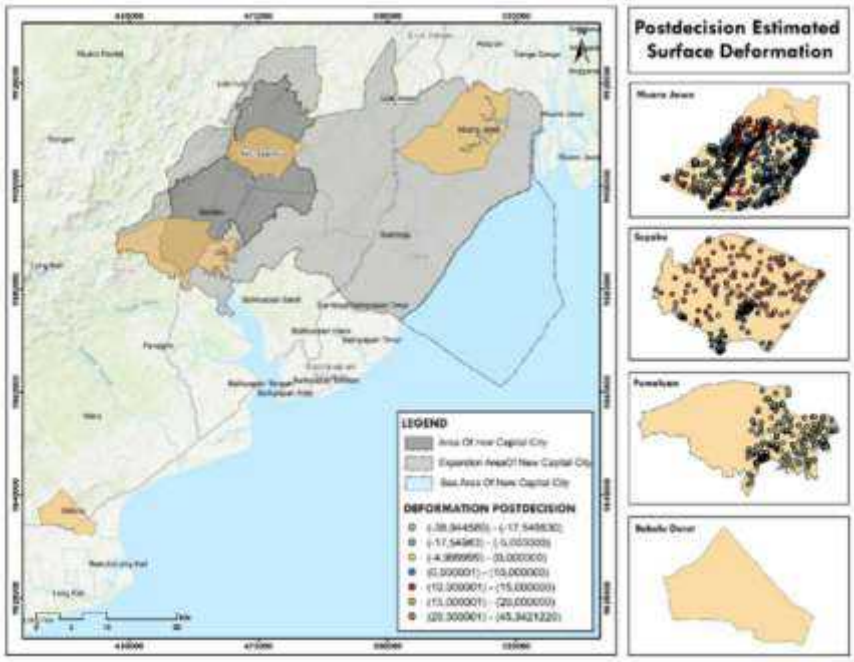
ALOS/PALSAR is more effective to estimate deformation in vegetated areas. The L-band SAR of ALOS/PALSAR has a wavelength of approximately 23 cm (Meyer, 2019) that penetrates deeper into the forest canopy to hit the large branches and tree trunks. However, ALOS-PALSAR images are commercial and not freely available. Sentinel-1 is a C-band SAR (ESA, 2012) with a 3.75 to 7.5 cm wavelength (ESA, 2013). Theoretically, C-band SAR can only penetrate the vegetation canopy layer by a few centimeters (Meyer, 2019), hence, dense vegetation such as forest remains unpenetrable.

**Table 9.** Pre-decision and Post decision Land Surface Deformation

| Time Measurement | Minimum Velocity (mm/year) | Maximum Velocity (mm/year) | Average Velocity (mm/year) | Standard Deviation Velocity (mm/year) |
|---|---|---|---|---|
| Pre-decision | -48.55 | 29.83 | -0.06 | 7.99 |
| Post-decision | -50.93 | 100.30 | -4.15 | 15.85 |




(a)




(b)

**Figure 10.** IKN land surface deformation (a) pre-decision and (b) post-decision

Table 9 and Figure 10 showed that there is a significant difference in land surface deformation between pre and post-determination of the new capital city. The land surface deformation pre-determination was slower and more homogeneous compared to the post-determination. When the PS-InSAR calculation process is accurate, the high deformation indicates an increase in development. However, the calculation can be inaccurate due to weather or baseline factors, and the relative position of the satellites between recording times that are too close. Theoretically, weather such as very thick rainstorms can refract radar waves, causing errors in the process of estimating land surface movements. Since the baseline or perpendicular distance of the Sentinel-1 satellite during the recording also causes inaccuracy, the use of the Short Baseline Subset (SBAS) method is recommended.

The weakness of this research is the absence of an accurate field validation process for land surface deformation such as measuring changes in land surface elevation using geodetic GPS with millimeter accuracy. This is because measurements should include before and after the determination of the new capital city. However, without validation, several results proved that PS-

Sepaku Landscape
Photo credit: Abd Rahman

InSAR is significantly reliable in estimating land surface movements. The PS-InSAR and SBAS had a relative error of less than 20% for land subsidence 15 mm/year or faster . Based on this assumption, it can be stated that the land subsidence ranges from -0.048 to -0.072 mm/year, with an average of -0.06 mm/year for pre-determination and -0.048 to -0.072 with an average of -4.15 mm/year for post-determination.

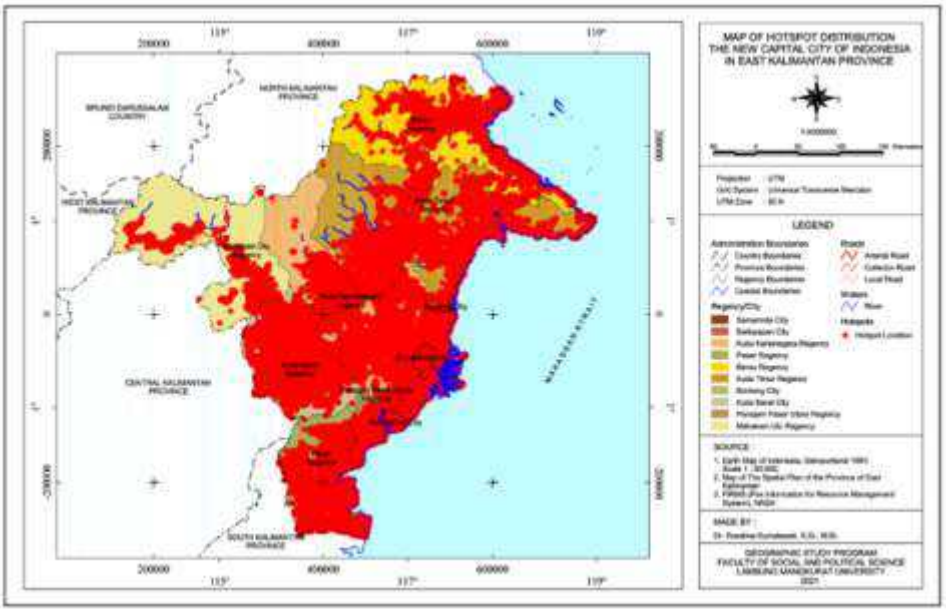
The maximum speed of land subsidence before and after the decision to determine the new capital city has reached -5 cm/year. Moreover, it is important to expect various massive urban infrastructures for the new capital city. The use of land horizontally rather than vertically can prevent land subsidence. Broader and shorter buildings are better than taller structures because they have a larger contact area with the land surface and will reduce pressure, which is inversely proportional to the surface area. The reduction of the groundwater extraction can also maintain a stable pressure below the land surface. The flow from the mountains through water channels using distilled seawater can become alternative sources of clean water for the new capital city to maintain a continuous supply and stable pressure below the land surface.

### 4.1.2 Hotspot Characteristics

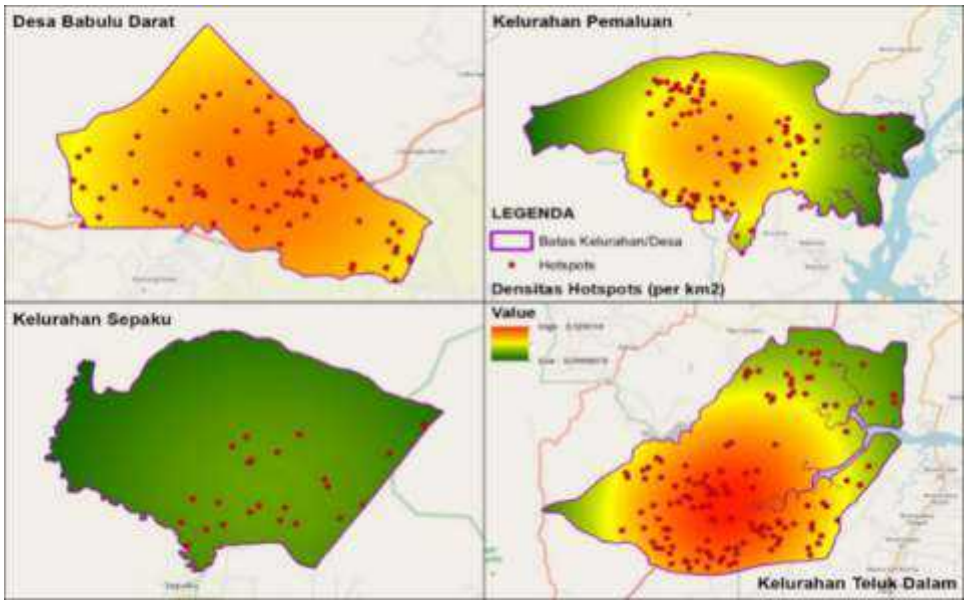
A hotspot shows a location with a relatively high temperature compared to the surroundings and has become a good indicator of land/forest fires. In North Penajam Paser and Kutai Kertanegara Regencies, the SNPP VIIRS satellite image recorded 43,554 hotspots between 2012 and 2021, which 1,801 with low

**Table 10.** Number of Hotspots in North Penajam Paser and Kutai Kertanegara Regencies from SNPP VIIRS 2012-2021 (Source: Results of Image Processing and Analysis of SNPP VIIRS., 2012-2021)

| Districts | Sub Districts | Amount | Amount | | |
|---|---|---|---|---|---|
| | | | Low | Nominal | High |
| Penajam Paser Utara | Babulu | 660 | 46 | 609 | 5 |
| | Penajam | 1431 | 75 | 1311 | 45 |
| | Sepaku | 904 | 19 | 864 | 21 |
| | Waru | 1456 | 36 | 1369 | 51 |
| Kutai Kertanegara | Anggana | 1551 | 12 | 1528 | 11 |
| | Kembang Janggut | 2618 | 116 | 2443 | 59 |
| | Kenohan | 3788 | 168 | 3477 | 143 |
| | Kota Bangun | 1297 | 63 | 1193 | 41 |
| | Loa Janan | 1801 | 16 | 1765 | 20 |
| | Loa Kulu | 941 | 33 | 877 | 31 |
| | Marang Kayu | 2395 | 145 | 2195 | 55 |
| | Muara Badak | 1469 | 25 | 1406 | 38 |
| | Muara Jawa | 741 | 12 | 714 | 15 |
| | Muara Kaman | 10317 | 477 | 9448 | 392 |
| | Muara Muntai | 2591 | 139 | 2394 | 58 |
| | Muara Wis | 3651 | 260 | 3266 | 125 |
| | Samboja | 2737 | 38 | 2661 | 38 |
| | Sanga Sanga | 149 | 3 | 142 | 4 |
| | Sebulu | 482 | 11 | 466 | 5 |
| | Tabang | 1891 | 89 | 1740 | 62 |
| | Tenggarong | 259 | 10 | 241 | 8 |
| | Tenggarong Seberang | 425 | 8 | 411 | 6 |
| **Amount** | | 43554 | 1801 | 40520 | 1233 |




(a)




(b)

**Figure 11.** IKN hotspots maps (a) hotspots distribution and (b) Hotspots density. Source: NASA FIRMS (Giglo et al., 2016), processed using the Kernel Density Analysis (KDA) method and ArcGIS 10.8 software.

accuracy, 40,520 with nominal, and 1,233 with high (Table 10 ). Figure 11 and Table 10 showed the highest hotspot in the villages, where Babulu Darat had 18 hotspots in 2006, while Pemaluan had 63 in 2015. Sepaku had 6 hotspots in 2004, Teluk Dalam had 25 in 2015, while Kutai Kartanegara Regency hosts the most in East Kalimanta. As the location of the new capital city, it is crucial to detect the hotspots, potential land/forest fires, or mitigate the existing fires , which is shown on the distribution map (Mapilata E. et al., 2013; Mukti et al., 2016; Samsuri, 2008; Setiawan et al., 2004).

**Table 11.** Table of Hotspot Density Characteristics. Source: NASA FIRMS (Giglio et al. 2016)

| Districts | Sub Districts | Village | Years | Number of Hotspots |
|---|---|---|---|---|
| Penajam Paser Utara | Kec. Babulu | Babulu Darat | 2002 | 11 |
| | | | 2003 | 3 |
| | | | 2004 | 9 |
| | | | 2005 | 5 |
| | | | 2006 | 18 |
| | | | 2007 | 3 |
| | | | 2009 | 16 |
| | | | 2011 | 3 |
| | | | 2012 | 1 |
| | | | 2014 | 3 |
| | | | 2015 | 9 |
| | Kec. Sepaku | Pemaluan | 2002 | 1 |
| | | | 2003 | 3 |
| | | | 2004 | 1 |
| | | | 2005 | 2 |
| | | | 2006 | 3 |
| | | | 2009 | 6 |
| | | | 2011 | 1 |
| | | | 2014 | 1 |
| | | | 2015 | 63 |
| | | | 2016 | 2 |

| Districts | Sub Districts | Village | Years | Number of Hotspots |
|---|---|---|---|---|
| Penajam Paser Utara | Kec. Sepaku | Sepaku | 2002 | 1 |
| | | | 2004 | 6 |
| | | | 2005 | 4 |
| | | | 2006 | 2 |
| | | | 2011 | 2 |
| | | | 2012 | 1 |
| | | | 2013 | 1 |
| | | | 2015 | 4 |
| | | | 2016 | 1 |
| | | | 2018 | 1 |
| Kutai Kartanegara | Kec. Muara Jawa | Teluk Dalam | 2002 | 18 |
| | | | 2003 | 10 |
| | | | 2004 | 15 |
| | | | 2005 | 7 |
| | | | 2006 | 11 |
| | | | 2007 | 6 |
| | | | 2009 | 21 |
| | | | 2010 | 3 |
| | | | 2012 | 4 |
| | | | 2013 | 1 |
| | | | 2014 | 4 |
| | | | 2015 | 25 |
| | | | 2018 | 4 |
| | | | 2020 | 1 |
| **Amount** | | | | 318 |

## 4.2 The forest ecosystems and disaster risks

Based on observation, it was discovered that splash and rill erosions occurred in many LMUs, while landslides occurred in LMU T4S4CH1 and T4S6CH1 (Table 12). The erosion debris created sedimentation in the riparian/river delta and affected the mangrove ecosystems along the river banks and the delta (Figure 13). The secondary dryland forest is mostly degraded (Figure 14).

**Table 12.** Landslides occurrence in research areas

| LMU | Characteristic | Land use/ cover | Location |
|---|---|---|---|
| T4S4CH1 | Red Yellow Podzolic, rather steep slope, very high rainfall intensity | Mining | Teluk Dalam |
| T4S4CH1 | Red Yellow Podzolic, rather steep slope, very high rainfall intensity | Industrial forest plantation | Sepaku |
| T4S6CH1 | Red Yellow Podzolic, very steep slope, very high rainfall intensity | Protected forest | Sepaku |


**Figure 12.** Soil erosions in Teluk Dalam - Photo credit: Wardatutthoyyibah

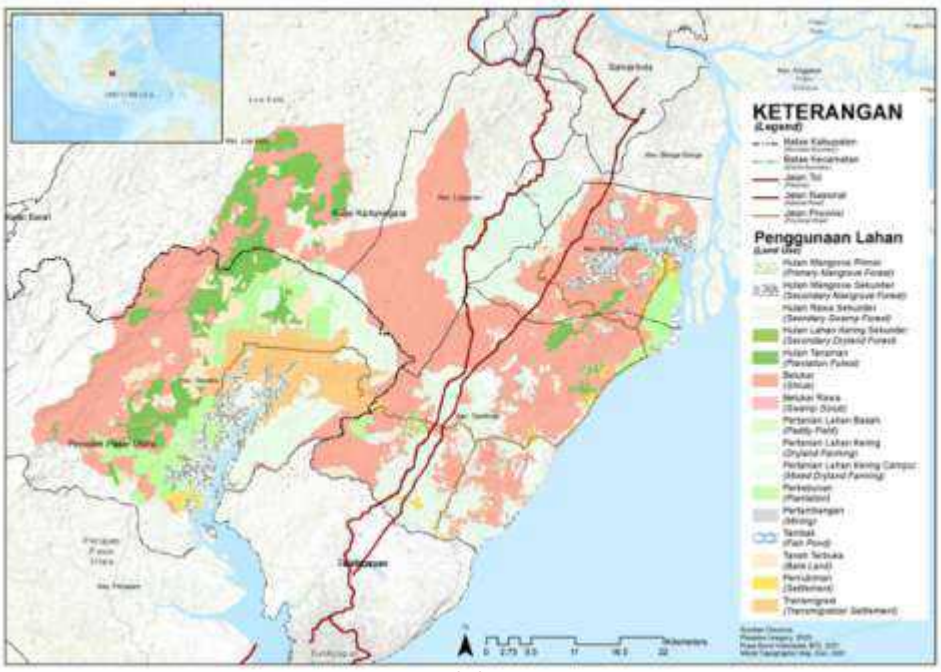

**Figure 13.** Mangrove forest in Teluk Dalam LMU T6S1CH1 – Photo credit: Genta Sena Santosa


**Figure 14.** Secondary dryland forest in Babulu Darat LMU 2S4CH1—Photo credit: Azis Musthofa

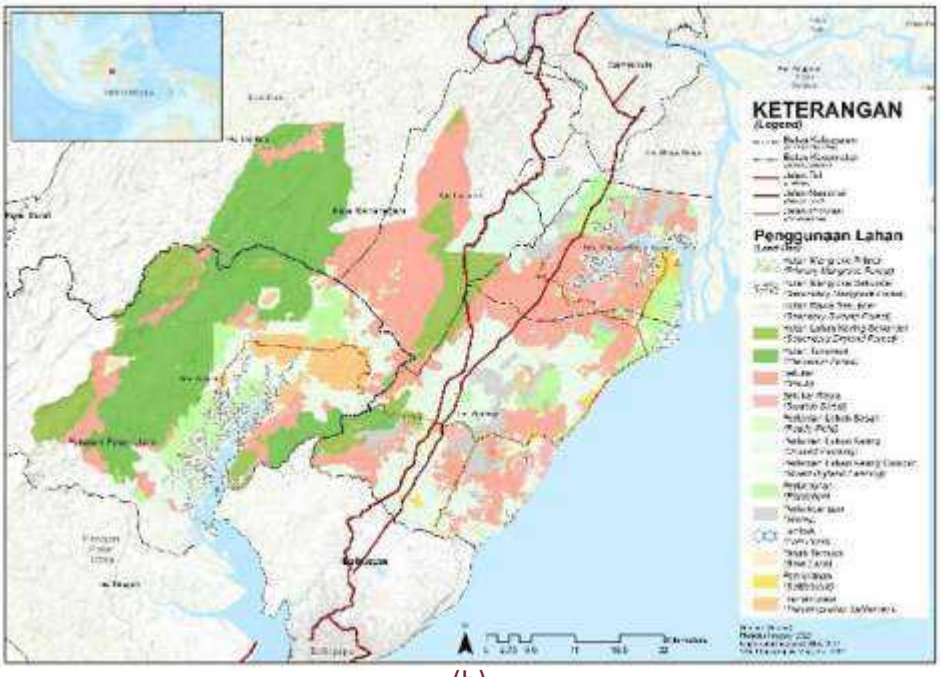
Although the peatland in LMU T6S1CH1 (peaty soil) in Teluk Dalam was not discovered, a soil sample (Figure 17) was collected for further analysis. The preliminary LMU classification used the peatland map from 2011 made by the Ministry of Agriculture. The map was updated by the ministry in 2021 and the area has changed significantly, therefore, research areas have no peatland. Moreover, recent research explained 3 possible sources of differences in peatland areas, which include (a) segregation of mineral soil inclusions that were previously considered as peatland, (b) improved remote sensing and GIS tools, and (c) extensive field observation for verification of peatland boundaries and thickness requirements (≥50 cm)(Anda et al., 2021). Therefore, the focus of the second and the following years was adjusted to the forest ecosystem and eliminated peatland.

The respondents were asked about disaster risks through the structured interview. They perceived that flooding, drought, and land/forest fires have the most possibility to occur in the areas. However, on 2nd March 2022, an earthquake occurred around the IKN area (Figure 18), and land deformation has also been occurring in the region (Figure 10). This can be due to climate change which intensifies the immensity and frequency of disaster events, specifically when the supporting system such as forest ecosystems are significantly disturbed.

The disturbance of the forest ecosystem can be direct or indirect (Bos et al., 2020). The Ministry of Environment and Forestry reported a rapid change in land cover maps between 1990 and 2020 (Figure 15). The rapid expansion of settlements, wetland agriculture/rice fields, industrial forest plantations, and mining have substantially influenced the dynamics of the land covered in the region. Meanwhile, zooming in to Babulu Village, it was discovered that the food bag of the area, and the land cover/use dynamic are slightly different. The agricultural expansion has dominated the land cover/use changes, specifically oil palm plantations which occupied most land cover/use in Babulu Darat (Figure 16). The interviews also indicated that many landowners in Babulu Darat were willing to convert their existing rice fields or dryland agriculture into oil palm plantations.




(a)




(b)

**Figure 15.** IKN land cover/use maps (a) in 2014 (MoEF, 2014) and (b) in 2020, calculated)

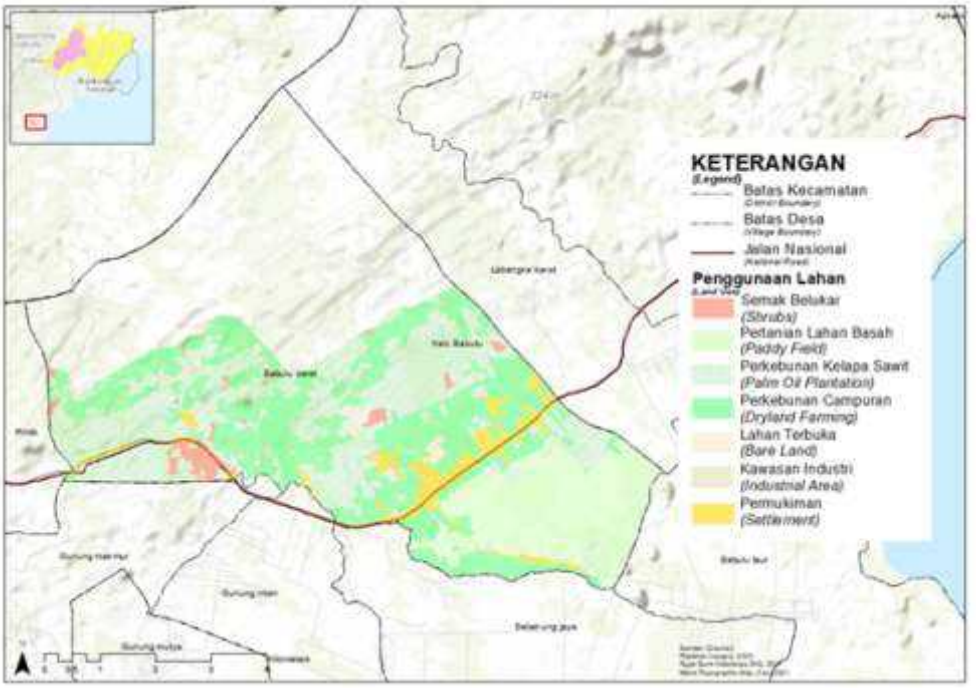



**Figure 16.** IKN land cover/use maps (a) in 2014 (MoEF, 2014) and (b) in 2020, calculated)


**Figure 17.** Soil sample TD113 from LMU T6S1CH1 in Teluk Dalam - Photo credit: Genta Sena Santosa

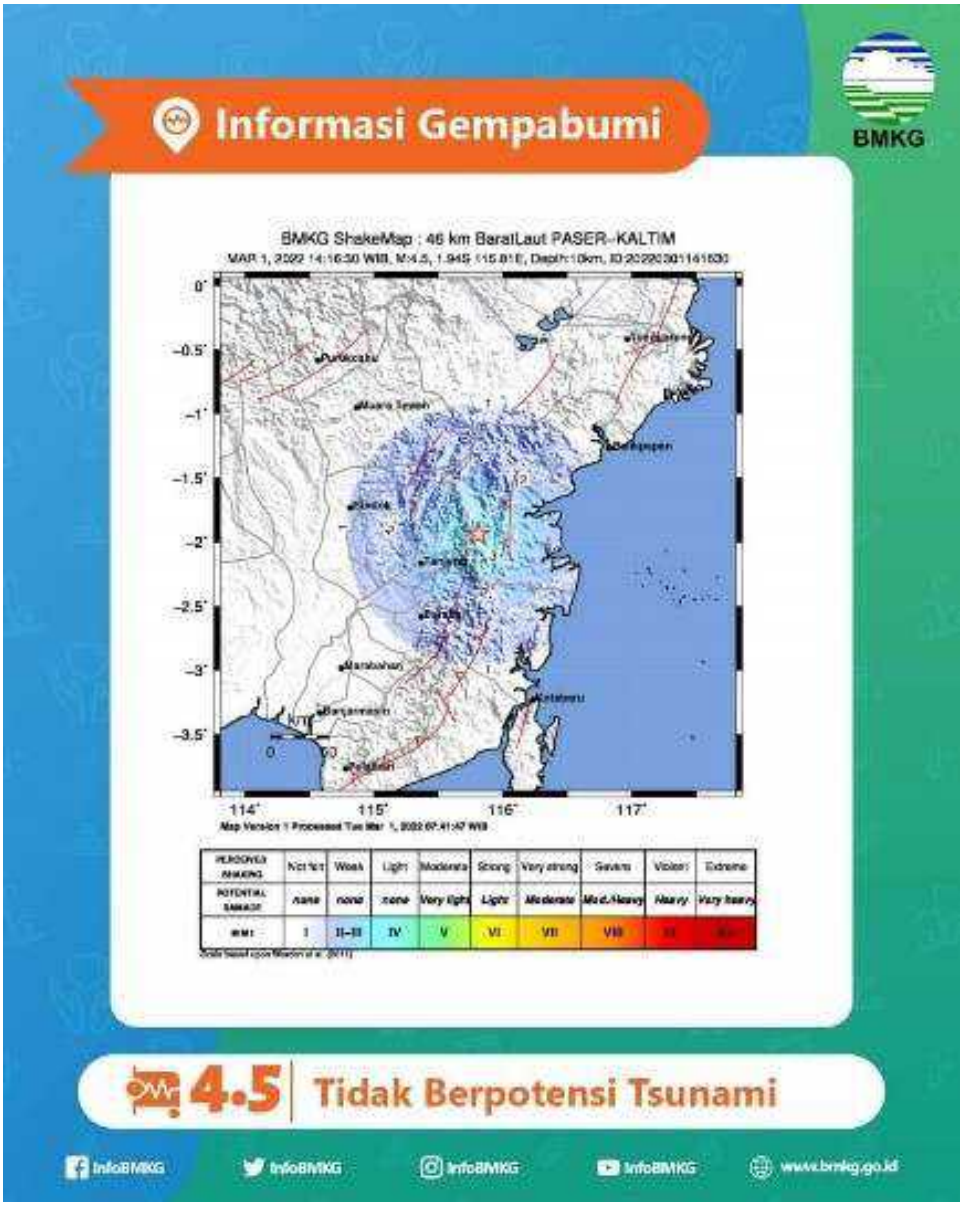



**Figure 18.** Earthquake announcement from the Meteorological, Climatological, and Geophysical Agency

## 4.3 Population readiness to address sustainability issues

Empirical evidence at the national level shows that East Kalimantan is among the successful Indonesian provinces to achieve sustainable development goals. This is because 14 of 17 SDGs in the country have been measured by the Indonesian Statistical Board (BPS, 2000). Out of the 14 objectives of sustainable development goals measured by BPS, East Kalimantan demonstrates achievement of 13 SDGs above the national score and the interprovincial average. However, the only lower score of SDG achievement is in its preparedness to respond to climate change (Table 13).

Knowledge of the local people on sustainable development and urbanization is very limited, or even negligible. However, their sustainable development attitudes towards and practices have evolved in line with local wisdom in resource management and environmental protection. The majority of respondents in research areas of the capital city are aware that their places of residence will be affected by the relocation to the Indonesian Capital. They commonly support the idea of relocating the capital city and are expecting new development that can improve their livelihood. At the community level, there are no activities related to the relocation involving the residents and participation in the preparation level was not reported. The residents do not understand the terms of sustainable development and urbanization, which is often used when discussing the relocation. However, many local sustainable development practices have been identified as they are in line with their basic wisdom in natural resource management, environmental protection, and interaction with various groups

**Table 13.** Relative Position of SDGs of East Kalimantan Province Compared to Interprovincial Average and National Figures, 2020 (BPS, 2020)

| No | SDGs | Indonesia | Inter-provincial Average | East Kalimantan | Remarks |
|---|---|---|---|---|---|
| 1 | No poverty | 79.4 | 71.9 | 86.3 | |
| 2 | Zero hunger | 79.0 | 70.2 | 86.4 | |
| 3 | Good health and well-being | 83.9 | 60.2 | 70.8 | |
| 4 | Quality education | 76.3 | 70.4 | 83.3 | |
| 5 | Gender equality | 83.5 | 71.1 | 91.2 | |
| 6 | Clean water and sanitation | 63.7 | 59.6 | 68.5 | |
| 7 | Affordable and clean energy | 92.6 | 83.2 | 100.0 | |
| 8 | Decent work and economic growth | 59.3 | 49.3 | 62.6 | |
| 9 | Industry, innovation, and infrastructure | 73.6 | 55.5 | 94.7 | |
| 10 | Reduced inequality | 67.2 | 77.5 | 100.0 | |
| 11 | Sustainable cities and communities | 41.5 | 39.3 | 43.3 | |
| 12 | Responsible consumption and production | 57.5 | n.a | n.a | n.a |
| 13 | Climate action | 29.8 | 38.8 | 20.0 | |
| 14 | Life below water | 100.0 | n.a | n.a | n.a |
| 15 | Life on land | 28.8 | n.a | n.a | n.a |
| 16 | Peace, justice, and strong institution | 85.5 | 77.2 | 86.7 | |
| 17 | Partnership for the goals | 87.9 | 26.2 | 37.7 | |

of people from different parts of Indonesia. East Kalimantan has been the third most important interprovincial migration after Jakarta and Riau for many decades.

## 4.4 Indigenous people's iterative marginalization

Many researchers supported the idea of the capital city relocation as a breakthrough, believing that it will boost the economy of the country and invite more investment. However, this research considers a more critical standpoint, which is how the plan will affect the indigenous communities in IKN. This was carried out to understand the current status of the indigenous communities after the decision to remove the capital and compile as well as analyze possible impacts of the development on their livelihood. From the geographical perspective, the changes occurring on the ground, based on the marginalization of the people were also analyzed. This research focused on 2 villages, namely Sepaku and Pemaluan, Sepaku District, Penajam Paser Utara Regency. These villages are the perfect representation of the investigation of the impacts of the new city development on the local people because they represent different demographic characteristics and mixed ethnicities and communities. Sepaku and Pemaluan are situated in the core zone of IKN, which indicated that they will be affected by the development.

Babulu Darat Landscape
Photo credit: Azis Musthofa

Furthermore, research on the new capital city development showed that the improvement of relatively empty huge areas, along with its massive infrastructures, has accelerated many environmental and socioeconomic status problems of the affected people within and surrounding areas. This includes Brasilia, where it was discovered that the development of a new big city in the middle of the forest areas was not free from problems. The arrival of mega infrastructures development and migrants with a relatively higher status of education and economy has increased the pressure on the local people. The residents can not bridge the quick and sudden development of the areas with many economic opportunities, therefore, the migrants are occupying these positions with proper education.

This research also discovered that the socioeconomic status of local and indigenous people is under pressure because the government decided to move the capital city to their areas. The marginalization occurs on the ground and has been occurring for a long time because of various large-scale developments. Based on the results, it can be stated that marginalization occurs continuously for the same indigenous communities such as Sepaku and Pemaluan Villages with a significant attachment to

the forest. Meanwhile, some of the people of these villages are Paser and Balik. The Balik People originated from Balikpapan areas, while Paser indigenous came from Tanah Grogot, both in East Kalimantan Province. They landed in the villages through several rivers that flow from Balikpapan Bay into the inner land.
Some of the marginalization dimensions experienced by the indigenous communities were identified. Economic marginalization occurred when the residents had limited wages and lived below the poverty line. This is because they are not fit with the modern trading system and had no adequate skill or education to respond to the job market. They also lived under spatial marginalization when their living spaces of forest, riverbank, and crop fields were occupied. This affected their spatial behavior and disrupted the territoriality as well as land inheritance between tribes. Since the land is an essential asset for the communities, it causes them to lose their livelihood assets. Through literature review, the Paser and Balik people suffered political marginalization due to the lack of representativeness in the governmental structure.

These communities have been experiencing several phases of marginalization. A total of 4 waves of activities of big-scale development were discovered as the triggers of the marginalization of the indigenous people, namely 1) the arrival of the industrial tree plantation, 2) the migrants of the transmigration program, 3) the second wave of the industrial tree plantation, and 4) the new capital city development.

The large-scale corporation came to Sepaku and Pemaluan in the 70s, devouring timber as one of the precious commodities from Indonesia. The forest was chopped down, the environmental deterioration in the upstream forest was inevitable, and the essential livelihood basis of the Paser and

Balik People was destroyed, the river was polluted, and the fish vanished. Furthermore, the corporate gated their area of Izin Usaha Pakai, confronted the social, and limited people's movement. The Indonesian government started to initiate the transmigration program simultaneously to decrease population density in Java Island, where thousands of people were moved to Sumatera, Kalimantan, and Sulawesi Island and granted about 2 hectares of land each. These transmigrants in Sepaku induced a socio-cultural blend between migrants and indigenous communities, including the share of natural resources to sustain their livelihood.

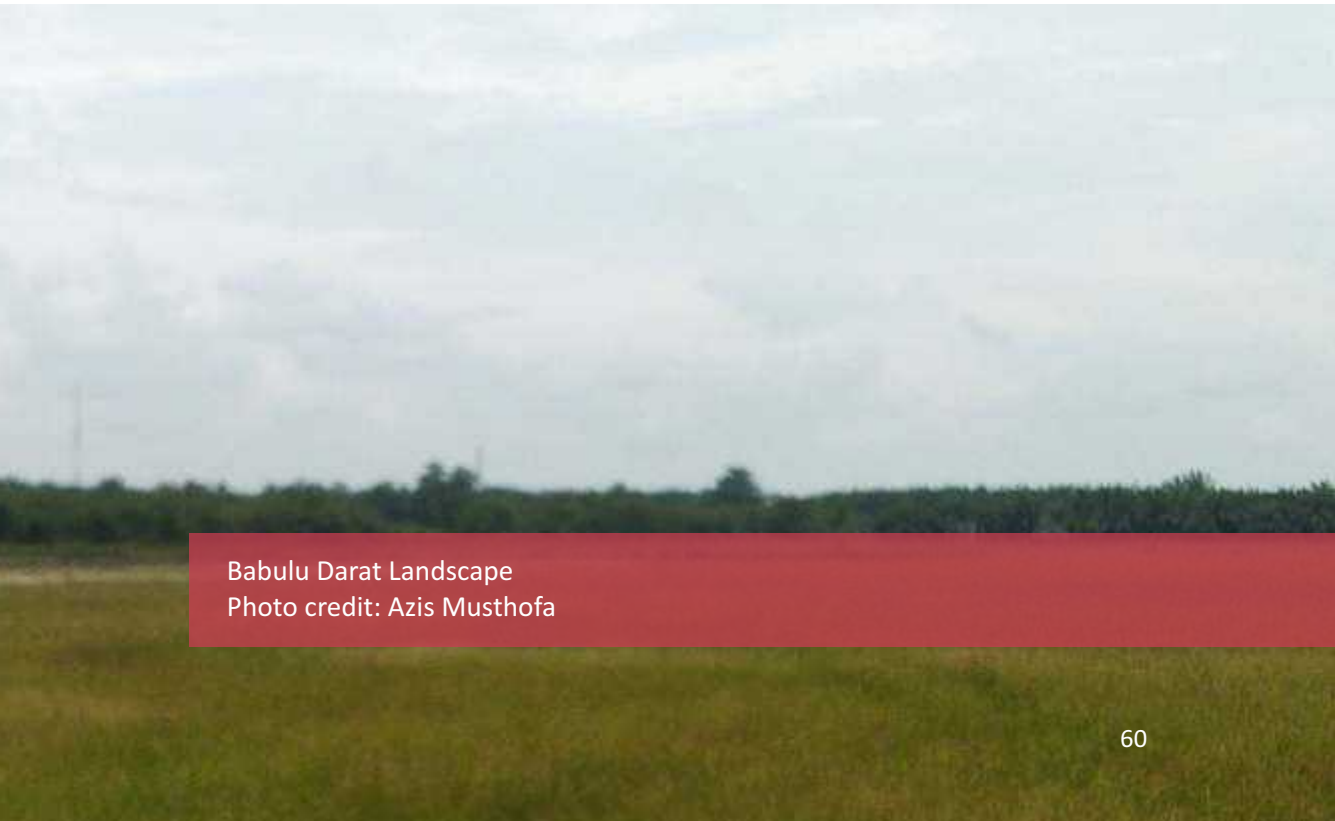
**Figure 19.** Interview with Mr. Sibukdin (Sepaku Village), one of the leaders of the Balik people – Photo credit: Hillary Reinhart

Since almost all indigenous communities in Sepaku and Pemaluan Villages live in the rural-hinterland area, they depend on agricultural activities and require land as the primary natural resource. Due to the emergence of modernization, land administration was shifted from communal-traditional to individual-certified. This often caused the communities to lose their land through certification by the government, involuntary settlement, and relocation that happened in research areas.

In addition to the relocating of the major capital city plan, several Paser and Balik indigenous communities are thriving to manage their livelihood in small villages of Pemaluan and Sepaku, not far from the ground zero of IKN. Their ancestor roamed the forest, bore Mandau to hunt down prey, and cultivated local crops. They dwelled on the riverbank, gathered fish from the river, and drank the water. Once in five years, they moved to other areas and opened the dense forest to make smaller crop fields of less than a hectare of land. This practice is

known as swindle agriculture, where the land clearing is carried out using the 'slash and burn technique. The local communities maintained this kind of livelihood for centuries until colonialism and big-scale development pounced over, extracted their livelihood assets, and left them marginalized.

There is a need for the governments to address current and potential marginalization processes as the significant issue in IKN. Within the concept of forest city, the new capital city development has to be sustainable, and inclusive involving many stakeholders, particularly the indigenous and traditional communities. The development should also be carried out above the tradition regarding indigenous rights. The authority also needs to ensure the infrastructures are built in harmony with nature, considering the carrying capacity, and the environmental deterioration. Therefore, the dream and vision of an inclusive and sustainable city be achieved.



Babulu Darat Landscape
Photo credit: Azis Musthofa

# 5 WAY FORWARD

The results of the first-year research form the basis for the second and the following years. Further investigation of the emerging questions from the preliminary observations and analyses will be carried out. From the Dutch side consortium, solid teamwork will also be developed to support the research activities. The learning lab is expected to play a crucial role in the co-creation of knowledge, therefore, stakeholders were invited to participate and contribute to the process of sustainable urbanization in IKN.

Based on the preliminary results from the first-year activities, the plan to continue the research activities is stated below:

a. Adjust the focus of each WP as this research proceeds to be in line with the dynamics on the ground
b. Refine analyses with better resolutions of images and specific indicators updated from the preliminary results
c. Explore a deeper insight into the emerging issues on each WP and cross-fertilized by others
d. Redefine research areas by adding villages along the infrastructure corridor between Balikpapan and Samarinda

Forest plantation landscape in Sepaku
Photo credit: Abd Rahman

e. Collaborate closely with other WPs in the consortium (Indonesia and Dutch)
f. Invite stakeholders such as students, local governments, NGOs, and others with mutual interests to participate in the research activities
g. Continue working on the data and information gathered from the first-year activities in form of publications (scientific and broader audience)

## REFERENCES


Adyatama, E., 2019. Lima Alasan Jokowi Pindahkan Ibu Kota ke Kalimantan Timur. https://nasional.tempo.co/.

Anda, M., Ritung, S., Suryani, E., Sukarman, Hikmat, M., Yatno, E., Mulyani, A., Subandiono, R.E., Suratman, Husnain, 2021. Revisiting tropical peatlands in Indonesia: Semi-detailed mapping, extent and depth distribution assessment. Geoderma 402, 115235. https://doi.org/https://doi.org/10.1016/j.geoderma.2021.115235

Aurora, L., 2012. Indonesia sets aside 45% of forest-rich Kalimantan to be worlds lungs [WWW Document]. CIFOR For. News. URL https://forestsnews.cifor.org/7144/indonesia-sets-aside-45-of-forest-rich-kalimantan-to-be-worlds-lungs?fnl=en (accessed 3.9.22).

Berardino, P., Fornaro, G., Lanari, R., Sansosti, E., 2002. A new algorithm for surface deformation monitoring based on small baseline differential SAR interferograms. IEEE Trans. Geosci. Remote Sens. 40, 23752383. https://doi.org/10.1109/TGRS.2002.803792

Bock, C., 1985. The Head Hunters of Borneo. Oxford University Press, Oxford, UK.

Bos, A.B., De Sy, V., Duchelle, A.E., Atmadja, S., de Bruin, S., Wunder, S., Herold, M., 2020. Integrated assessment of deforestation drivers and their alignment with subnational climate change mitigation efforts. Environ. Sci. Policy 114, 352365. https://doi.org/10.1016/j.envsci.2020.08.002

BPS, 2022a. Lifetime Migration by Province, 1971-2015 [WWW Document]. https://www.bps.go.id/. URL https://www.bps.go.id/linkTableDinamis/view/id/855 (accessed 3.9.22).

BPS, 2022b. Per Capita Gross Regional Domestic Product by Province (Thousand Rupiahs), 2019-2021 [WWW Document]. bps.go.id. URL https://bps.go.id/indicator/52/288/1/-2010-version-per-capita-gross-regional-

domestic-product-by-province.html (accessed 3.15.22).
BPS, 2022c. Recapitulation of Forest and Non-Forest Land Coverage by Province 2014-2020 (Thousand Ha) [WWW Document]. bps.go.id. URL https://www.bps.go.id/statictable/2020/07/13/2110/rekapitulasi-luas-penutupan-lahan-hutan-dan-non-hutan-menurut-provinsi-tahun-2014-2020-ribu-ha-.html (accessed 3.15.22).
BPS, 2022d. Average Population Growth by Province, 1971 - 2019, bps.go.id.BPS, 2021. Total population projection result by province and gender (Thousand People), 2018-2020 [WWW Document]. bps.go.id. URL https://www.bps.go.id/indicator/12/1886/1/jumlah-penduduk-hasil-proyeksi-menurut-provinsi-dan-jenis-kelamin.html (accessed 3.8.22).
BPS, 2020. Indikator Tujuan Berkelanjutan (TPB) Indonesia 2020. BPS, Jakarta, Indonesia.
Cigna, F., Esquivel Ramírez, R., Tapete, D., 2021. Accuracy of Sentinel-1 PSI and SBAS InSAR Displacement Velocities against GNSS and Geodetic Leveling Monitoring Data. Remote Sens. 13, 4800.
ESA, 2013. Sentinel-1 User Handbook [WWW Document]. https://sentinel.esa.int/. URL https://sentinel.esa.int/
ESA, 2012. Sentinel-1: ESAs Radar Observatory Mission for GMES Operational Services.
Farisa, F.C., 2021. KSP: Pembangunan IKN Cara Revolusioner Jokowi untuk Pemerataan Ekonomi di Luar Jawa. Kompas.com.
Giglio, L., Schroeder, W., Justice, C.O., 2016. The collection 6 MODIS active fire detection algorithm and fire products. Remote Sens. Environ. 178, 3141. https://doi.org/https://doi.org/10.1016/j.rse.2016.02.054
Government of Indonesia, 2019. SDG Indonesia: voluntary national review [WWW Document]. SDG Knowl. Platf. URL https://sustainabledevelopment.un.org/memberstates/indonesia (accessed 6.29.21).
Kumalawati, R., Murliawan, K.H., Yuliarti, A., 2021. Hotspot

management strategies in media framing during the covid-19 period. IOP Conf. Ser. Earth Environ. Sci. 758, 012021. https://doi.org/10.1088/1755-1315/758/1/012021

Kumalawati, R., Saputra, A.N., Murliawan, K.H., Rajiani, I., 2019. MODIS data to analyse utilization and distribution frequency of future peatland fires, in: ADVED 2019-5th International Conference on Advances in Education and Social Sciences.

Mapilata E., K., G., G., D., 2013. Analisis daerah rawan kebakaran hutan dan lahan dalam penataan ruang di kota Palangka Raya provinsi Kalimantan Tengah. Maj. Ilm. Globe 15, 178 184.

Meyer, F.J., 2019. Spaceborne Synthetic Aperture Radar : Principles , Data Access , and Basic Processing Techniques, in: Flores-Anderson, A., Herndon, K., Thapa, R., Cherrington, E. (Eds.), The Synthetic Aperture Radar (SAR) Handbook: Comprehensive Methodologies for Forest Monitoring and Biomass Estimation. SERVIR Global Science, Huntsville, pp. 2163. https://doi.org/10.25966/nr2c-s69

MoEF, 2014. Land cover/ use map of East Kalimantan.

Mukti, A., Prasetyo, L.B., Rushayati, S.B., 2016. Mapping of Fire Vulnerability in Alas Purwo National Park. Procedia Environ. Sci. 33, 290304. https://doi.org/https://doi.org/10.1016/j.proenv.2016.03.080

Pandu Permana, R., 2012. Economic development, environmental stress and sustainability in Indonesia : a case study on community transformation and local resource use in Berau, East Kalimantan. Utrecht University, Faculty of Geosciences], Utrecht - The Netherlands.

Putri, C.A., 2022. Ibu Kota Baru RI Rawan Bencana? Simak Kajian Badan Geologi [WWW Document]. https://www.cnbcindonesia.com/. URL https://www.cnbcindonesia.com/news/20220121150526-4-309425/ibu-kota-baru-ri-rawan-bencana-simak-kajian-badan-geologi (accessed 3.9.22).

Samsuri, 2008. Model Spasial Tingkat Kerawanan Kebakaran Hutan Dan Lahan Studi Kasus Di Wilayah Propinsi Kalimantan

Tengah. Institut Pertanian Bogor.
Saputra, E., 2019. Land subsidence as a sleeping disaster: case studies from Indonesia. Ridderprint, Utrecht, The Netherlands.
Sekretariat Kabinet Republik Indonesia, 2022. IKN Nusantara Jadi Representasi Bangsa yang Unggul [WWW Document]. https://setkab.go.id/. URL https://setkab.go.id/ikn-nusantara-jadi-representasi-bangsa-yang-unggul/ (accessed 3.9.22).
Setiawan, I., Mahmud, A.R., Mansor, S., Mohamed Shariff, A.R., Nuruddin, A.A., 2004. GIS-grid-based and multi-criteria analysis for identifying and mapping peat swamp forest fire hazard in Pahang, Malaysia. Disaster Prev. Manag. An Int. J. 13, 379386. https://doi.org/10.1108/09653560410568507
Susanti, A., Maryudi, A., 2016. Development narratives, notions of forest crisis, and boom of oil palm plantations in Indonesia. For. Policy Econ. 130139.
Varisk Maplecroft, 2021. Environmental Risk Outlook 2021 [WWW Document]. https://www.maplecroft.com/. URL https://www.maplecroft.com/insights/analysis/environmental-risk-outlook-2021/#report_form_container (accessed 3.9.22).