CLIMATE RESILIENT AND INCLUSIVE CITIES

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URBAN ANALYSIS REPORT *2020*

01

SAMARINDA

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FOREWORD

Addressing the threat of climate change remains a top priority for the European Union (EU). The European Green Deal is a response to these challenges; it aims to transform the EU into a fair and prosperous society, with a modern, resource-efficient and competitive economy with zero net emissions of greenhouse gases by 2050.

Through the Climate Resilient and Inclusive Cities (CRIC) project, the EU and Indonesia are working together to help cities build a resilient and inclusive future. We do so by building partnerships between governments, businesses, local communities and research institutes in Europe, South Asia and Southeast Asia.

Clearly, there are hurdles along the way, especially in the midst of the COVID-19 pandemic. However, our response to this pandemic needs to be a sustainable one, addressing the challenges of climate change as well as economic recovery.

Just last month, in Sukabumi City of West Java Province, a flash flood cost lives and forced hundreds of citizens to leave their houses. According to the Indonesian National Disaster Management Agency, Indonesia is about to experience more hydrometeorological disasters due to climate change. The CRIC Urban Analysis Report is a timely reminder that cities cannot delay their sustainable transition.

This Urban Analysis Report for ten Indonesian pilot cities under the CRIC project offers a comprehensive overview of city characteristics, policy gaps and climate-related policies in the cities of Pangkalpinang, Pekanbaru, Bandar Lampung, Cirebon, Banjarmasin, Samarinda, Mataram, Kupang, Gorontalo and Ternate.

The report provides empirical evidence to help cities develop policies and tools to strengthen climate change-affected sectors. I am happy to note the consultations among a wide range of stakeholders including government officials, academicians, civil society, professional practitioners, NGOs, and the private sector, ensuring that the proposals are inclusive.

We look forward to seeing how the cities will take up the given recommendations by transforming them into local climate-proof policies and programmes and to further working together to build climate resilient and inclusive cities.

Jakarta, October 2020

Vincent Piket

EU Ambassador to Indonesia and Brunei Darussalam

Climate Change is an issue of humanity, it is not merely a threat to the environment only. It is one of most visible humanitarian crises of the century. On very many occasions, we have seen how climate-induced disasters disrupted local economy, food system, basic services and left vulnerable groups more powerless. As an association connecting more than 10,000 cities and local governments in the Asia-Pacific region, UCLG ASPAC is responsible for supporting cities to be climate-resilient, something that we take seriously.

The cost of inaction now is huge. It is therefore urgent for cities to act and find solutions that should be based on data and scientific rigour enabling evidence-based decisions that subsequently reduce the impact of climate change. I emphasise, continual and periodic assessment of risks and change in attributes of cities are critical in enhancing resilience. In light of this, I commend the Climate Resilient and Inclusive Cities (CRIC) team and our urban experts for their hard work to publish this Urban Analysis Report. Great thanks to all the pilot cities of CRIC for their support in producing this Report. It presents a comprehensive outlook on climate risks, programmes and policies at a city level and provides recommendations and solutions to tackle climate change.

This report also underlines the importance of coordination that transcends administrative boundary as climate has no border! It is something that UCLG ASPAC can contribute through the CRIC Programme, by connecting the dots between cities in Asia and the Pacific and beyond within the framework of sub-national and national governments for vertical integration. We intend to bring cities on the center stage of "Blue Ocean" and "Blue Sky" agenda through action-based proposals and approaches on circular economy, air pollutions and cross-cutting issues. And we are committed to ensuring that climate change best practices can be up-scaled and replicated for greater multiplier impact.

I look forward to seeing how the plans are put into actions to create climate resilient and inclusive cities. Our future will depend on how cities act today. Every concrete step on climate action we make now will bring closer our dream for inclusive, prosperous and sustainable cities and communities.

Dr. Bernadia Irawati Tjandradewi

Secretary General of UCLG ASPAC

As President of Pilot4Dev, I have had the honor to be directly involved in the Climate Resilient and Inclusive Cities Project from its very inception. It was with great pleasure that I attended the CRIC Kick-off event back in January 2020 which allowed us to meet up with our Indonesian partners in order to prepare and launch the project. A great added value from this event was the possibility to meet up with the mayors of the cities piloting the implementation of the project. Today, there is a myriad of cities in need of support in terms of urban environment and climate change resilience.

Pooling the expertise and knowledge of EU partners including ACR+, Pilot4DEV, University Gustave Eiffel, ECOLISE and Asian partners UCL ASPAG and AIILSG, this very ambitious five years project aims to establish a long lasting and unique cooperation. It is carried out through a triangular cooperation between cities and research centres in Europe, South Asia (India, Nepal, Bangladesh), and Southeast Asia (Indonesia, Malaysia, Philippines, Thailand). It aims to contribute to sustainable integrated urban development, good governance, and climate adaptation/mitigation through long lasting partnerships, and tools such as sustainable local action plans, early warning tools, air quality and waste management in consultation with experts' panels. The final beneficiaries include the local community of the cities/provinces, including women, marginalised sector, civil society and private sectors.

Now entering the 10th month of its implementation, this project has already proven to be a fruitful endeavor now implemented in 10 different cities in Indonesia. Among the chief results obtained so far, 10 urban analysis reports have been written and edited, and assess the current capacities of the different target cities. The project in itself has required the direct involvement of local authorities' officials, generating a real eagerness to make the cities more resilient and inclusive at the local level. The next steps of this project will involve the release of the Urban Analysis Reports along with policy briefs and recommendations adapted to the different pilot cities which have been involved in the project so far. This release will be completed by the creation of tools put together by the International Partners of the CRIC project, in order to equip local authorities and possibly tackle the urban and environmental challenges they face.

Due to high urban growth rates in countries such as Indonesia, Vietnam and the Philippines it is predicted that a significant share of the population of those countries will be living in cities in the next ten years. Cities in the South Asian and South East Asian regions are already impacted by climate change, and they could substantially benefit from long lasting solutions in terms of climate resilience and inclusiveness. The CRIC Project aims to inform and facilitate the equipment of local governments, cities, urban stakeholders working on climate resilience, mitigation and adaptation of those cities by pooling the best resources available and transferring and adapting as much knowledge as possible. Since urban areas host most of the vulnerable populations, as well as vital and social infrastructure, and local governments get increased pressure to develop services, infrastructure and employment, it is therefore of utmost urgency to make sure that we are all up for the challenge presented by climate change.

Isabelle Milbert, President of Pilot4Dev

The CRIC project represents for the Association of Cities and Regions for sustainable resource management (ACR+) – a network of local and regional authorities mainly based in the EU and the Mediterranean Area – a unique opportunity to cooperate and strengthen the role of cities to deliver on resiliency and inclusiveness.

ACR+'s core mission is to develop sustainable resource management initiatives involving local and regional authorities; in particular regarding waste management, one of the priorities raised by the urban analysis report. As such and for more than 25 years, we have been designing and implementing initiatives on circular economy, waste prevention, and waste management, building through this an extensive knowledge basis. Several ACR+ members have been already cooperating in the South-East region, whose experiences could be capitalized on and further developed through CRIC.

Conversely, this project provides a great learning opportunity for ACR+ members, to understand how local initiatives make a difference at global level. The present report contributes to effectively comprehend the local context, shedding the light on the key challenges and priorities. It shows that the exchange of methodologies to support decision-making processes rather than transfer solutions is crucial to successfully deliver sustainable projects.

However, more than a mere exchange of experiences, CRIC is a timely reminder that cooperation is key, at all levels and between countries. The EU cannot deliver alone the ambition of the European Green Deal for a climate-neutral, resource-efficient and circular economy. Activities like the ones developed within the CRIC project (trainings, stakeholder engagement, tools development, local action plans) can provide solid evidences to support bilateral and regional policy dialogue actions aimed at implementing the Green Deal and 2030 Agenda's objectives beyond the EU. Unfortunately, we cannot and should not forget the wider context in which the project is unfolding: the COVID-19 outbreak has been posing tremendous challenges at local level. With the hindsight we have so far, we see that local agenda based on resilient models contribute to better adapt and mitigate the negative impacts of the pandemic. Having this in mind, ACR+ has been supporting its members in overcoming the situation and is determined to also follow this path in CRIC.

Françoise Bonnet

ACR+ Secretary General

ABOUT THE AUTHORS

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GLOSSARY

AMDAL	Analisis Mengenai Dampak Lingkungan (Environmental Impact Analysis)
AMPL	Air Minum dan Penyehatan Lingkungan (Drinking Water and Environmental Health)
APBD	Anggaran Pendapatan dan Belanja Daerah (Local Government Revenue and Expenditure)
APBN	Anggaran Pendapatan dan Belanja Negara (National Revenue and Expenditure)
API	Adaptasi Perubahan Iklim (Climate Change Adaptation)
ASL	Above Sea Level
BAPPEDA	Badan Perencanaan Pembangunan Daerah (Local Development Planning Board)
BAPPENAS	Badan Perencanaan Pembangunan Nasional (National Development Planning Agency/Ministry)
BAU	Business as Usual
BBM	Bahan Bakar Minyak (fossil fuel)
BIG	Badan Informasi Geospasial (Geospatial information Agency)
BMKG	Badan Meteorologi, Klimatologi, dan Geofisika (Agency for Meteorological, Climatological, and Geophysics)
BNPB	Badan Nasional Penanggulangan Bencana (National Disaster Management Agency
BPBD	Badan Pengendalian Bencana Daerah (Local Disaster Management Authority)
BPPT	Badan Pengkajian dan Penerapan Teknologi (Agency for the Assessment and Application of Technology)
BPS	Badan Pusat Statistik (Central Bureau of Statistics)
BUMD (ROEs)	Badan Usaha Milik Daerah (Regional Owned Enterprises)
BUMN (SOEs)	Badan Usaha Milik Negara (State Owned Enterprises)
CNC	Clean and Clear
DAS	Daerah Aliran Sungai (Watershed)
DDDT-LH	Daya Dukung dan Daya Tampung Lingkungan Hidup (Supporting Capacity and Environmental Capacity)
DDPI	Dewan Daerah Perubahan Iklim (Regional Council for Climate Change)
DLH	Dinas Lingkungan Hidup (Local Environment Agency)
EBT	Energi Baru Terbarukan (Renewable Energy)
ESDM	Energi dan Sumber Daya Mineral (Energy and Mineral Resources)
EWS	Early Warning System
GDP	Gross Domestic Product
GDRP	Gross Domestic Regional Product
GEL	Greenhouse Emission Level
GRK (GHG)	Gas Rumah Kaca (Greenhouse Gas)
IKLH	Indeks Kualitas Lingkungan Hidup (Environment Quality Index)
IMB	Izin Mendirikan Bangunan (Building Permits)
IPCC	Intergovernmental Panel on Climate Change
IPAL	Instalasi Pengolahan Air Limbah (Wastewater Treatment Plant)
IPLT	Instalasi Pengolahan Lumpur Tinja (Fecal Sludge Treatment Plant)
IPM (HDI)	Indeks Pembangunan Manusia (Human Development Index)
IUP	Izin Usaha Pertambangan (Mining Business Licenses)
KEMENDAGRI	Kementerian Dalam Negeri (Ministry of Internal Affairs)
KEMENKES	Kementerian Kesehatan (Ministry of Health)

KEMENPUPR	Kementerian Pekerja Umum dan Perumahan Rakyat (Ministry of Public Works and Public Housing)
KEMENPERIN	Kementerian Perindustrian (Ministry of Industry)
KEPPRES	Keputusan Presiden (Presidential Decree)
KLHK	Kementerian Lingkungan Hidup dan Kehutanan (Ministry of Environment and Forestry)
KLHS	Kajian Lingkungan Hidup Strategis (Strategic Environmental Assessment)
KOTAKU	Kota Tanpa Kumuh (City Without Slums)
KRB	Kajian Risiko Bencana (Disaster Risk Study)
LAPAN	Lembaga Penerbangan Antariksa Nasional (National institute of Aeronautics and Space)
LIPI	Lembaga Ilmu Pengetahuan Indonesia (Indonesian Institute of Sciences)
MFO	Marine Fuel Oil
MUSRENBANG	Musyawarah Rencana Pembangunan (Development Planning Meetings)
NDC	Nationally Determined Contribution
OPD	Organisasi Perangkat Daerah (Local Government Organization)
PERDA	Peraturan Darah (Local Regulation)
PERMEN	Peraturan Menteri (Ministry Decree)
PERMENPERA	Peraturan Menteri Perumahan Rakyat (Minister of Public Housing Decree)
PERPRES	Peraturan Presiden (Presidential Regulation)
PERWALI	Peraturan Walikota (Mayor Regulation)
PHBS	Perilaku Hidup Bersih Sehat (Clean and Healthy Life Behaviour)
PLN	Perusahaan Listrik Negara (State Electricity Company)
POSYANDU	Pos Pelayanan Terpadu (Community Level Health Center)
PP	Peraturan Pemerintah (Government Regulation)
PPP	Public Private Partnership
PROKLIM	Program Iklim (Climate Village Program)
PUSDALOPS	Pusat Pengendalian Operasi Penanggulangan Bencana (Disaster Management Operations Control Center)
RAD	Rencana Aksi Daerah (Local Action Plan)
RAN	Rencana Aksi Nasional (National Action Plan)
REDD	Reducing Emissions from Deforestation and Forest Degradation
RENSTRA	Rencana Strategis (Strategic Plan)
RISPAM	Rencana Induk Sistem Penyediaan Air Minum (Main Plan for Development of Drinking Water Supply System Samarinda)
RKAB	Rencana Kerja dan Anggaran Biaya (Work Plan and Budgeting)
RKPD	Rencana Kerja Pemerintah Daerah (Local Government Work Plan)
RP3KP	Rencana Pembangunan dan Pengembangan Perumahan dan Kawasan Permukiman (Housing and Settlement Areas Development Plan)
RPJMD	Rencana Pembangunan Jangka Menengah Daerah (Local Medium Term Development Plan)
RPJMN	Rencana Pembangunan Jangka Menengah Nasional (National Medium Term Development Plan)
RPJP	Rencana Pembangunan Jangka Panjang (Long Term Development Plan)
RTH	Ruang Terbuka Hijau (Open Green Space)
RTRW	Rencana Tata Ruang dan Wilayah (Spatial Planning)
RUKN	Rencana Umum Ketenagalistrikan Nasional (National Electricity General Plan)
RUPTL	Rencana Umum Penyediaan Tenaga Listrik (Electricity Supply Business Plan)
SDGs	Sustainable Development Goals

SIDIK	Sistem Informasi Data Indeks Kerentanan (Vulnerability Index Data and Information System)
SPAM	Sistem Penyediaan Air Minum (Drinking Water Supply System)
SPPL	Surat Pernyataan Kesanggupan Pengelolaan dan Pemantauan Lingkungan (Statement Letter of Ability in Environmental Management and Monitoring)
SIPESUT	Sistem Informasi Pengadaan Secara Utuh (Holistic Procurement Information System)
SRN	Sistem Registri Nasional (National Registry System)
SSK	Strategi Sanitasi Kota (City Sanitation Strategy)
TOGA	Tanaman Obat Keluarga (Family Medicinal Plant)
TPA	Tempat Penampungan Akhir (Final Landfill)
TPS	Tempat Penampungan Sementara (Temporary Waste Collection Point)
UKL-UPL	Upaya Pengelolaan Lingkungan Hidup-Upaya Pemantauan Lingkungan Hidup (Environmental Management Efforts-Environmental Monitoring Efforts)
UNFCCC	United Nations Framework Convention on Climate Change
WIUP	Wilayah Izin Usaha Tambang (Mining Business License Area)

CHAPTER 1
Overview of Samarinda

This chapter provides an overview of Samarinda City in East Kalimantan, Indonesia, from a primarily environmental and social angle. It provides an initial basis for assessing the extent to which the principles of a climate-resilient and inclusive city could be achieved in Samarinda, given its current conditions.

1.1 General Description

Samarinda, with an area of 718 km^2 and a population of 872,770 in 2019, is the capital of East Kalimantan Province. The city was originally founded when the Bugis Wajo people first settled on a low-lying area on a sharp bend of the Mahakam River, after migrating from Sulawesi. Samarinda serves as a gateway to the inland areas of East Kalimantan through rivers, land, and air. The city is enclosed by Kutai Kartanegara Regency (see Figure 1), which, together with Samarinda, make up the 10 cities and regencies in East Kalimantan.[1]

The regencies surrounding Samarinda are rich in natural resources; oil, gas, coal, palm oil and timber are key commodities that have made East Kalimantan one of the richest provinces in Indonesia. For example, Kutai Kartanegara Regency is home to some of the country's largest oil and gas operations, especially in the Mahakam Block (previously operated by Total and Inpex) and the Sanga-Sanga Block (previously operated VICO). Both are now operated by the National Oil and Gas Company (PT Pertamina).

[1] "city" refers to the Indonesian administrative unit "Kota", while "Regency refers to "Kabupaten". These are third-level government units below the national government and the provincial government. However, the Indonesian political system is decentralized; cities and regencies have a substantial amount of autonomy from the provincial and national government.

Figure 1. Images of Samarinda and the Mahakam River (right),
Map of East Kalimantan by Cities and Regencies (left)

Source: https://kaltimbkd.info/

Source:
https://legaleraindonesia.com

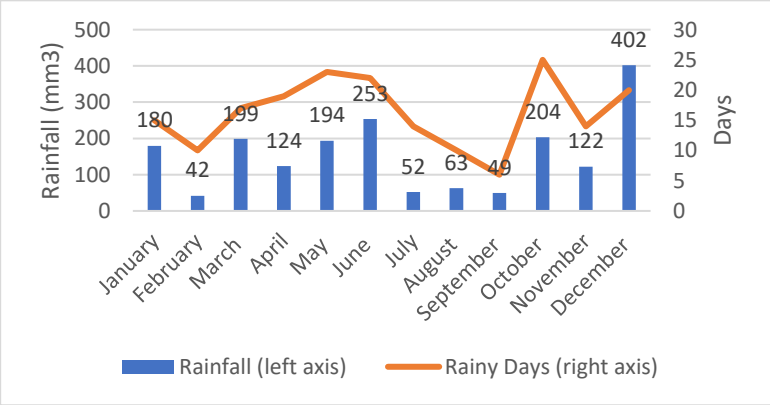
Source: Personal
Documentation/MA

Note: Arrow points to Samarinda.

1.2 Topography and Climatology

Located near the Equator and the rainforests of Borneo, Samarinda has a wet tropical climate with temperatures between 20-34° Celsius, an average annual rainfall of 1,980mm, and average humidity of 85%. In 2019, the most rainfall occurred in December, with precipitation of 401.7mm^3 in 20 days. Meanwhile, the driest month was September, with 49.2mm^3 of over 6 days (see Figure 2).

Figure 2. Rainfall and Rainy Days by Month



Source: BPS, Samarinda City in Figures 2020.

Samarinda is located approximately 20 kilometers before the Mahakam River reaches its delta and flows into the Makassar Strait (see Figure 3). The city is in the vicinity of 20 watersheds, with Mahakam as the main river that divides the city into a Northern part and a Southern part. The Mahakam is 300-500 meters wide and 980 kilometers long. Important tributaries of Mahakam are:

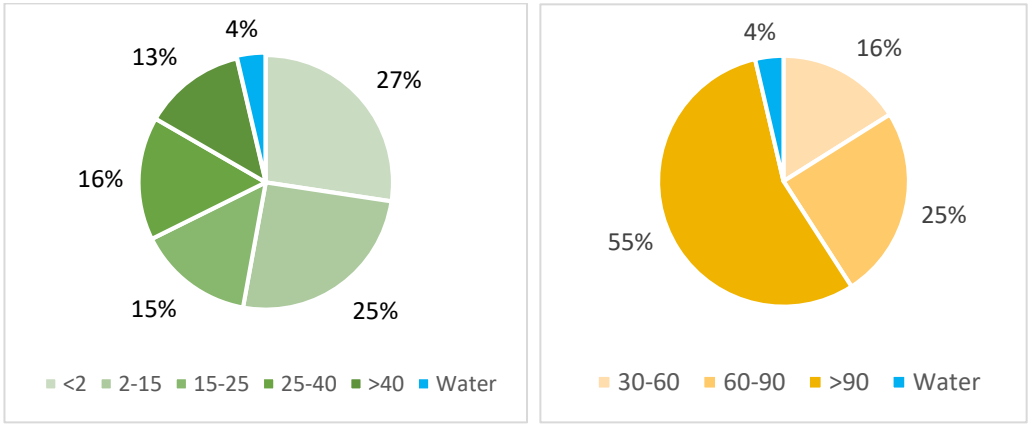
1. Karang Mumus River (a 31,931ha watershed area with a 37.9km length).
2. Other tributaries: Palaran, Loa Bakung, Loa Bahu, Bayur, Betepung, Muang, Pampang, Kerbau, Sambutan, Lais, Tas, Anggana, Loa Janan, Handil Bhakti, Loa Hui, Rapak Dalam, Mangkupalas, Bukuan, Ginggang, Pulung, Payau, Balik Buaya, Banyiur, Sakatiga and dan Bantuas.

Figure 3. Aerial photo of Samarinda and Immediate Surrounding Area

Source: Google Maps, 2020.

The topographic condition of Samarinda is mostly flat and low-lying, but there are also hilly parts where coal deposits and mining concession areas are located (more about coal mines later). The city has an average elevation of around 10-200 meters above sea level (asl). About 27% of the land has an altitude of 0-7 meters and mostly are located along the Mahakam River. Around 41% has an altitude of 7-25 meters and 33% at 25-100 meters. Based on slope class and soil depth (see Figure 4), 53% of the city area is at a slope of less than 15% while 40% is at a slope of more than 40%. In terms of soil depth, about 55% of Samarinda's area (equivalent to 39,833ha) reaches soil depths of more than 90 cm.

Figure 4. Percentage of Samarinda Area based on Slope Class (%, left) and Soil Depth (cm, right)

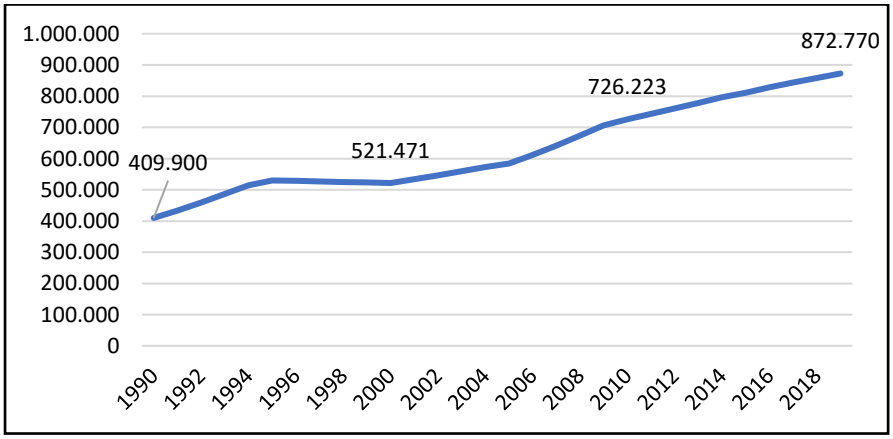


Source: BPS, Samarinda City in Numbers, 2020.

1.3 Demographic Characteristics

Samarinda is the most populated city in East Kalimantan, accommodating 23.7% of the province's total population. The most rapid population growth occurred in the early 1990s and the late 2000s. Between 1990 and 2010, the population grew by 78% (see Figure 5). The high population growth rate was influenced by commodity price booms. This translated into growth in the trade, hotels, restaurants, and service sectors. This ultimately attracted numerous migrants. Nowadays, the population continues to increase, but at a relatively slower pace, possibly related to the drop in commodity prices.

Figure 5. The Population of Samarinda City 1990-2019



Source: BPS Samarinda City

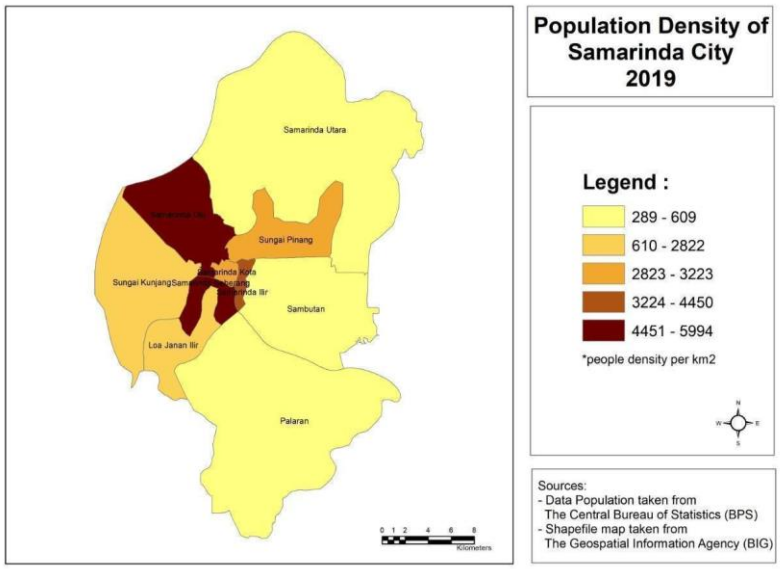
Samarinda is divided into 10 districts (Kecamatan), as listed in Table 1. The city's average population density in 2019 was 1,216 people/km^2. The most populated districts are Samarinda Ulu and Samarinda Utara, and the densest ones are Samarinda Seberang and Samarinda Ulu (see Figure 6). Samarinda Ulu is the city's trade and service center while Samarinda Seberang is the location of the original settlers, where many houses stand on stilts above the river body.

Table 1. Total Population by District in Samarinda City in 2019

No.	District	Population	Density per km^2
1	Palaran	63,870	288.6
2	Samarinda Seberang	74,870	5,994.4
3	Loa Janan Ilir	73,750	2,822.4
4	Sambutan	61,500	609.2
5	Samarinda Ilir	76,450	4,449.9
6	Samarinda Kota	34,800	3,129.5
7	Sungai Kunjang	120,100	2,790.4
8	Samarinda Ulu	128,030	5,788.0
9	Samarinda Utara	129,320	563.4
10	Sungai Pinang	110,080	3,222.5

Source: BPS Samarinda City, 2020.

Figure 6. Map of Samarinda City Population Density (2019)

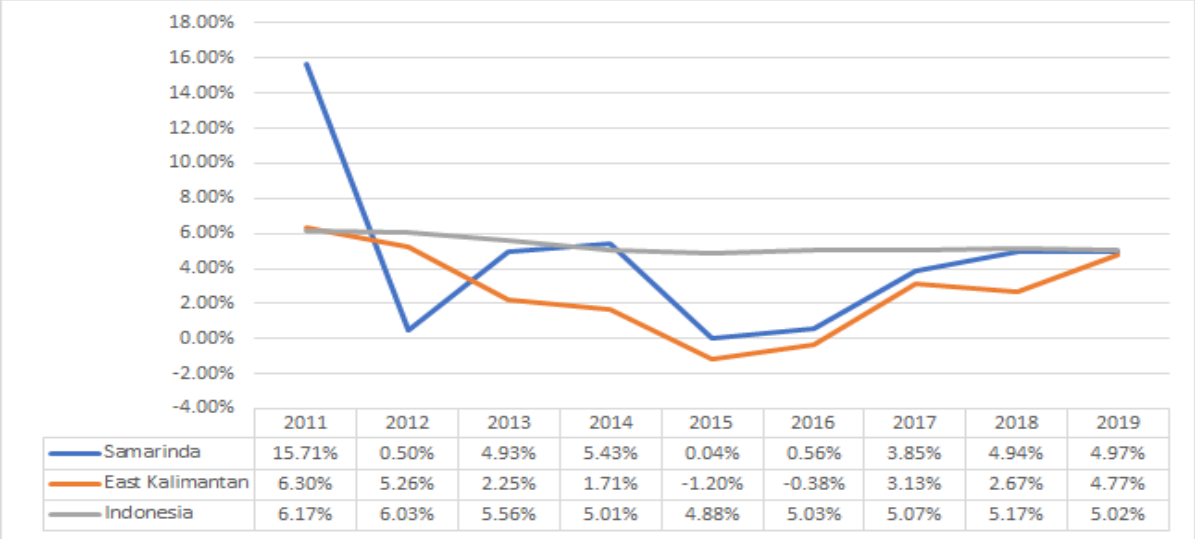


Source: BPS Samarinda City, Authors

1.4 Economic Structure

Samarinda is surrounded by major oil and gas mining activities in the neighbouring districts. Economic growth in the city is therefore quite volatile, depending on oil and gas prices, with very high growth before 2011 and a more moderate growth rate in the last few years. In 2019, the economic growth rate was 4.97%, but it was close to zero in 2012, 2015, and 2016 (see Figure 7). The growth rate for East Kalimantan Province is typically lower than Samarinda's and was negative for two years consecutively (2015-2016).

Figure 7. GDRP Growth Rate of Samarinda, East Kalimantan, Indonesia, 2011-2019



	2011	2012	2013	2014	2015	2016	2017	2018	2019
Samarinda	15.71%	0.50%	4.93%	5.43%	0.04%	0.56%	3.85%	4.94%	4.97%
East Kalimantan	6.30%	5.26%	2.25%	1.71%	-1.20%	-0.38%	3.13%	2.67%	4.77%
Indonesia	6.17%	6.03%	5.56%	5.01%	4.88%	5.03%	5.07%	5.17%	5.02%

Source: BPS Samarinda City

The construction sector plays an important role in Samarinda, contributing to 21.5% of the economy in 2019 (see Table 2). Real estate and housing construction are some of the investment opportunities in the city brought forth by oil and gas revenue from the neighbouring districts. Due to the presence of construction and trade sectors, Samarinda's economy was able to grow positively even though the province of East Kalimantan and its oil and gas producing areas experienced a decline. Mining and excavations contribute a substantial 13.3% of Samarinda's economy, which is peculiar for an urban area. This is due to the city's large land area, which includes mining areas. In 2019 mining was the third-largest contributor to Samarinda's economy, just under construction and trade.

Table 2. Samarinda Gross Regional Domestic Product by Sector, 2015-2910 (billion rupiahs, current prices)

No.	Sector	2015	2016	2017	2018	2019	% (2019)
A	Agriculture, Forestry, and Fishery	905.3	966.0	1,063.9	1,1619	1,196.4	1.7%
B	Mining and Excavation	6,513.7	6,607.0	8,118.3	8,712.5	8,926.0	13.0%
C	Processing Industry	4,140.3	4,398.3	4,722.9	5,001.0	5,306. 3	7.7%
D	Electricity and gas procurement	55.6	61.7	76.0	88.3	96.2	0.1%
E	Water procurement, Waste Processing, Waste and Recycling	64.3	74.0	86.3	95.0	99.9	0.1%
F	Construction	10,532.7	10,532. 7	11,921.2	13,382.2	14,763.3	21.5%
G	Wholesale and retail trade; Car and Motorcycle Repair	7,710.0	8,386. 7	9,295.4	10,291.2	11,184. 1	16.3%
H	Transportation and Warehousing	3,675.1	3,699.1	3,992.8	4,402.9	4,763.3	6.9%
I	Accommodation and Food and Drink	1,770.2	1,993.5	2,236.4	2,513.9	2,754.6	4.0%
J	Information and Communication	1,614.6	1,801.4	2,047.0	2,121.1	2,257.8	3.3%
K	Finance Services and Insurance	4,086.6	4,206.9	4,251.1	4,551.0	4,736.4	6.9%
L	Real Estate	1,345.1	1,456.2	1,546.5	1,546.5	1,619.6	2.4%
M, N	Company services	445.2	460.1	505.0	539. 9	554.3	0.1%
O	Government Administration, Defense, and Mandatory Social Security	4,016.1	3,786.7	3,840.3	4,084.3	4,380.5	6.4%
P	Education Services	1,878.7	2,156.8	2,396.9	2,666.1	2,890.3	4.2%
Q	Health Services and Social Activities	637.3	737.3	809.9	891.7	949.9	1.4%
R, S, T, U	Other Services	1,434.1	1,434.1	1,642.3	1,868.3	2,091.8	3.1%
Gross Domestic Regional Product		50,799.6	52,647.4	58,461.9	63,917.8	68,570.7	100%

Source: BPS Samarinda City

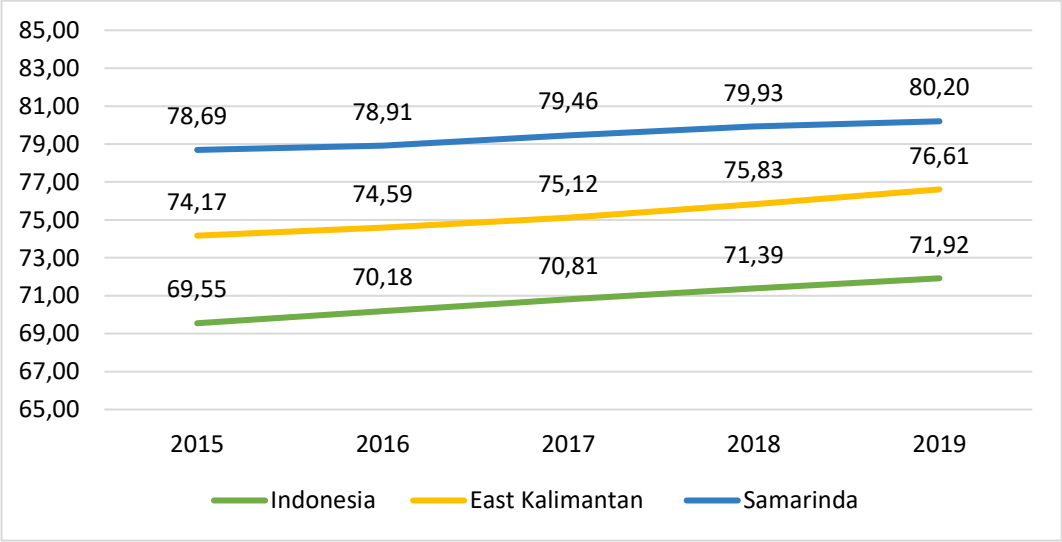
The number of job seekers registered with the city government was 25,844 in 2019 (5.87%[2]), which is an increase of 139% compared to the previous year. This indicates that there is an increasing number of unemployed people in 2018-2019, most likely related to the recent commodity price bust. The sectors that have the greatest number of businesses and employ the most (146,892 people) are transportation, warehousing, and communications.

[2] See Annex 1

1.5 Social Infrastructure and Services

As seen in Figure 8, Samarinda is among Indonesia's richest cities, with a relatively high Human Development Index (HDI) of 80.2 in 2019. This is above the HDI score of East Kalimantan (76.6, the third-highest in the country), and much higher than Indonesia's (71.9). In terms of gender, Samarinda has a higher share of males than in many other places, with a ratio of men to women of 106:9 in 2019. This is possibly related to the large presence of natural resource extraction activities in Samarinda and the surrounding regencies.

Figure 8. Human Development Index of Samarinda, East Kalimantan, Indonesia, 2015-2019



Source: BPS Samarinda City

1.5.1 Education

In 2019, Samarinda had 220 elementary schools with a student to teacher ratio of 21. There were 91 junior high schools with a student to teacher ratio of 18 and 41 senior high schools with a student to teacher ratio of 17 (see Table 3). Samarinda's student to teacher ratio is higher than those of East Kalimantan and Indonesia for elementary and junior high schools, but not that much different for senior high school level.

Table 3. Number of Schools and Students-Teacher Ratio in Samarinda City, 2019

No.	Educational Stage	Number of Schools	Student to Teacher Ratio		
			Samarinda	East Kalimantan	Indonesia
1	Elementary School	220	21	17	17
2	Junior High School	91	18	16	16
3	Senior High School	41	17	17	16

Source: Ministry of Education and Culture

1.5.2 Health

The most common health facilities in Samarinda city are *Posyandu* (Community-level Integrated Health Centers), as shown in Table 4. In 2019, the most common health issue in Samarinda was hypertension, with around 52,240 cases.

Table 4. Health Facilities in Samarinda City in 2015-2019

No.	Health Facilities	2015	2016	2017	2018	2019
1	Hospital	16	15	14	13	15
2	Public Health Center	24	24	26	26	26
3	Clinic	42	63	86	85	85
4	Integrated Health Center	609	629	637	648	663
5	Public Health Center ratio to 1000 population	0.030	0.029	0.031	0.030	0.030
6	Clinic ratio per 1000 population	0.052	0.076	0.102	0.099	0.097

Source: Samarinda City Statistic Bureau

1.6 Environmental Condition

1.6.1 Air Quality and Greenhouse Gas Emission

The Samarinda City Environmental Agency conducts ambient air measurement using the Passive Sampler method.[3] The measurement tools were deployed at four spots throughout the city, representing transportation lanes, office buildings, housing complexes, and industrial sites for two weeks in four periods. The Passive Sampler results for air quality in Samarinda from 2017 to 2019 exhibited satisfactory results (see Table 5). On certain days throughout the dry season, however, Samarinda suffers from highly polluted air caused by forest fires in the neighbouring regencies. These conditions are not reflected in the index.

[3] The measurements were evaluated using the European Unit (EU) Directives standard, where a smaller score is preferred. If the index score is <= 1, it means air quality complies with the EU standard.

Table 5. Air Quality Test in Samarinda City in 2017-2019

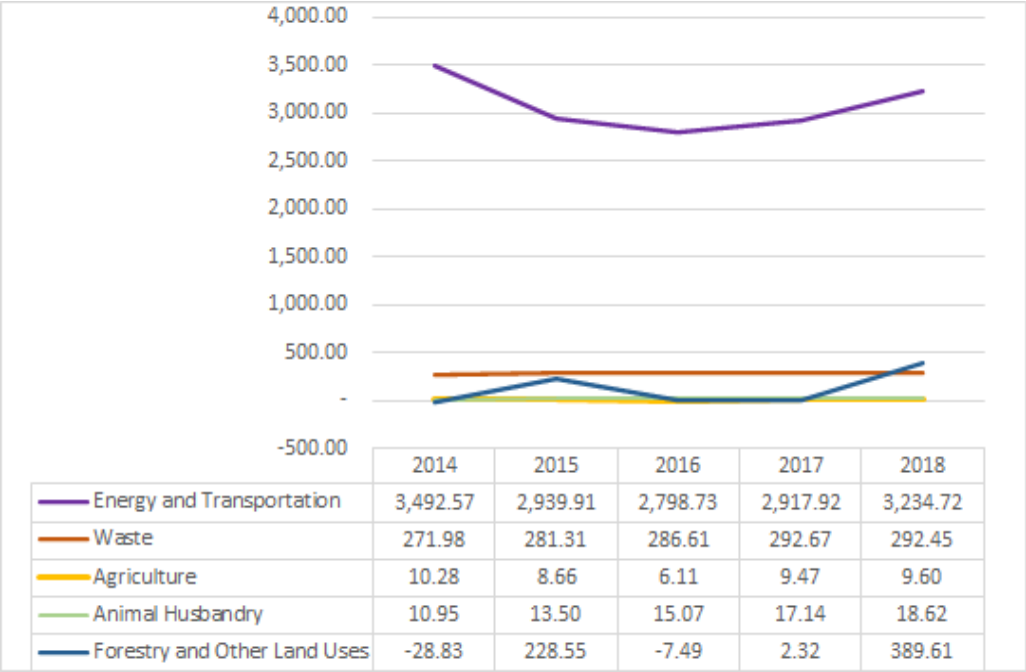
Parameter	Average Observations	Quality Standard	Index		
			2017	2018	2019
NO_2	11.675	40	0.292	0.089	0.178
SO_2	2.6875	20	0.134	0.238	0.339
Air Index (Annual Index model EU-leu)			0.213	0.163	0.259
Air Quality Index			87.795	91.932	91.185

Source: Samarinda City Environmental Agency, 2019

For the first time, Samarinda city has released a Local Action Plan for Greenhouse Gases (GHG), or RAD GRK (*Rencana Aksi Daerah Gas Rumah Kaca*) for 2020-2030, which elaborates the sectors contributing to greenhouse gas emission level (GEL). The GEL in Samarinda in 2014-2019 showed fluctuation with a generally high emission level (see Figure 9).

The total GEL in Samarinda declined from 2014 to 2016 but increased during 2017-2018. A similar fluctuation was also apparent in the GEL for the energy and transportation sectors, which make up the bulk (88%) of the emissions. "Energy" here refers largely to electricity usage in the city. Meanwhile, the waste and animal husbandry sectors tended to demonstrate a yearly increase during the 2014-2018 period.

Figure 9. Actual GEL of Samarinda City Based on Sectors, 2014-2018 (million Ton CO_2 e)



	2014	2015	2016	2017	2018
Energy and Transportation	3,492.57	2,939.91	2,798.73	2,917.92	3,234.72
Waste	271.98	281.31	286.61	292.67	292.45
Agriculture	10.28	8.66	6.11	9.47	9.60
Animal Husbandry	10.95	13.50	15.07	17.14	18.62
Forestry and Other Land Uses	-28.83	228.55	-7.49	2.32	389.61

Source: GHG Local Action Plan Samarinda City 2020-2030

In terms of GHG type, the most significant contribution of GEL came from CO_2 gas, which contributes to about 94% of GHG in the city, followed by N_2O and CH_4 gases (see Table 6). The high emission level of CO_2 is in line with the sectoral contribution of GEL in Figure 9, as electricity and vehicle fuels contribute substantially to CO_2 emissions. High level of private vehicle usage is an issue, and Samarinda's development is sprawling without a reliable public transportation system.

Table 6. Actual GEL of Samarinda City Based on Type of GHG, 2014-2018 (1000 Ton CO_2 e)

GHG Type	2014	2015	2016	2017	2018
CO_2	3,301,049.63	3,259,044.33	2,831,228.85	2,994,831.65	3,707,061.15
CH_4	143,309.,58	84,035.08	97,627.44	94,939.18	92,902.25
N_2O	312,586.26	128,847.29	170,179.27	149,754.71	145,040.28
Total	3,756,945.46	3,471,926.70	3,099,035.56	3,239,525.54	3,945,003.67

Source: GHG Local Action Plan Samarinda City for 2020-2030

The source of GHG originating from the energy and transportation sector is calculated from the combustion of hydrocarbon fuels, obtained primarily from the state-owned electricity company (PLN) and the state-owned oil and gas company (Pertamina). Based on sectoral types (Table 7), total GHG emissions are dominated by the transportation and industrial sectors. Emissions in the transportation sector come from the use of gasoline and diesel fuel. Meanwhile, the industrial sector generates GHG emissions from the use of fuel and energy from power plants.

Diesel fuel is the largest contributor to GHG emissions in the energy and transportation sectors, followed by other types of gasoline fuels.

Table 7. Sectoral GHG Emissions (Tons CO_2 e/year)

No.	Sectoral Type	2014	2015	2016	2017	2018
1	Power plants	506,386.65	181,371.65	254,897.86	215,118.69	208,897.36
2	Industrial	20,396.84	960,177.17	1,062,861.27	1,157,967.31	1,286,942.15
3	Transportation	2,618,261.41	1.441.650,53	1,115,129.05	1,170,699.68	1,356,419.16
4	Household	255,369.37	262,756.87	270,075.96	276,615.82	283,153.89
5	Commercial	64,631.21	65,895.52	67,169.16	68,397.14	69,652.86
6	General and Others (Electricity/PLN)	27,519.59	28,057.92	28,600.23	29,123.10	29,657.78
	Total	3,492,565.08	2,939,909.66	2,798,733.53	2,917,921.75	3,234,723.20

Source: GHG Local Action Plan Samarinda City for 2020-2030

In general, fluctuations in the GEL reflected variations in Samarinda City's GDRP in 2014-2018. The total net emission intensity (in tons of CO_2) toward GDRP in Samarinda City depreciated from 2014 to 2017 and increased in 2018 (see Table 8).

Table 8. The Net Total GEL Emission Intensity Toward Samarinda City GDRP in 2014-2018

Parameter	2014	2015	2016	2017	2018
GEL (in tons of CO_2 e)	3,756,945	3,471,926	3,099,035	3,239,525	3,945,003
GDRP (in million IDR)	48,273,715	50,799,587	52,647,368	58,461,903	63,947,538
GEL emission intensity (in ton CO_2 e/ million IDR)	0.078	0.068	0.059	0.055	0.062

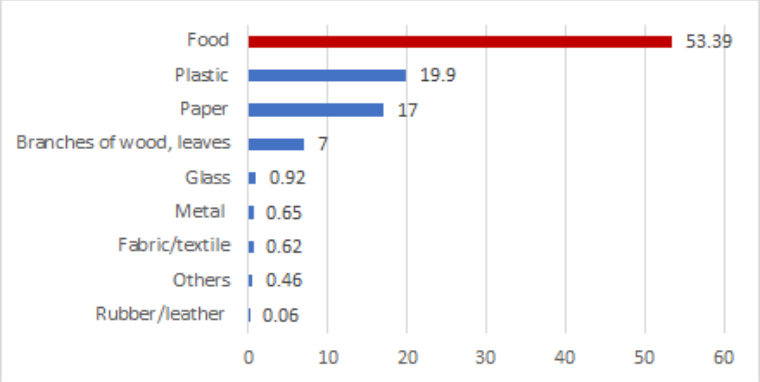
Source: GHG Local Action Plan Samarinda City for 2020-2030

1.6.2 Waste Management

The city of Samarinda produces around 600-800ton of solid waste daily. These are dominated by food waste (53.39%), followed by plastic (19.9%) and paper waste (see Figure 10). Between 2015-2019, around 72% of the waste was transported to the final landfill (TPA) (see Table 9). Based on data from Samarinda's Technical Implementation Unit, only two tonnes of the total waste collected was monthly turned into compost (no further detail is available), and a tonne of waste is picked up by scavengers daily. Most of Samarinda's garbage ends in the final landfill, and some of it is being thrown into the river or burnt.

The capacity of Samarinda's main landfill in Bukit Pinang is 500 tonnes of waste daily. Therefore, the landfill is currently in a state of under capacity (overload of waste).

Figure 10. Waste Composition in Samarinda City (%)



Source: Samarinda City Environmental Agency, 2020

Table 9. Waste Produced and Processed in the city of Samarinda

No.	Description	2015	2016	2017	2018	2019
1	Potential of waste generated (ton/day)	815.04	835.54	686.61	601.25	610.94
2	Waste per person (kg/day)	0.89	0.89	0.89	0.70	0.70
3	Volume of waste handled (ton/day)	504.18	520.76	595.19	496.56	444.64
4	Percentage of waste transported and processed (%)	61.86	62.33	86.69	82.59	72.78

Source: Samarinda City Environmental Agency, 2020.

1.6.3 Water Quality

Rivers play an important role in Samarinda City. They are used as water sources for the community as well as primary drainage for flood control and rainwater reservoirs. The Samarinda Environmental Agency organizes a water quality test each year, using the Sumitomo and Nemerow Pollution Index method. The results show that many rivers in Samarinda are highly polluted (see table 10). The rivers measured were Mahakam, Karang Mumus, Karang Asam Besar, and Karang Asam Kecil rivers. There is no identification of the sources of water pollution. However, from the pollutant sources, the largest pollutant in the Mahakam River (at Samarinda City segment) is household waste (55%), followed by waste from fisheries (16%), livestock (13%), and industry (9%).[4]

[4] Pusat Pengendalian Pembangunan Ekoregion Kalimantan-FMIPA UNMUL, 2016

Table 10. Water Quality Test Results in Samarinda City in 2015-2019

No.	Test Location	2015	2016	2017	2018	2019
1.	Mahakam river at Samarinda segment	9.799 (Mildly Polluted)	Unavailable data	5.349 (Mildly Polluted)	10.860 (Heavily Polluted)	9.128 (Mildly Polluted)
2.	Karang Mumus river	6.483 (Mildly Polluted)		6.992 (Mildly Polluted)	8.414 (Mildly Polluted)	6.681 (Mildly Polluted)
3.	Karang Asam river	10.795 (Heavily Polluted)		7.939 (Mildly Polluted)	10.193 (Heavily Polluted)	10.714 (Heavily Polluted)

Source: Samarinda City Environmental Agency, 2019.

1.6.4 Land Cover

In terms of land cover, as shown in Table 11, almost half (45.2%) of the city is covered in natural vegetation (mostly shrubs), while 16.4% is for the built environment. It needs to be noted that 14.2% of Samarinda's land area is occupied by mining pits. In terms of the built environment, Figure 11 shows that Palaran, North Samarinda, and Samarinda Ilir districts are among the least urbanized (low proportion of built environment). On the other hand, Samarinda Kota and Sungai Kunjang districts are areas with a high proportion of the built environment.

A previous study conducted by Warsilan (2019) found that in 2000, the composition of the land was dominated by 74.72% open areas which included natural swamps. But in 2016 it decreased to 42.33% of the total area. Meanwhile, the composition of built-up areas has increased by 41.35% from 2000-2016. Many of these natural areas, including swamps and water reservoirs, have been turned into settlements. The decrease in absorption capacity can be seen from the increase in water runoff by 23.81% from 2000-2016.[5]

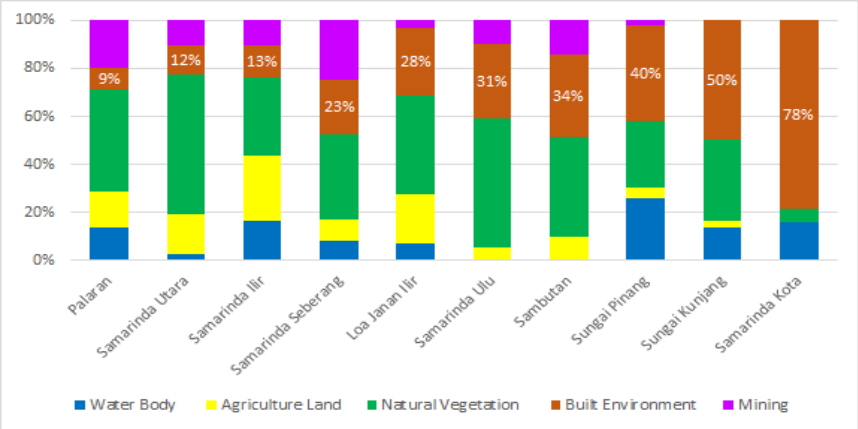
[5] Warsilan. "The Impact of Land Use Changes to Water Absorption Ability (Case: Kota Samarinda). "(2019).

Table 11. Land Cover Classification in Samarinda City (2015)

No.	Land Cover Classification	Area (Ha)	Percentage (%)
1	Natural vegetation	32,451.18	45.22
2	Agricultural land	10,545.47	14.69
3	Built environment	11,804.87	16.45
4	Mining	10,195.63	14.21
5	Waterbody	6,771.12	9.43

Source: Supporting Capacity and Environmental Capacity (DDDT-LH) Samarinda City, 2018

Figure 11. Samarinda City's Land Use by District (2015)

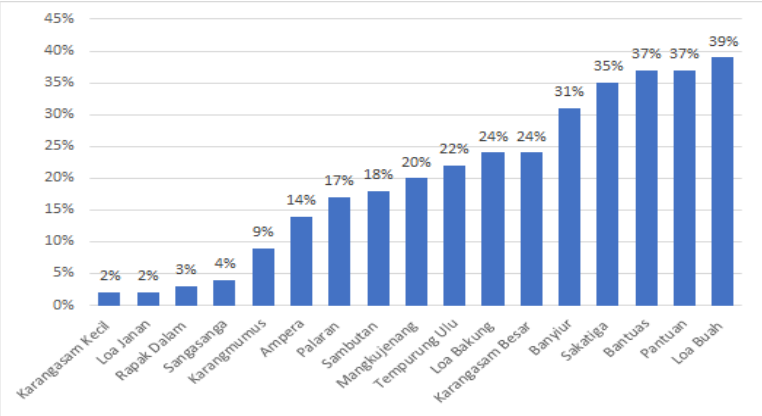


Source: Supporting Capacity and Environmental Capacity (DDDT-LH) Samarinda City, 2018

Mining pits are spread throughout 8 out of 10 districts in Samarinda, with the highest proportion in Samarinda Seberang and Palaran (see Figure 11). A study from Angggraeni *et al*. (2019) stated that Samarinda is the only provincial capital city in Indonesia that has mining areas. More than 71% of the total area of Samarinda has obtained land clearance permits for mining activity, either through the Ministry of Energy and Mineral Resources, Mining Business Permits (IUP), and Mining Concessions (KP) issued by local and provincial governments.[6] Some sub-watershed areas have a high proportion of mining land coverage: above 35% in Loa Buah, Pantuan, and Bantuas (see Figure 12).

[6] Anggraeni, Ike, Annisa Nurrachmawati, and Andi Anwar. "Environment Quality on Surrounding Community of Coal Mining Area in Samarinda. East kalimantan, Indonesia." (2019).

Figure 12. Proportion of Mining Land Cover in Samarinda's Sub-Watershed Areas (2015)



Source: Environmental Support and Capacity (DDDT-LH) Samarinda City, 2018

1.6.5 Green Open Space

The Spatial Planning Law (Law No.26 of 2007) mandates a minimum ratio of 30% for green open spaces (RTH) in all local jurisdictions. Green open space is made up of public RTH (at least 20% of the area) and private RTH (at least 10%). An inventory of the size of RTH in Samarinda city is currently underway, but based on the last available data from 2013, areas allocated for public RTH only makes up 5.13% of the city area, or equivalent to 3,683ha (see table 12). This is far from the ideal RTH area of 20%, which is equivalent to 14,360ha. Thus, Samarinda still requires an additional 10,865ha of green open space.

Table 12. Public RTH Area by Type and Proportion of Samarinda City Area

No.	Types of RTH	Area (Ha)	Proportion (%)
1	City Forest	701.46	0.98
2	Median – Pedestrian Walk	9.62	0.01
3	Water Reservoir	114.32	0.16
4	Cemetery	100.89	0.14
5	Final Waste Landfill	30.42	0.04
6	Reservoir Setback Area	235.03	0.33
7	River Setback Area	917.28	1.28
8	High Voltage Tower Setback	35.48	0.05
9	Dam Setback Area	61.45	0.11
10	City Park	18.50	0.03
11	Sporting Field	61.82	0.09
12	Office Buildings	16.33	0.02
13	Educational Vicinity	38.62	0.05
14	Hospital	8.02	0.01
15	Airport	23.02	0.03
16	City-Council-Owned Land	1,291.39	1.80
	Total	3,683.65	5.13

Source: Samarinda City Environmental Agency

Privately-owned RTH is currently 31,096ha large, or 43.31% of Samarinda's total area (see table 13). Private RTH in Samarinda is therefore above the standard of 10% or 7,180ha. However, the majority of the RTH areas are covered by bushes and shrubs and cannot be accessed by the public.

Table 13. Private RTH and Its Proportion to Samarinda City Area

No.	Types of RTH	Area (Ha)	Proportion (%)
1	Golf Course	87.53	0.12
2	Hotel	2.44	0.01
3	Housing Complex	69.53	0.10
4	Industrial Space	5.40	0.01
5	Tourism Sites	8.03	0.01
6	Commercial Space	4.50	0.01
7	Rice Fields	3,020.70	4.21
8	Gardens	550.00	0.77
9	Small Forest	1,007.50	1.40
10	Bushes and Shrubs	26,341.01	36.69
Total		31,096.64	43.33

Source: Samarinda City Environmental Agency

1.7 Climate Change and Disaster Risk

Samarinda city has various geological characteristics ranging from fault lines, ebb tide swamp, alluvial plains, wavy areas, hills, and river areas which all pose potential disaster threats. Information from Samarinda City BPBD (Regional Disaster Management Agency) identifies five types of disasters for Samarinda, covering natural and man-made disasters. Statistics for these disasters between 2011 and 2019 is presented in Table 14:

Table 14. Disaster History of Samarinda City 2011-2019*

No.	Event	Number of Disasters	Lives Impacted	Houses Damaged	Houses Submerged
1	Floods	44	208,953	2,005	53,909
2	Landslides	41	422	4	40
3	Droughts	4	-	-	-
4	Forest and land-clearance fires	47	4	-	-
5	Social conflicts	1	-	1	-
	Total	137	209,379	2,010	53,949

Source: Samarinda City Risk Assessment Study 2018-2022, BPBD Samarinda City

By the number of disasters, the most common types of disaster in Samarinda are floods, forest and land fires as well as landslides. These disasters have damaged houses and infrastructure and impacted human lives. Fires caused by land clearance for agriculture or built-area purposes happen regularly every year and have negative impacts on both the environment and the community.

Samarinda BPBD has conducted a risk assessment of the hazard level and susceptibility for each type of disaster. A summary of the results is shown in Table 16, which is used as a reference to determine the disaster risk map up to the village level (shown in Annex). The National Disaster Management Agency also provides a portal to assess the disaster vulnerability map called Vulnerability Index Data and Information System (SIDIK) and risk assessment portal (InaRISK), which are included in the Annex.

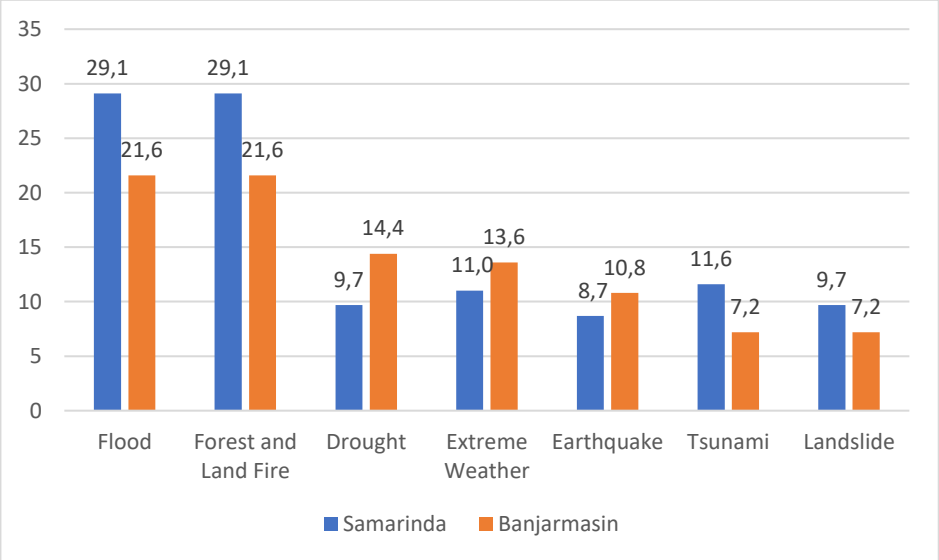
Table 15 shows that floods, forest and land fire, and extreme weather pose the highest level of hazard, followed by landslides, droughts, and social conflicts. The Indonesian Disaster Risk Index score for Samarinda City in 2018 was 109.95, which is considered the "medium" category.

Table 15. Disaster Hazard Level of Samarinda City in 2019

No.	Disasters	Potential Hazard Area as % of Samarinda area	Risk Index	Hazard Level Classification	Note on Hazard Level
1	Flood	23.14	High	High	Height > 3m
2	Forest and land fire	99.60	High	High	Type of land: Shrubs, dry grasslands Rainfall < 1500 mm Type of soil: Organic/peat
3	Extreme weather	97.78	Medium	High	Hazard Score > 0.67
4	Drought	99.67	Medium	Medium	Medium danger zone
5	Landslide	99.71	Medium	Medium	Medium ground movement vulnerability
6	Social conflict	99.74	-	Medium	Frequency: 2-3x Impact: 5-10 people
7	Diphtheria	99.91	-	Low	-
8	Epidemic and virus spread	99.62	-	Low	Hazard Score < 0.34

Source: Samarinda City Risk Assessment Study 2018-2022, BPBD Samarinda City and National Disaster Management Agency, 2019

Figure 13. Disaster Risk Index in Samarinda Compared to Banjarmasin



Source: National Disaster Management Agency, 2019

Compared to another city in Kalimantan, Banjarmasin, located in South Kalimantan, Samarinda generally faces higher disaster hazard for floods, forest and land fire, tsunamis, and landslides. However, the city is less likely to experience droughts, extreme weather and earthquakes (see Figure 13). Disasters in Samarinda have caused the loss of lives and assets, such as housing and public facilities, as well as environmental losses. The level of loss is measured from the population and the index of losses based on physical components, economic components, and environmental components (see Table 16).

Table 16. Potential Loss due to Disaster in Samarinda City (in million rupiah)

No.	Disaster Types	Physical Component	Economic Component	Environmental Component	Total
1	Flood	765.4	866.8	781.0	2,413.2
2	Extreme Weather	2,330.6	2,499.5	64,851.8	69,681.8
3	Forest and Land Fires	2,179.7	1,788.7	1,670.8	5,639.2
4	Drought	81.5	525.6	14,642.2	15,249.4
5	Landslides	360.1	1,599.2	12,669.2	14,628.4
6	Social Conflict	975.3	966.8	32,142.3	34,084.4
7	Diphtheria	594.6	389.7	11,000.0	11,984.3
8	Epidemic and Disaster Outbreak	316.1	551.5	34,725.3	35,592.9
9	Technology Failure	488.0	20.4	19.0	527.4
	Total for Samarinda City	8,091.2	9,208.2	172,501.6	189,801.1

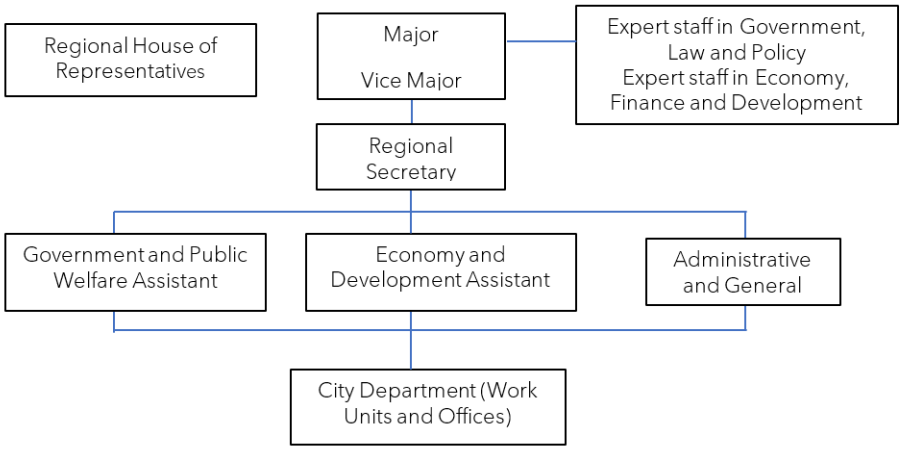
Source: Samarinda City Risk Assessment Study 2018-2022, BPBD Samarinda City

Note: Physical components include houses, public facilities, and critical facilities. Economic component: productive land and GDRP. Environmental component: different parameters for several hazards.

1.8 City Government Structure

The governmental institution in Samarinda is divided into three branches, namely: the local executive, local legislative, and vertical executive institutions that report directly to the central government. The local executive organization consists of the mayor and vice mayor, and local sectoral departments (see Figure 14).

Figure 14. Samarinda City Government Structure



Source: Authors

The mayor and vice mayor, as heads of the local administration, oversee local governmental duties. The Local House of Representatives (DPRD) holds the legislative function of approving local regulations. The DPRD has 45 members for the 2019-2024 political period, based on the 2019 local elections. Besides the executive and legislative assembly, there are also vertical institutions or branches of central government organizations operating in the local jurisdictions, comprising public court, attorney, Narcotics Bureau, etc.

Bottom-up Development Planning Meetings (Musrenbang) are conducted starting from the village/subdistrict (*kelurahan*), district (*kecamatan*), and at city level to seek community inputs for the city's annual development plans. Programs and projects proposed by the community will be assessed by their urgency and the capacity of the government at the grassroots level to implement the proposal. So far, the urgency and capacity of the government to assess the various submitted proposals determine the implementation of programs and projects later. If a proposal is considered very urgent but unable to be implemented by the government at the level below, it will be proposed to be taken to the Musrenbang above it, namely at the district, regency/city, province, and national.

CHAPTER 2
Current Policies and Strategies for Climate Resilient and Inclusive Cities

Achieving climate-resilient and inclusive cities throughout Indonesia, including in Samarinda, require the presence of good, supporting policies at the national and local level. This chapter reviews the relevant government policies and strategies to ensure Samarinda can achieve that goal.

2.1. Nation-Wide Policies and Strategies

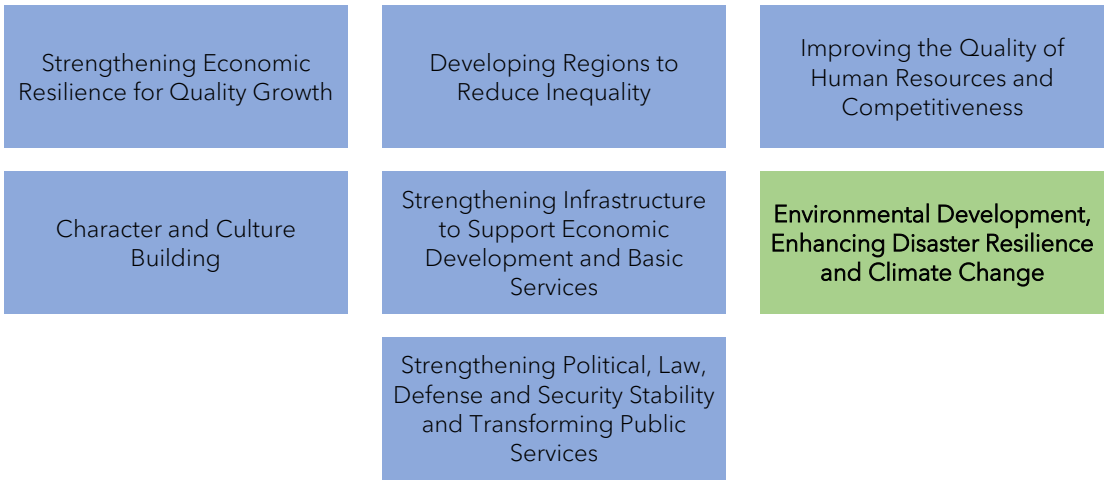
The Indonesian government issued a report entitled Low Carbon Development Indonesia, suggesting that if we implement key sustainability policies, Indonesia can increase economic growth to 6% (higher than the current growth) while reducing GHG emissions by 43%.

Low carbon development is part of Indonesia's current Mid-term Development Plan (RPJMN) 2020-2024. This is a development approach that advances the balance between economic growth, people welfare, and environmental protection, by (1) shifting from fossil fuels to renewable energy such as solar, wind, and geothermal, for electrification and vehicle fuel; (2) planting trees in an area of more than one million hectares by 2024; (3) being efficient in energy usage; (4) conserving water, fisheries, and biodiversity; (5) stopping the issuance of business licenses in the forests and peatland area; (6) investing to implement low carbon development; and (7) improving land productivity by 4% a year, meaning that smallholders can produce more food and feed more people with fewer resources and land.

2.1.1 Sustainable Development

The Government of Indonesia in the early 2000s compiled the 2006-2026 National Long-Term Development Plan (RPJPN) as a guide in achieving development targets. In 2020, the RPJPN has entered the final stages. The 2020-2024 National Medium-Term Development Plan (RPJMN) identifies seven development agendas that are in line with Sustainable Development Goals (SDGs), as seen in Figure 15.

Figure 15. Seven Development Agendas of RPJMN for 2020-2024



Source: Ministry of National Development Planning/Bappenas, 2020.

Among the seven development agendas, environmental issues, climate change, and disaster resilience (highlighted in the green box) are part of the development focus. These issues become the attention of the government due to the negative impacts that can hamper sustainable economic development. As a follow up to the resolution of these issues, the central government plans the environmental agenda through three main policies, namely: 1) Improving the Quality of the Environment; 2) Increasing Disaster and Climate Resilience; and 3) Low Carbon Development. This is further explained in Table 17, and the narrative that follows.

Table 17. Policy Directions and Strategies for Environmental, Climate Change, and Disaster Problems

No.	Policy Direction	Strategy
1	Improving Environment Quality	Pollution and Damage Prevention of Natural Resources and the Environment. Pollution and Damage Management for Natural Resources and the Environment. Pollution and Damage Recovery of Natural Resources and the Environment. Institutional Strengthening and Law Enforcement in the Field of Natural Resources and the Environment.
2	Enhancing Disaster and Climate Resilience	Disaster Management Increasing Climate Resilience
3	Low Carbon Development	Sustainable Energy Development Sustainable Land Restoration Waste Management Green Industry Development Restoration of Coastal and Marine Ecosystems

Source: National Mid-Term Development Plan 2020-2024.

Improving Environmental Quality

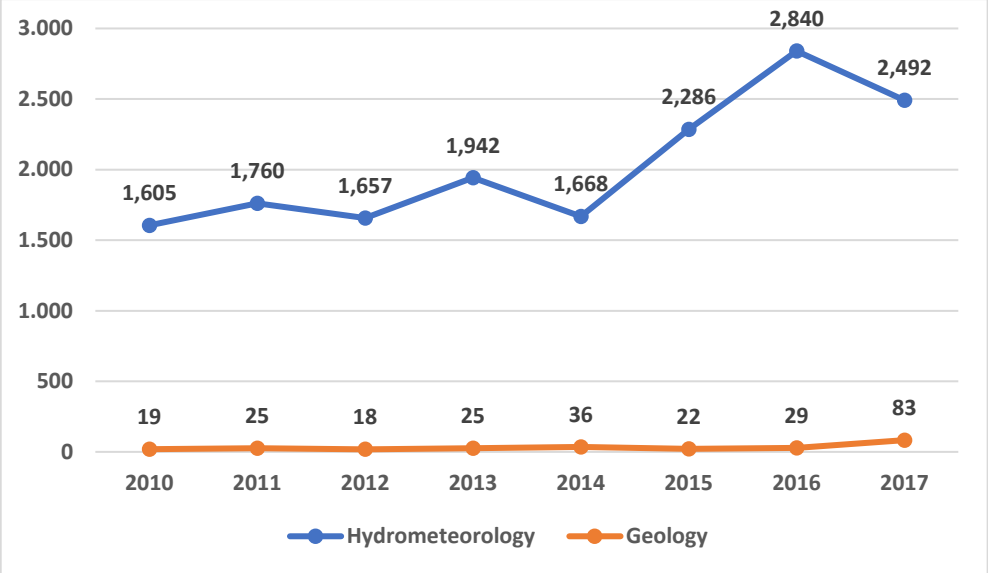
The quality of the environment in Indonesia in 2015-2017 was relatively stagnant. The National Environment Quality Index (IKLH) shows that only air quality has improved, while water quality and absolute land cover quality are declining. The cause of the decline in water quality is due to the handling of sources of pollution that have not been optimal. Controls for pollution from domestic (household) waste, plastics, and industrial waste are still below the target of the RPJMN of the previous leadership period (2014-2019).

The government's strategy in dealing with the problem is to improve the monitoring of water and air quality. The government is also trying to reduce the rate of deforestation through the strengthening of licensing systems, supervision, and security around natural resource management and the state of the environment. As stated in Chapter 1, water quality and waste management are issues that also apply to Samarinda.

Increasing Disaster and Climate Resilience

The objective of the second policy direction is to increase disaster and climate resilience. Based on the World Risk Report (2016), Indonesia's disaster risk level is high due to the increasing number of disasters. Natural disasters in Indonesia are divided into two categories: hydrometeorological disasters due to climate change and disasters due to geological activities (see Figure 16). Disasters due to hydrometeorology are far more significant and tend to increase compared to geological hazards.

Figure 16. Comparison of the Number of Disasters in Indonesia in 2010-2017



Source: National Disaster Management Agency (BNPB), 2019.

The increasing trend in the number of disasters made the government adopt disaster risk mitigation planning. The plan must also be supported by a strong government response at the local level. Several regulations have been issued, such as Government Regulation PP No. 2 of 2018 concerning Minimum Service Standards, and Minister of Home Affairs Regulation Permendagri No. 101 of 2018, which regulates disaster management mechanisms explicitly at the city/regency level.

Low Carbon Development

GHG emissions are the main cause of climate change. In 2015, Indonesia ratified the Paris UNFCCC Agreement as a form of commitment to reducing carbon dioxide emissions, which will begin in 2020. By 2024, Indonesia is targeting a reduction in GHG emissions by 27.3% and a reduction in the intensity of GHG emissions by 24%. At the national level, the National Action Plan for Emission Reduction (RAN GRK) forms the basis for ministries/agencies to carry out activities to reduce GHG emissions.

The national government has set a target to increase the use of renewable energy (EBT) in the energy mix to a minimum of 23% by 2025, and 28% by 2038. The target is stated in the General Plan for National Electricity (RUKN) 2019-2038. The potential for total renewable energy output in Indonesia is 443.2 gigawatts, while the current utilization as stated in the Annual Report of the State Electricity Company (PLN) in 2019 is only around 8.8 gigawatts, equivalent to 2% of the potential. The main policies to realize this commitment include increasing the use of renewable biogas as a substitute for fossil energy, peatland restoration and reforestation, conservation and auditing of energy use in industry, and conducting inventory and rehabilitation of coastal and marine ecosystems (mangroves, seagrass beds, coral reefs, estuary and beach forest).

2.1.2 National Regulations and Programs

The national government has developed various regulations, policies, and programs related to the environment and climate resilience (see Table 18). These policies form the basis for development planning and program implementation at both the central and local levels.

In line with improving environmental quality, one of the mandates of the Spatial Planning Law No. 26/2007 is the provision of at least 30% of the local jurisdiction's area as green open space (RTH). The 30% figure is the least measure to maintain the balance of the urban ecosystem, which also has an impact on hydrological and air quality. The RTH obligation is divided into 20% for public green open space and 10% for private green open space.

Table 18. National Policies and Programs related to the Environment and Climate Change

No.	Policy and Program	Goal
1	RPJMN – National Medium-term Development Plan of 2020-2014	Five-year planning document that is a reference for cross-sectoral plans, both at national and local levels. The RPJMN is a manifestation of the political promises of the elected president, including the issue of climate resilience.
2	Law No. 32/2009 about Environmental Protection and Management	This law governs environmental management related to principles; scope; planning; utilization; control; maintenance; waste management, duties, and authority of local government; rights, obligations, and prohibitions; community role; and supervision and administrative sanctions.
3	Strategy for Implementation of NDC Act No. 16/2016 on Paris Agreement to the United Nations Framework Convention on Climate Change Ratification	Global commitment to maintain/control the increase in earth's temperature
4	National Action Plan for Adaptation of Climate Change (RAN API) - BAPPENAS	Integration of climate change adaptation with the government, community organizations, donor agencies, and other stakeholders in anticipating the negative impacts of climate change
5	Presidential Regulation - Perpres No. 61/2011 about National Action Plan for Reducing Greenhouse Gas Emissions (RAN GRK)	Work plan to reduce GHG emissions. Activities include agriculture, forestry and peatlands, energy and transportation, industry, land management, and other supporting activities
6	Indonesia Adaptation Strategy - BAPPENAS	Describe the impacts of climate change on the sectors: marine and fisheries, agriculture, health, disaster water resources, and other adaptation strategies.
7	Climate Change Sector Road Map - BAPPENAS	Mainstreaming climate change issues into development planning. Consists of adaptation and mitigation efforts in the water, marine, fisheries, agriculture, health, transportation, forestry, industry, and energy sectors.
8	National Action Plan for Mitigation and Adaptation of Climate Change (RAN-MAPI) – Ministry of Public Works	Reference to the preparation of programs related to public works and spatial planning in anticipating the impacts of climate change and reducing emissions in public works and spatial planning programs.
9	Guidelines for Gender-Responsive Climate Change Adaptation Programs – PPPA Ministry of Women Empowerment and Child Protection	Complementary technical guidelines related to gender mainstreaming in climate change adaptation programs that can be applied in sectoral programs and regional programs
10	Ministerial Regulation - Permen LHK No. P33/2016 on Guidelines for the Preparation of Climate Change Adaptation Action	Guidelines for governments and local governments to develop climate change adaptation actions and integrate them into development plans
11	Ministerial Regulation - Permen LHK No. P7/2018 on Climate Change Vulnerability, Risk, and Impact Assessment Guidelines	Guidelines for: (a) determining the scope of analysis, selecting methods, indicators, indicator data, and data sources in preparing climate change vulnerability, risk, and impact studies, and (b) determining verification criteria for the results of vulnerability, risk, and climate change impacts

12	Presidential Decree - Keppres No. 19/2010 on the Task Force for Preparation for the Establishment of REDD +	Implementation of the Indonesian Government agreement with the Government of Norway (Letter of Intent on Cooperation to Reducing GHG Emissions from Deforestation and Forest Degradation) in the establishment of a REDD + task force
13	REDD+ 2012 National Strategy	Incentive mechanisms for sustainable forest management and compensation for GHG emission reduction
14	Law No. 26/2007 on Spatial Planning	Regulate spatial planning, distribution of authority, rights, obligations, and the role of the community, to criminal sanctions for violations of spatial planning. It also regulates the 30% RTH obligation in each region.
15	National Policy of Handling Slum Settlements 2015-2019 (Bappenas)	Policy to create a supportive environment to improve and prevent the formation of new slums
16	Ministerial Regulation - Permendagri No. 7/2018 on Preparation and Implementation of Strategic Environmental Assessment (KLHS) in the Preparation of RPJMD	Regulate the preparation of KLHS in the preparation of the RPJMD in the framework of sustainable development studies. It sets targets, indicators, and calculation methods of the assessment
17	Presidential Regulation - Perpres No. 97/2017 on National Policies and Strategies for Management of Household Waste and Household-like Waste	The policy direction and strategy to reduce and manage household waste and household-like waste at the national level in an integrated and sustainable manner
18	Ministerial Regulation - Permen ESDM No. 12/2015 on Provision, Utilization and Trading System of Biofuels as Other Fuels (third amendment)	Describes the minimum obligation stage for the use of biodiesel (B100) as a fuel mixture
19	Ministerial Regulation - Permen ESDM No. 50/2017 on Utilization of Renewable Energy for Electricity Supply	Guideline for state electricity company (PLN) to purchase power from the power plants that utilize Renewable Energy Sources (EBT)
20	Presidential Regulation - Perpres No. 35/2018 on Acceleration of Waste to Energy based on Environmentally Friendly Technology	Aims to reduce the volume of waste by using waste as a source of energy for power plants

Source: Processed from various sources

2.1.3 Major Projects and Funding

In addition to policies and strategies, funding is an important aspect which requires improvement. The government plans to establish a pool of funds that will be managed by a body to be determined through a regulation (see Table 19). Funding does not only depend on the national or local budget (APBN/APBD), but can also come from the community, SOEs, private funds, and international bodies.

Table 19. Disaster Resilience and Climate Change Major Projects and Funding Plan 2020-2024

No.	Major Project	Funding Allocation	Funding Source	Executor
1	Strengthening of the Integrated Multi-Disaster Mitigation System	Rp15.79 trillion	APBN, Local government Budget, Private, State-owned enterprise	BMKG, BNPB, LAPAN, BIG, LIPI, Housing and Public Works Ministry, KLHK, BPPT, Local government
2	Construction of Medical Waste, Hazardous (B3) Waste, Domestic Waste, and Plastic Waste Treatment Plants	Rp 13.72 trillion	APBN, Local Government Budget, PPP	KLHK, Kemenkes, KemenPUPR, Kemenperin, Kemendagri, Local government, private sector

Source: National Medium-Term Development Plan 2020-2024

Targets for achieving national policies and programs are laid out in Table 20. GEL has reduced by 23.5% in 2019 and is targeted to decrease further by 27.3% in 2024. The targets summarized in RPJMN 2020-2024 was the first step of a long-term target of GHG emission reduction by 29% in 2030. From the economic side, a loss of GDP might be inevitable, but it is targeted that the potential loss of GDP due to climate change mitigations will be reduced from about 0.13% to 0.11% of the GDP between 2020 and 2024.

Table 20. Mainstreaming Disaster Vulnerability and Climate Change Targets, 2020-2024

No.	Objective	Indicator	Target				
			2020	2021	2022	2023	2024
1	Increasing Regional Disaster Resilience Index	Percentage increase in the Regional Disaster Resilience Index	5%	5%	5%	5%	5%
2	Declining potential for loss of GDP in sectors affected by climate change	Percentage decrease in potential GDP loss due to climate change impacts	0.13%	0.12%	0.12%	0.11%	0.11%
3	Reducing GHG Emissions	Percentage of GHG emission reduction	26%	26.3%	26.7%	27.0%	27.3%
4	Reduction in GHG Emission Intensity	Percentage of reduction in GHG emission intensity	15.2%	18.8%	21.13%	22.8%	24.0%

Source: National Medium-Term Development Plan 2020-2024

National political stability is necessary to ensure support for overall environmental improvement. Policy formulation that is in line with principles of sustainability can only be realized when the political situation is conducive. Technological advances need to be utilized for the planning, supervision and more efficient control of development as well as its impact on the environment. This will enable low carbon development to be accomplished.

2.2. City-Level Policies, Strategies, and Targets

Samarinda City's Medium-term Development Plan (RPJMD) for 2016-2021 states a vision to become a metropolitan city that is competitive and environmentally friendly. The development mission is aligned with the SDGs agenda. Based on Regional Regulation No. 2 of 2014 on Samarinda's Spatial Plan (RTRW) for 2014-2034, the city's spatial vision is to become a waterfront city that is environmentally friendly, green, and possesses multiple advantages. The government is also planning to reduce, by 2.78%, the potential loss of GDP in sectors affected by climate change.

2.2.1 Environmental Priority Programs

To achieve these goals, both in the economic and social aspects, Samarinda's development is driven by environmental sustainability. The city's development plan is carried out considering the following conditions: a) low level of river and air pollution; b) modern and sustainable waste management system and c) responsible development based on the prevailing spatial plan (RTRW). The city's priority programs and key indicators for achieving environmental sustainability are listed in Table 21.

Table 21. Samarinda's Environmental Priority Programs and Indicators

No.	Programs	Indicators
1	Healthy environment & Wastewater	Number of IPAL units (Wastewater Treatment Plants)
2	Potable water system	Households with access to potable water
3	Spatial planning	Changes in land use (Ha)
4	Retention wall development	Percentage of embankment walls along the river
		Construction of embankment wall along the river
5	Drainage	Percentage of good condition drainage in the city
6	Flood management	Remaining number of flooded areas
7	Urban sanitation improvement	Area covered by sanitation services
8	Green open space	Percentage of public green open space
9	Post-disaster rehabilitation and reconstruction	Percentage of recovered public facilities and infrastructure after the disaster
10	Emergency logistics	Percentage of disaster victims evacuated using complete emergency response
11	Pre-fire preparedness and prevention	Coverage of firefighting services
		Percentage of people in fire-prone areas who understand early fire prevention and control
		Percentage of buildings and business areas with fire protection equipment
		Response time in fire management service areas
12	Waste management	Water quality status
		Urban ambient and air quality index
13	Improvement of waste management	Transported and processed waste in the landfill
		Percentage of waste reduction

Source: The Work Plan of Samarinda Regional Government Planning Agency, 2019

Aside from these policies, Samarinda also has a Local Regulation (Perda No. 2 of 2011) that stipulates where and when the public can dispose of solid waste, limiting waste disposal to between 18:00 and 06:00 daily. Furthermore, a more recent Mayor Regulation (Perwali No. 1 of 2019) tries to reduce plastic bags by prohibiting sellers from providing single-use plastic bags to buyers. This aims to raise public awareness of the need to reduce non-degradable plastic bags.

2.2.2 Water and Sanitation

Samarinda has developed its local SDG Action Plan (RAD SDG) for 2018 – 2021. This serves as a reference and guideline for the local government and other stakeholders in realizing good governance. The followings are some of the programs, activities, and budget allocation that support the implementation of sustainable development goals, in the water and sanitation sector (Table 22):

Table 22. Samarinda's Programs and Activities on Water and Sanitation

No.	Programs	Activity	Implementing Agency	Budget Allocation (Rp)
1	Potable water and wastewater	Construction of distribution pipelines	Public Works (PUPR) Unit	3,189,535,000
		Expansion of the drinking water supply system (SPAM)		3,125,000,000
		Expansion of SPAM piping		1,366,380,000
		Increase of SPAM Coverage		174,651,863
		HDPE piping, Samarinda - Bontang		7,000,000,000
2	Healthy environment and waste management	Community wastewater treatment plant	Public Works (PUPR) Unit	5,900,000,000
		Integrated Waste Collection Sites (TPST)		5,450,000,000
		Improvement of sanitation facilities		7,751,314,600
		Construction of sanitation facilities		2,388,000,000
3	Pollution and environmental damage control	Hazardous and toxic waste management	The Environmental Unit	417,450,000
		Environmental Assessment Documents (AMDAL, UKL-UPL, SPPL)		380,000,000
		Monitoring of water, water springs, and water reservoir quality		240,000,000
		Water, land, and air pollution control		95,000,000

Source: RAD SDG Samarinda City 2018-2021

Table 23. Local Policies and Strategies related to Water and Sanitation

No.	Policy	Objective
1	Perda No. 30 of 2003	Management of Quality and Control of Water Pollution in Samarinda City
2	Perda No. 25 of 2003	Wastewater Disposal and Wastewater Retribution Permits in Samarinda City
2	Perda No. 13 of 2006	Liquid Waste Management, aiming to reduce the disposing of wastewater to recipient bodies.
3	Perwali No. 8 of 2017	Main Plan for Development of Drinking Water Supply System Samarinda (RISPAM) 2016-2035
4	The City Sanitation Strategy (SSK) of Samarinda City	Contains strategies for comprehensive sanitation development at the City level. It contains the outline of developing community participation with funding indications. Some of the strategic issues, namely improvement of clean and healthy life behaviour (PHBS), development of wastewater management system in districts.

Source: Processed from various sources

There have been challenges in implementing these policies. It was argued that a lack of supervision and coordination among relevant institutions, and limited facilities had led to a lack of community awareness on the importance of environmentally friendly behaviour. [7]

2.2.3 Disaster Management

Climate change causes a higher intensity in disaster occurrence in the greater area of Samarinda. The city has prepared a disaster risk study (KRB) which constitutes an instrument to assess the likelihood and magnitude of losses caused by the existing disaster threat. By understanding the likelihood and magnitude of losses, the city can increase the efficiency and the effectiveness of its plan to manage and handle disasters both in administrative and technical policies.

Based on Samarinda City SDGs Action Plan for 2018-2021, the following are the city's programs and budget allocations for disaster and climate change mitigation (Table 24):

[7] Maryah, Dewi. 2012. "Pengawasan Implementasi Peraturan Daerah Kota Samarinda Nomor 30 Tahun 2003 tentang Pengelolaan Kualitas Air dan Pengendalian Pencemaran Air."

Table 24. Samarinda's Programs and Activities on Disaster and Climate Change

No.	Program	Activity	Implementing Agency	Budget Allocation (Rp)
1	Prevention and preparedness	Disaster prevention and mitigation	Regional Development Planning Agency	1,080,000,000
		Disaster risk reduction		1,005,145,000
		Training and technical support		150,000,000
		Community empowerment		946,550,000
		Regulatory reviews		1,900,000,000
		Regulatory drafting		1,030,000,000
2	Emergency and logistic	Procurement of PUSDALOPS infrastructure	Regional Development Planning Agency	200,000,000
3	Protection on conservation and natural resources	Climate change impact control	The Environmental Unit	1,361,209,000
		Inventory of Samarinda's land damage		75,000,000

Source: RAD SDG Samarinda City 2018-2021

Table 25. Local Policies related to Disaster Management

No.	Policy	Objective
1	Perda No. 10 of 2017	Implementation of Regional Disaster Management
2	Perwali No. 33 of 2014	Management, Funding Arrangements and Determination of Benefits/Assistance of Disaster Victims

Source: Processed from various sources

More specifically, Samarinda's policies that aim to support disaster management include:

1. Strengthening rules and institutional capacity, through:

   (a) Establishing community participation and decentralization through the delegation of resources and authority at the local level. (b) Integrating and combining disaster risk reduction measures into post-disaster rehabilitation and recovery processes. (c) Providing relevant procedures to conduct post-disaster reviews during emergency response periods.

2. Integrated disaster management plan, through:

   (a) Strengthening the city's risk assessment document by incorporating cross-border risks to foster cooperation among regions. (b) Preparing disaster management contingency plans at all levels of the government. (c) Procuring systems to monitor, archive, and disseminate data on potential disasters. (d) Providing disaster information

for all the stakeholders (through the improvement of network infrastructure and information management system).

3. Research, education, and training

   The BPBD of Samarinda conducts prevention and preparedness programs including publications, outreach activities, contingency exhibitions, disaster early warning systems, disaster-resilient villages, and disaster-resilient schools and madrasah. These are expected to reduce the use of budget in post-disaster recovery programs, hence higher effectiveness of budget usage. These are done through (a) Community capacity building and participation. (b) Establishing and empowering local forums/networks to lower disaster risks. (c) Realizing plans and policies to reduce the economic vulnerability of the community.

Technical policies are to be obtained based on disaster risk maps and considered for each disaster at the lowest level of government. Key policies in this regard are:

1. Protection of Communities from Disasters, through:

a) Disaster Prevention and Mitigation: implementation of special measures for disasters that have been mapped in a structured, measurable, and comprehensive manner.

b) Disaster Preparedness: to improve the community evacuation process supported by a threat detection and an early warning system.

2. Disaster Management, through:

a) Disaster Emergency Management: to rescue disaster victims and normalize the lives and livelihoods of disaster victims as quickly as possible.

b) Disaster Recovery: taken in the aftermath of a disaster, to speed up the repair of the system.

Resolving the problem of flooding has long been a priority agenda for Samarinda. In the city's 2019 Work Plan, the government allocated IDR 514 billion (35 million USD)[8], equivalent to 7.42% of Samarinda's Local Budget (APBD). In the city of Samarinda itself, there are 50 flood disaster points in 9 sub-districts that experience flooding every time the rainfall is high. To reduce flood points and waterlogging, four specific measures are adopted: construction or repair of environmental sanitation channels (287 km), construction of 31 retention ponds, procurement of 54 pumps, and procurement of 6 sludge catchers.

To achieve a flood-free Samarinda, there is also a spatial control program for land-use change that involves 100ha of land, with a budget of IDR 2.7 billion (USD 0,18 million)[9]. This program consists of supervision of feasibility and building layout, preparation of procedures and manuals for controlling space utilization, and coordinating the implementation of supervision and control.

[8] 1 USD = IDR 14,675.76 (per 26/10/2020)
[9] 1 USD = IDR14,675.76 (per 26/10/2020)

2.2.4 GHG Emission Reduction

The city of Samarinda conducted a GHG emission reduction analysis for 2020-2030, according to the provisions of the 2006 Intergovernmental Panel on Climate Change Guidelines (IPCC Guidelines). A comparison between the BAU baseline and mitigation/reductions targets for 2020-2030 is presented in Table 26. The figures are organized according to three main clusters of GHG emission sources: (1) energy and transportation, (2) waste, and (3) farming, agriculture, forestry, etc. The energy and transportation cluster, i.e. the electricity used by industries and fuels used by motor vehicles, contributes the most to GHG emissions (by 37.3% and 40.0%, respectively), compared to other sources.

Table 26. GHG Emission, BAU Baseline, and Reduction Target, 2020-2030

Sector	BAU Baseline (2020) Total (ton CO_2 e)	Reduction Target (2030) Total (ton CO_2 e)	% Emission Reduction
Energy and transportation			
Power plant	2,765,982	2,300,527	16.83
Industry	22,341,918	18,363,347	17,81
Transportation	23,971,776	19,687,187	17,87
Household	3,842,217	3,186,463	17,07
Commercial (business)	1,086,241	897,415	17,38
General and others	367,487	305,750	16,80
Sub Total	54,375,620	44,740,6903	17.72
Waste management			
Solid waste	3,419,253	2,845,072	16,79
Liquid waste	233,360	194,156	16,80
Sub Total	3,652,636	3,039,247	16.79
Farming, agriculture, forestry, and other land usages			
Lowland rice management and soil management	125,848	104,096	17.28
Use of urea fertilizer	6,339	5,245	17.26
Enteric fermentation	125,104	103,050	17.63
Manure management	228,226	186,771	18.16
Land cover change	1,463,194	1,187,196	18.86
Sub Total	1,948,712	1,586,356	18.59
Total	59,976,945	49,366,294	17.69

Source: RAD GRK Samarinda City 2020-2030

Currently, East Kalimantan's electricity system is supplied from the Kalimantan Interconnection System that covers three provinces: East Kalimantan, South Kalimantan, and Central Kalimantan. The system has a total capacity of 1,737 Megawatts and a peak load of 1,240MW. In 2028, the energy mix in the Kalimantan region is projected to be 70.8% coal, 8.8% hydropower, 16.8% natural gas, 0.2% fuel oil, and 3.3% other renewable energy, as presented in Table 27.

Table 27. Energy Mix Target for Regional Power Plants in Kalimantan (%)

No.	Fuel Type	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
1	Hydro	1.6	1.4	2.4	2.1	2.0	2.0	10.5	10.0	9.4	8.8
2	Gas	18.7	17.3	18.1	17.8	20.1	18.7	16.4	17.8	17.9	16.8
3	Fuel Oil	7.1	4.0	1.1	0.7	0.7	0.3	0.3	0.3	0.2	0.2
4	Coal	60.7	65.3	74.0	75.2	72.5	74.7	68.8	68.3	68.9	70.8
5	Import	11.5	10.2	0	0	0	0	0	0	0	0
6	Other renewable energy	0.5	1.8	4.4	4.2	4.6	4.3	4.0	3.8	3.6	3.3

Source: Electricity Supply Business Plan (RUPTL) PLN (State Electricity Company) 2019-2028

The government of Samarinda has prepared action plans to reduce GHG emissions. These include a series of activities focusing on energy and transportation, waste management, and farming. The proposed solutions are applicable in multiple sectors and serve as a reference for relevant agencies (see Table 28). On energy, the city has adopted these action plans but needs to adopt specific local regulations to operationalize higher-level regulations.

Table 28. Mitigation Action Plans and Scale by Energy Sector

Sector	Sub Sector	Mitigation actions
Energy and transportation	Power plant	Increased use of renewable fuels in power plants
	Industry	Increased use of renewable fuels in industrial activities.
	Transportation	Increased supply of renewable fuels at petrol stations.
		Use of environmentally friendly electronic devices and lighting
		Increased use of renewable fuels in commercial activities.
		Campaign to use low-emission motorized vehicles
		Test emissions in public and private vehicles periodically
		Increased requirement for feasibility testing of public transport
		Creation of bicycle and pedestrian paths
		Construction of facilities and public transport infrastructure
	Household	Environmentally friendly electronic devices and lighting in house stairs and public facilities
		Add 2 “energy-based climate villages" per year.
	Commercial (business)	Increased use of renewable energy for commercial activities
		Environmentally friendly electronic devices and lighting in commercial activities (business)
	General and others	Campaign and implementation of green building and green zones
		Increased frequency of "car-free day" activities on main roads.

Waste management	Solid waste	Management of TPS and TPA according to the waste type. Sorting of inorganic waste (plastic, glass, metal, etc).
		Improved 4R practice (reduce, reuse, recycle, replace).
		Campaign and development of a "Waste bank" in each district.
		Stack management garbage and capture of methane gas in landfills.
		Improvement of schools that implemented the Adiwiyata program.
	Liquid waste	Construction of wastewater treatment plants (IPAL).
Farming, agriculture, forestry, and other land usages	Lowland rice and soil management	Application of dryland farming with minimum land plow.
	Use of urea fertilizer	Increased use of organic fertilizers, herbicides, and pesticides.
	Enteric fermentation	Increased use of methane gas from animal waste as energy.
	Manure management	Increase in compost production from animal waste.
	Land cover change	Mandatory minimum Green Open Space (RTH) for each building.
		Planting trees obligation for building permit (IMB) application
		Increased gardening activity in each neighbourhood
		Increased development of “Climate based villages".
		Increase in RTH to 50%, i.e., by reclaiming former mining areas.

Source: RAD GRK Samarinda City 2020-2030

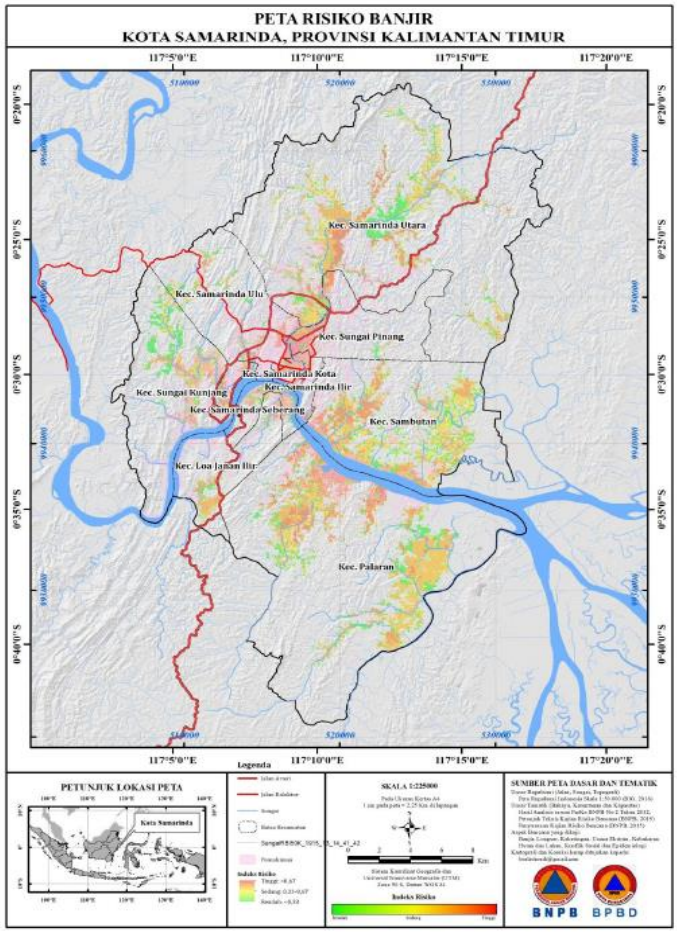
CHAPTER 3
Key Challenges and Opportunities

In the previous chapter, relevant central government and local government policies on climate resilience in Samarinda were reviewed. This chapter will discuss the key challenges and opportunities in implementing those policies and achieving the intended targets.

3.1. Key Problem: Flooding as an Outcome of Other Problems

The flood problem in Samarinda is grave and complicated. Figure 18 shows the extent of flood risk that threatens the city. But flooding itself is not the cause; it is the manifestation or outcome of problems that have long plagued the city. Therefore, it is an appropriate entry point to explore and dissect the key issues in Samarinda. According to the Samarinda City Disaster Mitigation Agency (BPBD), 80% of the causes of flooding are human activities.

Figure 18. Samarinda Flood Risk Map

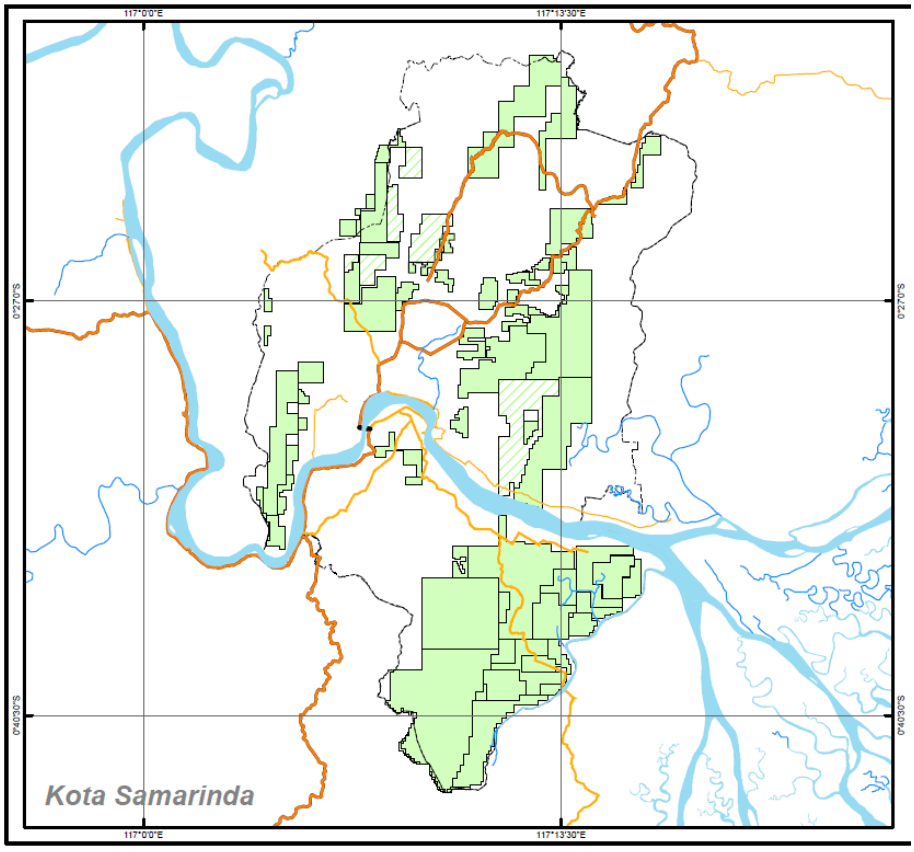


Source: Samarinda City Risk Assessment Study 2018-2022, BPBD Samarinda City

3.1.1 Mining Activities

One of the issues often raised as a key cause of the flooding is the loss of water catchment areas in the upstream hills of Samarinda. This is caused primarily by mining activities. Land clearance and removal of vegetation for coal mining contributed to the increase in surface runoff that causes flooding. In Section 1.6 we have established that 14% of Samarinda's land cover is occupied by mining pits and that more than 71% of the city's total area has obtained land clearance permits for mining. A map of those mining business permit areas is presented in Figure 19.

Figure 19. Map of Mining Licenses in Samarinda City



Source: East Kalimantan Energy and Mineral Resources Agency, 2020

Between 2009 and 2016, the authority to issue coal mining permits was held by regency and city governments, based on Law No. 32 of 2004 (on Local Governments) and Law No. 4 of 2009 (on Minerals and Coal Mining). However, due to concerns about rampant issuance of mining permits by regency and city governments throughout the country, the authority was transferred upwards to the province according to Law No. 23 of 2014 (on Local Governments). However, further licensing of mining permits by the provincial government continued while the city continued to bear the environmental damage.

Based on data from East Kalimantan Energy and Mineral Resources Agency, since 2010, 63 companies obtained mining business licenses (IUP) with a total concession area of 27,438.10ha or

38% of Samarinda total area. About 35% of these licenses are still valid until the next five to ten years. The document also identified 1,529.76 hectares of open mining areas and 1,284.07 hectares of the reclamation area in 2019.

Mining activities have changed Samarinda's landscape massively. Many ex-mining pits have been left abandoned and un-reclaimed, resulting in dangerous pools of deep, contaminated water. Abandonment may be caused by the mines being already fully extracted, or simply abandoned during periods of commodity price bust when it was not profitable to mine coal due to the low price.

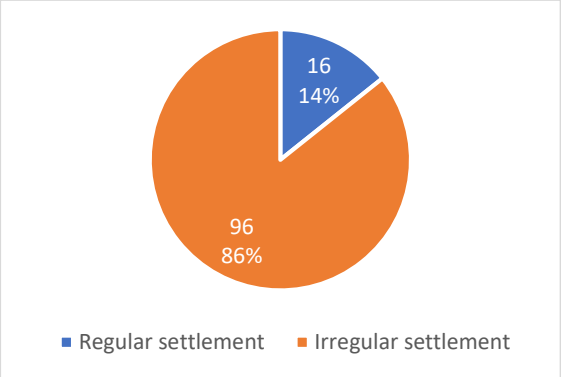
Toxic chemicals from the mines pollute raw water, making it unsuitable for food crop farming. In ex-mining pits, there are also physical hazards: steep walls and deep holes. Up to December 2018, 20 people have died falling into ex-mining pits in Samarinda. Some of the mining activities are close to residential areas. Activities using heavy machinery create noise and generate dust that negatively impacts residents.

3.1.2 Housing Development

Mining is not the only major activity that has cleared vegetations, reduced water catchment areas, and possibly contributed to flooding. High population growth rate in 1990-2010, and especially in the early 1990s and late 2000s (see Section 1.3 earlier), came with a demand for housing. This demand was accommodated through various means: (1) formal real estate development projects; (2) organic and "irregular" (not well-planed) residential development; and (3) informal and substandard housing (slums).

The housing sector contributes to flooding via massive informal land clearing. The change in land use did not pay attention to environmental impacts that reduce water absorption capacity. The majority (86%, or 96km^2) of residential development in Samarinda tends to be irregular (see Figure 20). This is characterized by an irregular road network pattern (narrow access, unequal widths, dead ends), unavailability of space for drainage, or drainage that does not flow to the river. These are either results of inadequate city planning, or development without adhering to city plans. Irregular settlements cause obstacles to the subsequent construction of public facilities and utilities, such as the installation of clean water pipelines.

Figure 20. Proportion of Residential Areas in Samarinda by Regularity Pattern (Km^2)



Source: Housing and Settlement Services Samarinda City, 2020

Besides, the conversion of swamps for housing has contributed to flooding in Samarinda. Swamps are a place to collect rainwater before it is discharged into rivers. As mentioned in Chapter 1, the existence of swamps is decreasing because of wetland being reclaimed for housing development. Currently, there is no integrated local policy on spatial management to protect natural swamps or other critical lands. Furthermore, public awareness on quality standards for land cover in Samarinda is minimal, so there is no valid land cover index calculation yet.

Samarinda city also accommodates settlements along the river as the settlements support the livelihoods of people who work in the trade and service sectors. Settlements on the river body have existed for hundreds of years, but the government is trying to relocate residents to settlements with better services on the land. The relocation program, however, is facing implementation problems and has a negative response from residents because the new location provided is far from the original place of residence.

Before 2015, the relocation program was synonymous with relocation to a new house for free plus an allowance. However, with the issuance of the Minister of Home Affairs Regulation No. 14 of 2016 on the prohibition of grants to individuals, the program was terminated. With the unavailability of land in urban areas, it is difficult to plan programs to meet the national target for slum-free cities.

Issues also abound in the formal settlements. Minister of Public Housing Regulation No. 7 of 2013 stipulates that small-scale housing development (less than 15 units) are only subject to a construction permit (IMB), and do not require planning permits. With the lack of explicit obligations for developers, it is difficult to enforce development that adheres to principles of good residential planning.

Based on Mayor Decree No. 413.2/222/HK-KS/VI/2018, slum areas are found in eight locations covering 133.3 hectares. Most of them are located in river areas, 41% are on the banks of Karang Mumus River (see Table 29).

Table 29. Slum Area in Samarinda City

No.	Location	District	Area (ha)
1	Karang Mumus 1	Samarinda Ulu, Samarinda Kota, Sungai Pinang, Samarinda Ilir	28.77
2	Karang Mumus 2	Sungai Pinang, Samarinda Utara	25.69
3	Muara	Samarinda Ulu	5.97
4	Karang Asam	Sungai Kunjang	7.68
5	Keledang	Samarinda Seberang	3.50
6	Sungai Kapih	Samarinda Ilir, Sambutan	9.09
7	Mesjid	Samarinda Seberang	34.14
8	Settlement Development	Palaran	18.39
	Total		133.33

Source: Housing and Settlement Services Samarinda City

The government has made efforts in the past five years to deal with slum areas in Samarinda. The updated data indicates that it has decreased to 38.22 hectares. The programs have been carried out with various sources of funding, from the City Without Slums (KOTAKU), APBN, APBD, community participation and private parties.[10] However, the government still has an important role to improve the infrastructure, facilities and utilities of those settlements.

3.1.3 GHG Emissions and Green Open Spaces

In Section 1.6 we established that most of the GHG emissions from the city are generated from electricity and vehicle fuels. Usage of vehicle fuels is largely driven by private vehicle use, which is further driven by sprawling housing development patterns coupled with a lack of good public transportation options. Not only these two encourage private vehicle use (and generate GHG emissions) but also result in intensive demand for land, leading to land clearance for residential development. These also directly contribute to GHG emissions, resulting in climate change and a deterioration in air quality.

The high emission from the transportation sector is contributed by the lack of obligation to conduct emissions tests for private vehicles. Such tests are only mandated for heavy equipment vehicles. In addition, there is a lack of local policies and specific programs aimed at reducing emissions such as the use of environmentally friendly vehicles, quality standard for private vehicle operations, and the use of public transport.

GHG emissions could be offset to a certain extent by green open spaces (RTH). Currently, Samarinda's public RTH is only 5% out of the targeted 20% of the city's land area. The issue: people (individuals), instead of the government, own most of the land in Samarinda. Many owners have not been identified, while assets owned by the local government have not been updated regularly, resulting in a lack of city government databases in the form of geographic information. Furthermore, budget allocation for compensation of people's land that will be converted into green open space is limited.

Inventory and monitoring of GHG emissions in the city of Samarinda are still experiencing barriers. Currently, there is an online database called SIGN SMART, which is still centralized at the Ministry of Environment and Forestry, and the calculation is on a provincial basis. Therefore, the monitoring control of emission at a certain period has not been carried out optimally at the city level.

3.1.4 Waste Management

Another cause of the floods is waste management issues, whereas a substantial amount of solid waste ends in rivers. Earlier in Section 1.6, from 610 tonnes of waste generated daily, only 444 tonnes (72.8%) are processed and transferred to the final landfill with open dumping system, while the rest are untreated and very likely to end in the rivers and drainage channels, contributing to the flood problem.

The high amount of domestic waste shows that there is still a lack of public awareness of the principles of waste management, both reducing and recycling. Currently, there is no local

[10] Source: https://ppid.samarindakota.go.id/berita/kabar-pemerintahan/kawasan-kumuh-samarinda-sisa-38-hektar-dari-539-hektar-di-tahun-2015

regulation that specifically covers the increasing economic value through waste and the form of incentives provided for the success of household waste management.

Part of the issue is that the current Bukit Pinang landfill is in under capacity (overload of waste). In 2013, the city completed the construction of a second landfill in Sambutan, which has a much larger capacity of 345,000m^3 and utilizes a more advanced method of the controlled landfill (Table 30). However, the Sambutan landfill is yet to be fully used because road access to the location is still being constructed.

Table 30. Final Landfills (TPA) in Samarinda City

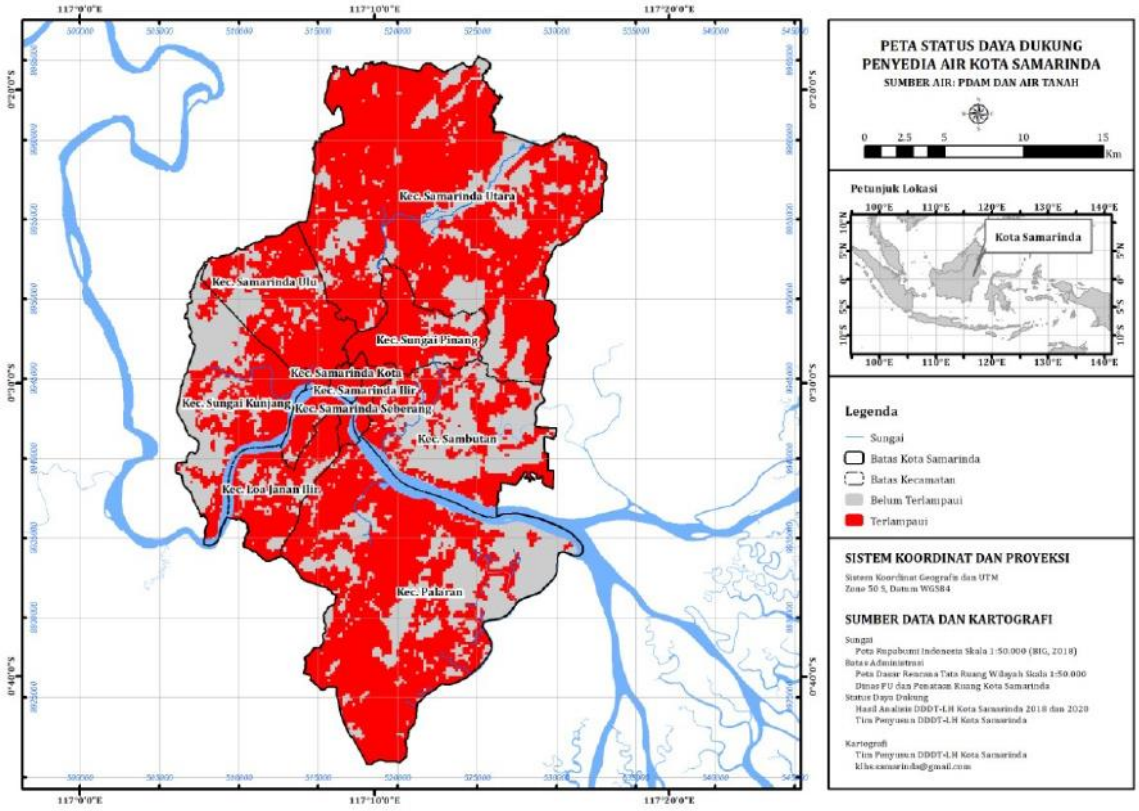
No.	TPA	Management System	Capacity (m^3)	Existing Volume (m^3)
1	Bukit Pinang	Open Dumping	105,000	120,000
2	Sambutan	Controlled Landfill	345,000	4,000

Source: Samarinda City Environmental Agency, 2020

Water and Sanitation

A spatial analysis conducted by the city shows that water supply capacity in most parts of Samarinda has been exceeded (see red areas in Figure 21). There are only a few areas in North Samarinda, Sambutan, Palaran, and Sungai Kukung, where water supply capacity has not been exceeded. As stated in section 1.6, currently, there is no identification of the sources and calculation of the load capacity of water pollution. The parameters used in determining water quality are also not uniformly used as a calculation reference.

Figure 21. Samarinda City Water Supply Capacity, 2018



Source: Supporting Capacity and Environmental Capacity (DDDT-LH) of Samarinda City, 2018

Samarinda already has several programs to develop a modern and sustainable waste management system (see chapter 2). However, the policies need to be strengthened. Regarding wastewater, Samarinda currently does not have a specific regulation on domestic wastewater management. The regulation related to categories licensed and debits allowed to be disposed needs to be clarified.

The city also needs to increase access to wastewater facilities and infrastructure for densely populated areas. Construction of communal wastewater treatment plants (IPAL) requires commitment in terms of financing, support, and participation from the community for planning, development, and maintenance.

3.1.5 Disaster Management

Disaster management in Samarinda is still lacking in emergency, preparedness, and contingency plans. According to the East Kalimantan BPBD, there are five Early Warning System (EWS) flood points in Samarinda, but they are not functioning and need maintenance. The Regional Disaster Management Agency of Samarinda does not have any EWS for floods. There is one unit of landslide EWS in Mount Steling area, was installed in 2018 and simulation was carried out for once. The improvement of early warning systems is necessary to reduce the magnitude of a disaster, especially for residents who live in disaster-prone areas.

According to the portal of the risk assessment of the National Disaster Management Agency (BNPB), three priority regional capacities need to be improved in Samarinda, namely strengthening policies and institutions; risk assessment; and integrated planning as well as developing information systems, training, and logistics.

3.2. Key Challenges

There are plenty of challenges underlying the problems stated above. But two types of challenges are key: unsynchronized urban planning and public coordination issues. They are more deeply rooted in nature and will require a collective effort to resolve. Another challenge is the planned construction of Indonesia's new national capital in Penajam Paser Utara district, which is located about 100km away from Samarinda.

3.2.1 Unsynchronized Urban Planning

In Samarinda, urban planning often becomes a hotly debated topic. Some of the key planning issues, as uncovered through interviews and media articles, are the quality and enforcement of spatial plans and the lack of accurate data inventory. One of the shortcomings of the current system is the unsynchronized spatial allocation between provincial and local/city-level spatial plans. This happens throughout almost all of Indonesia's cities, but the scale in which it impacts Samarinda is quite grave.

There are instances where licenses, such as location permits and building permits (IMB), are not accommodated on the map. One example is the construction of a supermarket that had obtained a planning permit, but it was designated on the spatial plan as a city park. Cases like this are prone to cause conflict between landowners and the local governments. If the local government gives a construction permit, it can get sanctions.

Another example: the regional spatial plan directs residential development towards the south of the city (such as Palaran, Loa Janan Ilir, and Kukung River) where there are still large areas of vacant land. However, in the RTRW land allotment map, many residential uses are still in the Northern parts of the city, which is supposed to be a buffer zone for the city.

The reasons for inconsistencies in the plan vary. Part of the problem is that many licenses were issued before 2014, but the updating of the spatial plan (RTRW) took place in 2014. The law does not allow for grandfathering in spatial planning[11], so the initial plan's negligence needs to be followed up with the rearrangement of new regulations.

3.2.2 Coordination between Government Agencies

A key constraint in coordination is the presence of multiple interests related to spatial plan and the lack of synergy. Each agency has its own development targets that may not be integrated with that of others. Coordination issues between the city and provincial governments are illustrated through unsynchronized spatial planning between the province and the city.

Another illustration is the current disaster early warning system (EWS), which was developed by the Provincial BPBD, but there has not been a formal management handover to the Samarinda City BPBD.

[11] A "grandfather clause" is a condition when a new regulation does not apply to an existing condition

This leads to coordination issues on how the equipment functions. Moreover, there are also coordination issues in disaster risk management with the River Basin Agency at the central government level.

There are also inconsistencies between the Regional Government Law and the Spatial Planning Law, where both are national-level laws. However, the law with the higher authority seems to be the Spatial Planning Law as it also regulates criminal sanctions for violations of spatial planning.

Energy and Mineral Resources Minister Regulation No. 7 of 2014 concerning Reclamation and Post-Mining in Mineral and Coal Mining Business Activities stated that reclamation can be carried out in other forms of tourism, water sources, or cultivation. This policy brings side effects that companies are no longer obliged to cover the excavated holes and restore the function of the land properly.

There is still plenty of challenges in enabling effective inter-local (inter-jurisdiction) government coordination within a functioning region, i.e. a watershed. Samarinda is located downstream of several rivers, so it is impacted by pollution that flows down from elsewhere. The city also suffers from forest fires that take place in other regencies. Tackling a regional problem like these could be done by a bottom-up cooperation initiative from the related local governments or could be facilitated by the provincial government as it concerns multiple regencies and cities within the province. Either way, such coordination is yet to happen effectively.

3.2.3 The New Indonesian National Capital

President Widodo announced in August 2019 that the central government is planning to relocate the national capital (currently in Jakarta) to an area at the size of 40,000 hectares in the regency of Penajam Paser Utara in East Kalimantan province. The location for the new national capital is about 100 kilometers Southwest of Samarinda. The cost of relocation was estimated at 466 trillion rupiahs (equivalent to about US $33 billion), in which 19.2% would be covered by the state budget (APBN), and the rest through collaborations with the private sector and state-owned enterprises.

The central government, through the National Development Planning Agency (Bappenas) argues that the relocation will provide a positive economic impact on the national economy and reduce inter-regional and inter-income group disparity. Alternative views from economists based at INDEF, a think tank, argues that the economic impact to the national economy is negligible, only 0.02%.[12] They also claimed that only East Kalimantan, South Kalimantan, and West Papua would benefit from the relocation, triggering an increase in their GDRP by 0.24% for East Kalimantan, and by 0.01% each for South Kalimantan and West Papua. Whereas for other provinces in the country, the economic impact is negative.

Despite efforts to portray the new capital relocation/construction project as a sustainable effort that utilizes green development principles, it is still developing a new city from greenfield, on at least a 2,000-hectare land area. Natural vegetation as land cover will be replaced by buildings and hardscape, and the construction process will consume energy, moving building materials and people from other parts of Indonesia, contributing to increased GHG emissions.

12 Sari 2020. "Ibu Kota Negara Pindah, Dampak Ekonomi Minim, Linkage Dibutuhkan", Bisnis Indonesia. Source: https://ekonomi.bisnis.com/read/20200123/9/1193357/ibu-kota-negara-pindah-dampak-ekonomi-minim-linkage-dibutuhkan

During the construction of the new city, if realized, workers and visitors would make use of Samarinda (and Balikpapan, another large city in East Kalimantan that is similarly close to the site) as stopping points. This will contribute positively to Samarinda's economy, especially the hotels, restaurants, and services industry. It may also trigger increased demand for housing in Samarinda and Balikpapan, for people who are planning to work on the new capital for multiple years or planning to relocate to the new capital altogether.

These are all issues that need to be handled delicately. We have seen from the earlier parts of this report how unchecked housing development that does not adhere to compact city and transit-oriented development principles have contributed to urban sprawl, loss of vegetation land cover, increased use of private vehicles, and even increased water runoff.

3.3. Opportunities

Despite the key challenges, several opportunities exist concerning climate resilience in Samarinda that could be developed into impactful policies and programs.

3.3.1 Integration of Maps and Data

Indonesia has been trying to integrate various maps created by different ministries, agencies, and sectors, into one base map. This is known as the One Map Policy, which was initially launched in 2010 and formalized through Law No. 4 of 2011 on Geospatial Information. The initiative is currently headed by the Coordinating Ministry for Economic Affairs and implemented by the Geospatial Information Agency (BIG). In 2016, a Presidential Regulation (No. 9 of 2016) was issued to accelerate the policy implementation at a map detail of a 1:50,000 scale. Once a base map at this scale is available, it is more possible to integrate maps from various agencies and sectors.

This integration would require local government agencies to be, first, a well-versed geographic information system. A World Bank project, in collaboration with the National Development Planning Agency and the Ministry of Public Works, is supporting the development of Municipal Spatial Data Infrastructure in some Indonesian cities. This includes the development of the spatial database as well as capacity building in geographic information systems and urban planning at the municipal level, which is something that Samarinda city may be able to benefit from.

New, cheaper, easier, and more advanced technologies such as drones, open-source mapping software, etc. offer more ways to accelerate the development of an integrated mapping and database system of a city government. Several Indonesian local governments,i.e. Jakarta, West Java, already have more advanced "Smart City" programs that Samarinda can learn from. Multinational companies and local startups alike are plenty and can offer Samarinda technical assistance for systems development and capacity building.

3.3.2 Climate Village Program

The Environment Agency (DLH) Samarinda continues to encourage the community to take various steps in facing climate change through the Climate Village Program. The Climate Village Program (ProKlim) is a national program managed by the Ministry of Environment and Forestry (KLHK), which aims at increasing the community involvement and various stakeholders to strengthen the climate adaptation capacity. This program is also expected to reduce GHG emissions and improve

societal welfare. Table 31 shows the components of adaptation and mitigation efforts carried in Samarinda City. In 2019, the Environmental Agency Samarinda registered Kelurahan Sindang Sari and Kelurahan Makroman in the National Registry System (SRN) of the Ministry of Environment and Forestry and were designated as the Climate Villages with the Main Category. Samarinda city government plans to have at least one climate village in every subdistrict by the end of 2020.

Table 31. Climate Adaptation and Mitigation Programs in Maroman and Sindang Sari Sub-Districts

No.	Components	Type of Activities
1	Control of disasters	Rainwater harvesting
		Water infiltration
		Spring protection
		Saving water usage
		Facilities and infrastructure for flood control
		Design adaptive building
		Making terraces (infiltration channels, drains, terrace reinforcing plants)
2	Increase food security	Cropping system
		Irrigation/drainage system
		Integrated farming/mix farming
		Diversification of food crops
3	Control of climate-related diseases	Vector control
		Sanitation and clean water
		Clean and healthy life behavior
4	Waste management	Solid waste management
		Utilization of liquid waste
5	New and renewable energy, energy conservation	Use of firewood-efficient stoves and rice husk stove
6	Agricultural cultivation	Agricultural cultivation processing
7	Increase vegetation cover	Greening, agroforestry practices
8	Control of forest and land fires	Land clearing without burning
		Peatland and water management

Source: Samarinda City Environmental Agency

The Climate Village Program is a good initiative to be continued and to develop measurement indicators so that its impact can comprehensively increase public awareness of the importance of climate change mitigation. It is important to ensure that the program is on target and effective in empowering the community.

3.3.3 Bioenergy

The understanding and awareness of the potential for renewable energy in Samarinda are still minimal. The East Kalimantan Province has a large potential for non-renewable energy resources.

Samarinda City needs to explore the potential use of solar panels and bioenergy from the vegetation land and agricultural sector. Table 32 shows bioenergy potential that can be analyzed further by mapping the agricultural sources and the integration within food and fuel production.

One of the energy sources that is being developed by the government is bioenergy from palm oil. In East Kalimantan, there are 3.5 million hectares of oil palm plantations. If bioenergy becomes a renewable energy source, then ensuring the principle of sustainable governance becomes important.[13] From a legal aspect, transparency in the supply chain must be upheld. From an economic point of view, there must be a clear contribution from oil palm plantations and factories to the region.

From a social aspect, there must be a fair relationship between company owners and farmers which is supported by capacity building. From an environmental perspective, no additional deforestation is allowed. The principle of sustainability will have an impact on reducing pollution, increasing productivity, and respecting land rights.

Table 32. SWOT Analysis on Use of Bioenergy

Energy Type	Strength	Weakness	Opportunity	Threat
Biogas	Effective use of agro-industrial waste Increase soil quality and fight soil depletion Cut down energy cost through self-provision Awareness for using energy alternatives that environmentally friendly Reduces number of sanitation-related disease due to poor waste management	High initial investment for plant setting Low financial returns High cost for collecting and transporting the feedstock Lack of technological know-how in plant management	Increase access to energy for local population Development of new enterprise for collecting and selling digestate to farmers as fertilizer substitute Existence of incentives for the production of renewable energy Improve the livelihood of local population	Artificially low energy prices due to fossil fuel subsidies Policy and administrative barriers Possibility of methane accident in the atmosphere Lack of understanding of the technology Small scale agriculture is not adapted to large scale technology Low acceptance from local population
Bioethanol	Raw material is easy to obtain Its octane value is higher than gasoline so that it can replace the function of additives	The feedstock costs for sugar/starchy crops are high Ethanol is characterized by high vapor pressure	Agricultural productivity continuously rises The European fuel standard for ethanol is under development	The limited infrastructure for bioethanol distribution

[13] Tim Publikasi Katadata. 2019. "Prinsip Berkelanjutan, Kunci Perbaikan Sawit". Accessed from https://katadata.co.id/timpublikasikatadata/infografik/5e9a4e56424d8/prinsip-berkelanjutan-kunci-perbaikan-industri-sawit

	Existing cultivation techniques Increase farmers' income through intensification of cultivation and expansion of land			
Biofuel	Potential land and high commodity biofuel feedstock Availability of human resources (farmer, worker) Prospect of biofuels as a substitute fuel in the future is high Contributes to secure energy supply Reduce GHG emission Creates additional distribution channel for agricultural products	Policies not yet synchronized between government agencies Productivity and crop diversification low source of biofuel The government does not see plant-based biofuel as a strategic industry Grants for research and development on biofuel still small Limited and overlapping technology development Feedstock production is land-consuming	High import duty policy abroad (anti-subsidy policy for palm oil/CPO) inhibits biofuel commodities and products from going abroad The world's oil reserves are decreasing, so we need alternative sources of energy There is a reduction policy on GHG emissions New and more efficient conversion technologies exist in research initiatives	Low world oil prices causing cheaper fuel prices There is no standardized engine for using mixed fuels biofuels above 10% (above B10) Biofuel price depends on the sale of co-products Biofuel production is limited due to land availability for feedstock production

Source: Compiled from various sources

CHAPTER 4
Policy Direction, Recommendations and Enabling Strategies

The objectives of sustainable development are producing high quality global human resources and improving the global economy while maintaining environmental sustainability. Indonesia faces challenges in adapting to climate change. Samarinda is prone to climate change with floods, deterioration of land cover, and solid waste issues, having effects on quality of life in urban areas.

Upon review of Samarinda's key characteristics (Chapter 1), the current national and local-level policies (Chapter 2), and the key challenges and opportunities (Chapter 3), this chapter concludes by offering key policy directions and recommendations for Samarinda to embark in becoming a more climate-resilient and inclusive city.

4.1. Suggested Policy Directions

The following policy directions are suggested to be adopted as high-level principles that need to be taken to support the implementation of climate change mitigation in the city of Samarinda to change the behaviour of government organizations, business actors, and individuals.

4.1.1 Adoption of a Growth Boundary

Much effort needs to be done to rehabilitate Samarinda's natural environment and prevent the city from falling prey to disasters like floods. A nature-based approach to development is appropriate for a city that is located near one of the world's largest rainforest reserves. Samarinda has a large geographic area that is almost as large as Jakarta and Singapore. But where Jakarta has a 10 million population and Singapore 5.5 million, Samarinda only has about 872,000 inhabitants. Naturally, development in Samarinda should be contained in a much smaller footprint.

A nature-based approach to development is strategic as it gives more benefits compared to concrete-based development. Various forms of green infrastructure can have multiple benefits. For example, city parks can act as oxygen producers, collect, and store rainwater and provide much-needed recreation areas too.

Samarinda should increase the proportion of its land area for public RTH from currently 5% to 20%, as mandated by the Spatial Planning Law of 2007. Considering the importance of watershed areas in the hills, the city should have a large nature reserve area, similar to the central catchment areas of Singapore, or the protected forests and watershed areas in the neighbouring city of Balikpapan. The area in North Samarinda needs to maintain its hydrological function as a water catchment area for the Karang Mumus sub-watershed. But high population growth in the two upstream watershed districts is not balanced with the protection of their natural vegetation. One strategy to be considered is the establishment of guidelines derived from Government Regulation No. 63 of 2002 concerning City Forest.

The identification and inventory of green open spaces need to be done thoroughly. Shrubs and vacant land are currently included in one of the categories of private green open space. There should be accurate field studies and aerial photographs so that the addition of green space is accompanied by an increase in the quality of maintenance.

According to the Department of Energy and Mineral Resources East Kalimantan, there are no documents and reclamation obligations that support the carrying capacity of the environment. Therefore, it is necessary to map in more detail the status of land ownership, post-reclamation mechanism, and the comprehensive measurement of contamination to soil, water, and air quality in Samarinda.

Ultimately, Samarinda should adopt a growth boundary to ensure the city's remaining unspoilt natural areas are not lost to short-term economic interests. The city should adopt a "compact city" approach that relies on higher density, vertical development in a few key areas, and protecting the remaining green areas. The city should also put a moratorium on mining activities and agree on a settlement with companies that already have mining permits. Samarinda should also be firm in ensuring the proper reclamation of former mining sites.

4.1.2 Political Commitment

Past policy directions that relied on land-intensive industries (i.e., coal mining, sprawling housing development) to drive Samarinda's economy should be corrected through a strong political commitment to rehabilitate the city's natural environment. The first step is to acknowledge the urgency of the problem and commit to solving the problem together.

As discussed in Section 3.1., environmental issues in Samarinda are interconnected to a multitude of problems that stem from disconnected urban spatial planning and weak enforcement of such plans. Samarinda has adopted several policies that indicate an effort to rehabilitate the environment. These include tree planting requirements, waste disposal time windows and a ban on plastic bags. However, the implementation of these policies does not seem to indicate a strong political commitment and collective effort, and enforcement seem lax. There are also efforts to improve the city's maps and database, but progress needs to be accelerated.

Urban governance refers to how local, provincial, and national government agencies, as well as non-government stakeholders, play a role in planning, financing, and managing urban areas. The local government stands at the core of good urban governance. Strong political will and commitment from local leaders are needed to reject unsustainable approaches to development and engage other stakeholders to commit to green development.

4.1.3 Involvement of Non-Government Actors

Without the role of non-government actors, urban governance will remain weak because the power of the public sector is limited. Non-government actors such as business associations, academics, and various civil society groups exist in Samarinda, but many of them do not feel that they are actively involved in planning and managing the city.

Samarinda City should adopt a large scale-campaign to build climate and environmental awareness among the people. Some of the communities have not developed the required level of climate awareness. Regular joint programs with representatives of the private sector, involving community groups, schools, and the civil society are important to

keep all stakeholders see this as a priority issue that they should be involved in.

Sustainable development needs commitment from multiple parties. For example:

- public green spaces that are scattered in public areas are under the authority of local governments, while private areas are under the authority of the private sector or society;
- restoring the river to its original function (naturalization) requires collaboration between different agencies, to make the location around the river not only as water storage but also a city park;
- flood control must be carried out comprehensively by all agencies, each sharing the same master plan, data on the volume of water, and integrated with spatial plans.

Many of these efforts require land acquisition, i.e. for public parks, water catchment areas, widening of drainage channels, etc. Currently, much of the land is owned by private individuals. Thus, it is quite normal and expected that the individual landowners would reject plans to acquire their land for public purposes if they do not get any benefits from it.

This is a common problem that has taken place in many cities around the world. But it does not mean that the government should back down from its plan to acquire land and redevelop it in the public interest. One of the strategies that can be considered is a win-win proposal between the government and individual landowners through "vertical land consolidation". This is a method where landowners consolidate their land and then redevelop it (or offer it to the private sector or government to be redeveloped) as a vertical structure, thus leaving room for green open spaces. But the vertical structure needs to be a mixed-use building/district with commercial value, not purely residential. For example, apartment units on the upper floors (where the residents could live), and shopping establishments or offices on the lower floors. The project can be seen as a business endeavour, where residents now become shareholders of the new mixed-use building/district. Whereas before they did not make any money from the land which they owned, they now receive shares from the income of the commercial property.

The government should also involve the private sector and international institutions in providing public services, where relevant. Start-ups or investors can be invited to help develop technological solutions. Investors can also participate in developing physical infrastructure and services. Collaborative urban governance can be an important catalyst for improvement and provide opportunities between institutions, business, and civil society to achieve more accountable decision making. Open collaboration can be used as a reference in inter-stakeholder management.

4.1.4 Integrated Approach to Planning

Unsynchronized or disintegrated planning is one of the root problems behind Samarinda's environmental issues. Acknowledging this problem, the city should have the base maps and technology necessary to engage in integrated planning across different sectors. Inventory of green open spaces, property boundaries, and ownerships, etc. should be accelerated if not yet completed. The capacity building of city staff and city government offices to adopt and operate a municipal spatial data infrastructure is critical and should be implemented with high priority. Trainers and experts are readily

available, and technology is accessible with many options, ranging from proprietary to free and open source systems.

Institutional silos in achieving integrated planning should be bridged by leaders who can break these silos. Processes to ensure integrated planning should be led by the mayor. Samarinda should start by achieving integrated planning across city departments. Collaboration among institutions can simultaneously achieve the goals of each institution. For example, a collaboration between the Natural Disaster Management Agency, the Department of Environment, Development, and Spatial Planning. An interview with the Regional Council for Climate Change (DDPI) East Kalimantan, highlights the necessity to set up a multi-stakeholder climate change council in Samarinda City. This collective urban governance consists of urban actors (government, private, educational institution) partnered with communities, as a facilitating platform to create and support urban sustainability.

If this seems challenging, it is only a first step in achieving integrated planning at the local level. There are other, more difficult silos to bridge, which is to achieve integrated planning across different levels of government, i.e., between city-level and provincial-level agencies, and between the different local jurisdictions that share the same region as Samarinda.

Land use planning and enforcement, as well as the issuance of planning permits, for example, requires coordination and integration between the city-level and provincial-level agencies. This means that whatever system is developed or adopted in Samarinda should be compatible with that used in East Kalimantan Province.

On a regional basis, some issues require coordination among neighbouring jurisdictions. For example, pollution that takes place in another regency may end up in Samarinda through the rivers or the air. The same thing can be said for forest fires, where hotspots are typically not located in Samarinda, but the city suffers from the smoke and haze. A Mahakam River watershed regional association may involve Samarinda City and Kutai Kartanegara Regency, but the issue of forest fires may involve more regencies, including East Kutai and West Kutai.

Intergovernmental cooperation needs to be addressed to create a comprehensive approach to climate change. Some issues like water and air pollution will not be solved unless there is a collaboration between local governments. Water and air cross administrative boundaries. To manage river pollution and flood, for example, a holistic approach from upstream to downstream is needed. The rivers in Samarinda are interconnected with different local government authorities.

That is why the mayor must lead these seemingly mundane processes because, ultimately, the processes will need to be led by a strong leader when the need to coordinate with the province and neighbouring jurisdictions arise.

4.1.5 Strengthening Regional Plans

To achieve climate resilience and inclusive city, the existence of policy support is crucial. Currently, several policies are deemed as not climate-proof, and "polluters pay" principles should be strengthened. These regulations must be clear and targeted, also executed with strict supervision and sanctions. Some sectors that need strong policy are:

Water and Sanitation: (a) Roadmap of water supply and drainage; (b) Development of drinking water supply systems; (c) Development of wastewater management

systems; (d) Protection of natural swamps, derivative of Government Regulation No. 73 of 2013 regarding the conservation and management of lowland swamps in Samarinda; (e) Determination of water quality status in water bodies; (f) Licensing category and debit allowance of wastewater to meet water quality standards; (g) Local Action Plan for Drinking Water and Environmental Health (RAD AMPL)

Energy and transportation: (a) Public transportation; (b) Emission test obligation for private vehicles; (c) Use of renewable energy, a derivative of the Government Regulation (PP) No. 79 of 2014 concerning the National Energy Policy; (d) Car Free Day program

Solid waste management: (a) Roadmap to increase economic value, establishment of waste bank[14] units; (b) clear implementation of Perwali No. 35 of 2018 concerning Samarinda City Policies and Strategies in Household Waste Management; (c) derivatives of local regulation (Perda) No. 2 of 2011 on Solid Waste Management in Samarinda.

Land Use and Settlements: (a) Rehabilitation of slum settlements, equipped with infrastructure and facilities; (b) the integrated implementation of Document of Housing and Settlement Areas Development Plan (RP3KP); (c) resources use in sustainable ways.

For the entire sector, the city of Samarinda also needs to prepare a document in the form of a local action plan or masterplan for climate change adaptation and mitigation.

Human Resources and Institutional Capacity Building

The improvement of institutional capacity is vital to be in line with the competency framework for each program planning and implementation. Some upgrading needs to be delivered in prioritized sectors:

Water and Sanitation: (a) Optimization of technical guidance and training to improve the capabilities and competencies of human resources concerning the development of the wastewater management system, (b) the Fecal Sludge Treatment Plant (IPLT); (c) drainage system; and (d) verification of category permits.

Solid waste treatment: Technical guidance and training to improve the capabilities and competencies of human resources regarding the landfill control system and equipment operations.

Green House gas emission reduction: (a) Socialization of guidance and training to government officials on using environmentally friendly energy; (b) energy efficiency, and (c) air pollution control.

4.1.6 Improved Monitoring and Enforcement

Even if good policies and integrated plans are already in place, lax monitoring and enforcement would prevent such policies from providing benefits to the public. The monitoring and evaluation of Samarinda's regional action plan for reducing GHG emissions (RAD-GRK) ensures that the implementation of mitigation activities is in line with the emission reduction target. Thus, this needs to take place regularly every year. The monitoring results are then assessed and reported to related institutions at the provincial and central levels through the Local Development Planning Board (Bappeda).

[14] The waste bank is a concept of collecting, sorting, and selling sorted waste. The collected and sorted waste is weighed and sold to a third party at a certain value of money.

Bappeda can coordinate the monitoring and evaluation of the RAD-GRK implementation in Samarinda, especially in mainstreaming local government departments' programs that can be related to GHG emissions. Meanwhile, the Environment Agency is tasked with measuring emissions and contributing to mitigation actions. The implementation of monitoring and evaluation tasks involves all parties related to the action plan to reduce GHG emissions, including local government departments, universities, non-governmental organizations and associated business players as well as the public.

In terms of monitoring Samarinda's level of environmental pollution, there is still a lack of certified human resources to take samples and conduct testing in a laboratory. Currently, laboratories in Samarinda are also limited by accredited air quality parameter testing.

4.2. Enabling Strategies

This section offers several enabling strategies to achieve the suggested policy directions above, considering the relevant and opportunistic policy instruments.

4.2.1 Conducting a comprehensive environmental assessment

First, Samarinda should conduct a comprehensive mapping and inventory of the city's environmental quality index.

- For the water and sanitation: protection of pockets of surface water (natural swamps) using remote sensing, more accurate data of drinking water and wastewater.
- For increasing green open spaces: mapping of forested areas in cities that have the potential to become urban forests, collecting data of open and critical lands, validating land cover indexes, and existing buildings in vulnerable areas.
- For tackling pollution: calculation of water and air pollution capacity comprehensively with valid parameters, fully aligned with the Ministry of Environment and Forestry.

4.2.2 Utilization of Technology

Samarinda City should build technological capacity. The Bappeda of Samarinda uses technology infrastructure for data compilation, planning, and evaluations. For data collection, primary data is collected from the community and secondary data through the *SiPesut* application, which is an information system on civil registrations. Secondary data from various local government departments also constitutes input, and inter-probability from system to system should be ensured. Interconnection is carried out to avoid overlapping and inconsistencies by the Samarinda data forum.

In 2019 the signing of a joint commitment was conducted to support the One Data Policy in Samarinda. But in terms of spatial planning, there is still a small number of city government staff who are skilled in GIS (Geographic Information System). As a result, the local government departments' understanding and capacity to interpret spatial plans can be inconsistent.

Technological capacity is important to be upgraded in various aspects, for example:

- Waste management: to ensure the success of waste to energy program, application of 3R, integrated system of waste collection and processing, increasing the economic value of solid

waste (such as waste banks at residential areas)

- Informal and irregular housing: upgrading system for relocation, optimizing limited land to build adequate and climate-adaptive housing, access to jobs, resources, and public facilities.
- For developers and business sector: regulations to fulfil environmental requirements, energy efficiency, and renewable utilization
- Regarding disaster management: improvement of green infrastructure/water absorption, a master plan of flood prevention and mitigation measures
- Air quality: monitoring the local action plan for GHG emission reduction, tool utilization for measuring air pollution and water pollution comprehensively
- Water and sanitation: tool utilization for comprehensively measuring water pollution, optimizing the Sewage Treatment Plant (IPLT)

The application of Smart City principles through technological adoption should be pursued. All institutions should have integrated data applications to make it effective to update periodically and achieve sustainability indicators. The government should understand the importance of a city's data documentation and data-driven planning process. This will allow a reduction in a development's impact on environmental quality.

4.2.3 Alternative Financing Sources

With a limited regional budget (APBD), innovation needs to be done in funding sustainable programs. Government funding is constrained by complicated budget disbursement mechanisms. Bureaucratic reform in fiscal management is needed so that budget disbursement can be easier while upholding the principles of transparency and accountability.

Participation of the private sector, state-owned and regional government-owned enterprises and the public should be mobilized. Public-Private Partnerships (PPP) can take place in many forms. More urban development-specific approaches such as Land Value Capture (LVC) and development exactions could be a potential source of financing.

LVC is a mechanism where the private landowners or developers contribute to the funding of infrastructure and public service development in the city, with the understanding that once built, the infrastructure and public service will benefit the landowner through an increase in land value. This mechanism has been utilized in many places throughout the world, where the private sector contributes to the construction of public transit (or other) infrastructure that passes by or is located near their property. Development exaction is a social obligation imposed on large private real estate projects to contribute to public services and infrastructure in the city, and it has been implemented in Jakarta.

Creative alternative financing by not only depending on state funding sources, especially for infrastructure development, will encourage sustainable development. There needs to be a mapping related to the potential of environmentally sustainable and innovative financing for private and public participation, especially green financing programs. Alternative funding also can be

allocated for optimization of waste management such as for operating controlled landfill and waste-to-energy technology investment.

4.2.2 Sustainable and Empowered Society

To achieve sustainable urban development, it is important to develop a sustainable community culture. In managing environmental problems and disasters in urban areas, generally, it is only from a technical approach, for example, in flood management efforts by making reservoir areas, drainage, and so on.

In the principles of good governance, community involvement, and participation in the development process is also needed. This approach emphasizes the capacity and independence of the community. In the concept of collaborative development governance, the community plays an active role in forming an environmentally friendly city.

In this case, the government needs to open as much access as possible for the community, provide knowledge and training on sustainable urban areas to increase awareness of the importance of action on climate change mitigation and eco-living practices. This requires capacity building, facilitation, and organization of local community groups through methods that are already familiar among NGOs and civil society groups, such as Participatory Rural Appraisal (*Survei Kampung Sendiri*), etc.

From the interviews for this research, dialogues with and involvement of the community and non-governmental organizations in the development sector are still low. Referring to the ladder of citizen participation, city development should involve the community at the citizen power level where citizens are involved in overall decision making.

4.2.4 Local Action Plan for GHG Reduction as Entry Point

By ensuring the adoption of the principles of local action plan in various local policy documents, it has the potential to be an instrument that facilitates the synchronization of multiple policy documents: the Local Medium-Term Development Plan (RPJMD), Spatial Plans (RTRW), Strategic Plans (Renstra), and Annual Work Plans of each local government organization (OPD) in Samarinda.

It is important to evaluate the results of drafting the RAD-GRK and encourage the issuance of related regulations in Samarinda. The RAD-GRK evaluation is carried out in conjunction with the review of regional development planning policies, spatial-based policies, and other sectoral policies that can contribute to GHG emissions reduction. Cooperation with the surrounding government is also essential in the form of knowledge sharing and development target synchronization.

In dealing with floods, programs and activities in the city of Samarinda focus more on infrastructure development, such as improving waterways, making retention columns and parapets (concrete walls), and still lack in prevention and mitigation. Ideally, Samarinda directs adaptive programs such as maintaining green open spaces in residential areas, offices, and land used for other functions.

4.2.5 Principles of Climate-Resilient Housing

Flood has become a problem every year, considering that Samarinda is in the lowlands. On the other hand, it is almost impossible to prevent floods entirely. What needs to be done is to control or reduce flood events. Thus, the existence of supporting facilities and infrastructure to carry out flood control becomes essential.

The implementation of housing and infrastructure development using climate-resilient' principles is still not a familiar thing to do. With Samarinda prone to flooding, housing development policies need to consider building structures that prioritize designs which are in harmony with the environment and are adaptive to climate change. When an area changes its function, it cannot be restored to its original state.

Acceleration of the post-flooding drying process, by way of absorbing water into the soil, is one of the efforts that need to be done for the lowlands. Housing and building design that is adaptive to water and in harmony with nature, such as a stilt house (as already adopted in Banjarmasin), should also be considered as a design principle in building regulations for certain flood-risk areas. Currently, housing policy still follows regulations from the central government that are typically monolithic and not adaptive to local wisdom.

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