



CLIMATE
RESILIENT
AND INCLUSIVE
CITIES



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URBAN ANALYSIS REPORT 2020

01

GORONTALO

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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

Foreword



Mayor of Gorontalo


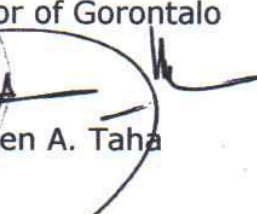
We are honoured to be selected as one of ten pilot cities to support the implementation of Climate Resilient and Inclusive Cities (CRIC) Project from 2020 to 2024. The publication of Gorontalo Urban Analysis Report is one of many benefits that Gorontalo will receive through this project. This report is an important milestone in an ongoing collaboration to build climate resilience in our city.

Climate change is one of our development priorities. The impact of climate change presents challenges that will affect Gorontalo tremendously; for example, Gorontalo has witnessed and experienced the impact of climate-induced disaster such as floods and drought. We need this report to help us examine city characteristics, climate-change affected sectors and appropriate measures to address the problems we are facing.

This report also highlights an important recommendation in building cross-sectoral and cross-city collaboration. Given the fact that climate change is a trans-boundary environmental problem, we need stronger and integrated cooperation to execute climate change mitigation and adaptation actions in the future.

We appreciate the contribution of all stakeholders and we thank CRIC Project and urban experts to include our input and feedback in the final report.

Thank you.


Mayor of Gorontalo

Marten A. Taha



Climate Change is an issue of humanity, it is not merely a threat to the environment only. It is one of the 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 centre stage of “Blue Ocean” and “Blue Sky” agenda through action-based proposals and approaches on circular economy, air pollution 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 AILSG, 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

A handwritten signature in black ink, appearing to read 'Isabelle Milbert', written over a horizontal line.



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 evidence 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

A handwritten signature in blue ink, appearing to read 'F. Bonnet', written in a cursive style.

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Irene Purman Cahyani



Asih Budiati



Maria Serenade



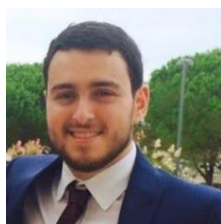
Putra Dwitama

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GLOSSARY

Abbreviations are alphabetically arranged and used for both Bahasa to English translation.

Bahasa	English
<i>Badan Penanggulangan Bencana Daerah (BPBD)</i>	Regional Bureau of Disaster Management
<i>Buku Putih Sanitasi</i>	White Book of Sanitation
<i>Indeks Risiko Bencana</i>	Disaster Risk Index
<i>Kota Gorontalo</i>	Gorontalo City
<i>Kota Gorontalo dalam Angka</i>	Gorontalo Municipality in Figures
<i>Kajian Lingkungan Hidup Strategis (KLHS)</i>	Strategic Environmental Assessment
<i>Pemetaan Investasi</i>	Investment Mapping
<i>Pusat Kesehatan Masyarakat (Puskesmas)</i>	Public Health Center
<i>Rencana Aksi Daerah</i>	Local Action Plan
<i>Rencana Pembangunan Jangka Menengah (RPJM)</i> <i>RPJMD: RPJM Daerah</i> <i>RPJMN: RPJM Nasional</i>	Mid-Term Development Plan Local Mid-Term Development Plan (Provincial/Municipal) National Mid-Term Development Plan (Hierarchy is the same with RPJP, RTRW)
<i>Rencana Pembangunan Jangka Panjang (RPJP)</i>	Long-Term Development Plan
<i>Rencana Tata Ruang Wilayah (RTRW)</i>	Spatial Plan
<i>Strategi Sanitasi Kota</i>	City Sanitation Strategy
<i>Statistik Kesejahteraan Rakyat</i>	Welfare Statistics

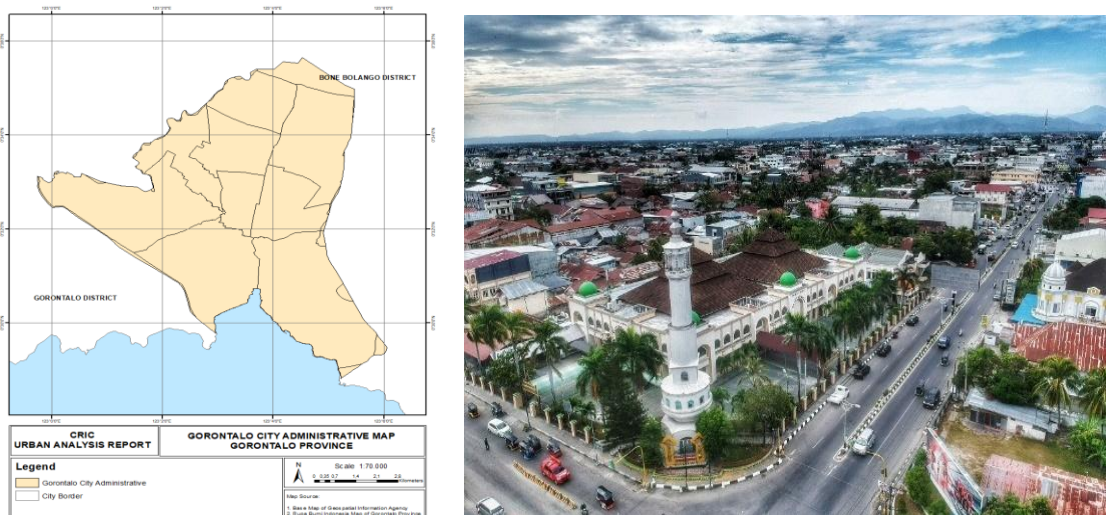
CHAPTER 1

Overview of Gorontalo

1.1 General Description

Gorontalo is the capital of Gorontalo Province and has been its key transportation hub. It has a bus station with A category and 4 water ports, including Gorontalo Harbor, Ferry Port, Pertamina Port, and Fishery Depot Port. Gorontalo Harbor is one of the national ports with general and specific cargo and logging in the national shipping line. The city is situated on 000 28' 17' ' - 000 35' 56" North Latitude and 1220 59' 44' ' - 1230 05' 59" East Longitude.

Figure 1 - Gorontalo City Map and View



Source: Authors, 2020

Based on the National Medium-Term Development Plan Year 2015-2019, the city is designated as an agro-town or farming town, benefiting Tomini Bay's potential that is the epicenter of agricultural production, fishery process, and marine tourism. Gorontalo plays a vital role in scaling trade and services in a regional context.

1.2 Topography and Climatology

Gorontalo City lies within Gorontalo Province and stretches over 0,65% of the provincial area with 67,07 km². It has 9 districts with 50 sub-districts. Dumbo Raya is the widest district occupying one-fifth of the city area, whereas Kota Selatan District is the narrowest district capturing 4,2 % of the city. In terms of the border, the city neighbors to the north with Bone Bolango Regency and to the south with Tomini Gulf. Bone Bolango Regency is also adjacent to the east of the city. It is also close to the west with Gorontalo Regency. The average temperature in 2019 was 27,3 degrees Celsius, where its highest was 35,6 degrees Celsius and its lowest at 18,8 degrees Celsius. Humidity varied in the range of 59% to 97%, with its

mean at 82,3%. The mean of humidity was at 82,3% and showed that air contains water vapor. The city also reported rainfall at 246 mm³ with the highest in December with its 27 rainy days. The lowest rainfall happened in September at 9 mm³ with its 7 rainy days. In sun exposure, the city recorded 61,8% showing 7,4 of 12 hours covered by sunshine.

1.3 Demographic Characteristic

Gorontalo achieved a variety of demographic dimensions. In economic activity, the economically active or employed population is 101,654 inhabitants, whereas 6,850 were unemployed in 2019. Many non-labor force populations are economically inactive at 57,972 people.

Table 1 - Demographic Profile Year 2019

No.	District	Number of Population	% of Gorontalo City Population	Growth Rate	Density (population/km ²)
1	Kota Barat	24,106	12.02%	1.58	1,200.5
2	Dungingi	25,657	12.79%	1.72	5,494
3	Kota Selatan	20,686	10.31%	-0.72	7,361.57
4	Kota Timur	27,167	13.55%	-0.46	5,106.58
5	Hulonthalangi	16,863	8.41%	-0.20	1,185.03
6	Dumbo Raya	19,157	9.55%	-0.63	1,364.46
7	Kota Utara	20,058	10.00%	1.82	2,501
8	Kota Tengah	27,360	13.64%	-0.40	5,688.15
9	Sipatana	19,504	9.72%	0.78	3,862.18
Gorontalo City					
Registration result		200,558		0.4	2,537.74
Projection Result		219,399		1.96	2,756.62

Source: Gorontalo Municipality in Figures, 2020

There were 3 districts with the largest population in the table above, including Kota Tengah at 27,360; Kota Timur at 27,167; and Dungingi at 25,657. However, the smallest inhabited 3 districts in terms of population were 16,863 at Hulonthalangi; 19,157 at Dumbo Raya; and 19,504 at Sipatana. Among those districts, the annual population growth rate occurred relatively in small intervals from -0,46 to 1,72. The lowest annual growth of the population was Kota Selatan, and the highest was Dungingi, respectively. During district reflects, both

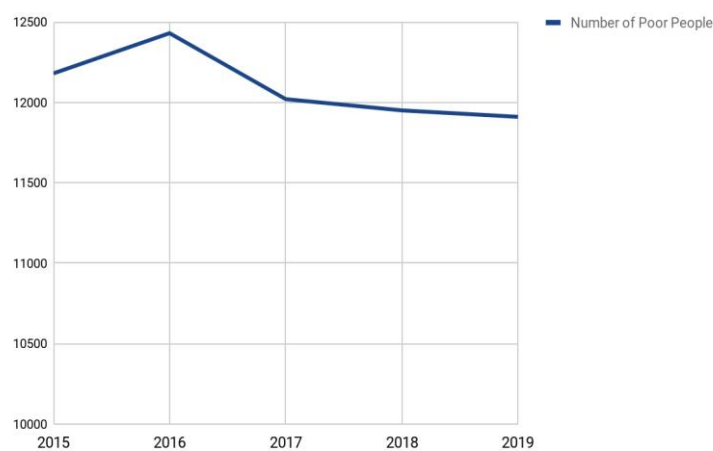
the higher population growth and the number of populations was comparable to other districts.

Five of nine districts reached negative population growth from 2018 to 2019. Negative population growth is when the population declines in a district due to many factors such as death rates exceeding birth rates or migration. Population density considerably relates to population numbers where Kota Tengah and Dungingi also had 5,688.1 and 5,494 population/km², respectively. However, the densest district was in Kota Selatan at 7,361.5 population/km² in contrast to its population number at 5th among other districts.

1.4 Social Structure

Statistics Indonesia has used the concept of basic needs approach to measuring poverty. Poverty is an economic inability to fulfill food and non-food basic needs, which are measured by consumption or expenditure. The method calculates the poverty line, consisting of two components of the Food Poverty Line (FPL) and Non-Food Poverty Line (NFPL). The poverty line calculation is separated for urban and rural areas. Every year, the poverty line in Gorontalo is increasing, indicating the population's welfare is increasing too. This is in line with the decreasing number of poor people in Gorontalo. Based on available data, a person whose expenditure per capita per month is below the poverty line is considered poor.

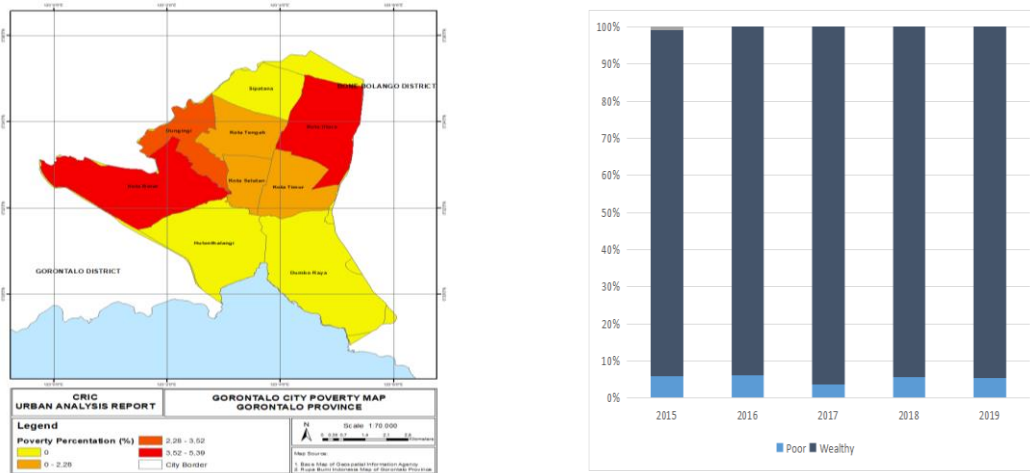
Figure 2 - Number of Poor People in Gorontalo 2015-2019



Source: Gorontalo Municipality in Figures, 2020

In 2015, the number of poor people had increased, but from 2016 onwards, the number of poor people in Gorontalo had decreased yet not so significantly.

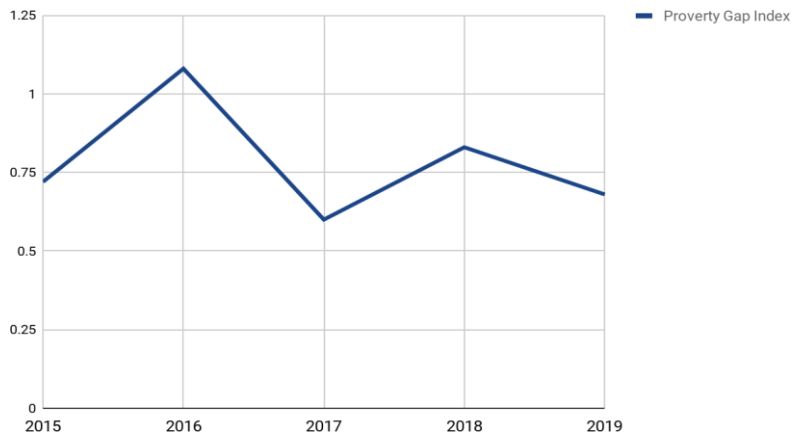
Figure 3 - Comparison of Poor and Wealthy People in Gorontalo 2015-2019



Source: Gorontalo Municipality in Figures, 2020; SMERU Poverty Map 2015

The percentage of poor people in Gorontalo was always under 10%. In 2019, the percentage of poor people in the city was 5,45 %. It just decreased by 0,12% in 2018. It is also shown in the map above which the highest mean percentage of poor people in Gorontalo is 5,39%. The government has carried out interventions in suppressing poverty; including through the construction of habitable housing programs, the provision of comprehensive public health insurance, assistance for poor students, non-cash food assistance, family hope program, capacity building of micro, small, and medium enterprises skills.

Figure 4 - Poverty Gap Index in Gorontalo 2015-2019



Source: Gorontalo Municipality in Figures, 2020

Poverty Gap Index (P1) measures the extent to which individuals fall below the poverty line (the poverty gaps) as a proportion of the poverty line. The index's higher value shows that the gap between the average expenditure of the poor and the poverty line is wider. It means the gap between the average expenditure of the poor population and the poverty line in Gorontalo is quite wide because, in 2019, the poverty gap index is 0,681.5 Economic Structure

Gorontalo City has a role as a center for trade and services whose scope also includes Tomini Bay. The growth rate of Gross Regional Domestic Product at Current Market Prices in Gorontalo has increased continuously from 2015-2019. Gorontalo has five main sectors each year. Public Administration spending shares the highest share except in 2015. From 2016 to 2019, Wholesale and Retail Trade: Repair of Motor Vehicles and Motorcycles contributed higher than four other leading sectors. As reported during the field interview, the fishery sector is not the primary sector because it has not met the market needs. The city must import from other districts or outside provinces. Currently, the development direction focuses more on the government, trade, and industry sectors.

Also, there is market competition with other regions due to the lack of diversification of underdeveloped fishery products. The fishery companies are challenging to compete, and the land-use is changing. Therefore, the land for fishing businesses such as aquaculture is diminishing. However, there is potential in this sector. For instance, fish consumption per capita increases per year, and regulations encourage an increase in non-oil export related to the fishery sector. Gorontalo has two malls known as Citimall Gorontalo in Kota Timur District and ITC Gorontalo in Kota Selatan District. There are many traditional markets for each district that spread all around the city.

1.6 Environmental Data

Based on the Sanitation White Book, 75% of water sources in Gorontalo have a risk of being polluted. This figure shows that many people do not have proper clean water, and other facilities such as bathroom and toilet. There are two types of systems for managing domestic or residential wastewater: local sanitation systems and off-site sanitation systems. Local sanitation systems, also known as on-site sanitation systems, are individual sanitation facilities such as septic tanks and 'cubluk.' *Cubluk* is a hole used to collect wastewater from the toilet and water from the bathroom, such as feces and liquid human wastes. The off-site sanitation system, known as the sewerage system, uses piping to drain wastewater from house to house which then flows to the wastewater treatment plant.

The Environmental Health Risk Assessment (EHRA) from 2013 looks at the behavior of people in environmental health. Urgent problems in the waste management from 2014 to 2016 include (a) 68,3% of the community has not been served by an adequate waste management system; and (b) 93,3% of the community does not sort out different types of waste such as organic, plastic, glass, paper, metal. EHRA findings also suggest 44,5% of people in Gorontalo manage waste through burning, 30% collect and dispose in waste dump, and 21,3% of people dump in other places such as a river, well, and empty land. The EHRA content is relevant to the CRIC program and would be even more relevant when using the latest years' data.

Most of the people of Gorontalo City still use the on-site wastewater management system in family toilets and communal sanitation. This 80% on-site clearing system uses a very simple processed septic tank. In one communal sanitation, it can serve around five households. Gorontalo City does not yet have a sanitation city scalar off-site system. There was a dedicated area of waste service of around 45 km² in 2016, which incremented by 5 km² from the previous two years, as shown in Figure 1.2. below. Waste management based on community decreased from 12 ton in 2014 to 5,3 ton in 2016.

Table 2 - Solid Waste Data 2014-2016

No.	Description	2014	2015	2016
1	Area of Service	40 km ²	43 km ²	45 km ²
2	Area of service to urban area	50,61 %	54,4 %	56,94 %
3	The number of served population	157.155 people	164.814 people	170.058 people
4	The number of served population	82,5 %	85 %	87 %
5	The assumption of the number of populations of Gorontalo City (during the day)	n/a	247.273 people	267.791 people
6	Garbage collection per day	95,24 ton	121,18 ton	133,95 ton
7	Transported waste to landfill per day	48,41 ton	60 ton	80 ton
8	Waste managed by waste bank, 3R integrated waste management facility & big collector	18,187 ton	28,3 ton	33,6 ton
9	Waste managed independently by the community	12 ton	8,1 ton	5,3 ton
10	Waste Transport			
	Dump Truck	14	14	16
	Aren Roll	3	3	3
	Motorised Wheelbarrow	20	20	25
	Pick-up L-300 & APV	7	7	7
	Garbage Wheelbarrow	52	52	52

Source: Policy and Environmental Management Strategy in Gorontalo City, (no date)

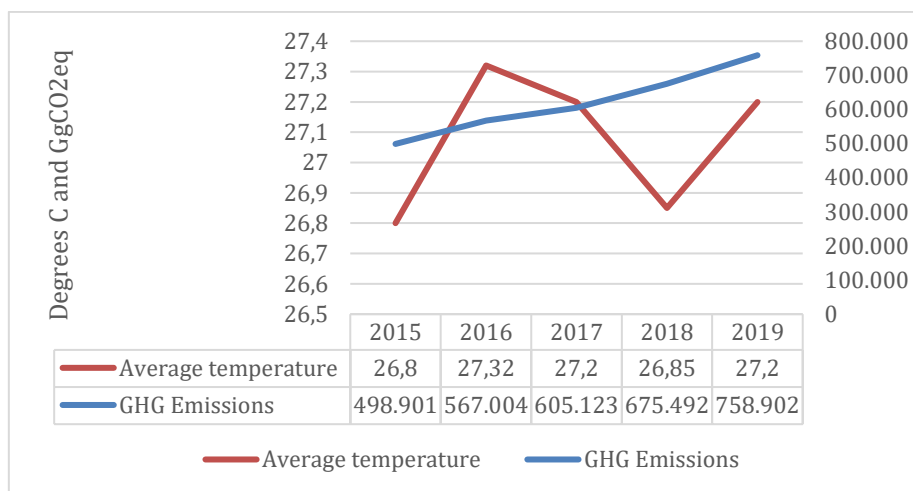
1.7 Climate Change and Disaster Risks

The main challenges in climate adaptation and mitigation are drought and flooding, agriculture and fishery, and the societal impact such as air pollution. The most significant societal impact leads to respiratory problems and, together with the increment of rainfall, instigating dengue fever, malaria, and chikungunya. There are two contributing factors to those environmental problems. Firstly, urbanization puts pressure on land conversion from agriculture to non-agriculture that impacts ecological sustainability, not to mention the contribution of upstream deforestation that lead economic activities to change the land function while decreasing the number of trees. It leads to floods and the support of good air quality, as reported in the focus group discussion (FGD). Land conversion is a means of city economic development that also causes food insecurity. Second, water pollution of the

Bone, Bolango, and Tamalate Rivers occurs in a moderate degree, and rivers in Gorontalo City are often used as an unavoidable dumping place. All of which resulted in the share of Greenhouse Gas Emissions and yearly average temperature as seen below.

The quality of Gorontalo's groundwater complies with the existing regulation. However, Bone River passes through the area of Gorontalo with its contaminants influencing the river's decreasing quality. In the Bone Bolango District, there are golden mining activities that involve the exploration of individuals and companies (Utina, 2008). As the district partially contains the Bogani Nani Wartabone National Park, the mining impacts contribute to air pollution whenever trees and plantations are reduced in the park. Bone Bolango is located northeast of Gorontalo's city. The city is the most significant contributor to waste in the Talumelito landfill, which possesses 80% of the joint landfill and the Gorontalo District and Bone Bolango district. The government plans to develop a landfill as a tourist destination like an automotive sports arena and potentially educate society about waste problems.

Figure 5 - Average Temperature in Celsius and GHG Emissions in GgCO₂eq



Source: Gorontalo Municipality in Figures 2016-2020 and GHG Emission Calculation

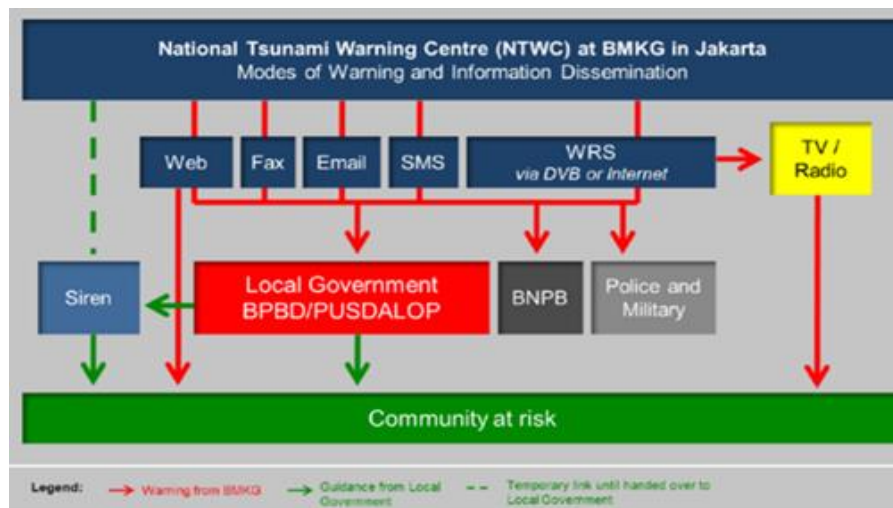
Gorontalo has an overall medium risk disaster index at 69,23, based on the 2018 Indonesian Disaster Risk Index appraisal. Gorontalo is of high risk towards forest and land fires and medium risks towards earthquakes, floods, drought, and extreme weather. This number is categorized on a medium level. To mitigate disaster impact, the city maintains disaster risk management with the national agency, Meteorology and Climatology Agency. The agency regularly transmits every two hours and distributes weather information to related institutions in time of flooding, as detailed below. In the dry season, information is provided to the community using handy talkies and local wisdom. Local wisdom is a belief in a seasonal calendar system such as rainy, dry, and transition seasons.

Each district corresponds to specific disasters, which are: a) Tsunamis potentially occurs in Hulonthalangi and Dumbo Raya District; b) Floods potentially occurs in Kota Timur, Hulonthalangi, Kota Selatan, Kota Barat, and Duingingi District; and c) Landslides potentially occur in Kota Barat, Dumbo Raya, and Hulonthalangi District. Drought occurs following the rainfall patterns, which when minimal causes Limboto Lake to dry. This lake is partially located in Gorontalo City, at 30%. Gorontalo has a relatively dry climate where some districts have the most parched regions. Other factors affecting the dried Limboto Lake include the

sedimentation process that causes water siltation, becoming dirty and polluted. This eutrophication process is the rapid growth of the hyacinth plant, contamination of liquid and solid waste, and the increased erosion rate from the river.

Besides that, inhabitants tend to have the massive activity of floating net cages, which contribute to degrading the quantity and quality of Limboto Lake. The flooding water occurred due to a high rainfall of 106-138 mm/year, the solid dominant landform, leveling and low permeability of soil types, shallow groundwater levels around 1-2.25 meters, and low land use in the area for community mining and annual land plantations.

Figure 6 - Modes of Warning and Information Dissemination



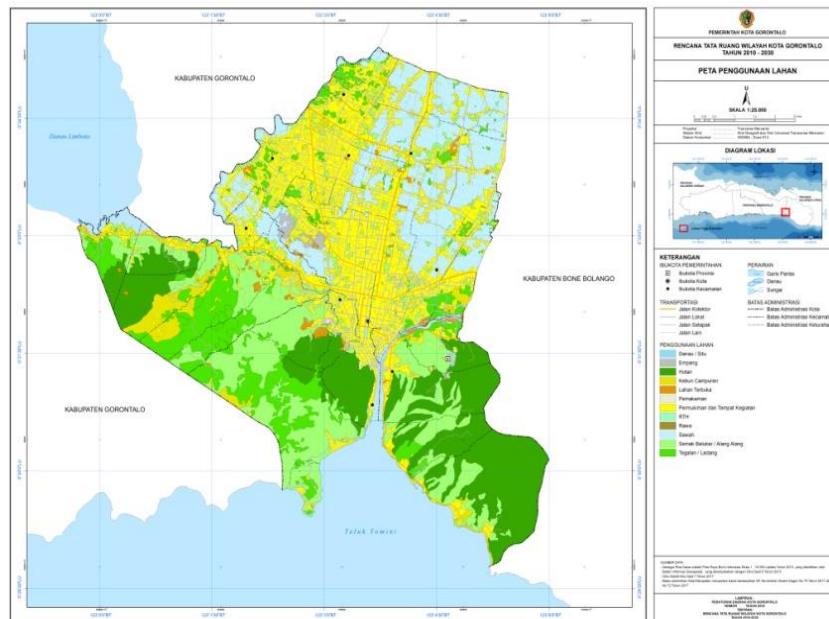
Source: *Tsunami Early Warning Services Guidebook for Inatews, 2012*

1.8 Spatial Planning and Infrastructure

As stipulated in the city's spatial plan, land structure in Gorontalo City consists of wet and dry land, mapped in Figure 1.7. Wetlands make up 47% of the city area, where it mostly consists of forests (49% of the whole wetlands) and shrubs (49,63% of the whole wetlands). Dry land makes up the remainder, or 53% of the city area, where settlements and residential activities account for 64% of all the dry land, and 34% of the whole city area. Tomini Gulf bordered to Gorontalo City in the south, which is the strategic location to Gorontalo Province and the Tomini Gulf area has some opportunities for the development of coastal and marine areas. Furthermore, City Service Centers have functioned as regional-scale trade and service center area, central area of national port and crossing port activities, and activity center type A passenger terminal.

Gorontalo experienced regional growth and physical infrastructure development, especially in the downtown area and the center of economic growth, region tourism, and residential areas. Infrastructure availability as supporting cities of trade and services is a big concern for the government. Infrastructures include roads, bridges, sanitation infrastructure facilities, communication facilities, transportation facilities, and electricity. In terms of transportation infrastructure, road conditions in Gorontalo, 74,8% are in good condition. Gorontalo has a Duingingi with a type A Bus Station. People can then access air transportation through Djalaludin Airport in Gorontalo District, which is around 30km away from the city center.

Figure 7 - Gorontalo City Land Use Map

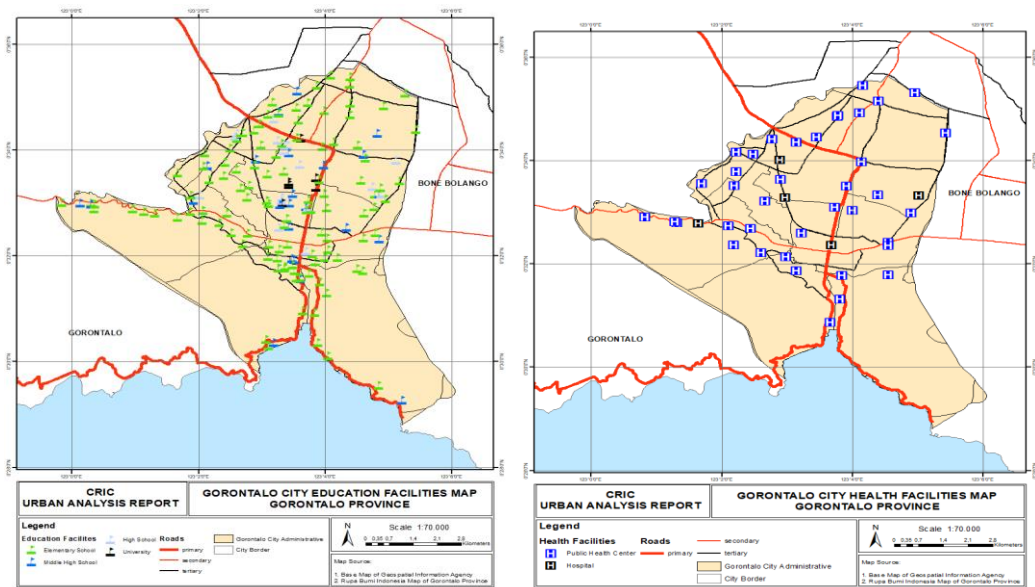


Source: KLHS RPJMD Kota Gorontalo, 2019

1.9 Social Infrastructure and Services

There are educational facilities, including 98 kindergartens, 128 elementary schools, 31 junior high schools, 20 senior high schools, and five universities. Public access to health service facilities has also been quite good, including hospitals, health centers, and physician clinics that can be easily reached by the people of Gorontalo City, as shown in Figure 1.8 below. Even though health centers exist in Dumbo Raya and Hulonthalangi, they are difficult to reach due to their location in dense residential areas, it is necessary to improve the quality of health services and facilities. There are health facilities in Gorontalo City of which 6 are hospitals, ten public health centers, 128 community integrated health centers, 16 clinics and 19 village obstetric centers. The five most prominent universities providing higher education services *Universitas Negeri Gorontalo*, *Universitas Nani Wartabone*, *Institut Agama Islam Negeri Sultan Amai Gorontalo*, *Universitas Ichsan Gorontalo*, and *Universitas Terbuka Gorontalo*, besides others are also there.

Figure 8 - Education and Health Facilities Map



Source: INAGeoportal, 2020

1.10 Urban Programs

The city's engagement with donors and civil society is quite good. There was an initiation in the form of the corporate social responsibility (CSR) forum. CSR forum is a means to overcome the problems of implementation and reduce overlapping in the deliverables of social programs by private companies to ensure effectiveness.

CHAPTER 2

Policies and Strategies for Climate Resilient and Inclusive City

2.1 Nation-Wide Policies, Strategies and Target

There is a development agenda in the living environment, increasing disaster resilience, and climate change, which is directed through policies to improve the quality of the environment, increase disaster and climate resilience, and the low carbon development in the National Medium-Term Development Plan of 2019-2024. The strategies comprise of processes on improving environmental quality, disaster resilience and climate change, and low carbon development. Furthermore, the National Action Plan for Climate Change Adaptation (RAN-API) is prepared to achieve targets, including realizing economic resilience, social order resilience, ecosystem resilience, and strengthening particular area resilience in urban, coastal, and small islands.

Programs and activities on adaptation to climate change also need to consider endeavors to reduce vulnerabilities, particularly to social groups vulnerable to climate change, such as women, children, low-income populations, and the aging population. RAN-API's objectives are divided into 5 sectors: economic resilience, livelihood resilience, the resilience of environment services, the resilience of particular areas, and supporting systems. Gorontalo has not adopted and released RAN-API into their administration. So, it is not yet clearly mapped what initiatives Gorontalo currently has that are formally recognized

as addressing climate change adaptation issues.

2.2 City-Wide Policies, Strategies and Target

The vision of Gorontalo City in the 2019-2024 Local Mid-Term Development Plan (RPJMD) is "Gorontalo City is Prosperous, Developed, Active, Religious, and Educated". Also, development priorities in RPJMD are set in the theme of regional development annually in a 5-year period (2019-2024) as follows: a) First-year, increasing competitiveness through improving infrastructure and environmental quality; b) Second-year, accelerating the development of government infrastructure and the economy to improve competitiveness; c) Third year, increasing the capacity of human resources in facing the modern industrial era; d) Fourth-year, equitable development, and improvement of community welfare; and e) Fifth-year, the embodiment of religious and cultured society.

Development strategies in RPJMD include the provision of housing and settlement facilities, disaster risk mitigation, integrated drainage for flood control, the application of 3R waste management and waste banks based on community empowerment, as well as the fulfillment of green open space to reach 30% of the total area of the city. The framework for priority program comprises limited human resources and infrastructure in facing the industrial era of 4.0, optimization of

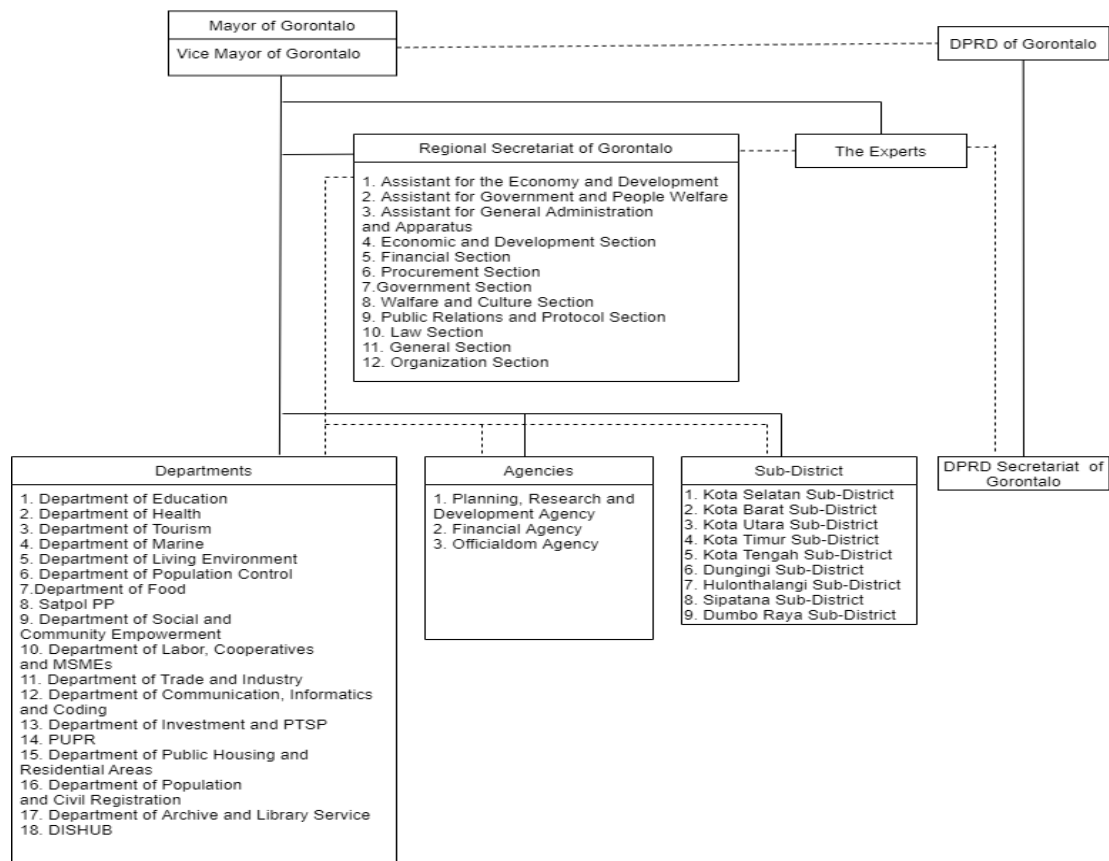
professional health services, integrated poverty, and unemployment reduction, optimization of infrastructure development and environmental management, strengthening education and cultural advancement, and strategic issues related to sustainable development goals.

2.3 Government Structure and Decision-Making Process

The mayor leads the city with help from the vice mayor. There are support groups

including a regional secretary, local representative council, regional inspectorate, 18 local government units, 3 agencies, and 9 sub-district offices. The regional offices coordinate with regional bodies, regional inspectorates, and a regional secretariat with the mayor and vice mayor's directives in the decision-making process. The details can be found below:

Figure 9 Organization Chart of Administration



Source: Region Regulation on Formation and Arrangement of Regional Apparatuses Number 5, 2016

2.4 Stakeholders Involvement in Policy Making

An approach of the community-based planning process applies to implement the Gorontalo City development agenda. As inclusion for the community, this process is gradually conducted in the form of workshops (*Lokakarya*), starting from the village workshop (*Musrenbang*), the district workshop (UDKP), and the city workshop (*Rakorbang*). The workshop participants include the village, sub-district, and city-level agency, department, technical implementation unit, and stakeholders. The participatory process in development starts at the village level by implementing a forum that aims to formulate the village community's aspirations in the list of problems. The aim is to formulate village problems into a work plan at the sub-district level. It formulates sub-district problems into city activities and discusses its priority agenda in the next fiscal year (Local Regulation No. 2, 2002).

CHAPTER 3

Key Problems, Challenges and Opportunities in Priority Sectors

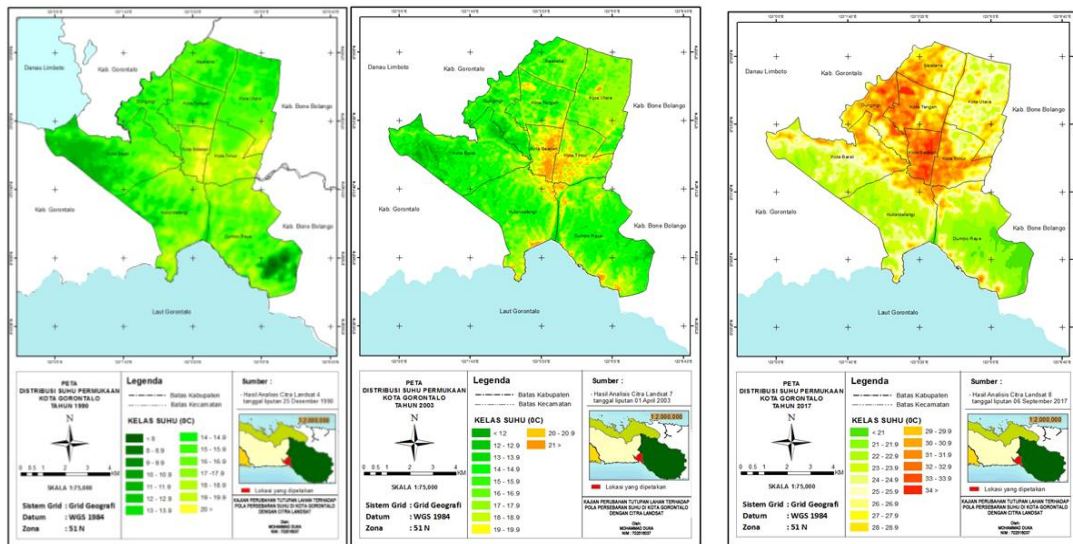
3.1 Climate Change Adaptation and Mitigation

The effects of climate change are observable in Gorontalo, most notably through the change in surface temperature in the last 30 years. The city temperature increased from 21 degrees in 2003 to 33 degrees Celsius in 2017, mostly in the settlement areas of Kota Selatan, Kota Tengah, Kota Timur, Duingingi, and Sibatana. The temperature range changed significantly of both low and high, as seen in Figure 3.1. below. The low range increased from <8 to <21 while the high increased from 20> to 34> from 1990 through 2017. Participants of Focus Group Discussion (FGD) confirmed the temperature transition by mentioning how rain intensified during the rainy season and hot temperature heightening during the dry season. They also informed two areas of Tanjung Keramat and Leato that experienced a drought regarded as an impact of climate change.

Besides, the increasing development growth in Gorontalo can impact climate change, including the greenhouse effect. It has also greatly changed the existing land's function, causing a decrease in environmental quality. In the FGD, participants mentioned the mining company in Bone Bolango District affected Bone River's catchment area, leading to the river quality flowing to the downstream. River pollution and the lowering of river surface occurred in the downstream river where Gorontalo is located, contributing to floods and drought. This condition enabled the municipal government to act, but since the mining area lies outside their territories, there was nothing much to do. A considerable range of temperature change happened in most urbanized areas. The increase of urban activities and urbanization contributed to the temperature change. Land use change, especially in the river area, really matters to the overall climate change of Gorontalo.

During the FGD, participants responded to the issue of climate change proactively. It is due to the change in land use patterning the main environmental condition of the city. The city is located downstream of Bone River, and the city's area laid on the riverbank, where it started from the National Park of Bogani Nani Watarbone. People built buildings and utilized the riverbank of Bone River and Bolango River. The utilization of the riverbank into housing settlement and infrastructure led to the ecosystem change that affects the carrying capacity. It also involves unplanned human settlements such as squatters causing slum areas. The change of function of the river bank contributes to the worsening of climate change effects. Not only has the riverbank been segregated, but also the river itself is littered with considerable thrash. Additionally, city vegetation is not well placed in city areas that can be seen from very limited green spaces. Green spaces take place only 0,91% in Kota Tengah District of 30% for all city areas mandated by Law on Spatial Management Number 26 the Year 2007.

Figure 10 - Surface Temperature Map of Gorontalo in 1990, 2003, and 2017



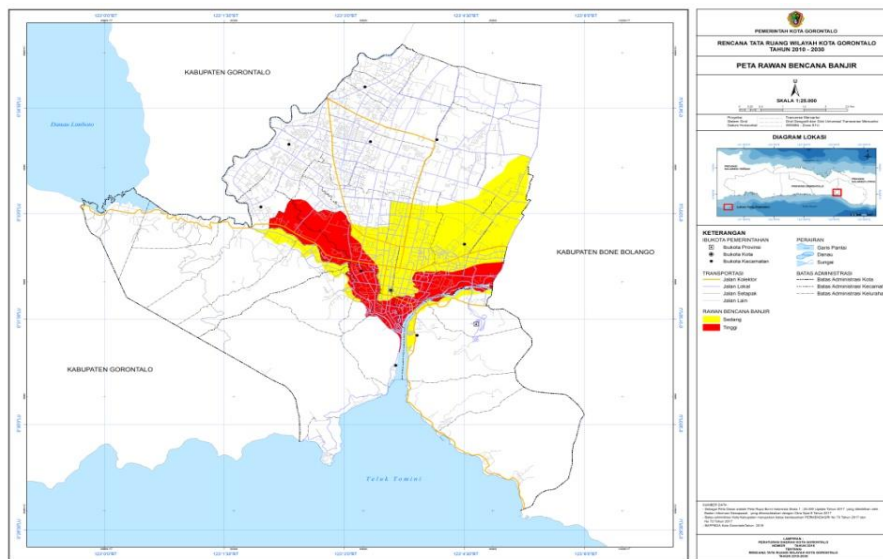
Source: KLHS RPJMD Kota Gorontalo, 2019.

3.2 Disaster Risk Reduction

Gorontalo is of high risk for forest and land fires and medium risk for earthquakes, floods, drought, and extreme weather. However, among the most commonly occurring disasters are floods, landslides, and earthquakes (KLHS RPJMD Kota Gorontalo, 2019). Accordingly, earthquakes occurred 32 times, flood incidences nine times, and landslides four times in 2019. Both earthquakes and floods decreased from the previous year, where the first happened 40 times, and the latter nine times. Similarly, landslides decreased from 7 to 4 times. In contrast, there are three high prone districts compared to others, and the speed of flood heightening in house units increases at approximately 2 meters in 2 hours, according to a citizen during the FGD. While in 2020, there are seven average incidents in the year for earthquakes, floods, landslides.

Gorontalo is prone to floods due to its bowl-like topography: the most problematic areas are located in the center parts of the city, namely Kota Timur, Kota Selatan, Kota Barat, Duingingi, Kota Tengah, and Dumbo Raya districts, as shown in Figure 11.

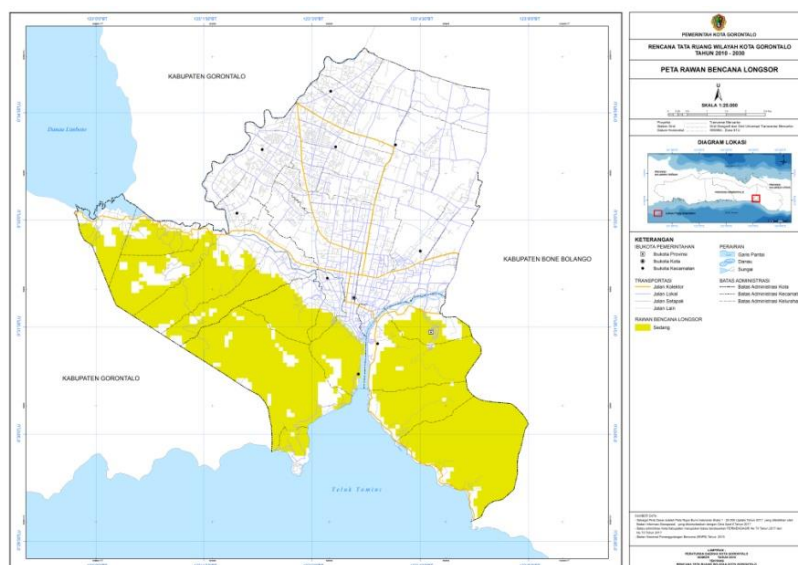
Figure 11 - Map of Flood-prone Areas in Gorontalo City



Source: KLHS RPJMD, 2018

Meanwhile, areas that are prone to landslides include Hulonthalangi, Dumbo Raya, and Kota Barat districts, as shown in Figure 12.

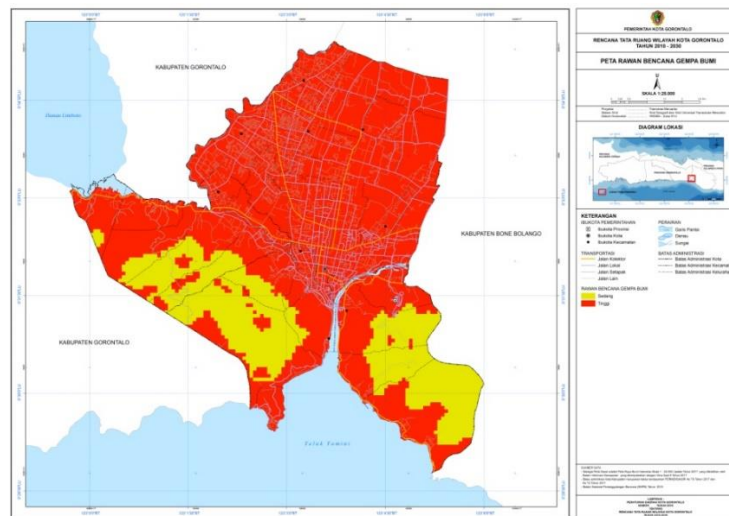
Figure 12 - Map of Landslide-prone Areas in Gorontalo City



Source: KLHS RPMJD Kota Gorontalo, 2018.

Furthermore, nearly all areas of Gorontalo city are prone to earthquakes, as shown in Figure 3.4. Kota Barat, Hulonthalangi, and coasts of Dumbo Raya districts are particularly located on the fault.

Figure 13 - Map of Earthquake-prone Areas in Gorontalo City



Source: KLHS RPJMD Kota Gorontalo, 2019.

Kota Barat, Hulonthalangi, and Dumbo Raya are considerably the most disaster-prone areas of Gorontalo. The severity of disaster occurrence on Gorontalo urbanites relates to population distribution and the situation. Three sub-districts host 29,9% of Gorontalo's total population (Gorontalo in Figures, 2020). That is relatively high for disaster-prone areas where 3 of the total 9 sub-districts contain almost one-third of the population. The male population sex ratio of the 3 sub-districts is more elevated than women, ranging from 100,12 to 101 using the males' number for every 100 females indicator. The higher number of men implicates the development of gender-specific disaster programs focusing on man and masculinity. Overall, the flood is the leading disaster challenge. City officials have conducted efforts on eliminating and reducing the incidences of disaster in the city. Besides gender-based, the flood needs to be addressed based on the classification of small and big floods.

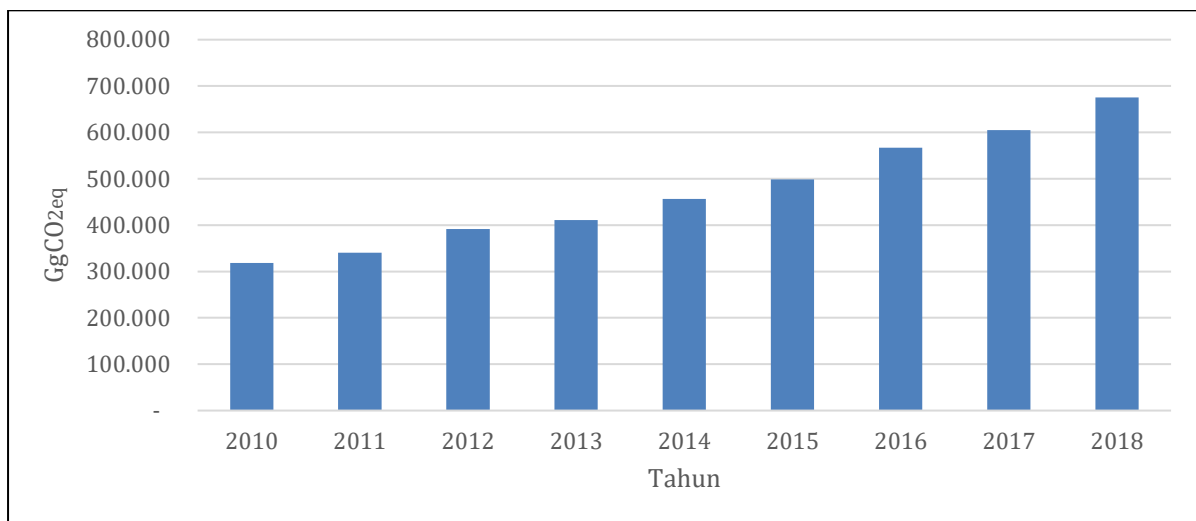
3.3 Energy and Transport

The primary source of energy supply in the city is from the State Electricity Company Suluttenggo region of the Gorontalo branch. Gorontalo has sufficient capacity for electricity supply. It is considered that Gorontalo is a provincial capital that functions as a center for trade and services and becomes a center of national activities. It certainly makes Gorontalo able to have a stable electricity energy supply and to meet the electricity needs. Natural disasters occasionally cause problems with electricity supply. This electricity problem can also hamper the activities of the city as the center of government and the economy. Currently, no data on renewable energy mix nor emissions from the energy sector are available. This might be an area of concern to address firsthand.

Transportation activities in the city produce a considerable amount of emissions and have been increasing throughout the years, as shown in Figure 3.5. Such a problem correlates with the increasing Greenhouse Gas emission from 318 to 675.4 GgCO₂eq over the last eight years. The estimated number from the city's Department of Environment informs an alarming condition about the GHG condition in the city that requires immediate and effective measurement. Most people in the city use the pedicab motor instead of public transport.

Furthermore, pedestrian infrastructures are lackluster. The pedestrian walk does not yet accommodate the needs of disability groups and others such as children, and (pregnant) women. The city pedestrian walk struggles even to facilitate ordinary people. The pedestrian condition links to the occupancy level of vehicles relatively. People tend to use private cars and motorbikes more when they are uncomfortable walking in pedestrian areas. For the mode, public transport should cover the services for all Gorontalo citizens regardless of socioeconomic status and background. People with special needs will require special assistance when using public transportation. That is why bus transportation and other circulating modes should accommodate them by providing appropriate directory assistance.

Figure 14 -GHG Emission from Land Transportation Sector

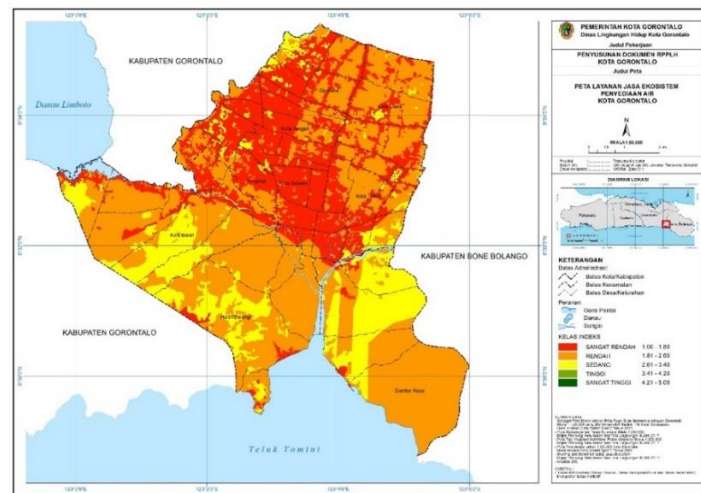


Source: Gorontalo Environmental Agency, 2018.

3.4 Water and Sanitation

The percentage of households with safe drinking water was 60,57% in 2018 (Local Mid-Term Development Plan of Gorontalo City, 2019-2024). More initiatives to develop sustainable water sources need to be done, especially since the capacity of clean water provisions in Gorontalo is deteriorating. Currently, the carrying capacity for water provision in Gorontalo City is 'Low', as shown in Figure 3.7. From Figure 3.7, it can be observed that the low carrying capacity for water provision is spread across the city, as shown through colors red, orange, and yellow. A projection of the clean water carrying capacity of Gorontalo City to 2030 indicates that the carrying capacity of clean water would still be in deficit (KLHS RPJMD, 2019).

Figure 15 - Map of Water Provision Carrying Capacity



Source: KLHS RPJMD Kota Gorontalo, 2019.

The share of households with a decent sanitation system was 85% which shows that also 15% has not accessed proper sanitation (KLHS RPJMD, 2019). Wastewater management capacity of Gorontalo City is also still below its 2030 domestic wastewater projections (KLHS RPJMD, 2019). There is an opportunity to improve sanitation conditions from Community-Based Total Sanitation in 36 of 50 villages.

3.5 Solid Waste Management

Gorontalo currently still has significant gaps in terms of solid waste management. In 2018, the percentage of waste collected was 52,8% that informed the gap of 47.2% uncollected waste (Local Mid-Term Development Plan of Gorontalo City, 2019-2024). Garbage collection per day in Gorontalo in 2014 was 48,41 tons, increased to 60 tons in 2015, and then to 80 tons in 2016. The city has five recyclable disposal facilities, and waste banks apply to reduce, reuse, and recycling principles. Waste banks also function for the commercial purpose where the environmental department encourages people to exchange trash with a small unit of gold for people's saving (Ministerial Regulation of Environment Number 13 on 3R with Waste Bank, the Year 2012; R60dtk.com, 2019). Those facilities exist in Tapa, Pulubala, Wongkaditi, Dembe, and Moodu sub-districts. The waste problem enmeshes people's awareness in conjunction with the limited budget on waste management. The citizens keep throwing their garbage to the river and making the river polluted, which then causes the floods.

Gorontalo City already applied a regulation on solid waste management, namely Regional Regulation No. 12 Year in 2017. The waste management system planning and programming involve the community, environmental activists, village officials, and other vertical agencies through harnessing recyclable principles before disposing to landfill. The independent landfill separated from the existing joint landfill with two neighboring districts needs to apply. It is essential due to measuring the production of waste in the city. This kind of measurement would be beneficial for environmental assessment and planning, leading to an impactful waste management program. In realizing this, the city official can ask help from

the central government through numerous forms, some of them are a public-private partnership and donor funding.

3.6 Sustainable Use of Resources

One indicator tracking sustainable use of resources is the quantity of recycled materials that the city lagged by 8 tons/day of the national target. Regarding climate change, it is worth considering the city's food systems' carrying capacity. Urban commercial activities have replaced many agriculture activities. The carrying capacity of the food provision of Gorontalo City has an overall 'Good' level, with a score of 56% (Gorontalo Environmental Agency, 2018). It indicates that Gorontalo has good potential to maintain food security. However, the demand for food is growing faster than increasing food sources (KLHS RPJMD, 2019). There is a need to optimize the potential for food resources.

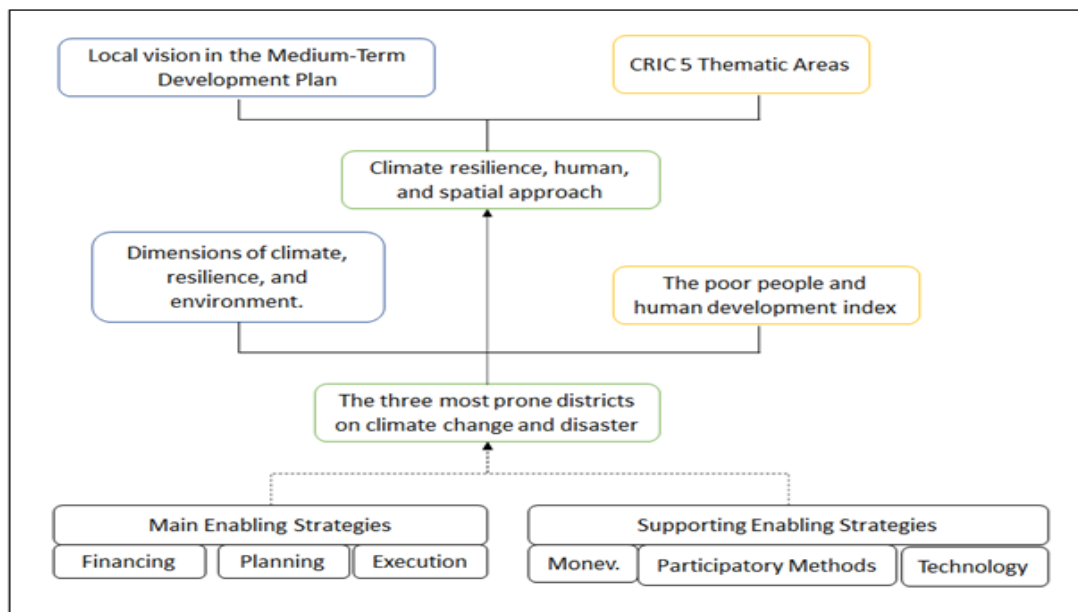
Besides, the Indonesia Chamber of Business Chapter of Gorontalo City actively cooperates with the city government as a meaningful effort for responsible production and consumption. This cooperation reflects how the private sector's awareness of developing the local economy further is good. Private sectors and the city government could jointly design innovative programs on reducing pollutants in the context of goods production and economy of scale. It involves how to efficiently allocate electricity, the flow of goods, and water and land use. Land relates to the sustainable use of resources where the city economy's expansion cannot correspond with land availability. The progress of the urban economy requires support from production capacity and distribution chain. Irresponsible production processes would harm the environment significantly, such as forest exploitation for housing. It certainly changes land allocation, such as green space and water well, to name a few.

CHAPTER 4

Policy Direction, Recommendations and Enabling Strategies

4.1 Policy Framework

Figure 16 - Climate Resilience Human and Spatial Approach (CRHSA)



Source: Authors, 2020

An analytical tool of Climate Resilience Human and Spatial Approach (CRHSA) addresses five themes: disaster risk reduction, climate change, water and sanitation, solid waste, and sustainable use of resources. This tool complements the local development plan and the expected policy target of climate change. Two underlying backgrounds are necessitating this tool in Gorontalo. The complexity of the local administrative system makes the climate working group less likely to be productive. The budget spending for the five sectors mentioned above is low compared to the budget allocated for the main four: general administration, public works, health, and education. This tool helps to strategize and trace related funding to the five climate themes. The illustration above explains how to meet those needs.

The city officials can focus on the underdeveloped areas of the five thematic issues and assemble the two closely related issues. In Gorontalo, the most prone areas to landslides are Kota Barat, Hulonthalangi, and Dumbo Raya, related to climate change. Planting trees serves as the prevention for both landslides and climate change. In the second step, the analytical tool incorporates the human dimension therein. It is essential, especially in the context of Gorontalo City, as disaster-prone areas where the crisis from a disaster takes form due to gender-specific conditions in the community (Rydström, 2019). For instance, in the two districts of Kota Utara and Dumbo Raya population sex ratio is higher, showing that men are

more populated than women in 2018 (Gorontalo Municipality in Figures, 2019). That implicates the need for a gender-specific disaster program, which focuses on man and masculinity. The disaster program includes sufficient physical activity for men based on health promotion, considering the intersections between rurality and masculinity (Carnahan et al., 2018).

In the third step, there are primary and supporting enabling strategies. Main enabling strategies include financing, planning, and program execution. The financing part aids the city official to understand funding related to the five themes across units of expenditure or spender per local government institution, as on the table below. Planning is based on the classification of events intensity, such as the classification of small and big floods, while program execution needs to address such classification accordingly. Supporting enabling strategies consist of monitoring and evaluation, participatory method, and technology. These three supporting strategies may follow what the municipal government has done, such as regular monitoring and evaluation in the planning system, including participatory meetings, and smart city. This research applies literature studies, focus group discussion, and in-depth interviews to inquire about climate change and resilience issues present throughout policy framework development. This research presents an analysis in the narrative, visual, and numeric data and provides relevant recommendations.

4.2 Current and Expected Policies Related to Priority Sectors

4.2.1 Urban Climate Policy

The current policy implemented for climate change focuses mainly on socialization. City officials realized the danger of dengue fever in the rainy season that requires well-addressed programs by the health department. The contribution of sufficient and decent sanitation helps to prevent dengue fever. Another good practice of climate includes the socialization of greenhouse gas impact in the deliverable of building permits. Even though on a small scale, two existing climate practices are a good starting point for gathering the overall city department to develop a coordinative climate change program. There is also a greenhouse gas program and air pollution implemented in the city relating to the Ministry of Environment program on climate change, even though it has questionable results compared to air quality and GHG data.

Moreover, the coordinative program should address the very core of climate change in urban Gorontalo, focusing on reducing methane, carbon dioxide (CO₂), and Nitrogen Dioxide (N₂O) as the building factors (Chilingar et al., 2014; Allen et al., 2012; NASA, 2020). In the Gorontalo context, payment for ecosystem services (PES) on solid waste management, water and sanitation, and sustainable use of resources will encourage people's awareness of the environment. PES essentially means the various advantages taken from the natural environment, including carbon sequestration and storage, biodiversity protection, watershed protection, and landscape beauty, as in ecotourism (Fripp, 2014).

The ecosystem services show mechanism in maintaining air quality and its chemical content to benefit humans that the higher the points show the optimum utilization by inhabitants. That point covers only the air quality based on landcover, vegetation type, and type of

landscape. Current air quality exists at the low point of 65,11%, a medium point of 14,48%, and a high point of 19,50%, as in Figure 4.1. below on ecosystem services for air quality. Three districts with the highest points, including Kota Barat, Hulonthalangi, and Dumbo Raya, where the change of landcover in forest occurred. Unfortunately, this assessment did not involve air pollution from vehicles and industrial sectors as its variables. The high use of pedicab motor emitting fuel pollution encourages further assessment to gain a comprehensive air quality level in Gorontalo City.

Figure 17 - Ecosystem Services for Air Quality Based on Districts

DISTRIBUSI LUAS KINERJA JASA LINGKUNGAN PENGATURAN FUNGSI EKOSISTEM PENGATURAN KUALITAS UDARA KOTA GORONTALO BERDASARKAN ADMINISTRASI													
NO	KECAMATAN	SANGAT RENDAH		RENDAH		SEDANG		TINGGI		SANGAT TINGGI		TOTAL	
		(Ha)	%	(Ha)	%	(Ha)	%	(Ha)	%	(Ha)	%	(Ha)	%
1	Dumbo Raya	2.25	0.03%	518.28	7.33%	54.79	0.78%	840.58	11.89%	-	0.00%	1,415.90	20.03%
2	Dungingi	35.88	0.51%	398.28	5.64%	28.28	0.40%	3.64	0.05%	-	0.00%	466.07	6.59%
3	Hulonthalangi	-	0.00%	667.55	9.45%	267.37	3.78%	281.98	3.99%	-	0.00%	1,216.90	17.22%
4	Kota Barat	7.07	0.10%	630.79	8.93%	506.70	7.17%	238.32	3.37%	-	0.00%	1,382.88	19.57%
5	Kota Selatan	0.74	0.01%	280.22	3.96%	0.01	0.00%	2.14	0.03%	-	0.00%	283.11	4.01%
6	Kota Tengah	2.87	0.04%	458.24	6.48%	20.13	0.28%	-	0.00%	-	0.00%	481.23	6.81%
7	Kota Timur	4.84	0.07%	445.55	6.30%	55.21	0.78%	8.03	0.11%	-	0.00%	513.63	7.27%
8	Kota Utara	10.65	0.15%	795.08	11.25%	29.85	0.42%	0.39	0.01%	-	0.00%	835.97	11.83%
9	Sipatana	0.17	0.00%	407.67	5.77%	60.97	0.86%	3.11	0.04%	-	0.00%	471.92	6.68%
TOTAL		64.47	0.91%	4,601.65	65.11%	1,023.30	14.48%	1,378.19	19.50%	-	0.00%	7,067.61	100%

Source: Strategic Environmental Assessment of RPJMD Gorontalo City 2019 - 2024

This research argued more based on two opposing facts within Gorontalo city government. Even though the GHG emission acquired as the sixth priority in the national development agenda, the Gorontalo city planning agenda put it as a secondary agenda in the local development plan 2019-2024. The city government is actually in a dilemmatic position because the administrative arrangement put it as non-primary. Another contributing factor is how the local government system adopts GHG emissions issues into their local programming system. The city government indirectly addresses the issue through several industry programs, regional waste management, land transportation, and environmental degradation according to the local development program and funding table in the current local development plan or RPJMD 2019-2024. The climate action plan should effectively force each department to coordinate across

departments in the city administration to decrease GHG emissions.

4.2.2 Disaster Risk Reduction

Disaster reduction policy should focus beyond onlt the prevention and mitigation but to broader spatial and ecological city context. During the data collection process, the limited available land has a high degree of land-use change with conjuncture of translocal impact of upstream mining exploration. The complex cause leads to a decreasing land capacity to maintain water, making floods higher. The research thus hypothesizes the water retention area in the neighboring regencies affected by the flood incidents in Gorontalo.

This is due to illegal logging, causing the area not to hold water and cause a flood in Gorontalo. The condition is better now because the illegal logging business is not as accessible as before, according to the

Head of Chamber business during the focus group discussion. The case covers the irresponsible business practice despite weak urban policy implementation that harms the environment impacting the city. Advocacy would be applicable to prevent the irresponsible business practice as the municipal government already has permanent cooperation with the business chamber.

4.2.3 Energy and Transport

The primary sources for urban people in Gorontalo City came from water, electricity, and transportation fuel, which the central government and local government-private company managed. The city government owns a local water sector company while the central state-owned companies manage other energy sectors. Local water company or *Perusahaan Daerah Air Minum* (PDAM), as a local government-owned company, regularly provides water to Gorontalo people. State Electricity Company or *Perusahaan Listrik Negara* (PLN) delivers the electric connection, and State Oil and Natural Gas Mining Company or Pertamina distributes gasoline for people transportation in Gorontalo City. All of which contribute to the degree of GHG emissions. The city government may only regulate the water company's upstream production but not for PLN and Pertamina. Further elaboration needs for managing this issue.

The energy and transport policy should go in hand within the context of the city's sustainability. However, such integration did not happen in Gorontalo City. The Department of Transport only applies for traffic and vehicle programs, mainly focusing on emission tests reaching 99% of the qualified emission category. This high percentage depends on further critical inquiries. This research questioned

more what vehicles have been tested against the common practice covering only big commercial vehicles. It is common sense in all Indonesian cities that private vehicles do not undergo an emission test. This sense aligns with the increasing number of pedicab motors in the city, leading to higher emissions.

The local officials confirmed the spurring number of pedicab motors in the focus group discussion. Other research also confirmed these findings, highlighting the percentage use of public transport in the city as little as 10% compared to pedicab motors at around 43.2%, and 38.6% private motorbikes (Akustia, 2016). The condition encourages the local official to ensure a reliable transportation system in the city through a well-developed development policy and its implementation. It has to include good public transport services upon its infrastructures such as a terminal, interconnected system, and comfortable vehicles. The sufficiency of public transport will reduce the use of pedicab motor and motorbike, reducing air pollution and emission.

4.2.4 Water and Sanitation

Water and sanitation services consist of priority on water supply, water resources, and wastewater systems. The water supply coverage reached out to 27.431 household channels per 5 people, so the water pipe networks served 137.155 inhabitants. The number shared only 60.5% of the total population as 200,558, which shows also 39.5% of people without access to the water services. Non-piped water to certain contexts brings risk to the population and environment, such as land subsidence and contaminated water. The high percentage of the population without decent sanitation contributes to the contaminated water.

Another issue in water resources is how water translocality occurred when the rain happened only in surrounding cities that lead to floods and puddles in Gorontalo city. The current drainage line of 151.400 meters did not adequately support to prevent this issue. In terms of sanitation, the drainage system of 25.061 unit meets the target of 38.633 urban households. Department of public works and spatial planning provided 31.800 toilet units that each toilet can serve five households. The toilet has not covered the number of 9.734 households, which roughly projected to 38.936 populations.

This research argued on the more integrated urban water approach towards complex water issues in the city. The water access coverage at the percentage of 68 needs the more systematic improvement from local water companies by ensuring improvement in administrative and technical coverage with cooperation. The water company/PDAM can cooperate with the head of district/kecamatan and sub-district/kelurahan to penetrate the water services for the uncovered population as well as a range of technical improvement for enhancing services other city PDAM in Gorontalo Province or the national association of drinking water (*Persatuan Perusahaan Air Minum Indonesia*). Local officials should focus on harvesting rainwater instead of groundwater as an alternative to non-piped water services. More importantly, the integrated policy on urban water should use flood data in a larger local planning context.

4.2.5 Solid Waste Management

The policy of solid waste management consists of waste collection services, waste banks, and landfill issues. The waste collection services have reached 25.368,36 tons in 2019, according to the Department of Environment. There are 9 operating waste banks units resulting in

various products of decorative plants and fertilizer. The current landfill, which is jointly shared with two neighboring districts, soon will be full. As a policy improvement, the waste services essentially depend on understanding the daily attitude of Gorontalo people. This enables the city government to intensify efforts to pick up waste, when most people dispose of their trash and where it is disposed of. The collection program should consider that the spread of waste varies across district levels to increase the number and frequency of vehicles picking up the waste.

4.2.6 Sustainable Use of Resources

Local officials and individuals in Gorontalo may have one achievable conduct by maintaining the waste banks and adopting a similar program. City officials can increase people's consciousness of waste by campaigning recycling attitudes in more delightful and beneficial ways. For example, an idea from another city like Bus Suroboyo where a plastic bottle is used as a transportation ticket. In a much similar way, the city of Gorontalo can adopt this by using plastic bottles to get a free ride of pedicab motor as the prevailing transportation or in a better way to compensate for public transport tickets. This kind of idea can also be enlarged from other environmental concerns in Gorontalo.

4.3 Enabling Strategies, Related Challenges and Opportunities in Priority Sectors

Supporting the priority sector's realization above entails two relevant strategies of a

robust evidence-based policy formulation and translocal development from the people–evidenced-based policy to support urban climate policy with more critical measurement in the development program and its result evaluation. Evidenced-based policy here means not only based on statistical data but also on the actual social reality from urban people. The application of the Climate Resilience Human and Spatial Approach (CRHSA) needs here where resilience in health infrastructure and human health conditions exists. The Head of Health Department informed that the location of public health centers in Hulonthalangi and Dumbo Raya District is not ideal due to narrow streets and the high density. Such a condition leads to uneasy access in health emergencies and worsens in the time of disaster.

Translocal development captures how other local places are causing an impact in the city. In the Gorontalo context, the mining sector near the Bone Bolango District issue caused a flood mentioned by some FGD and interview participants. That case happens because of the retention of water upstream disturbed by the mining practices. The translocal development works as an input for the city to city cooperation. Starting to solve this problem needs to engage with the Gorontalo Provincial Government, who granted the business permit to the mining sector according to Law Number 23 the Year of 2014 on Local Government.

4.3.1 Disaster and Resilience

The city areas of Gorontalo maintain a 60% practical utilization where the rest is used as protected forest and with hill topography constraint. Meanwhile, the significant progress of the city caused the change of land-use on farmland. According to an academia in the FGD, Gorontalo City managed only 1.4%

private green space and around 12% public one. The Law of green spaces mandated private green space at a minimum of 10% and public green space at a minimum of 20% of the total city area. Ensuring consistent spatial policy makes the implementation of green space more reliable.

In the ongoing year of 2020, Gorontalo City experienced floods from 9 to 12 incidents alongside significant puddle water on several main roads. Considering the downstream factors, minimum urban vegetation and the urban concave morphology are responsible for these flood disasters. The causing factors also occurred upstream due to illegal logging from legal and illegal mining. Change of function alongside the river basin became another factor leading to flooding. Besides floods, the city persists with landslides in three districts; Kota Barat, Hulonthalangi, and Dumbo Raya. The current disaster policy only focused on mitigation management when the disaster occurred and did not socialize and put significant effort into disaster prevention.

4.3.2 Waste and Water Nexus

Most Gorontalo people have access to a clean water supply, but the quality aspect is an issue. The local water company harvests and utilizes surface water from the river on which people usually dispose of their waste. The city government's effort anticipating this problem is not optimum due to the current awareness-raising program that did not change societal behavior. Lack of awareness of the proper behavior towards disposing of trash can also contribute to this problem. Another significant issue on the capacity of landfill signifies the broad environmental issue of Gorontalo. The city waste management unit transports the waste to the Talumelito landfill to be disposed of, but its capacity will be fully occupied in 2022. Bone

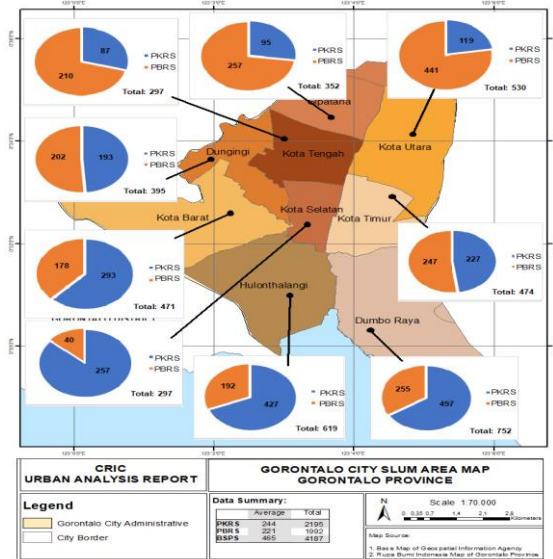
Bolango and Gorontalo District jointly utilize the landfill to make the carrying capacity of the landfill more limited for the city. It is also supported by the fact that the provincial government owns the landfill. The proposed policy on this issue consists of changing the way of disposing trash and building an adequate landfill. City policy on waste management can transform the way people dispose of trash through waste programs, strengthening local regulation on household and business waste production.

4.3.3 Informal Settlement

Informal settlement contributed to the cleanliness aspect of the city and living conditions. It also shows how the city's housing capacity can accommodate the whole of urban people in Gorontalo. There are three districts, Kota Utara, Hulonthalangi, and Dumbo Raya, which have the highest informal settlement, as shown below. The informal settlement data below derived from the Housing Stimulant Support Program proposed the ministry of public works.

Housing Stimulant Support Program, or *Bantuan Stimulan Perumahan Swadaya* (BSPS) in Indonesian, is a program made by the National Government of Indonesia, which rebuilds or renovates housing of slum areas in any city or district in Indonesia. There are two programs attached to the BSPS program: a) House Quality Improvement or *Peningkatan Kualitas Rumah Swadaya* (PKRS) in Indonesian; and b) New House Building or *Pembangunan Baru Rumah Swadaya* (PBRS) in Indonesian. In Gorontalo City, 4.197 houses will be the object of this program, of which 2.195 homes will get their house quality improved, and the other 1.992 places will get a new proper house.

Figure 18 - Estimated Informal Settlement



Source: Stimulant Program for Housing, 2020

4.4 Technologies for Development

Water as a source of energy came from the local water company, which channeled to the people of Gorontalo. The companies harvest the surface water from rivers that depend on the season. The river's quality upstream and alongside the river body, especially across the city, became the primary concern. It became the principal concern because of the contribution to the water quality, which is consumed by the urban people of Gorontalo.

Water access to Gorontalo people becomes a specific concern because this has multiple effects. The water distribution reflects on the equality of energy access in the city. Beside this equality issue, the water distribution determines the level of groundwater that affects land subsidence. The more inhabitants take the groundwater; the more land subsidence will occur. Besides, the critical condition of landfills that overuse also needs further

assessment and relevant technology. Further assessment requires what time the landfills will fully occupy and what kind of waste incinerators apply to the landfills.

4.5 Challenges and Opportunities for Mainstreaming Sustainable Development

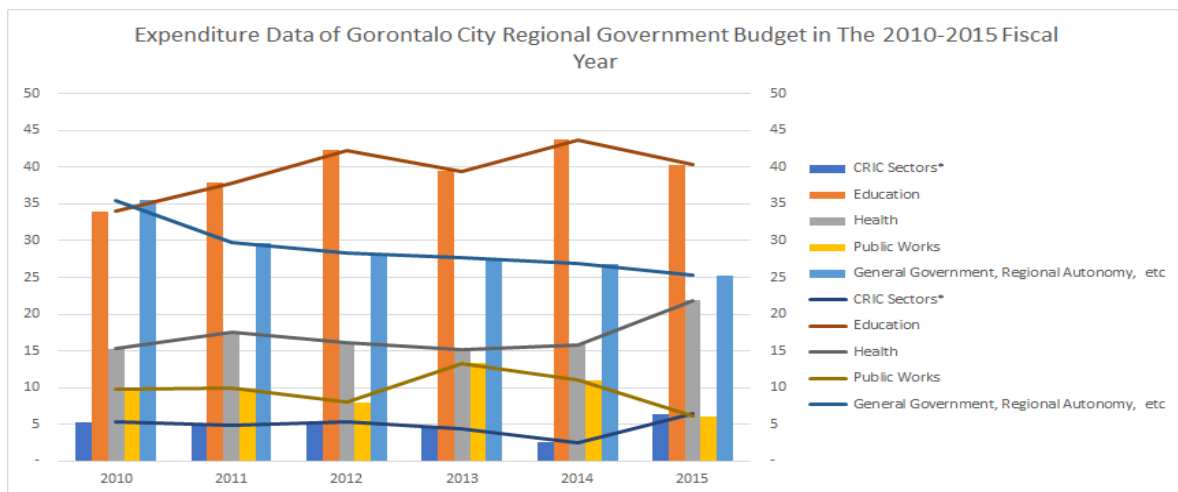
Sustainable development implementation at the city level depends on the regional strategy of Sustainable Development Goals (SDGs) established by the provincial government. The city government has

implemented SDGs by applying a more inclusive approach towards children, women, disabled citizens, and minority groups even though there is no existing SDGs regulation.

The city implements the principle of SDGs through different means and forms. A Child-Friendly City program is implemented to meet these needs upon local regulation. In another way, the city government has initiated to develop the Working Plan of Non-State Budget. This plan serves as a coordinating plan to integrate and solve the overlapping activities of Corporate Social Responsibility (CSR) programs by private companies.

4.6 Financing instruments

Figure 19 - Public Expenditure of Gorontalo City Government 2010-2015



Source: Authors, 2020

CRIC related sectors annotated Transportation, Environment, Agriculture, Forestry, Trade, Industry, Marine, and Fisheries expenditure. In 2014, there were only transportation and environment sectors data. The small share of CRIC related sectors needs to deal with unsolved problems in inadequate landfills, high disaster incidents, and land-use change issues.

The expenditure informed how the city administration prioritized human development, government administration, and infrastructure throughout its development years. The high spending on education expenditure still contributed to the insufficient ratio between students and classes (Local Long-Term Development Plan, 2007-2028). In the health sector, the average spending of 17% of the total budget did not align with the health program's quality. Public health centers in Dumbo Raya and Hulonthalangi are not in good condition and are an inadequate location, due to difficult access to the public health center and much air pollution from fishery companies, and flood presence. The pattern of expenditure dominated by human development sectors, government administration, and infrastructure is also reflected in almost all provincial and municipal governments in Indonesia.

4.7 Partnership and Capacity Building

Gorontalo's city government gradually maintains relationships with academia, civil society, business, and international organizations. The relationship among partners of development include the United Nations Development Programme (UNDP), *Sahabat Pulau Gorontalo* (Gorontalo Island Fellows), *Forum Komunitas Hijau* (Green Community Forum), Gorontalo Biodiversity Forum, USAID IUWASH Plus, *Universitas Negeri Gorontalo*, and *Politeknik Gorontalo*. Among them, cooperation with UNDP, local enterprise, and academia shared a significant partnership with its benefits on capacity building.

UNDP and the city government jointly developed an analysis of SDGs indicators aligning with the local development plan in 2019. The alignment analysis informed city officials on

the current status of urban sustainable development together with possible strategies. A group of local enterprises congregated to establish the Association of Child-Friendly Local Companies, gathering corporate social responsibility funding to help Gorontalo children reach their development. The city government also keeps a very good relationship with academia in Universitas Negeri Gorontalo, where advising on city development is born in many engagements and meetings. The city cooperation unit should utilize the external relationship with the above organization by way of tackling the very actual and fundamental problems of the city. This effort could also involve the neighboring districts by proposing joint action to solve common problems.

Cooperation with other municipal governments comprises translocal development issues that are caused by other places. For instance, the city government can cooperate with Bone Bolango District to tackle the flood caused by mining companies in the upstream area around its area. The program will involve the provincial government and enlarge greater business issues and might be a resource for management politics. Regardless of this issue, Indonesia's law has persuaded such cooperation under Government Regulation Number 28 the Year 2018 on Regional Cooperation. It intends and urges more local governments located near each other or neighboring areas to conduct technical cooperation on development areas.

CHAPTER 5

Conclusion and Recommendations

5.1 Conclusion

There are four climate and resilience-related sectors to focus on: air pollution, waste management, water and sanitation, and early warning systems for disaster mitigation. Land characteristics and vegetation and the high use of pedicab motor emitting gasses from fuel-burning, leading to 19,5% of the high ecosystem services on air quality, cause a significant increment of air pollution. Besides, the steady increment of GHG emissions includes a point for consideration of air pollution. Waste management problems require the city government to immediately figure out how the future landfill operates alongside its technology and public awareness toward waste disposal. The city government and provincial government should immediately figure out how the future landfill would and what could be. Further, the research argues that air pollution and waste management are the biggest priority of the Gorontalo city government.

The 32% of people who have no access the water services, the low carrying capacity, and 15% of people without proper sanitation became the focus of the water and sanitation sectors. High incidents of floods, landslides, and earthquakes share a significant degree to the city government to apply more agile early warning systems as a means of disaster risk management, acquiring a proper early warning system. Another point to consider is that spatial focus more on districts with high ecosystem services on-air and disaster-prone areas, e.g., Kota Barat, Hulonthalangi, and Dumbo Raya. It

also considers translocal development issues related to water coming from the neighboring districts leading to flooding.

5.2 Recommendations

Gorontalo city can apply payment for ecosystem services (PES) on air pollution and waste management to encourage people's awareness of air pollution and waste management. The reward system in cash or others will cause people to act more friendly to the environment. Evidence-based policy harnessing the technocratic approach, and local realities will strengthen the policy implementation on climate change and resilience. Besides, the city government should focus on translocal development issues outside of the city that impact them internally.

REFERENCES

- Allen, S. K., et al. 2012. Summary for policymakers. In *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: Special Report of the Intergovernmental Panel on Climate Change* (pp. 3-21). Cambridge University Press.
- Carnahan, L. R. et al., 2018. Physical activity and masculinity in rural men: a qualitative study of men recruited from churches. *Health education research*, 33(2), 145-154.
- Chilingar, G. V., et al. 2014. Do increasing contents of methane and carbon dioxide in the atmosphere cause global warming?, *Atmospheric and Climate Sciences*, 4(05), 819.
- Central Bureau of Statistics of Gorontalo City, 2020
- Fripp, E. 2014. *Payments for Ecosystem Services (PES): A practical guide to assessing the feasibility of PES projects*. CIFOR.
- Gorontalo Municipality in Figures, 2020
- Government Regulation Number 28 Year 2018 on Regional Cooperation
- INAGeoportal, 2020
- InaRisk, 2020
- Law on Local Government Number 23 Year of 2014
- Law on Spatial Management Number 26 Year 2007
- Local Long-Term Development Plan of Gorontalo City, 2007-2028
- Local Mid-Term Development Plan of Gorontalo City, 2019-2024
- Local Regulation of Gorontalo on Community Based Development Planning Number 2, 2002
- Ministerial Regulation of Environment Number 13 on 3R (Reduce, Reuse, and Recycle) with Waste Bank
- NASA, 2020. *The Causes of Climate Change*.
- National Medium-Term Development Plan Year, 2015-2019
- Policy and Environmental Management Strategy in Gorontalo City, no date
- Presentation in Pilot City Discussion, 2020
- Region Regulation of Gorontalo on Formation and Arrangement of Regional Apparatuses Number 5, 2016
- Revised Local Mid-Term Development Plan, 2014-2019

Rydström, H. 2019. Disasters, ruins, and crises: Masculinity and ramifications of storms in Vietnam. *Ethnos*, 85(2), 351-370.

SMERU Poverty Map 2015

Stimulant Program for Housing, 2020

Strategic Environmental Assessment of RPJMD Gorontalo City 2019 - 2024

Tsunami Early Warning Services Guidebook for Inatews, 2012

Utina, R. 2008. Community Perspective of Mineral Potential and Conservation Effort in The National Park of Bogani Nani Wartabone in Bone Bolango District, Gorontalo (Translated by Authors)

60dtk.com, 2019, Exchanging thrash to gold as solution by Gorontalo to reduce plastic waste (<https://60dtk.com/tukar-sampah-jadi-emas-solusi-pemkot-gorontalo-kurangi-sampah-plastik/>)

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