

Exploring SDGs Regulatory Frameworks and Regional Regulation for Climate Change Mitigation and Adaptive Resilience in Coastal Communities

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Abstract

Climate change will cause ecosystem changes that will affect all aspects of human life on earth. The Intergovernmental Panel on Climate Change (IPCC), in its fifth assessment report (AR5), stated that climate change is also having an impact on the marine environment. Indonesia as an archipelagic country will of course also feel the domino effect of climate change. Therefore, climate change is very urgent to be discussed in Indonesia. This article will examine and formulate derivative regulations which are implementation instruments to provide legal protection for the environment and coastal residents when facing the impacts of climate change. This paper applies normative research methods as well as a contextual approach, historical approach, legal approach, comparative approach and case approach which will then be analyzed qualitatively. Specifically, this article will analyze the Buton Regency, especially the North Buton Regency government's efforts to overcome climate change which is realized by the existence of regional regulations that specifically regulate Climate Change Adaptation [API] as well as integrating regional regulations with API elements, especially in the sectors of spatial design, development planning and disaster management. So, it can be a reference for a regions that have coastal areas to achieve the target of Sustainable Development Goals [SDGs] point 13.

Keywords: *Climate Change; Coastal; Adaptation to Climate Change*

1. INTRODUCTION

This paper specifically examines the Buton Regional Regulation and its associated derivative regulations. The primary focus is to analyze how these regulations are formulated to serve as implementation instruments, providing legal protection for the environment and coastal communities. This analysis is particularly relevant in addressing the pressing challenges posed by marine ecosystem degradation and the impacts of climate change. By studying the regulatory framework and its practical applications, this paper aims to contribute to a better understanding of effective environmental governance in coastal regions.

As *Intergovernmental Panel on Climate Change (IPCC)*, in its fifth assessment report (AR5),¹ states that climate change is impacting the global marine environment at an unprecedented rate, resulting in multifaceted implications for marine and coastal ecosystems. Climate change and its socio-economic effects on coastal communities are also emphasized in the report. The marine environment, which is crucial to food security and economic development in tropical and subtropical coastal communities, is expected to experience negative effects according to projections.²

Under climate conditions that are experiencing relatively unpredictable changes, the challenges of coastal community fishing activities and businesses currently do not only come from aspects of human resources, capital and facilities, but fisheries business actors also need to face the challenges of environmental alteration.³ The outcome of climate change will be influenced by changes in fishing practices and outcomes for fish processing industries. Uncertainty in weather and fishing results hinders the ability of fish processors to meet consumer demand for processed fish products.⁴

Sea level rise (SLR) poses a significant threat to the environment and livelihoods of coastal communities. All coastal areas, regardless of their legal or illegal status, are disaster-prone zones due to their inherent vulnerability to climate change, particularly in low-lying regions and small islands, particularly low-lying coastal areas and small islands, which are vulnerable to climate change.⁵ Coastal flooding, coastal erosion, and saltwater intrusion are among the effects of SLRs, which are closely linked to the rise in sea levels caused by climate change. This is one of the most discussed impacts on coastal areas.⁶

The domino effect of the SLR phenomenon is the occurrence of salinization which encourages seawater intrusion into surface water and groundwater, as well as increasing land-based drought events.⁷ Freshwater supply in coastal and small island environments has been a recurring issue in IPCC reports. Increasing daily demand, land conversion, and tourism have put significant pressure on limited freshwater reserves, making large parts of the region water-stressed.⁸ The effects of climate change are expected to become more severe, with reduced precipitation and warmer temperatures leading to seawater intrusion and flooding caused by rising sea levels, which will lead to sedimentation from existing drinking water bodies and contamination from inland sources.⁹

1 Rajendra K Pachauri et al., *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to The Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Geneva: Intergovernmental Panel on Climate Change (IPCC), 2014).

2 Lauren V Weatherdon et al., "Observed and Projected Impacts of Climate Change on Marine Fisheries, Aquaculture, Coastal Tourism, and Human Health: An Update," *Frontiers in Marine Science* 3 (2016): 48.

3 Indah Listiana, I Efendi, and A Rahmat, "The Behavior of Extension Agents in Utilizing Information and Technology to Improve the Performance of Extension Agents in Lampung Province," in *Journal of Physics: Conference Series*, vol. 1155 (IOP Publishing, 2019), 12004.

4 Helvi Yanfika et al., "Impact of Climate Change on Coastal Communities in Tanggamus Regency," in *Journal of Physics: Conference Series*, vol. 1796 (IOP Publishing, 2021), 12029.

5 Weatherdon et al., "Observed and Projected Impacts of Climate Change on Marine Fisheries, Aquaculture, Coastal Tourism, and Human Health: An Update."

6 Sofia Ehsan et al., "Current and Potential Impacts of Sea Level Rise in the Coastal Areas of Malaysia," in *IOP Conference Series: Earth and Environmental Science*, vol. 228 (IOP Publishing, 2019), 12023.

7 Gary Griggs and Borja G Reguero, "Coastal Adaptation to Climate Change and Sea-Level Rise," *Water* 13, no. 16 (2021): 2151.

8 Elisa Sainz de Murieta, Ibon Galarraga, and Marta Olazabal, "How Well Do Climate Adaptation Policies Align with Risk-Based Approaches? An Assessment Framework for Cities," *Cities* 109 (2021): 103018, <https://doi.org/10.1016/j.cities.2020.103018>.

9 Laura Sinay and R W Carter, "Climate Change Adaptation Options for Coastal Communities and Local Governments," *Climate* 8, no. 1 (2020): 7; Susana Lincoln, "Impacts of Climate Change on Society in the Coastal and Marine Environments of Caribbean Small Island Developing States (SIDS)," *Caribbean Marine Climate Change Report Card: Science Review*, 2017, 115–23.

Indonesia is an archipelago that is surrounded by oceans, and the conditions described above are bound to have a significant effect on coastal communities that depend on marine resources. The risk of climate change in coastal communities is reduced by governments at both national and regional levels through protective adaptation.¹⁰ A climate change mitigation refers to efforts to reduce or prevent emission of greenhouse gases. Mitigation can mean using new technologies and renewable energies, making older equipment more energy efficient, or changing management practices or consumer behavior¹¹ Fawzy et al.¹² state that there are three main approaches to climate change mitigation. First, conventional mitigation efforts use decarbonization technologies and techniques that reduce CO₂ emissions, such as renewable energy, fuel switching, efficiency improvements, nuclear power, and carbon capture, storage, and utilization. The second route is a series of new technologies and methods that have recently been proposed. These techniques have the potential to be used to capture and sequester CO₂ from the atmosphere and are called negative emission technologies, also referred to as carbon dioxide removal methods. Finally, the third route revolves around the principle of altering the Earth's radiation balance through the management of solar and terrestrial radiation. These techniques are called radiative forcing geoengineering technologies, and their main goal is temperature stabilization or reduction. Unlike negative emissions technologies, this is achieved without changing the concentration of greenhouse gases in the atmosphere. All of these techniques are still theoretical or in the very early stages of testing and carry many uncertainties and risks in terms of practical large-scale implementation¹³¹⁴.

The formulation of appropriate regulations and policies will play an important role in such efforts. Therefore, the focus of this paper is to examine the formulation of derivative regulations which are implementation instruments to provide legal protection for the environment and coastal communities in facing the threat of marine ecosystem degradation and the impacts of climate change.¹⁵

This study applies the normative-empirical legal research method, which focuses on the study of the harmonization of regulations and policies related to environmental protection and coastal communities. Normative research mainly uses several approaches, including conceptual approaches, historical approaches, statutory approaches (conventions), comparative approaches, and case approaches. All legal materials will be analyzed qualitatively.

This paper applies normative research methods as well as a contextual approach, historical approach, legal approach, comparative approach and case approach which will then be analyzed qualitatively. Specifically, this article will analyze the efforts of the

10 Carla Gonçalves and Paulo Pinho, "Does Landscape Play a Role in the Governance of the Coastal Region? An Evolutionary Perspective from Portugal since 1950," *Progress in Planning* 181, no. April 2023 (2024): 100811, <https://doi.org/10.1016/j.progress.2023.100811>.

11 Deborah Panepinto, Vincenzo A. Riggio and Mariachiara Zanett, "Analysis of the Emergent Climate Change Mitigation Technologies," *International Journal of Environmental Research and Public Health* 18 no. 13 (2021): 10.3390/ijerph18136767

12 Samer Fawzy et al., "Strategies for mitigation of climate change: a review," *Environmental Chemistry Letters* 18 no. 6 (2020): 10.1007/s10311-020-01059-w

13 Mark G. Lawrence et al., "Evaluating climate geoengineering proposals in the context of the Paris Agreement temperature goals," *Nature Communications* 9 no. 1 (2018): 10.1038/s41467-018-05938-3

14 Andrew Lockley, Zhifu MI, D'Maris Coffman, "Geoengineering and the blockchain: Coordinating Carbon Dioxide Removal and Solar Radiation Management to tackle future emissions," *Frontiers of Engineering Management* 6 no. 1 (2019): 10.1007/s42524-019-0010-y

15 aul Atagamen Aidonojie et al., "Prospect, Legal, and Socio-Economic Implication of Metaverse Operation in Nigeria," *YURISDIKSI : Jurnal Wacana Hukum Dan Sains* 19, no. 4 (2024): 455–75, <https://doi.org/10.55173/yurisdiksi.v19i4.201>.

Buton Regency government in tackling climate change and integrating the realization of regional regulations with API elements, especially in the spatial planning, development planning and disaster management sectors.

2. ANALYSIS AND DISCUSSION

2.1. Regulatory Products for Climate Change Adaptation

The risk of climate change is greater due to human actions rather than natural factors like changes in the Earth's orbit and solar activity, which endanger coastal regions.¹⁶ Coastal areas also face significant challenges, changes in the Earth's ability to reflect sunlight, volcanic activity, and changes in carbon dioxide concentrations.¹⁷ It can be said that all these natural processes do not have a significant impact on climate change. The changes that occur are very slow and are not dangerous to humans. The main cause of climate change that is currently happening is human activity. It is time to stop blaming nature and immediately take responsibility to overcome climate change.¹⁸

One of the most vulnerable groups to climate change is coastal communities. This is because they are very dependent on natural resources. Small changes in their environment can have a direct impact on the lives of coastal communities. The effects of climate change that occur can be in the form of economic and non-economic losses and damage. Examples of economic losses and damage are loss of income and damage to infrastructure, while non-economic, for example, they have to leave their old homes because they can no longer be inhabited due to climate change. In addition, non-economics also talks about mental health, lost culture, local knowledge, and biodiversity.¹⁹ These impacts must of course be addressed, which is why loss and damage due to climate change must be recognized, minimized from occurring, and anticipated when they occur.²⁰

It has been stated that human activities have become the main cause of climate change, impacting not only the life of marine biota and its waters but also because of it, impacting the lives and livelihoods of coastal communities. By understanding the causes, the impact of human interaction on the environment [marine ecosystem threats] can be minimized and/or anticipated when they occur. Thus, minimizing and/or anticipating the impact of climate change is an effort to manage human activities with the environment [social and natural]. Managing is usually equated with *bestuur* which according to Bagir Manan law has various functions. In addition to the function of managing [*besturen*], *bestuur* also carries out the function of regulating [*regelen*], the function of enforcing the law [*handhaving van het recht*] both the function of supervising or the function of controlling and the function of applying sanctions, and the function of implementing judge's decisions [*executive*].²¹

16 Kaitlin F. Strange, Hug March, and Mar Satorras, "Incorporating Climate Justice into Adaptation Planning: The Case of San Francisco," *Cities* 144, no. January 2023 (2024): 104627, <https://doi.org/10.1016/j.cities.2023.104627>.

17 Mila Sari et al., "Adaptasi Dan Mitigasi Perubahan Iklim Di Indonesia" (Jakarta: Global Eksekutif Teknologi, 2023).

18 Yogesh K. Dwivedi et al., "Climate Change and COP26: Are Digital Technologies and Information Management Part of the Problem or the Solution? An Editorial Reflection and Call to Action," *International Journal of Information Management* 63, no. November 2021 (2022), <https://doi.org/10.1016/j.ijinfomgt.2021.102456>.

19 Ajeng Rachmatika Dewi Andayani, Henriette Imelda, and Kevin Setiadi, "Pengantar Loss and Damage," Policy Brief Indonesia Research Institute for Decarbonization, 2024.

20 Muhammad Mutawalli, "Tanggung Jawab Negara Terhadap Pencemaran Laut Dari Limbah Buangan PLTU Di Kawasan Pesisir Pantai," *Yudisia: Jurnal Pemikiran Hukum Dan Hukum Islam* 12, no. 1 (2021): 1–16.

21 Mahkamah Konstitusi Republik Indonesia, *Putusan MK No. 13/PUU-XI/2013 Dalam Perkara Pengujian UU No. 15 Tahun 2006 Tentang BPK Terhadap UUD NRI Tahun 1945* (Jakarta: Mahkamah Konstitusi Republik Indonesia, 2013).

In the context of regional government [in the static sense], *bestuur* is related to the understanding of the function of government or more precisely state administration by the regional head and the DPRD. Both elements of the regional government organizers jointly carry out the function of making regulations or *regelen* in the form of regional regulations [Perda]. This regulatory product is a legal instrument to manage human activities within their environment. Following the legal function, Perda has a role as a social controller.²² Regional regulations contain signs or benchmarks that humans follow in interacting with their environment. Regional regulations can also function as social engineers, as a means to change society [a tool of social engineering] to a mutually desired goal.²³ For such a Regional Regulation to function, an integrated and planned benchmark is needed that will apply to and in circumstances that encourage changes in society. The benchmark in question targets various human activities that influence climate change, the impact of which is very bad for the environment and coastal communities. This means that these various activities are directed at protecting the environment and coastal communities.²⁴

In the context of addressing the impacts of climate change, the protection in question has two types, namely anticipatory and reactive. Both types are included in the category of Climate Change Adaptation [API]. Why is that? This is because these efforts fall into the definition of adapting to changing natural conditions [which could be caused by climate change].²⁵ Although anticipatory and reactive efforts can be distinguished from each other, both are certainly related and cannot be understood separately. Both anticipatory and reactive efforts are equally oriented towards reducing the risk of climate change impacts. These efforts certainly require government support, more specifically local governments [in the static sense]. Because, the ability or capacity of the community to act in the face of the threat of climate change is limited and combined with high [economic] vulnerability factors [in this case, communities in coastal areas]. The question support is a policy that is responsive to climate change, which is stated in [regional] regulatory products.

2.1.1. Regional Regulation on Climate Change Adaptation

North Buton Regency is an example of a region that already has a Regional Regulation on climate change. Regional Regulation No. 5 of 2022 concerning Climate Change Adaptation. This Regional Regulation contains guidelines for compiling API actions and integrating them into spatial plans and [regional] development plans. This means that API actions are part of the spatial planning and development planning framework.²⁶ API actions are the main input [material for compiling and/or evaluating] spatial planning and development planning policies. Integration of API elements into spatial planning and development planning must be viewed as a necessary strategy to protect the environment and communities [especially in coastal areas] from the impacts or

22 Satjipto Rahardjo, *Hukum Dan Perubahan Sosial* (Bandung: Alumni, 1983).

23 Soerjono Soekanto, "Pokok-Pokok Sosiologi Hukum," *Rajawali Pers*, 1989.

24 Elena Lucchi et al., "Climate-Responsive Design Practices: A Transdisciplinary Methodology for Achieving Sustainable Development Goals in Cultural and Natural Heritage," *Journal of Cleaner Production* 457, no. April (2024): 142431, <https://doi.org/10.1016/j.jclepro.2024.142431>.

25 Indarto Supriyadi et al., *Adaptasi Terhadap Dampak Perubahan Iklim Masyarakat Pesisir* (Jakarta: Puslit Oseanografi – LIPI, 2019).

26 Mahendra Gooroochurn, "Circular Homes – An Energy-Water-Materials Nexus for Community Climate Engagement and Action at Grassroots Level in the Built Environment," *Results in Engineering* 15, no. April (2022), <https://doi.org/10.1016/j.rineng.2022.100548>.

risks of climate change. This integration leads to the realization of regulations that are responsive to the impacts or risks of climate change.²⁷

Specifically in North Buton Regency, with the existence of these regulations, it is possible for the community to actively participate in the preparation of API actions through independent institutions formed by the community as representatives of local communities or the community,²⁸ even representatives of local communities are actively involved in the subsequent input process, integrating API actions into spatial planning documents and development planning documents.²⁹ Participatory models [which according to researchers] better guarantee the aggregation of community interests compared to the Musrenbang [development plan preparation] or public consultation [spatial plan preparation] models.³⁰

The formulation of regulations for environmental protection and coastal communities from the impacts or potential risks of climate change is thus anticipated by the preparation of API actions, including through:

- a). Identification of target coverage areas and/or specific sectors and climate change impact issues;
- b). Preparation of climate vulnerability and risk assessments;
- c). Preparation of API action options;
- e). Determination of API action priorities; and
- f). Integration of API actions into development policies, plans, and/or programs.³¹

Specifically regarding Coastal and Small Islands [P3K], by Law No. 23 of 2014 it is delegated as a provincial government affair [not delegated to districts/cities].³² Meanwhile, by Law No. 27 of 2007, the P3K sector is also stated as a district/city government affair.³³ In response to the differences in these provisions, borrowing the opinion of G.J. Wolhoff,³⁴ theoretically, what functions as a constitution for regions within a unitary state is the regional government law. Therefore, it is appropriate that Law No. 23 of 2014 be given priority in its enforcement, or override Law No. 27 of 2007, following the principle of *lex specialis derogat legi generali*.

If so, do districts/cities not need to prepare API actions? If using the perspective of disaster management [sub-affairs of government affairs in the field of security, public order, and community protection], the preparation of API actions becomes a necessity in the framework of implementing mandatory government affairs [provinces and districts/cities].³⁵ In this perspective, API action is interpreted as an effort to reduce the impact or potential risk of disasters caused by climate change, both through physical development and awareness and increased capacity to face disaster threats

27 Muhammad Mutawalli et al., "The Conference of Parties-27 (COP-27) Agreement as an Instrument of State Policy in Handling Deforestation: A Comparative Study of Sweden and Indonesian Governments," *Law Reform* 19, no. 1 (2023): 1–24, <https://doi.org/10.14710/lr.v19i1.52926>.

28 Pemkab Buton, *Peraturan Daerah Kabupaten Buton Utara Nomor 5 Tahun 2022 Tentang Adaptasi Perubahan Iklim* (Buton: Pemerintah Kabupaten Buton, 2022).

29 Pemkab Buton, article 2.

30 Anna Lea Eggert, Roland Löwe, and Karsten Arnbjerg-Nielsen, "Feedbacks between City Development and Coastal Adaptation: A Systems Thinking Approach," *Ocean and Coastal Management* 249, no. September 2023 (2024), <https://doi.org/10.1016/j.ocecoaman.2024.107026>.

31 Eggert, Löwe, and Arnbjerg-Nielsen.

32 Republik Indonesia, *Undang-Undang Republik Indonesia Nomor 23 Tahun 2014 Tentang Pemerintahan Daerah* (Jakarta: Sekretariat Negara, 2014).

33 Republik Indonesia, *Undang-Undang Republik Indonesia Nomor 27 Tahun 2007 Tentang Pengelolaan Wilayah Pesisir Dan Pulau-Pulau Kecil* (Jakarta: Sekretariat Negara, 2007).

34 Jimly Asshiddiqie, *Perihal Undang-Undang Di Indonesia* (Jakarta: Sekretariat Jenderal dan Kepaniteraan Mahkamah Konstitusi RI, 2006).

35 Republik Indonesia, *Undang-Undang Republik Indonesia Nomor 23 Tahun 2014 Tentang Pemerintahan Daerah*, p. 31.

[in coastal areas]. Such efforts, by PP No. 21 of 2008 and PP No. 64 of 2010 are called disaster mitigation. The difference is that PP No. 64 of 2010 uses the perspective of Coastal Area and Small Island Management [PWP-3-K], as an elaboration of the provisions of Article 59 paragraph [4] of Law No. 27 of 2007, while PP No. 21 of 2008 uses the perspective of disaster management itself, as an elaboration of the provisions of Article 50 paragraph [2], Article 58 paragraph [2], and Article 59 paragraph [2] of Law No. 24 of 2007.

Based on this explanation, from the district/city perspective, API actions as a form of effort to reduce the risk or impact of disasters caused by climate change should not be a separate document that has its formal legal force as referred to in North Buton Regency Regulation No. 5 of 2022, or the RSWP-3-K, RZWP-3-K, RPWP-3-K, and RAPWP-3-K documents as referred to in PP No. 64 of 2010, but become the main input and an integral part of the spatial plan document and the development plan document. API actions should be part of the disaster management planning framework. Because climate change is only one cause of threats to the safety of the environment and coastal communities. Therefore, API actions should be prepared in a medium-term perspective [five years] such as [regional] disaster management planning,³⁶ not one year as stipulated in the Regional Regulation of North Buton Regency No. 5 of 2022. API Action, according to the Regional Regulation of North Buton Regency No. 5 of 2022, is only associated with the preparation of the Regional Annual Development Plan [RKPD], and is not the main material and part of the framework for preparing the Regional Medium-Term Development Plan [RPJMD].³⁷

2.1.2. Regional Regulation on Spatial Planning

Integration of API in spatial planning documents indicates how important spatial planning is in reducing the risk or impact of climate change. AAPI, or what in PP No. 64. The reduction of hazard in 2010 defines it as the set of actions to reduce the risk of accidents, either artificially or physically, through the development of physical and artificial or non-physical or other capabilities. Prepare for serious threats to coastal areas and small islands.³⁸ Efforts that should not be absent in the preparation of spatial planning documents, or that are part of spatial planning.

In the context of North Buton Regency, the integration of API within the framework of protecting the environment and coastal communities from the risks or impacts of climate change is outlined in spatial planning regulations. The regulation in question is Regional Regulation No. 51 of 2012 concerning the North Buton Regency RTRW for 2012-2032. Chronologically, the preparation of this RTRW is not linked to API actions according to the North Buton Regency Regulation No. 5 of 2022 mentioned above. However, if examined, the substance mainstreams elements of disaster management [which could be caused by climate change].

Spatial planning systems that incorporate potential hazards or impacts of hazards will ensure that they are factored into future climate change projections, without causing

³⁶ Republik Indonesia, *Peraturan Pemerintah Nomor 21 Tahun 2008 Tentang Penyelenggaraan Penanggulangan Bencana*, Article 6 Paragraph (5) (Jakarta: Sekretariat Negara, 2008).

³⁷ Muhammad Mutawalli Mukhlis et al., "Regional Government According to the 1945 Constitution: Ideas Refinements and Law Reform," *Journal of Law and Legal Reform* 5, no. 2 (2024), <https://doi.org/10.15294/jllr.vol5i1.3125>.

³⁸ Republik Indonesia, *Peraturan Pemerintah Nomor 64 Tahun 2010 Tentang Mitigasi Bencana Di Wilayah Pesisir Dan Pulau-Pulau Kecil*, Article 1 Number 4 (Jakarta: Sekretariat Negara, 2010).

the region to become more vulnerable to environmental impact.³⁹ Such a perspective has three main objectives, such as:⁴⁰

- a). Ensure that the implementation of spatial planning has considered the potential risks of climate change and to avoid the impacts of climate change;
- b). Ensure that the implementation of spatial planning does not result in increased regional vulnerability to various types of hazards due to the impacts of climate change in all sectors;
- c). Ensure that the implementation of spatial planning contributes to development goals and efforts to adapt to climate change in the future.⁴¹

Concerning this, Tommy Firman et al stated that RT RW does not have a role in reducing the impact of climate change.⁴² According to N. Stern,⁴³ spatial planning can facilitate adaptation to climate change. Adaptation must be integrated into every level of planning, both regional and national levels, in other words, spatial planning must consider the potential risks or impacts of climate change. Therefore, adaptation to spatial planning needs to be done. One of the adaptations to spatial planning can be done through spatial pattern planning.⁴⁴

In this context, the process of determining spatial planning patterns needs to be carried out based on the following three options:⁴⁵

- 1) Protection, Protection strategies can be implemented by creating coastal structures that can prevent seawater flooding [rob] from invading the land. This pattern aims to protect settlements, tourism industries, highways, agricultural areas, fish ponds, and others from seawater inundation. Coastal embankments and structures are not only designed based on the current high tide and sea waves, but must also take into account land subsidence, rising sea levels, and sea waves due to wind in extreme conditions. Other protection efforts that can be taken are to carry out beach nourishment restoration and mangrove rehabilitation. This process includes taking material from places that are not dangerous and filling it in places that need it. The land that has been filled is then planted with mangroves so that it can reduce the rob flood that infiltrates the land. Another function of mangrove forests is as a carbon absorber so that these plants can reduce global warming.
- b) Step Back, The prevention of sea flooding can be achieved by relocating homes, industries, and agricultural areas to prevent floods. further towards the interior of the sea. Due to the rise in sea levels, sea water will not be able to reach those areas.
- c) Accommodation, this strategy is carried out by adjusting the rise in sea level. One example is by building stilt houses on the beach to be safe from seawater inundation,

39 Muhammad Khalid Anser et al., "Beyond Climate Change: Examining The Role of Environmental Justice, Agricultural Mechanization, and Social Expenditures in Alleviating Rural Poverty," *Sustainable Futures* 6, no. July (2023): 100130, <https://doi.org/10.1016/j.sftr.2023.100130>.

40 Nicholas A. Craddock-Henry, Gradon Diprose, and Bob Frame, "Towards Local-Parallel Scenarios for Climate Change Impacts, Adaptation and Vulnerability," *Climate Risk Management* 34, no. May (2021): 100372, <https://doi.org/10.1016/j.crm.2021.100372>.

41 Ardiyanto Aryoseno, "Perspektif Adaptasi Perubahan Iklim Dalam Penataan Ruang," Pemerintah Kota Medan Dinas Tata Ruang Tata Bangunan, 2016.

42 Tommy Firman et al., "Potential Climate-Change Related Vulnerabilities in Jakarta: Challenges and Current Status," *Habitat International* 35, no. 2 (2011): 372–78.

43 Aris Subagiyo, "Adaptasi Pola Ruang, Tantangan Dampak Perubahan Iklim & Wacana Pemindahan Ibukota Di Kota Palangka Raya," 2021.

44 Muhammad Mutawalli et al., "Implementation of FLEGT Licensing Scheme in Deforestation Law Enforcement: Improvements and Handling in Indonesia," *Jurnal Hukum Unissula* 39, no. 2 (2023): 130–56, <https://doi.org/10.26532/jh.v39i2.32210>.

45 Dirjen Tata Ruang, *Petunjuk Teknis Integrasi Adaptasi Perubahan Iklim [API] Ke Dalam Perencanaan Tata Ruang No. 5/Juknis-HK.02.01/VI/2024, Kementerian Agraria Dan Tata Ruang/Badan Pertanahan Nasional* (Jakarta: Direktorat Jenderal Tata Ruang, 2024); Sari et al., "Adaptasi Dan Mitigasi Perubahan Iklim Di Indonesia."

especially during high tide floods. For agricultural areas that are inundated by sea water due to rising sea levels, the area can be converted into a fishery cultivation area.

The spatial pattern plans that mainstreams API is reflected in the distribution of spatial allocation in a region, one of which is for the protection function [protecting environmental sustainability] through the establishment of protected areas. The areas in question include⁴⁶:

- a) Except for the Kulisusu district in the west, all districts have local reserves, primarily located along the coastal area. Coastal land that has the shape and physical form of the beach or is steep, a distance proportional to the shape and physical form of the beach];
- b) Nature reserve areas, nature conservation, and cultural heritage, among which are mangrove forest areas [approximately 9,463 Ha] spread across all sub-districts;
- c) Areas prone to natural disasters, including flood-prone areas, which are located in West Kulisusu District, North Kulisusu District, and Boneguru District;
- d) Another protected area is the Bonelipu Beach coral reef area in Kulisusu District.

RT RW also needs to be followed up with a detailed plan as a basis for the region in granting permits for spatial utilization or development activities. In North Buton Regency, the detailed plan is stated in Regent Regulation No. 3 of 2014 concerning the Detailed Spatial Plan of North Buton Regency. This regulation regulates [among other things] the control of spatial utilization [as an effort to adapt to climate change] through the determination of zoning, in this case, coastal area zoning. Determination of coastal area zoning functions to control spatial utilization in coastal areas.⁴⁷ The existence of coastal area zones provides clarity about the variance of activities that must, may, and may not be carried out in the spatial utilization zone. The determination is based on the land development plan [in the research area], areas threatened by rising sea levels, the existence of protected areas, and regional vulnerability. Spatial Planning Map of RT RW North Buton Regency 2012-2032 as a basis for compiling a zoning map for the coastal area of North Buton Regency, by considering aspects of existing land use and spatial planning maps that have been compiled in RT RW North Buton Regency 2012-2032.

From the substance of the spatial plan above, it can be said that API has been mainstreamed into the spatial plan document.⁴⁸ Such spatial planning regulations are expected to protect the environment and coastal communities, although the space referred to in the regulation does not include coastal waters [which are the province's domain, according to the provisions of Law No. 23 of 2014].⁴⁹

2.1.3. Regional Regulation on Development Planning

Integration of API in the framework of regional development must also be realized in the development planning process, which is stated in the development plan documents [RPJPD and RPJMD]. This is because the development plan is part of the implementation

46 Madan Lamami, "Arahan Pengembangan Kawasan Desa Wisata Desa Malalanda Sebagai Penunjang Pariwisata Pesisir Pantai Kecamatan Kulisusu Utara Kabupaten Buton Utara" (UNIVERSITAS BOSOWA MAKASSAR, 2020).

47 Svetlana V. Feigin et al., "Proposed Solutions to Anthropogenic Climate Change: A Systematic Literature Review and a New Way Forward," *Heliyon* 9, no. 10 (2023): e20544, <https://doi.org/10.1016/j.heliyon.2023.e20544>.

48 M Monson, "Socially Responsible Design Science in Information Systems for Sustainable Development: A Critical Research Methodology," *European Journal of Information Systems*, 2021, 1–31, <https://doi.org/https://doi.org/10.1080/0960085X.2021.1946442>.

49 Ananda Prima Yurista and Dian Agung Wicaksono, "Kompabilitas Rencana Zonasi Wilayah Pesisir Dan Pulau-Pulau Kecil [RRZWP3K] Sebagai Rencana Tata Ruang Yang Integratif," *Jurnal Rechts Vinding: Media Pembinaan Hukum Nasional* 6, no. 2 (2017): 183–98.

of spatial planning so that the suitability of spatial patterns can be realized through development programs that are resilient to climate change.

From the chronology of the determination, it is clear that the North Buton Regency RTRW for 2012-2032 [determined by Regional Regulation No. 51 of 2012] precedes the determination of the North Buton Regency RPJPD for 2010-2025 [through Regional Regulation No. 3 of 2014]. This indicates that the determination of the North Buton Regency RPJPD refers to the North Buton Regency RTRW. The reference to the RPJPD on the RTRW is carried out through the formulation:⁵⁰

- a) Regional vision and mission in the RPJPD by considering the objectives of spatial planning in the RTRW through observing the substance of the regional development direction in the RTRW;
- b) Policy direction in the RPJPD by referring to the policy direction and strategy in the RTRW through observing the substance of the RTRW;
- c) Main targets in the RPJPD by considering the indications of the main programs in the RTRW which are priority programs for the region.

Likewise, the 2021-2026 North Buton Regency RPJMD [which is stipulated in Regional Regulation No. 2 of 2021] refers to the RTRW, carried out through the formulation of:⁵¹

- a) The vision and mission of the regional head in the RPJMD guide the objectives of spatial planning in the RTRW through observing the substance of the superior potential of the region based on space;
- b) The strategy and direction of policy in the RPJMD by guiding the direction of policy and strategy in the RTRW through observing the content of the substance in the RTRW;
- c) The regional development program in the RPJMD pays attention to the indications of the main program in the RTRW which is the priority program of the region.

The inclusion of the RTRW on adaptation to climate change ensures that development plans [RPJPD and RPJMD] take into account the potential impacts of climate alteration and preventive measures. The perspective of adaptation to climate change in the RPJMD of North Buton Regency for 2021-2026 is reflected in the regional development program based on adaptation in sectors affected by climate change, including:

- a) Coastal ecosystem restoration [planting coastal vegetation that functions as a barrier to seawater abrasion and reduces the risk of flooding, such as mangroves, seagrass beds, coral reefs, etc. in areas that are vulnerable or threatened by tidal waves];
- b) Coastal engineering [creating structural mitigation to reduce the impact of sea waves that cause coastal abrasion];

Livelihood development [coastal communities]:

- (1) Increasing mastery of production aspects [provision of infrastructure and mastery of production technology];
- (2) Facilitation of productive financing sources;
- (3) Facilitation of production tools and capital.

Coastal community capacity building:

- (1) Increasing knowledge and access to education for the community to raise awareness of the importance of achieving educational attainment figures up to the tertiary level;

50 B Sri Ratna Setiawati, "Penyelarasan/Harmonisasi Rencana Tata Ruang Wilayah (RTRW) Dengan Rencana Pembangunan Daerah (RPJPD Dan RPJMD) Mutlak Dilakukan," Bappeda Provinsi Nusa Tenggara Barat, 2023.

51 Setiawati. The reference not complete

- (2) Increasing technical and management capabilities [to improve community livelihoods so that the community can develop more diverse types of livelihoods and also increase the scale of their businesses].⁵²

2.1.4. Regional Regulation on Disaster Management

Climate change has received attention related to issues in coastal areas. Coastal erosion, coastal flooding, and water pollution are common problems affecting infrastructure and artificial ecosystems in coastal areas.⁵³ It is imperative to give more attention to the consequences of climate change on coastal communities, who are at risk of extinction. Climate change will disrupt the functioning of societies, resulting in significant human casualties from various factors such as poverty and hardship, and also escalating natural disasters that surpass their capacity to cope.⁵⁴

In this context, API can be said to be the embodiment of disaster management. From a disaster management perspective, API as an effort to reduce the risk or impact of disasters caused by climate change, includes various activities, including prevention, education and training, preparedness, and disaster mitigation [as part of pre-disaster]. This effort is concretized in the regulatory product of North Buton Regency, namely Regional Regulation No. 6 of 2015 concerning Disaster Management. This regulation is expected to be a [legal] instrument to make efforts to reduce the impact or risk of disasters caused by climate change more effectively, to protect the environment and coastal communities in particular.⁵⁵

Preventive efforts designed and implemented to reduce the threat of climate change as can be found in Article 7 paragraph [1] f of Regional Regulation No. 6 of 2015:

“Perumusan kebijakan, pencegahan dan pengendalian penggunaan dan pemanfaatan sumber daya alam yang melebihi kemampuan alam yang berdampak pada perubahan iklim.”

And how to reduce the threat of climate change by the provisions of Article 28 paragraph [2] of Regional Regulation No. 6 of 2015, include:

- a) Identification and recognition of sources of danger or disaster threats;
- b) Monitoring of:
 - (1) Control and management of natural resources;
 - (2) Use of high technology.
- c) Supervision of the implementation of spatial planning and environmental management;
- d) Strengthening the social resilience of the community.

Education and training as part of pre-disaster is aimed at increasing community awareness, concern, ability, and preparedness in facing disasters.⁵⁶ Preparedness itself is an effort to anticipate disasters through organization and appropriate and effective steps. This effort is carried out, among others, through:

- a) Provision and preparation of supplies to fulfill basic needs;

⁵² Pemkab Buton, *Peraturan Daerah Nomor 2 Tahun 2021 Tentang Rencana Induk Pembangunan Kepariwisata Daerah Kabupaten Buton Tahun 2021-2026* (Buton: Pemerintah Kabupaten Buton, 2021).

⁵³ Zachra Putri Arfiani Monoarfa, Moh Tri Adiftio Gobel, and Muhammad Rijal Syukri, “Penataan Kawasan Pesisir Pantai Untuk Mengurangi Resiko Bencana,” *Jambura Journal of Urban and Regional Planning* 1, no. 1 (2023): 10–22.

⁵⁴ Agung Harijoko et al., *Manajemen Penanggulangan Bencana Dan Pengurangan Risiko Bencana Di Indonesia* (Yogyakarta: Gadjah Mada University Press, 2021).

⁵⁵ Maskun et al., “Empowering SDG 16: Electronics-Based Criminal Law Policy to Combat Sexual Violence in Indonesia,” *Jurnal Hukum Novelty* 14, no. 2 (2023): 288–303, <https://doi.org/10.26555/novelty.v14i2.a26968>.

⁵⁶ Pemkab Buton, *Peraturan Daerah Kabupaten Buton Utara Nomor 6 Tahun 2015 Tentang Penyelenggaraan Penanggulangan Bencana*, Article 33 (Buton: Pemerintah Kabupaten Buton, 2015).

- b) Organizing, counseling, training, and rehearsals on emergency response mechanisms;
- c) Preparation of evacuation locations;
- d) Provision and preparation of materials, goods, and equipment to fulfill the recovery of infrastructure and facilities.

Regarding mitigation, Article 38 of Regional Regulation No. 6 of 2015 stipulates that disaster mitigation is carried out, among other things, through efforts:

- a) Planning and implementation of spatial planning based on risk analysis;
- b) Development regulation, infrastructure development, and building layout;
- c) Provision of education, training, and counseling, both conventionally and modernly.

Various efforts to reduce the impact or risk of climate change are integrated into the regional/spatial plan [RTRW] and development plan [RPJP/RPJM] of North Buton Regency, to be further elaborated into operational policies implemented by regional apparatus or taken by encouraging community participation. Why is that? Because, various systematic efforts to prepare for the threat of disaster are not only burdened on one party, but work together with their respective duties and functions, both at the local government, community, and private sector levels. It must be realized that climate change affects the level of danger, especially threats related to hydrometeorology. Climate change also affects the level of vulnerability and capacity. This relationship must be the basis for how efforts to reduce the level of disaster risk do not run alone.

3. CONCLUSION

The most vulnerable community groups affected by climate change are those living in coastal areas because they depend on natural resources for their livelihoods. A small change in the environment can have a direct impact on their lives, especially in the social and economic sectors. To mitigate the impacts of climate change, protection efforts are made by prioritizing anticipatory and reactive aspects which are the scope of the API. The form of anticipatory and reactive protection of coastal communities will focus on prevention efforts [mitigation/preventive] or risk management. The government, especially local governments, has an important role in efforts to mitigate climate change, this can be realized through policies outlined in regulatory products or regional regulations without ignoring other laws and regulations, to create legal harmonization. Areas that are coastal areas must at least integrate regional regulations with API elements, as has been done by the North Buton district government.

Buton Regency is one of the coastal areas in Indonesia, this means that coastal communities in North Buton Regency are also affected by climate change. Realizing this, the North Buton Regency government. Buton has regulations or regional regulations that specifically regulate Climate Change Adaptation, in addition, the North Buton Regency government has also integrated several regional regulations with API elements, especially in the spatial planning, development planning, and disaster management sectors as described above. This integration represents a tangible initiative by the North Buton Regency government to mitigate climate change impacts while addressing environmental protection and safeguarding coastal communities. This can certainly be a role model for other regional governments, especially in areas that are coastal areas so that they can achieve sustainable development goals or Sustainable Development Goals [SDGs] point 13.

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