

# The Prospect of Sea Protection (Coral Reefs) as Carbon Sink and Carbon Source Due to Climate Change

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**Abstract**—The sea as the outermost of the state is in uncertainty due to global warming as a result of increasing carbon emissions into the atmosphere, resulting in melting of polar ice or polar ice melts and changing patterns of seasons and sea level rise as a result of rising temperatures and temperatures Seawater that can significantly result in coral bleaching and ocean acidification. This condition will be very dangerous for the territory of Indonesia which 2/3 of its territory is sea. But with the development of science there is a new concept that the sea is no longer as a carbon sink, but already in a position as a net carbon source. While the condition of Indonesian coral reefs in the area of coral triangle is one of the richest in biodiversity in the world. Coral reef ecosystem also functions as a net carbon source. Therefore, the Government of Indonesia should immediately provide legal protection related to the marine environment. The analysis in this paper uses the type of normative legal research, which is done by analyzing related laws and regulations, with the approach of problem statute approach and conceptual approach. Prospects for the protection of the marine environment, especially coral reefs are needed as an effort to protect the sea as carbon sink and carbon source.

**Keywords**—climate change; sea; coral reefs

## I. INTRODUCTION

Climate change is a scientific phenomenon that has been scientifically proven. Article 1 The UNFCCC defines climate change as a change in climate caused either directly or indirectly by human activities that alter the composition of the global atmosphere and natural climate variability observed over a period of time. In general there are four climate change impacts: rainfall, extreme weather, temperature rise and sea level change. Thus, climate change can lead to serious problems such as rob floods, disease vectors and drought that could affect communities, especially poor people who lack the knowledge and capacity to respond to the impacts of climate change [1].

Coral reefs and polar ice caps have provided very concrete evidence of the effects of climate change on ecosystems and this is inevitable. The impacts of climate change will aggravate the conditions that have occurred, and reduce the ability of ecosystems to withstand subsequent changes. Coral reefs as

one of the mature ecosystems in tropical seas, of course, will also be affected either directly or indirectly by global warming events. This influence leads to disruption of ecosystem balance. Over the last three decades, major disasters have affected coral reef systems resulting in extensive damage to areas, such as storms, warming by El Niño, current extra low tides, acanthaster attacks (Predators of coral polyps) and various kinds of pressure by human activity [2].

Indonesia is the largest archipelago country in the world, which stretches 5,000 km from the Indian Ocean to the Pacific Ocean and consists of nearly 13,500 islands. As the world's second lowest and longest-standing archipelagic country, Indonesia is vulnerable to climate change. As a tropical country with significant forest and peatlands, Indonesia has high potential both as source of emissions and as sinks. The oceans absorb a lot of carbon dioxide, so the condition becomes more acidic. The global sea level has risen by 20 cm since the beginning of the last century and has continued to accelerate [3]. For the scope of Indonesian territory the average increase in average temperature in Indonesia is 0.5 - 3.92°C in 2100 from the baseline condition of 1981-2010, while the minimum air temperature will increase by 0.04 - 0.07 °C.

Most of the islands are volcanic islands that emerge from deep sea waters. As many as 16% of the world's coral reefs (more than 39,500 km<sup>2</sup>) are located in Indonesia. Only Australia has larger coral reefs (42,000 km<sup>2</sup>).

Areas with large coral reefs are found in western Indonesia, which includes Sumatra and Java; Central Indonesia, especially in Sulawesi and the Lesser Sunda Islands (Nusa Tenggara); And eastern Indonesia, around the islands of Maluku and West Papua (Irian Jaya). Most of the coral reefs are in the eastern and central parts of the country. This is the coral reef located within the Coral Triangle Center.

A few other things that threaten coral reef ecosystems are marine acidification, namely the decrease of sea pH due to anthropogenic carbon uptake in the atmosphere by the sea. Acidification can erode the shell of a marine biota or a coral formed from calcium carbonate. In addition, the impact of rising sea surface temperatures, extreme rainfall can trigger coral bleaching [4].

Thus, climate change adaptation and mitigation is an important issue in coral reef governance. Adaptation in coral reef areas is crucial because it deals with ecological functions that are essential for fisheries resources, biodiversity and the welfare of nearby communities. However, this is not related to the role of coral reefs as an absorber or carbon release to the atmosphere. This issue has actually sparked considerable debate in the 1990s. Given the report of Gattuso it is sufficiently clear that the coral reefs and other waters which have calcification processes are self-sufficient as carbon releases to the atmosphere. The issue of carbon release or absorption in coral reefs is not really an issue related to the Clean Development Mechanism (CDM) as produced in the Kyoto Protocol. CDM leads to a reduction in anthropogenic carbon emissions and is not a natural process as occurs in coral reef ecosystems.

## II. METHOD

The analysis in this paper uses the type of normative legal research, which is done by analyzing related laws and regulations, with the approach of problem statute approach and conceptual approach.

## III. RESULTS AND DISCUSSION

Policy is an action plan to guide decisions and achieve results. Governments from countries around the world are working on designing policies that will stop climate change, helping people make adjustments to past changes, and make better preparations for future changes.

Negotiations work through international organizations that help governments work together to make policy on many important issues covering climate change. The international organization that leads international policy-making is the United Nations (UN), which covers 192 countries-almost every country in the world [5]. Referring to the principle of common but differentiated responsibility (CBDR), the North State pledged to reduce GHG emissions by at least 5% below the 1990 level of emissions measured during the 2008-2012 commitment period [6]. Meanwhile, countries do not have a target to reduce GHG emissions, but based on the principle of common but differentiated responsibility. These countries have an obligation to cooperate in tackling climate change issues.

Within the United Nations, a body called the United Nations Framework Convention on Climate Change (UNFCCC) is working on governing countries to design climate change policies. The UNFCCC holds important policy-making meetings annually. Each UNFCCC country sends delegates or representatives to participate in this policy meeting to negotiate and make decisions on how to deal with climate change. Non-governmental organizations (NGOs), private parties, and special interest groups, such as indigenous people's organizations, also attend this meeting to present their opinions and influence decisions. However, only government delegates make decisions at the UNFCCC.

The most important action being undertaken by the UNFCCC at the moment is the policy of assisting countries to halt or mitigate climate change and make adjustments to the

ongoing effects of climate change. This policy creates plans, encourages research, and supports countries with money and technology to take action in solving problems that come with climate change [7].

The UNFCCC sets out an overall framework for intergovernmental efforts to address the challenges posed by climate change. The Convention has been ratified (approved) by 192 countries so it almost has universal membership. According to the Convention, governments: a. collect and share information on greenhouse gas emissions, national policies and best practices. b. launch a national strategy to address greenhouse gas emissions and make adjustments to expected impacts, including the provision of financial and technological support to the state Develop. c. cooperates in preparing adjustments to the impacts of climate change such as rising sea levels, droughts and floods.1 The Convention came into force on 21 March 1994.

Countries in the world are increasingly serious about addressing climate change issues. Commenced during the implementation of the UN Conference on Environment and Development (UNCED) in Rio de Janeiro, Brazil, in 1992 or known as the Earth Summit. UNCED then produced signatories to the signing of the United Nations Framework on Climate Change Convention (UNFCCC). The Convention's decision-making body is the Conference of the Parties (COP) [8].

In addition, the UN commissioned the World Meteorological Organization (WMO) and the United Nations Environment Program (UNEP) to establish the Intergovernmental Panel on Climate Change (IPCC), which consists of the world's leading scientists for scientific climate change measurement. One of the most famous COP was the 3rd COP in Kyoto, in December 1997 which resulted in the Kyoto Protocol. The Kyoto Protocol aims to stabilize greenhouse gas concentrations (including CO<sub>2</sub>) at a level not harmful to humans, in which the period from 2008 to 2012 [9]. However, until the end of the Kyoto Protocol there is no significant reduction of CO<sub>2</sub> emissions into the atmosphere and no binding agreement to extend the Kyoto Protocol. Recent developments show no hope of reducing CO<sub>2</sub> emissions to the atmosphere, even some countries that have ratified the Kyoto Protocol have already withdrawn from their commitments. Therefore, Indonesia as a country ratifying the Climate Change Convention (UNFCCC) and the Kyoto Protocol, Indonesia is very concerned with the Paris Treaty. The Paris treaty agreed at COP-21 in Paris, France, has entered the signing date for the States Parties to the Climate Change Convention (UNFCCC). Indonesia has signed the Paris Agreement in New York, USA, April 22, 2016. Indonesia has submitted to the UNFCCC Secretariat the intention of the Nationally Determined Contribution (INDC) to global efforts to mitigate the negative impacts of climate change prior to COP-21 in Paris.

The impact of climate change on coral reef ecosystems has resulted in a significant reduction of calcification processes in coral formation through calcium carbonate deposits. In addition, the impact of rising sea surface temperatures, extreme rainfall can trigger coral bleaching. In terms of human life, coral reef conservation will not play a major role in slowing

climate change. While forests play an important role to absorb carbon sinks, coral reefs are not so important, as corals not only absorb carbon, but also emit carbon during their growth. Thus, climate change adaptation and mitigation is an important issue in governance of coral reefs. Adaptation in coral reef areas is crucial because it deals with ecological functions that are essential for fisheries resources, biodiversity and the welfare of nearby communities [10].

Given the report of Gattuso then it is quite clear that the coral reefs and other water areas that have the calcification process are functioning as carbon releases to the atmosphere. The issue of carbon release or absorption in coral reefs is not really an issue related to the Clean Development Mechanism (CDM) as produced in the Kyoto Protocol. CDM leads to a reduction in anthropogenic carbon emissions and is not a natural process as occurs in coral reef ecosystems [11].

In May 2009, the governments of Indonesia, Malaysia, Papua New Guinea, the Philippines, the Solomon Islands, and Timor-Leste signed a declaration of Coral Triangle Coral Reefs, Fisheries and Food Resilience (Coral Triangle Initiative Declaration on Coral Reefs, Fisheries, and Food Security/cTi-cFF). CTi-cFF is a multilateral partnership that seeks to secure marine and coastal resources in the Coral Triangle area.

In cTi-cFF, six countries in the Coral Triangle jointly drew up a regional action plan, which was immediately followed by the preparation of a national cTi-cFF national action plan by each country in line with the objectives of the regional plan. The regional action plan has five objectives, each of which is supported by a technical working group headed by one of six countries: 1. priority sea landscape is established and effectively managed (chairman: Indonesia) 2. Ecosystem approach to fisheries management and marine resources (Chairman: Philippines) 4. Adaptation measures to climate change are achieved (chairman: Indonesia and Solomon Islands) 5. Status of endangered fish species improved (Chairman: Malaysia) Chairman: Philippines).

The technical working group consists of national representatives of each country and various partners providing technical and financial assistance, including USaid, the Australian government, global environment Facility, and adb. Regional and national action plans contain measurable indicators and targets for each of the five targets at the regional and national levels to be achieved by 2020. For example, a strategy to protect and improve the state of coral reefs in the Coral Triangle - as part of reaching the Goals 3 (on Maritime affairs and fisheries) - is to establish and function fully the Coral Water Conservation Area System in the Coral Triangle (CTMPaS) by 2020. The Maritime affairs and fisheries Technical Working Group designs the cTMPaS framework, where each country will contribute a good Maritime affairs and fisheries to the system Maritime affairs and fisheries area scope.

The criteria under consideration in good Maritime affairs and fisheries determination include: meeting the minimum standards of effective management, addressing key biodiversity issues, meeting the needs of fisheries and climate adaptation, and, where possible, providing a linkage of key links in a rather large Maritime affairs and fisheries system. The expected

benefit of cTMPaS is to provide incentives for each country to raise its standards in the design and management of kkp so that the Maritime affairs and fisheries is eligible for inclusion into the system.

#### IV. CONCLUSION

A number of concrete actions can be taken to reduce the impacts of climate change on people living in coastal areas such as: Addressing threats to living creatures in the sea that are not sources of climate (e.g. overfishing and using environmentally damaging and polluting) Climate will further exacerbate the threat. Establish and manage effectively marine conservation areas, including: (i) maintaining the integrity of coral reef systems and mangrove forests around the island that can help protect coastal communities from storms; and (ii) maintaining the health of reef fish populations that can provide abundance and replacement Fish stocks that have been depleted in the surrounding area. Rehabilitation of mangroves and coral reefs and other natural habitats that have been damaged. Develop an ecosystem-based fisheries management approach to increase the resilience of fish populations.

#### REFERENCES

- [1] J.A. Church and N.J. White, "A 20th century acceleration in global sea-level rise," *Geophysical Research Letters*, vol. 33, 2006.
- [2] IPCC, "Summary for Policymakers. In: *Climate Change 2007: Mitigation*," Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007.
- [3] J.M. Guinotte, and V.J. Fabry, "Ocean Acidification and Its Potential Effects on Marine Ecosystems." (Pengasaman Air Laut dan Kemungkinan Pengaruhnya terhadap Ekosistem Laut)," *Annals of the New York Academy of Sciences (Catatan Kejadian Akademi Ilmu Pengetahuan New york*, vol. 1134, no. 1, pp. 320–342, 2008.
- [4] Wildlife Conservation Society (Masyarakat Pelestarian Satwa Liar), "Troubled Waters: Massive Coral Bleaching in Indonesia. (Perairan yang Terganggu: Pemutihan Terumbu Karang Besar-besaran di Indonesia). Wildlife Conservation Society (Masyarakat Pelestarian Satwa Liar)," [Online]. Retrieved from [www.wcs.org/new-and-noteworthy/aceh-coral-bleaching.aspx](http://www.wcs.org/new-and-noteworthy/aceh-coral-bleaching.aspx).
- [5] O.P.J. Hoegh-Guldberg, A.J. Mumby, and Hooten, "Coral Reefs under Rapid Climate Change and ocean Acidification." (Terumbu Karang dalam Perubahan Iklim dan Pengasaman Air Laut yang Cepat) *Science (Ilmu Pengetahuan)*, vol. 318, no. 5857, pp. 1737–1742, 2007.
- [6] D. McAllister, "Status of the World ocean and Its Biodiversity," (Status Lautan Dunia dan Keanekaragaman Hayatinya). *Sea Wind (Angin Laut)*, vol. 9, no. 4, pp. 1-72, 1995.
- [7] O.J. Eong, "Mangroves-a carbon source and sink," *Chemosphere*, vol. 27, no. 6, pp. 1097-1107, 1993.
- [8] S. Solomon, *Climate change 2007-the physical science basis: Working group I contribution to the fourth assessment report of the IPCC*, vol. 4, Cambridge University Press, 2007.
- [9] Y. Pan, "A large and persistent carbon sink in the world's forests," *Science*, vol. 333, no. 6045, pp. 988-993, 2011.
- [10] J.A. Kleypas, "Geochemical consequences of increased atmospheric carbon dioxide on coral reefs," *science*, vol. 284, no. 5411, pp. 118-120, 1999.
- [11] Departemen Lingkungan Hidup dan Konservasi dan Badan Perikanan Nasional), "Papua New Guinea Marine Program on Coral Reefs, Fisheries and Food Security: National Plan of Action 2010-2013. (Program Kelautan Papua Nugini mengenai Terumbu Karang, Perikanan, dan Ketahanan Pangan: Rencana Aksi Nasional 2010-2013).

Coral Triangle Initiative (Upaya Segitiga Terumbu Karang),” [Online].  
Retrieved from <http://www.uscti.org/uscti/>

Resources/PNG%20MARINE%20NATIoNAL%20PLAN%20.