

Blue Carbon: The Role Of The Ocean As A Climate Balance In The Mitigation Of Climate Change

Dina Sunyowati
Law Faculty, Airlangga University
Surabaya, Indonesia
dinasunyowati@gmail.com

Ria Tri Vinata
Law Faculty, Airlangga University
Surabaya, Indonesia
riatrivinata@gmail.com

Abstract— The impact of global climate change has been a particular concern of the world community and nations, including Indonesia. As an archipelagic country that has a wide range of natural resources and high biodiversity, Indonesia has great potential to be adversely affected by climate change and also has great potential to contribute in its mitigation and adaptation to its negative impacts. The United Nations Framework Convention on Climate Change (UNFCCC) sets out several targets for reducing Green House Gas (GHG) emissions in the context of climate change mitigation. Blue carbon in Indonesia is stored in the marine environment and has great potential as an absorber or hoarder of carbon dioxide that can reduce GHG emissions. Indonesia's coastal and marine areas have the potential to absorb approximately 138 million tonnes of carbon equivalent per year or five times more than the potential absorption of tropical forest ecosystems in Indonesia. The carbon sequestration potential can reduce 25% of global carbon emissions. The amount of carbon storage shows that the ocean can play an important role in climate change mitigation. However, the complexity of blue carbon management and its implementation capacity still requires in-depth study. The analysis in this paper uses a form of normative legal research, which is done by analyzing related laws and regulations, using a problem statute approach and conceptual approach. Legal construction in the management of blue carbon is required as a form of protection of the marine environment as a climate balancer.

Keywords— *Blue Carbon; Policy; Climate Change; Sea; Mitigation*

I. INTRODUCTION

Climate change is part of the chain of impacts of the destruction of natural resources and the environment. From 1975 – 2006, natural disasters have become more frequent and 80% of such disasters, floods, droughts, storms, etc., are directly related to climate change. Climate change will differ in impact across countries, regions, generations, classes of people, occupation, gender, age and income. ^[1] From 1975 – 2006, most natural disasters occurred in the Asian continent. Of the vulnerable groups, 3.4 million people are from poor and vulnerable groups, such as children, indigenous peoples, farmers and fishermen. ^[1]

The increase in the average temperature of the Earth's surface due to the increase in the amount of greenhouse gas emissions in the atmosphere is a brief explanation of what we have been calling global warming. This warming will be followed by climate change, such as increased rainfall in some parts of the world causing flooding and erosion, while, the other hemisphere will experience a prolonged dry season due to rising temperatures. The impacts of climate change will feel more real and harsh for the island nation. Indonesia, as a State of Prominent, if not having the right mitigation and adaptation strategy, will continue to face disaster. Climate change as a disaster phenomenon has had many impacts on Indonesia. Indonesia in 2016 also faces various challenges related to climate change, such as floods, abrasion and landslides. Indonesia, as an archipelago country, has a real vulnerability issue.

The impact of increased production of greenhouse gases is increasingly felt, among others through changes in global climate patterns and disruption of food production, which has a real impact on human life and welfare. Food security and social, economic and human development will be increasingly threatened in the coming decades. One of the most important or key aspects of mitigating climate change impacts is efforts to maintain or enhance the ability of forests and seas to absorb and store CO₂. The contribution of forest ecosystems to carbon storage has been well-socialized and has been supported by several financial mechanisms (funding). In contrast, the important role of marine ecosystems has been neglected. ^[2]

Coastal areas are where blue carbon-absorbing ecosystems play a central role in community productivity, by providing environmental facilities for humans such as water filtration and coastal pollution reduction, nutrient (eutrophication) and sedimentation, erosion-prevention, and extreme weather impact mitigation. Much of the degradation of coastal ecosystems is caused not only by unsustainable use of natural resources (coastal and marine), but also by inadequate river basin management and waste management. The loss of these blue carbon-absorbing ecosystems, along with their crucial role in climate control, health management, food security and economic growth in coastal areas, is a real threat that could happen in the near future. The threat is one of

the biggest factors to be considered in the context of climate change mitigation efforts. It is imperative to quickly develop viable management and adaptation options while minimizing and mitigating climate change, improving food security, benefiting health and related product productivity and enhancing business development and employment opportunities.^[3]

II. DISCUSSION

This concept contradicts the common perception that mitigation and CO₂ emission reduction can be viewed as a disadvantage, not as a form of investment. Improving the integrated management of coastal and marine environments, including the protection and recovery of blue carbon-absorbing ecosystems in our oceans, is one of the most potent forms of mitigation with the most powerful "win-win" attributes, due to the economic value of benefits. The profit generated can be far beyond the budget that the UNW management needs to incur. Unfortunately, however, global carbon trading protocols and systems still do not recognize the advantages of managing the carbon absorbent ecosystem.

Impacts that will occur in the marine environment due to climate change processes include sea level rise, acidification of sea water, increased frequency and intensity of extreme weather disasters and declining fishery resources. With these changes, the effects of physical and biological changes in communities that rely on capture and cultivation will vary greatly.ⁱ Impacts to be felt on the marine environment include changes in patterns/yields, production and marketing costs, selling points, and increased risk of damage or loss of fishing and aquaculture facilities and infrastructure, as well as settlements and buildings. Communities dependent on the fisheries sector are also likely to see increased vulnerability, including through uncertain livelihoods/income, decreases in availability and/or quality of fish consumption, and increased safety hazards, such as going to sea in less favorable weather and catching areas farther away from the landing site results. Thus, adaptation and mitigation efforts to improve integrated coastal and aquatic resource management can be a prerequisite for restoring carbon sink capacity as well as for health, income (livelihood) and community food security. [4]

In regards to climate change, the undertaking of development efforts are divided into two major groups, namely mitigation and adaptation efforts, as described as follows. Mitigation efforts aim to increase carbon absorption capacity and reduction of greenhouse gas (GHG) emissions into the atmosphere that potentially dilutes the ozone layer. Therefore, mitigation efforts are mainly focused on five sectors: a. The Forestry Sector as a source of carbon sink mechanism, directed at sustainable forest maintenance, avoiding deforestation and forest degradation, prevention of illegal logging, forest fire prevention and forest and land rehabilitation; b. The Energy Sector, directed at efforts to reduce GHG emissions from energy, transportation, industrial and urban power plants; c. Peatland Sector, directed at equalization of water surface of peatland area; d. Agricultural Sector and Food Security, directed at land and swamp

management and optimization of irrigation infrastructure utilization; and e. Sector Waste and Waste, directed particularly by mechanisms for reducing the release of carbon emissions (especially methane gas).

Adaptation efforts are an act of adjusting natural and social systems to deal with the negative impacts of climate change. Climate change mitigation is the process of reducing greenhouse gas emissions derived from industrial activities as well as forestry and agricultural activities. Reducing greenhouse gases in the atmosphere will require that different parts of the country's economy be considered when thinking of changes that will reduce CO₂ generated by human activities.

A. Mitigation of blue carbon-based ecosystem in Indonesia's marine territory

World leaders agree on COP 22 in discussing the implementation of the Old Testament before and after 2020. One of the paths to be taken in reducing emissions and adaptation to the impacts of climate change is through consideration of the functions of marine and mangrove ecosystems. In this COP22 and the Blue Carbon Partnership held a constructive discussion to mainstream the role of blue carbon into mitigation efforts, with Indonesia included in this partnership because it already has conservation practices and sustainable use of coastal and marine areas in various regions. Also, as a country that has the second longest beach in the world, it can be seen that this partnership has strategic value.

The role of coastal and marine ecosystems in Indonesia's First Nationally Determined Contribution (NDC) has been integrated in mitigation from the land sector, but it has not been stated quantitatively, because there are still many technical issues that must be addressed as regards adaptation. The Indonesian delegation stated that the role of coastal and marine ecosystems has been recognized, both in the Convention and the Paris Treaty, in the past year. The role of forest ecosystems has been discussed since COP11 in Montreal in 2005 and decided at COP13 in Bali in 2007, so that in the first NDC in Indonesia, the land sector "wraps" the role of terrestrial ecosystems, including mangrove and coastal ecosystems.

Blue carbon has the potential to support national programs of reducing emissions, food security and poverty alleviation, but the complexity of management and its implementation capacity still require improvement in the future.ⁱⁱ

Marine ecosystems play a very important role in the carbon cycle. In addition to having the greatest role in long-term carbon storage, carbon blue in the marine environment is an intensive carbon stocking hot spot, where phenomena play an important role at the global level necessary for natural carbon sinks. The possibility of about half of the carbon sink capacity has been the main cause of the destruction/habitat loss of vegetation in coastal areas since the 1940s. Efforts to raise the carbon-absorbing capacity need to be an integral part of the climate change mitigation strategies being drafted so as to encourage the development of recovery efforts. [5]

The restoration of blue carbon ecosystems will help countries in mitigating carbon emissions and, at the same time, in restoring the role of valuable ecosystems, as well as important natural resources. In order to achieve the goal, integrated coastal management is a core part of the process, both in terms of carbon binding capacity and services related to food security, coastal livelihoods and sustainable coastal development. Firstly, to protect these important blue carbon sinks, protection should include the provision of regulation of activities responsible for global depletion in its breadth, including coastal reclamation, mangrove logging/conversion, excessive use of fertilizers and disposal of organic wastes, sedimentation derived from land clearing/deforestation, unsustainable emphasis, and coastal settlement due to coastal development. The second should include large-scale efforts to restore lost/degraded blue carbon ecosystem lands, estimated at or greater than the extent covered by these aquatic habitats. [6]

B. Protection towards the Role of the Marine Environment as Climate Balancing

Indonesia's active international engagement in anticipating the impacts of climate change began with the signing of the United Nations Framework Convention on Climate Change Convention (UNFCCC) on Earth Summit on the Environment and Development United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro, Brazil, in 1992. The Climate Change Convention was subsequently ratified by the Government of Indonesia with Law No. 6 of 1994 which marked the commencement of a joint commitment to address the impacts of climate change, not only by Government agencies, but also the various private sectors and businesses as well as the whole society. [7]

The main objective of the Climate Change Convention as set forth in Article 2 is to stabilize greenhouse gas (GHG) concentrations in the atmosphere at a certain level of human activities that endanger the climate system. In order to achieve these objectives it is agreed upon the fundamental principles of the Convention which emphasize the principle of equality and precautionary principle, as set forth in Article 3, which states that each party has the same general responsibility, but, specifically, should be differentiated according to their capabilities.

Indonesia also played an active role in the protection of marine environments through the World Ocean Conference (WOC) and the Coral Triangle Initiative (CTI) held in Manado, North Sulawesi, on 11-15 May 2009, but the conference failed to provide protection to the management and utilization of marine resources. The ever-worsening maritime and fishery crisis should be a key consideration for the Indonesian government. The first consideration is the Food and Agriculture Organization report, which states, "The condition of fish resources around Indonesian waters, including the waters around the Indian Ocean and the Pacific Ocean, has shown the condition of exploitation exceeds the threshold and excess."ⁱⁱⁱ

In the event, the blue carbon was first launched in Indonesia at the World Environment Ministerial Forum in Nusa Dua, Bali, on February 24, 2010. On the occasion, the Government of Indonesia and the United Nations Environment Program (UNEP) jointly implemented the blue carbon program referencing the ability of marine and coastal ecosystems to maintain a balance of carbon dioxide (CO₂) absorption and potential greenhouse gas emission reduction. This concept proves the role of marine and coastal ecosystems dominated by marine vegetation, such as mangrove forests, seagrass beds, and swampy swamps in carbon deposition.^{iv} In addition, these coastal and marine ecosystems are believed to be able to become the vanguard of balancing with tropical forests to reduce the rate of emissions through the absorption of carbon dioxide from the atmosphere. The move has opened up wide opportunities for Indonesia to begin scientific research on the important role of marine and coastal ecosystems as a driver of global climate change.

In 2009, the Government of Indonesia, through the Ministry of Marine Affairs and Fisheries, initiated the initiation of a blue carbon study through the Blue Carbon Pilot Project in Banten Bay and continued with the Blue Carbon Project Demonstration Site in Derawan Islands, East Kalimantan, from 2012 until now. The Ministry of Marine Affairs and Fisheries has developed a program of blue carbon scientific studies activities in several other locations in the country, including Tanjung Lesung-Banten, East Coast Sumatra, Nusa Penida-Bali and Tomini Bay-North Sulawesi. [8]

III. CONCLUSION

Climate change mitigation policies are built by exploiting coastal ecosystems through market mechanisms such as carbon replacement, building coastal communities' resilience to improve protein sources by developing natural adaptation strategies through the conservation of community-based coastal ecosystems, a developing policy mechanisms to support integrated coastal zone management, including the resilience of networks of marine protected areas to climate change, to ensure priority focus on coastal ecosystem management; reducing the release of greenhouse gases from damaged coastal ecosystems through increased conservation and reforestation; commencing pilot projects in order to collect carbon emissions data from coastal ecosystems to prepare carbon replacement schemes, which should be available in the course of the project; and to reduce activities that negatively impact the ability of the ocean to absorb carbon.

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