Development of Tourism Areas for Coral Reef Ecosystems in Maintaining Conservation and Sustainable Coastal Planning

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Abstract. The aim of the study is to identify and analyze a model for the development of coral reef tourism areas in maintaining conservation and structuring sustainable coastal areas through a legal perspective. The approach method used is normative juridical, descriptive analytical research specifications, the data used are primary and secondary data and analysis uses qualitative methods. The object of research includes data and information on the development of tourist areas, coral reef conservation, sustainable beaches, as well as legal materials and other supporting data. Study results assist local governments, coral reef tourism managers, communities in developing coral reef tourism and help provide a frame of reference for policy makers to consider in developing sustainable tourism areas and coral reef conservation. The study results show that coastal ecosystems are increasingly threatened by coastal developments and climate change. Coral reefs provide vital ecosystem services of climate change mitigation and adaptation, but are already experiencing widespread decline throughout the tropics requiring conservation efforts. Tourism and related human activities have been a stimulus for coastal erosion. Coral reef ecotourism can be developed which is one form of coral reef conservation implementation. Utilization of the potential and development of coral reefs as a tourist attraction as well as conservation land which is managed in partnership between the local government and farmers, traders, boat operators and community members. Coral reef ecosystem tourism can bring additional income benefits to local communities and indirectly preserve coral reef ecosystems and sustainable coastal arrangements.

Keywords: development, tourism, coral reefs, conservation, coast

1. Introduction

In the era of industrialization, the coastal area is a top priority and is a center for the development of industrial activities, agribusiness, agro-industry, settlements,

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transportation ports, and tourism. [1] In a coastal area, there are usually one or more coastal environmental systems (ecosystems) and coastal resources. Natural ecosystems are found in coastal areas, including seagrass beds, sandy beaches, rocky beaches, escape formations, Barrington formations, estuaries, lagoons, deltas, small island ecosystems, mangrove forests, and coral reefs. [1]

Coral reefs as one of the ecosystems in the coastal and marine areas have great potential for the welfare of society from an economic, social, and environmental perspective. The role of coral reef ecosystems in supporting people's lives, especially coastal communities, is very important, such as preventing abrasion, sediment stabilizers, as a shelter and breeding ground for several types of fish, utilization for medicinal raw materials and cosmetic raw materials as well as a tourism facility that can attract tourists. tourists because the existence of coral reefs does not yet exist in all coastal areas.[2] Tourism activities in addition to providing income, are also able to grow the economy of the surrounding community by providing employment and business opportunities.[3]

Coastal areas and habitats (mangrove forests, estuaries, pond areas, deltas, and coral reefs), are biologically productive areas but are easily degraded due to human impacts or natural events.[4] Physical damage to coastal ecosystem habitats in Indonesia has occurred in mangrove forests, seagrass beds, estuaries, and coral reef ecosystems.[5]

Coral reefs are one of the ecosystems in coastal areas that are vulnerable to changes that occur both internally and externally.[2] Economic growth is quite rapid, and the pressure on Indonesia's coastal and marine areas is increasing, including in the utilization of coral reef ecosystems which are widely used for tourism activities, causing some to be in a threatened condition. It is generally threatened by negative pressures, overfishing, coastal development, sedimentation, and pollution from agriculture and logging, tourism, climate change, and ocean acidification.[2] Degradation of coral reefs will cause the loss of functions and benefits of the ecosystem so that in the end it will harm the community, especially local communities.

In managing coastal areas, the community has the right to carry out coastal resource management activities. The interests of the people of the coastal area include land areas related to water areas and sea areas, affecting land areas.[4] Management activities so that coral reefs can run while still paying attention to sustainability and not exceeding their carrying capacity and coral reefs can remain sustainable. The damages have a very large impact both ecologically and economically. To control every activity so that the economic and ecological aspects continue to run in balance, sustainable management is needed to maintain the sustainability of the coast and sea. [2] Several strategies are needed in the management of coral reefs.[6]

Development and management of coastal areas as an activity of the government, the business world and the community to regulate, manage, and serve tourists who need planning. Planning integrated tourism development into a program of economic, physical, and social development of an area. In addition, planning must

be able to provide a policy framework to encourage and control tourism development and maintain the conservation of coral reef ecosystems.

2. Problems

From the background as above, the problems in this study are:

a. What are the potential and benefits of coral reefs as part of the Coastal Area
b. How is coral reef conservation in an integrated and sustainable coastal area arrangement

3. Method

The approach method used is normative juridical, descriptive-analytical research specifications, the data used is secondary data, including data and information about the potential and utilization of coral reefs, development of tourist areas, coral reef conservation, sustainable coasts, legal materials and supporting data others, as well as analysis using qualitative methods.

4. Discussion

4.1. Utilization potential of coral reefs as part of the Coastal Area

Indonesia's coral reefs occupy the top ranking in the world for their area and species richness. More than 75,000 km2 or 14% of the total area of the world's coral reefs. [2]. Coral reefs provide many great benefits for the life and environment of the biota that live around them and also for human life. Various aquatic biota utilize coral reefs as a place to find food, nurture, and protect. Humans use coral reefs as a source of protein, fishing grounds, building materials, tourist attractions, souvenirs, and medicines.

Coral reefs have functions that support human life and livelihoods so they are economically important. The benefits of coral reefs can be in the form of goods and services they produce. Benefits of goods are benefits from resources that can be recovered which are exploited to meet needs such as fishing, selling ornamental corals, and so on. The benefits of services are categorized into benefits of physical structure, biotic, information, and socio-cultural benefits. [2]

The role and benefits of this coral reef ecosystem consist of economic, ecological, and socio-cultural benefits.

a. Ecological Benefits of Coral Reefs

   The ecological benefits of coral reefs can be interpreted as the benefits of coral reefs in terms of the reciprocal relationship between living things and their environment. Coral reefs are one of the marine resources that have great benefits or are called services for humans and the environment. The coral reef

ecosystem is the third highest productivity ecosystem after mangroves and seagrasses with productivity values between 1800-4200 gC/m2/year. Coral reefs have been identified as having high conservation value like rainforests because of their biological diversity, aesthetic appeal, and function as a reservoir of genetic diversity. Coral reefs provide many great benefits for the life and environment of the biota that live around them and also for human life.

Based on the benefits provided, the benefits of coral reefs are divided into 3 categories. Among others are:

1) Coral reefs are useful as habitats and food sources for various types of living things in the sea. Here many different types of living things live, find food, shelter, and reproduce;
2) Coral reefs are a source of high biodiversity. With the high biodiversity present in it, these coral reefs are a source of genetic diversity, and the species found to have a higher survival rate; [2]
3) Coral reefs can be useful as a protector of the surrounding ecosystem, for example in the function of mangrove forests, and also protect beaches and coastal areas from big waves. Coral reefs can reduce the energy of waves heading inland which can cause coastal abrasion and damage to the surroundings; and
4) Coral reefs can reduce the causes of global warming that occur with the chemical processes carried out by coral reefs and zooxanthellae. The chemical process is the process of changing CO2 gas into lime, which is a reef-building material.

b. Social Benefits of Coral Reefs and Corals Economically

Socially, coral reefs can be used as a support for educational and research activities so that the ecosystems within and around them, as well as the marine plants and animals present in the coral reef ecosystem, can be better known so that they are easy to study. This will be very useful as knowledge so that management and conservation actions carried out by coral reefs are more appropriate so that damage to coral reefs can be overcome easily. In addition, the ecosystem of the coral reef area can also be used as a means of recreation for the community, both local people and foreign people who want to see the beauty produced by coral reef ecosystems.

The economic benefits of coral reefs include that coral reefs are a high source of fisheries commodities. Because in it live various types of fish that can be caught for human food needs. In addition, coral reefs are also a source of medicines. Because in coral reefs there are chemicals that have been studied by many experts to produce drugs for humans. In detail, the benefits of coral reefs include:

1) As a source of fishery and source of medicine;

2) The surrounding community can also utilize biota that live on coral reefs, such as seaweed, shrimp and fish to be used as a source of food which can later be sold so that it becomes a source of income for the community;

3) Various types of fish, sea cucumbers, and seaweed that live in coral reefs can also be used as seeds for cultivation;

4) Ornamental and marine fish aquariums, reef fish usually have very beautiful colors, besides that their shapes are very unique. Many of these fish (including other marine organisms, such as sea anemones, starfish, and tube worms) are used as ornamental fish in aquariums. The beauty of the colors and the uniqueness of the shapes of these fish, so that they are in great demand by ornamental fish enthusiasts and become of high value. Many of them are export commodities; and

5) Breaking waves and harbors, naturally, the existence of coral reefs can protect the coast from the dangers of abrasion. Likewise, this natural breakwater also functions to protect the back reef from big waves. The lagoon or goba in the back reef area can be very deep and very clear so that the coral reefs can grow very fertile. In addition, because it is free from storm attacks or big waves, the lagoon in the area is often used as a boat or ship landing port. [2]

The beauty produced by the coral reef ecosystem the ecosystem can be used as an attractive tourist object so that it can increase the income of the people who live around it.[2] Many coral reefs in Indonesia have been used for marine tourism activities.[2] Coral reefs, home to tens of thousands of marine species, are ecosystems with the highest biodiversity.[7] The benefits of coral reef ecosystems do not only come from coral animals but also from various types of ecosystem constituents that are closely related to coral animals in a functional and harmonious relationship.[2] Ornamental and marine fish aquariums and reef fish usually have very beautiful colors, besides that their shapes are very unique.[2] Indonesian coral reefs have the highest biodiversity in the world often called mega biodiversity. Coral reef ecosystems have become a special attraction for tourists as a tourist attraction.[2]

4.2. Conservation of coral reefs in an integrated and Coastal Area Management.

Coral reef ecosystems as sustainable tourism areas

Tourism activities provide economic benefits for communities around the coral reef ecosystem area. If the local community is empowered to participate in management, then it will become an alternative livelihood with great potential to increase people's income.[8] Empowering coastal communities who are directly dependent on coral reef management by developing sustainable alternative livelihoods for coastal communities is a coral reef management strategy.[2]

Management of tourism activities so that they can run while still paying attention to the sustainability of coral reefs, with the concept of carrying capacity so that tourism activities do not exceed their carrying capacity and coral reefs can remain sustainable.[2] Ecotourism is a concept and term that relates to conservation.

Management of marine ecotourism is implemented with a management concept that prioritizes sustainability and utilizes natural resources and community culture. The concept of ecotourism management is not only oriented towards sustainability but more than that, namely maintaining the value of natural and human resources.[2]

The direction of sustainable development has two objectives, namely socio-economic benefits and preservation of natural resources and the environment.[2] Ecotourism is often understood as environmentally friendly tourism and is a form of alternative tourism that emphasizes environmental responsibility. Ecotourism has developed as one of the potential tourism for the benefit of sustainable tourism. Ecotourism as a type of tourism based on environmental conservation has several missions, namely:[2]

a. Develop tourism based on nature while maintaining the preservation of nature;
b. Promote local culture as cultural tourism that supports nature tourism;
c. Develop tourism in an integrated manner between nature and culture; and
d. Community empowerment to improve eco-friendly tourism.

Conservation of coral reefs in an integrated and sustainable coastal area arrangement

Good management thinks that future generations can also enjoy the resources that currently exist. Management of coral reefs to maintain a balance between economic utilization and environmental preservation.[2] The term conservation is often analogous to preservation which has the opposite meaning of utilization.[2] In the context of the sustainability of small islands, the direction of sustainable development has two goals, namely socio-economic benefits and preservation of natural resources and the environment.[2] Some of the strategies needed in managing coral reefs include empowering coastal communities directly, reducing the rate of degradation, and managing coral reefs based on ecosystem characteristics, potential, utilization, and legal status.[6]

In managing coral reefs, the following matters must be considered:[9]

a. First, preserving, protecting, developing, improving, and improving the condition or quality of coral reefs and the resources contained therein for the benefit of all levels of society and thinking about future generations;
b. Second, encourage awareness, participation, and cooperation/partnership from the community, local government, regions, and between agencies in planning and implementing coral reef management; and
c. Third, encouraging and assisting local governments to formulate and implement management programs by the characteristics of the region and the local community and comply with standards set nationally based on regional considerations that maintain the balance between exploitation efforts and environmental preservation efforts.

One of the steps that is considered appropriate to achieve the preservation of marine natural resources is the establishment of a Marine Protected Area, making

requests or zoning certain areas, which have certain functions and objectives. [2] . A location arrangement within an area to maintain biophysical conditions with the various potentials they contain and support the existence of local wisdom which is always a limiting factor for activities that are detrimental and endanger these biophysical conditions. Requesting or zoning certain areas to set aside locations [2] that have the potential for diversity of animal and plant species, uniqueness and natural phenomena, and their ecosystems into several zones, namely the core zone (no-take area), sustainable fisheries zone, utilization zones, and other zones.

The Karang Tirta coastal waters area better known by the public as Nirwana Beach in Lubuk Begalung District, Padang City, has a fairly clear distribution of biota area distribution, which is divided into three zones consisting of a residential zone, a tourist zone, and a mangrove ecosystem zone. Dominated by seagrass ecosystems, seaweed ecosystems, mangrove ecosystems, and coral reef ecosystems [10]. Bintan Regency Government by Decree of the Regent of Bintan No. 261/VIII/2007 has designated the east coast of Bintan Island as a Regional Marine Conservation Area which in the Bintan Regency Spatial Plan has designated the East Bintan Coastal area as a marine tourism development area and sustainable fisheries. As an effort to preserve the coral reef ecosystem and use the biological resources contained therein sustainably, with an area of 116,000 ha since 2006 the east coast of Bintan Island has been designated as one of the COREMAP (Coral Reef Rehabilitation and Management Program) locations.[8]

One of the zonings contained in a marine conservation area that has a very important function and purpose is the Marine Protected Area which has a function as a core zone or protection zone for the biological resources in it. In the Marine Protected Area, a no-fishing activity zone is enforced by fishermen. The stipulation of a prohibition on fishing activities in the Marine Protected Areas sometimes creates controversy among coastal communities. Some fishermen think that the existence of Marine Protected Areas will have an impact on decreasing fishermen's income due to the closure of some of their fishing grounds. and their rights become limited to utilizing these resources. However, some support the establishment of Marine Protected Areas with the assumption that there will be sustainability for coastal and marine ecosystems and will affect the welfare of fishing communities.[2]

5. Conclusion

Coral reefs have functions that support human life and livelihoods in the form of goods and services they produce, consisting of economic, ecological, and socio-cultural benefits. The benefits of reef ecosystems from various types of ecosystem constituents are closely related to coral animals in a functional and harmonious relationship as marine tourism objects. Management of marine ecotourism is applied with a management concept that prioritizes sustainability and utilizes natural resources and community culture, not only oriented towards sustainability but more than that, namely maintaining the value of natural and human resources.

The preservation of marine natural resources is carried out by establishing Marine Protected Areas, reclaiming or zoning certain areas, and setting aside

locations that have the potential for diversity of animal and plant species, uniqueness and natural phenomena, and their ecosystems into several zones, namely the core zone, sustainable fisheries zone, utilization, and other zones. Marine Protected Areas that have a function as a core zone or zone of protection for the biological resources contained therein are subject to a no-fishing activity zone. Sustainability is also carried out by being designated as one of the Coral Reef Rehabilitation and Management Program locations.

The preparation and implementation of coral reef management programs must involve all actors in coastal resource development, consisting of the government, coastal communities, the private sector/investors, boat managers in cleaning, and anchoring in the reef, and non-governmental organizations, such as tourism awareness groups. It is also necessary to increase human resources and community empowerment as well as environmental law counseling in community-based management of coral reefs (community-based management) which will create awareness and compliance of the community and tourists in preserving coral reef ecosystems.

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