

## THE COMMUNITY EFFORTS IN PRESERVING THE CORAL REEF ECOSYSTEM IN KOTA SABANG

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**ABSTRACT:** This study aims to know how the efforts of Kota Sabang community in maintaining and preserving the coral reef ecosystem in Iboih, Kota Sabang. The study was conducted in 2017, data collection techniques were using documentary studies, observations, questionnaires and in-depth interviews descriptively related to the efforts that have been done in the conservation of coral reef ecosystems. The data analysis shows that most (98.22%) of the respondents' answers have made efforts in maintaining and preserving the coral reef ecosystem in Iboih Kota Sabang. The role of communities greatly determines the success in managing the conservation of natural resources of coral reef ecosystems in coastal areas by empowering or raising awareness and understanding to convince coastal communities for long-term benefits of coastal protection as key to sustainable development.

**Keywords:** *Community Efforts, Ecosystems, Coral Reefs*

### 1. INTRODUCTION

A hot issue to be addressed today is environmental issue. The environment is the abode of all living things on the earth. The environment is the unity of space with all objects, power, conditions and other living things, including human beings and their behavior, which affects the viability of the life and welfare of human beings and other living beings, the human environment is everything that is around humans that affect the properties and growth of human beings concerned[1], [2]. The problem faced today is the decreasing of the land or the environment that is used as living place of living creature. Whether as a place to live human beings, animals and even plants. The total land area on the earth does not increase, but the population is growing every year. So that it causes the reducing land that is used as a place to live for animals and plants.

An ecosystem is an ecological system formed by mutual and indivisible relationships between one another, that is between living things and their environment. The ecosystem can also be said to be a unified of whole order between all elements of the environment that affect each other. People should also consider it, because between humans and nature have a close relationship, humans can not live without the plants and animals. Because with them they can survive, enjoy all kinds of food and most importantly human get oxygen to breathe.

Kota Sabang is Indonesia's free economic zone, it is often referred to as the northernmost point of Indonesia. The city of Sabang is famous for its natural beauty that pampers every tourist who comes to this area. So that the Kota Sabang is famous for its tourism destinations.

In time of the massive development of Kota Sabang to support its tourism area, various hotel facilities and other supporting facilities for tourism has begun to be built by the community and government, but there are interesting things, Iboih region is used as a coral reef ecosystem for animal and plant dwelling is still well maintained. As a place with various tourism supporting facilities, Kota Sabang has increased very rapidly, but the natural ecosystem is also still very beautiful. Various efforts made, the government with the community are maintaining the natural ecosystems in Kota Sabang. Based on the description above, the writers are interested to study "The community efforts in maintaining the coral reef ecosystem in Iboih Kota Sabang". This study is important as information in maintaining, preserving, conserving coral reef ecosystem so it can be an understanding for other regional communities.

### 2. METHODS

The study was conducted in Iboih, Kota Sabang in 2017, through literature study, documentation, observation, questionnaire and in-depth interviews elated to community efforts in

maintaining the coral reef ecosystem in Iboih Region, Kota Sabang

### 3. RESULTS AND DISCUSSION

#### Coral Reef Ecosystem

Indonesia is an archipelagic country with two thirds of its territory is the ocean. In addition to being awarded the title as a maritime country, its strategic position in the tropics as well as making Indonesia also known as a country which is rich of biodiversity. Indonesia also got the title as a maritime country. The extensive ocean surface is a potential as well as a challenge for Indonesia to be able to develop its water resources and keep its water resources from illegal fishing.

Coral reefs are composed of two syllables; coral and reefs, if the two words are combined, it will have the meaning of coral reefs. Coral reefs are one of the most abundant water resources in Indonesia. As a resident of the marine ecosystem, Indonesia's coral reef is ranked the world's top for its breadth and richness of its kind. More than 75,000 km<sup>2</sup> or 14% of the world's total coral reefs [3]

Furthermore, about the characteristics of coral reefs as follows: Coral reefs are highly sensitive ecosystems. Not to be destroyed, only taken one part, a wholeness will be disrupted, this is caused by the interdependence between the thousands of creatures that exist in the coral reefs. The process of its creation is not easy, takes millions of years to form completely. It is estimated that coral reefs in Indonesia had been formed since 450 years ago [4]. The diversity of coral reefs in Indonesia is quite high, there are more than 480 types of identified rock corals and 60% of the coral species have been described and recently in eastern Indonesia. As one of the major coastal and marine ecosystems, coral reefs have high ecological and economic value.

Ecologically, coral reefs play a role in protecting the shore from strong waves and currents, coral reefs also function as habitats, food-seeking sites, nurseries and spawning for marine biota. Economically, coral reefs have a function as a place to catch various types of marine biota, ornamental fish, pharmaceutical raw materials as well as an attractive choice of tourism areas. The results of the economic valuation calculations of fishery activities, coastal protection and tourism in Indonesia are estimated to generate a value of about 1.6 billion US dollars [5].

Coral reef ecosystems exist in a rather shallow water environment such as continental exposure and clusters of islands in tropical waters. To achieve maximum growth, coral reefs require clear waters with warm water temperatures, large wave motions and smooth water circulation and avoid sedimentation processes [6]. Coral reef ecosystems

have a good ability to repair damaged parts if habitat characteristics of various coral reef formations and environmental factors affecting them are well maintained.

The world's coral reef ecosystem is estimated to cover an area of 600,000 km<sup>2</sup>, with a distribution boundary around shallow tropical waters, between 30 ° N and 30 ° LS [3]. Coral reefs can be found in 109 countries around the world, but it is thought that most of these ecosystems have been damaged or destroyed by human activities at least in 93 countries. Based on its geographical distribution, 60% of the world's reefs are found in the Indian Ocean and Red Sea, 25% are in the Pacific Ocean and the remaining 15% are in the Caribbean. Coral reefs are a typical tropical ecosystem with a dispersal center in the Indo-Pacific region. Limited distribution of coral reefs in tropical waters and across the country from southern Japan to northern Australia is controlled by temperature and surface circulation factors.

The longitudinal spreading of coral reefs is strongly influenced by inter-land connectivity that is a stepping stones across the ocean [4]. The combination of physical environmental factors (temperature and surface circulation) with the large number of stepping stones found in the Indo Pacific region that is estimated to be a factor that strongly supports the extent of coral reef deployment and the high biodiversity of coral reef biota in the region.

Like other ecosystems, coral reefs do not require direct human intervention or manipulation for their survival [3]. It seems that the coral biodiversity, high ecological and economic functions are also accompanied by high threats. Human activities such as illegal harvesting, bombing, fishing, anchor disposal, sedimentation, and the current world issue of climate change can all degrade the quality and quantity of coral reefs in waters, especially the Indonesian archipelago. The observation of 324 coral reefs in Indonesia shows that about 43% of coral reefs are damaged or even considered to be on the verge of extinction, while still very good only about 6.48%. Furthermore, based on the research of LIPI Oceanography Research Center, from 985 stations recorded up to 2008 shows only 5.48% of coral reefs in Indonesia are in very good condition. In the Thousand Islands, for example, the results from the Terangi Foundation in 2013 explain that coral reef damage has reached an alarming stage as a result of the discharges of tons of waste and rubbish flowing into Jakarta Bay [7]

Having known the explanation above, it can be seen that in 2008 only 5.48% of coral reefs in Indonesia which is very good, only 5.48% of the rest is considered not good, even though Indonesia is very good for coral reef growth process, this is

all because there is no responsibility of human being to maintain the natural beauty that already exists, but we know the growth of coral reef itself takes time not for a while, but until now there is constant damage to coral reefs every year, there are two factors that cause reefs the first is that crushed coral, due to the factors of natural disasters and the second is the human activity itself.

In Bangka Island, the damage to coral reefs is quite vital due to the suction vessels that conduct large offshore tin mining. This damage is not only causes damage to coral reefs but also seagrass beds which is a buffer of fisheries sector and marine tourism as a sector of hope[8].

The data and facts above suggest that if progressive measures are not taken, then the rate of degradation of coral reefs in our country will be even more worrisome. That is, there must be minimal national effort to reduce the rate of damage. Otherwise, coral reef degradation is feared to be wider and larger and the consequences will also have ecological and economic impacts in Indonesia.

Marine waters ecosystem and the resources contains must be maintained to ensure the productivity of resources, especially fisheries that are the leading sector for Indonesian. Coral reef is an asset as well as a natural fortress that can protect the beach from the onslaught of waves as well as a source of food and medicine. In Indonesia, the economic value for coral reefs reaches 1.6 billion US dollars per year, it is still low when compared with the world economic value of coral reefs that reaches nearly 30 billion US dollars per year. It is conceivable how much material and non material losses arising from the destruction of coral reefs that will directly or indirectly affect human life.

Conservation efforts that can provide protection, preservation and sustainable use of natural resources that are essential in this case. Community integration with related parties must be created so that the business can be achieved. The global community concerning for coral reefs has been demonstrated by the implementation of the CTI (Coral Triangle Initiative) Summit which is the international meeting of the Philippines, Indonesia, Papua New Guinea, Malaysia, Timor Leste and Solomon Islands in Manado North Sulawesi in 2008. This meeting is a dedication of partnership efforts of interagency governments to promote healthy marine resources and assist communities in managing marine resources through the creation and strengthening of the Marine Protected Area. In addition, the partnership is also being developed to promote large-scale seascape management, improved fisheries, adaptation to climate change and the recovery of

endangered species (Conservation International, 2008).

### Coral Reef Conservation Efforts

Conservation areas can assist coastal communities in maintaining their economic base through the optimal and sustainable use of environmental resources and services. that marine conservation areas play an important role for the conservation and management of coral reefs by:

- Protect undamaged coral reefs that can be a source of larvae and as a tool to aid recovery.
- Protect free areas from human impact and suitable as substrate for coral attachment and rebirth.
- Ensure that coral reefs continue to sustain the needs of the surrounding communities that depend on them[9].

The beauty of the marine nature is priceless, it should be maintained and cared for in order not to get extinction one day and become regrets in the future, the beauty of nature can not be separated from the damage, therefore the government and local people must keep nature to keep it long-lasting by giving strict action to the public not to damage the environment only for personal interests that can harm other people and conservation areas in order to protect the coral reefs.

Therefore, in doing business for coral reef conservation, it requires the involvement of government and society, because it can not run well if all the elements do not work together. Coral reefs have many benefits to human life. Without the coral reefs, humans will find that it is difficult to get fish, as one of the favorite food items in Indonesia. then also, if the fish does not exist then the impact is on the tourists reducing who want to do diving and snorkeling to see the fish and coral reefs which are very beautiful under the sea. Furthermore, if the tourists are reduced, it will also affect the income generated by those who work in the tourism sector, resulting them to lost jobs and sources of income and it will impact on the increasing of unemployment in Indonesia. Now it is time for us to take care of coral reef for posterity in the future, so that they also can know and enjoy the beauty of nature under the sea directly and they do not get to know and see coral reef through book and video only, due to the extinction of reef ecosystem corals on this earth in the future.

### Community Participation in Coral Reef Management

To get success in managing the conservation of natural resources in coastal areas, it is necessary to find the right strategy by referring to common constraints faced, such as by empowering or raising public awareness in the conservation of

natural resources on the coast. Increasing public awareness is demonstrated to convince coastal communities for the long-term benefits of coastal protection. Because community participation should be decided on the identification, design and implementation of various possible benefits that can be obtained from coastal area protection[10].

Increasing awareness of coastal communities is generally more directed to the fishing community. In reality, however, the fishermen are merely actors, so the coach also needs to be directed to other "stakeholders". Key aspects of sustainable development include the empowerment of local self-sufficiency and social justice. One effort to achieve this is to move away from the traditional form of resource management, dominated by professional experts from the public and private sectors to an approach that combines knowledge and understanding experiences within each community.

Economic development of marine and coastal communities with the aim to improve the welfare of coastal communities through the strengthening of socio-economic institutions with the utilization of reef resources in a sustainable manner. By empowering local communities rehabilitation modes of coral reefs will have a prolonged economic potential, fishermen have better alternative livelihoods in coral reef cultivation.

#### **Marine Conservation Area in Island Region**

The marine conservation area is the tidal waters of the coastal zone and small islands, such as plants and animals therein, as well as the evidence of historical and socio-cultural heritage underneath, which is protected by law or in an effective manner, whether it is protected in whole or in part the region. That the main objective of conservation in coastal areas is to conserve ecosystems and natural resources so that an ecological process in an ecosystem can continue and to sustain the production of an environmentally sustainable food and services for human interest[11].

Coral reef ecosystem is a very important ecosystem for the waters and become a habitat for fish and other marine biota. Various benefits and high productivity that occur in coral reef ecosystems led to considerable utilization in coastal and marine areas such as: fishing activities, increasing the number of tourists, coastal development, the increasing waste and pollution. This study aims to determine the efforts undertaken in the management of East Coastal Waters Conservation Area, Weh Island Sabang, especially coral reef resources that are effective. This Research conducted in May of 2017.

#### **Challenges in Preserving Coral Reef Ecosystems**

Current coral reef ecosystems have come under pressure along with the increasing of human population density especially in coastal areas. reported[5] that the causes of damage to coral reef ecosystems in Southeast Asia, including Indonesia, are as follows.

- 1) Development in coastal areas that cause sedimentation and marine pollution, such as dredging, reclamation, sand mining, solid and liquid waste disposal;
- 2) Marine pollution due to marine activity, such as pollution from port, oil spill, garbage disposal from aboard, and direct result from ship anchor throwing;
- 3) Sedimentation and pollution from the land, such as deforestation, land-use change and non-conservative farming practices;
- 4) Overfishing;
- 5) Fishing by destructive means, such as bomb fishing, poison and other fishing gear; and
- 6) Coral bleaching due to global climate change.

The challenges in conserving coral reefs are very heavy, coral reefs can also be damaged by the process of activities on the land, if it is not immediately stopped it will adversely affect the growth of coral reef itself. Factors that become one of the coral reef ecosystem damage is mostly caused by human hands.

Furthermore, that the health of coral reefs is determined by good or bad activity in the land. Unplanned development activities in coastal areas will have an impact on coral reef ecosystem damage. Some activities such as mangrove forest clearance, deforestation, agricultural intensification, poor watershed management in general will increase turbidity and sedimentation in coral reef areas[10].

Sedimentation that occurs in the coral reef ecosystem will affect the declining ability of corals to grow and develop. Several human activities closely associated with sedimentation are the increasing use of forests and agricultural land, dredging activities, mining and construction[12]. The effect of sedimentation on coral reefs has been concluded by some researchers:

1. Causes coral mortality when covering the entire surface of the coral with sediment;
2. Reducing coral growth directly;
3. Inhibits coral planula to attach itself and thrive on the substrate;
4. Improve the ability of coral adaptation to sediment.

From many components of waste such as surfactants, heavy metals, toxic organic materials and chemicals, nitrogen and phosphorus elements are the most decisive factors of coral reef



damage[12]. The increasing concentration of nutrients will spur the productivity of phytoplankton and benthic algae. This is indicated by increased chlorophyll and turbidity, ultimately spurring the filter animal population and the detritus feeder. The effect of increasing population of phytoplankton and turbidity, competition of benthic algae and phosphate toxicity simultaneously can decrease coral amount[13].

The development of tourism, especially the development of coastal tourism and marine tourism, shows a considerable growth. This has resulted in an increasing number of people involved in this tourism activity. The increasing facilities and accessibility around the tourism area also help the acceleration of the tourism industry growth in coastal areas. The development of the tourism sector also encourages coral reef damage. For example, coral reef damage in Malaysia, especially in PulauPaya, PulauLembu, Songsong Island and Telor Island have been severely damaged by the tourist boats that often stuck their anchors further explains the impact of commercial tourism activity on coral reefs as follows:

- 1) The development of tourism facilities, the impacts can change the flow of water around the coral reefs and eventually change the main ecological factors of coral reefs, can cause turbidity so that reduce photosynthesis, can be a source of permanent pollution.
- 2) Damage by anchors, their effects break down and damage corals.
- 3) Damage by divers, often diving activities by accident can cause damage to corals and other biota.
- 4) Damage by small boats, often the base of boats and yachts can hit reefs and cause physical damage to shallow areas, especially at low tide.
- 5) Walking on reefs, tourists often stroll on coral reefs at low tide, and this way is potentially damaging to coral reefs due to being trampled[14].

The results of the research on Iboih Kota Sabang community efforts in maintaining, preserving, conserving and preventing coral reefs damage and management of coral reefs. Management is essentially a process of controlling human actions so that the utilization of coral reefs can be done wisely by prioritizing environmental sustainability. Special controlling / monitoring for coral reefs in Sabang has been good, which is done by the government and communities around in protecting coral reefs to the next generation.

Kota Sabang is surrounded by marine waters that have a variety of marine biota. It should be kept as natural assets to keep its sustainability, the

community plays an important role to protect the marine ecosystem, especially coral reefs, considering that given the coral reefs grow in decades. If damage occurs, it will result impacts, one of them is existing fish within the coral reefs will migrate for new sanctuaries. The community has been maintaining the coral reef ecosystem, the sensitivity or awareness of the community is important to maintain the marine ecosystem, public awareness with the government to promote transplant cultivation for the addition of coral reefs with various forms and interesting motifs. With the public awareness of the importance of protecting coral reefs in addition to increasing the income area, it also beautify the underwater world to create comfortable conditions for visitors so that becomes the attraction and added value for the coastal environment of Iboih, its beauty and cleanliness make the tourists very comfortable to return visiting Iboih in the future.

The efforts related to the enforcement of the rules in protecting coral reefs that there are not allowed to fishing, catching and bombing and reducing all activities, stepping on and taking all kinds of marine biota in Iboih region because the activities can damage and destroy the coral reef ecosystem so that habitat of ornamental fish in marine park will become extinct. And for the maintenance of marine parks, the government forms a marine and terrestrial security who will conduct regular controls in Sabang zone. Besides reminding tourists about the rules regarding to the marine ecosystem maintenance.

In addition, to find out how the cultivation and conservation of coral reef ecosystems, young people may attend training, socialization, approach and follow the efforts that have been done by their elders in the village for generations. Since earlier, they have had given knowledge in preserving coral reef ecosystem.

Like many areas of Gampong Iboih, they have adhered to the local customary law well, the people around Iboih are strongly agree to the enactment of customary law and participate in arresting those who involve in violations such as marine biota, illegal bombing and trawling that will be processed according to customary rules, then submitted to the customary government to be punished or given customs sanction expressly either in the form of fines and detention according to mistakes made. Customary rules that have been established do not violate the Laws, government regulations, Qanun Aceh and Kota Sabang. In the effort to maintain the coral reef ecosystem marine park, Panglima Laot as Customary Institution is very important role.

Other efforts undertaken in maintaining the environment in the coastal region Iboih is that by keeping its beauty always, most respondents

answered the environment Iboih Kota Sabang is very satisfactory. Keeping the environment clean which is commonly visited by tourists is very important, so that tourists feel comfortable while enjoying the scenery, the rules about littering is already applied by the local government that if anyone is littering will be dealt firmly by the local community and will be fined for Rp. 100.000, - (one hundred thousand rupiah), this provision is determined by the government of GampongIboih, because the cleanliness of coastal marine environment is very influential on the coral reef ecosystem.

The application of existing sanctions and implemented in maintaining local wisdom in protecting coral reefs runs well, most respondents answered strongly agree that the punishment is given if violating local wisdom in maintaining the coral reef ecosystem is going well in Kota Sabang. An irresponsible person who tries to take the opportunity to destroy nature without thinking the future impact is only to solely meet personal satisfaction, city government and the surrounding community are always alert. It is proven that all (100%) responded strongly agree that perpetrators of violators who seek to destroy coral reef ecosystems are subject to fines or strict sanctions from the government.

Based on the result of the research, it can be concluded that community efforts in maintaining coral reef ecosystem in GampongIboih Kota Sabang that 20 respondents stated strongly agree 77.85%, agree 20.35%, less agree 1.78%, and not agree 0%. Thus, it can be concluded that community efforts in maintaining the coral reef ecosystem in GampongIboihSabang is mostly responded very agree (77.85%) with the positive efforts of the community in maintaining the coral reef ecosystem for marine tourism destinations with a sustainable local wisdom manner. The given natural landscape by God to Kota Sabang make anyone who see it feels amazed by the charm of the natural marine and protected forests beauty, various coral reefs and various flora-fauna, becomes one of the tourists' fascination. Kota Sabang, besides having the satisfactory natural ecosystem, marine tourism such as diving equipment, it also has complete equipments to see the underwater natural beauty as tourists' attraction.

#### 4. CONCLUSIONS

From the research results that has been done, it can be concluded as follows: The existence of the coral reef ecosystem found in Iboih Kota Sabang was quite diverse, community has been aware and plays an important role in maintaining the marine ecosystem of coral reefs, public awareness with the

government encourage the addition of coral reef cultivation. Marine ecosystems of coral reefs in addition to increasing local revenue also beautify the underwater as a tourist attraction. Efforts to enforce local rules and wisdom as well as the application of sanctions for violators in the effort to preserve coral reefs have been going well in Iboih Kota Sabang, they are realized to be a long-term benefit as the key to sustainable development for the welfare of the community. Based on the conclusions above, the authors provide suggestions as follows: The efforts to preserve coral reefs in Iboih Kota Sabang has been good, coral reef cultivation and the application of sanctions for violators are expected to be done continuously in the future. Communities and governments play an important role in safeguarding coral reef ecosystems, it is advisable to continue cooperating sustainably for the beauty and sustainability of underwater ecosystems for next generations.

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