

Coral Reef Management in Temukus Village

I Putu Ananda Citra¹, Made Dwipayana²

ananda.citra@undiksha.ac.id¹, made@undiksha.ac.id²

Universitas Pendidikan Ganesha^{1,2}

Abstract. This research was conducted in Temukus Village, Buleleng Regency, which is the most famous tourist area in North Bali. The method used in this research is the descriptive qualitative method. The aim of this research is to Describe the management of Temukus Village Reefs. Data collection by observation to obtain data on coastal resource potential, and in-depth interviews using key informants and purposive sampling techniques for coral reef management. Temukus Village has a coral island name (Tangkad Kramat) as a coral reef conservation area. The management of coral reefs is carried out by the Monitoring Community Group in collaboration with the Temukus Village Tourism Awareness Group. Seeding, planting, and supervision are stages in coral reef cultivation.

Keywords: Coastal areas, Coral reefs, Management

1. Introduction

Coastal resources are huge and potential the future [1]; [2]. The use of coastal resources has experienced developments in their utilization. However, sustainable management is not yet optimal. One of the coastal potentials which is the main potential that must be planted is coral reefs. One of the most important coastal resource potentials is coral reefs. Coral reef health as an indicator of marine health [3]. Coral reefs have a very important role both ecologically, socially, and economically for marine organisms and the lives of coastal communities [4]. Integrated coastal resource management with various aspects and stages. The first stage that must be carried out is managing and developing potential by mapping the potential of coastal resources owned. Management of coastal resources in an integrated manner with the first step, namely mapping the potential of the coast is one of the steps to utilize the potential as optimally as possible. The Coastal Resources Management Law [5] has stipulated that utilizing existing potential for welfare purposes and improving the welfare of communities in coastal areas. This is capital for equitable development in Indonesia. Coastal areas are areas that intersect with land areas and sea areas. Land boundaries include areas both dry and submerged in water, and are influenced by marine activities, such as tides, sea breezes, and saltwater seepage, including communities that predominantly work as fishermen. Meanwhile, the ocean boundary is the area of the sea that is still influenced by natural processes and activities that occur on land such as erosion, abrasion, sedimentation, and river activity, as well as activities or activities carried out by humans [6]. Indonesia is one of the largest archipelagic countries in Asia. 2/3 of the territory is ocean. Thus, it can be interpreted that the potential for coastal resources is very abundant and diverse. The potential of these resources can be seen from the large biodiversity (biodiversity), non-biological potential, artificial resources, and environmental service resources (tourism).

North Bali is one of the areas in Bali with the longest beaches and the most extensive coastline. Buleleng Regency has mountainous physiographic conditions. Located between hills and sea areas. Shallow seas have resulted in the development of potential coastal resources, namely coral reefs. The coastal village that cultivates coral reefs in Banjar District is Temukus

Village. Coral reef cultivation is the key to developing the coastal area in Temukus Village as a tourist village. The importance of identifying other potentials and creating development strategies [7]; [8], is an urgent matter to be implemented. This is a step to advance coastal communities in Temukus Village. Healthy coral reefs will provide various benefits [9]; [10]. Such as ensuring the preservation of other marine biota that support local communities. Fishermen are the main source of livelihood for the people of Temukus Village, so strategies are implemented in coastal resource management (SDP) that open up business opportunities for the wider community [11]; [12]. Based on this description, the aim of this research is to develop a strategy for managing coastal resources in Temukus Village.

2. Methods

The research design is descriptive [13]; [14]. Respondents were determined using purposive techniques, namely tourism awareness groups, fishermen groups, and community leaders who could provide information according to the research objectives. Data was collected by observation techniques, in-depth interviews, and documentation of each stage. Data were analyzed using qualitative analysis techniques, namely all stages of coral reef management [15], starting from preparation, implementation, monitoring, outcomes, and benefits obtained by coastal communities.

3. Results and Discussion

This activity is carried out through 3 (three) stages including, 1) the planning stage, 2) the implementation stage, and 3) the evaluation stage. The following describes each stage.

3.1 Planning Stage

At the planning stage, the first activity is observation and outreach. The implementation team met with parties from the village to hold a meeting regarding the work program and the outputs of this activity. The results of previous studies showed that there is great potential in the coastal areas of Buleleng Regency, especially the Lovina area including Temukus Village, namely the potential for coral reefs. However, based on the results of the interviews, information was obtained that coral reef cultivation has so far been carried out experimentally. Based on this, the results of this socialization decided to make a map of the depth of the sea which will later be used as a basis for mapping the feasibility zones for coral reef cultivation. After that, the next activity was preparing a work plan and signing a cooperation agreement with the village, especially the supervisory community group of Temukus Village, which was given a special assignment by the Head of Temukus Village for coral reef cultivation. After the administrative preparations were completed, the technical preparations, namely the preparation of mapping tools such as GPS and Aquamaps from the implementing team, while the village side prepared diving equipment, and boats, involving fishermen groups and tourism awareness group Temukus Village.

3.2 Implementation Stage

Implementation of the sea depth mapping program in Temukus Village, Banjar District on 20 June – 11 July 2022. The target groups involved were the supervisory community group, tourism awareness group, Fishermen's Groups, *Bendesa Adat Temukus*, and Community Leaders who were also participants and provided boat facilities to carry out planting coral reef seedlings and underwater mapping. The focus of the activity is coral reef planting and ocean depth mapping for coral reef cultivation zones, so the type of activity is in the form of data

collection training with GPS and Aquamaps. The data recording was accompanied by a group of fishermen because they are used to going to sea and knowing the location of coral reefs. Data recording is done using a zig-zag technique for more detailed recording. The results of the recording in the form of data are then processed with a computer device. The application used is GIS software. The obstacle encountered was that apart from the limited number, of computers at the Temukus Village Office did not support this mapping software. So the mapping training experienced problems. However, the enthusiasm of the target group in mapping and cultivating coral reefs is very high. This can be seen in the presence, participation, and activeness of the community.

3.3 Evaluation Stage.

There are several obstacles encountered in the development and management of coral reef cultivation. The main obstacle is weather and climate because if the weather/climate is not supportive then the process of coral reef reproduction or growth will be slow and not optimal. The second obstacle is the relatively expensive cost required to create coral reefs. The difficulty of cultivating coral reefs sustainably. This is because supervision or monitoring requires expensive operational costs such as a lack of diving equipment. Implementation of framing and placement of coral reefs in the sea. As a special interest tourist attraction, the number of tourists who come and visit is very minimal, this really needs government support that pays more attention to the management and development of coral reefs. This will have a good impact on the environment and tourism in Temukus Village in particular and in the North Bali area in general.

3.4 Coral Reef Management Strategy

The environmental awareness of the Temukus Village community resulted in the formation of the Karang Rupit tourism awareness group organization where one of the group's activities is coral reef conservation [17]. There are stages in the management of coral reefs that are carried out in the sustainability of coral reef management in Temukus Village. tourism awareness group requires several materials to carry out coral reef management. In this case, the materials used are: 1) Iron, this iron is the basic framework in coral reef conservation. The iron used can be scrap iron or new iron, but it's better to use rusty used iron. The iron will be assembled in such a way as to resemble a spider (spider frame), having five cornerstones with a size of 1 Meter. 2) Fox Glue, this glue is used as an adhesive for sand which is attached to the entire iron frame which has been assembled to resemble a spider. 3) Cable ties, these cable ties are used to tie coral reef seeds to the iron frame that has been prepared. 4) Coral seed, this coral reef seed is the main material to be developed.

The land used in coral reef conservation has an area of approximately 10 hectares. Placement of coral reefs is done about 100 meters from the shoreline and has a depth of 4 meters. The depth of 4 meters is the depth when the sea is high and during low tide, the coral reefs are still submerged by seawater of approximately up to 2 meters. The placement of coral reefs can be reached by using the medium of transportation in the form of a boat. The Karang Rupit tourism awareness group also takes into account the weather and climate when placing coral reefs in the middle of the sea, namely by estimating the size of the sea waves for safety and also so as not to damage the newly installed coral reefs. Installation of coral reefs on the seabed is usually carried out in certain months, namely from May to September because during these months the sea waves in Temukus Village tend to be calmer.

This conservation activity certainly requires a lot of help, one of which is the workforce which is very much needed in this activity. The workforce in the coral reef conservation efforts carried out by the Karang Rupit tourism awareness group comes from members and the Arrow Dive team. Funds are also required for this activity. The source of funds used for coral reef conservation comes from tourism awareness group membership fees of IDR 5,000 per month. As a place to gather and prepare for the planting of coral reef seedlings, it is carried out at the Karang Rupit tourism awareness group secretariat which is not far from the coral reef conservation area. The expected outcomes in the conservation of coral reefs in Temukus Village are expected to become one of the tourist attractions that support tourism activities in Temukus Village. Maintaining the preservation of coral reefs in Temukus Village, policies that focus on preserving coral reefs still do not exist, but general policies in efforts to protect the environment already exist, such as socialization conducted to the surrounding community not to throw garbage in rivers and seas.

Before carrying out the activity of planting coral reef seedlings on the seabed, preparations are made in advance so that activities can run optimally such as determining the location for planting coral reef seedlings, time, and preparing the necessary raw materials. It was agreed that the installation of coral reef seedlings would be carried out on Sunday, June 27 2021 which was attended by members of the Karang Rupit tourism awareness group arrow dive team, experts, and supervision by extension services from the Banjar sub-district fisheries service. In this activity, the implementation went smoothly and further monitoring will be carried out periodically regarding the development of the coral reef seeds that are installed.

Coral reef conservation efforts in Temukus Village have problems in their management, especially the very limited costs which will affect the purchase of coral reef seeds that are few. The challenge in coral reef conservation is to make people aware of the use of marine products, where sometimes they do not realize that they have damaged the existing coral reefs when they take marine products. To conserve coral reefs in the village of Temukus, what is expected is the creation of beautiful coral reefs and their sustainability.

Coral reef conservation is something that can preserve the existence of existing coral reefs by having various benefits which are as a breakwater for sea waves that cause abrasion and as a place for marine biota to live [8]; [18]. This coral reef conservation also provides knowledge to the public regarding the importance of protecting the environment so that awareness will emerge within the community while in this case conservation efforts do not have a negative impact [19]; [20]. Efforts to install coral reef seedlings in Temukus village have just been carried out and it takes a long time to grow so currently the benefits have not been felt for the community and living things, but in the long term, it will allow for many benefits where for the community it can be used as a marine tourism object and for marine biota the existing ecosystem can be maintained. In addition, the development of coral reefs as a place to live for various marine biota including fish will increase fish populations and increase income for fishermen.

4. Conclusion

The results of the study show the potential for superior coastal resources in Temukus Village, namely coral reef management. Broadly speaking, the stages starting with the preparation are the organization of the management agency, the land, and the materials and tools used, namely materials for making coral reef planting media in the form of iron frames, and operational tools such as diving equipment. The implementation stage is to make planting media with a spider design, test the suitability of the requirements and location of activities with the ideal depth of coral reefs, namely with a depth of more than 3-20 meters and 100 meters from

the shoreline, placing media and seeds in the sea, and monitoring the development of reefs coral. The results of the activities and the benefits derived from coral reef cultivation are the preservation of marine life and the economic benefits of local communities due to the growing development of tourists. Community groups can use the Temukus Village Bathymetry Map to determine the location of coral reef cultivation. This activity can be adopted in different areas with the same problem, namely mapping the depth of the sea for coral reef cultivation.

Reference

- [1] I. Chairunnisa, R. Rijanta, and M. Baiquni, "Pemahaman Budaya Maritim Masyarakat Pantai Depok Kabupaten Bantul," *Media Komunikasi Geografi*, vol. 20, no. 2, p. 199, 2019, doi: 10.23887/mkg.v20i2.21216.
- [2] I. B. P. Dwiyasa and I. P. A. Citra, "Partisipasi Masyarakat Lokal Dalam Pengembangan Ekowisata Di Desa Pemuteran," *Media Komunikasi Geografi*, vol. 15, no. 2, pp. 29–42, 2014.
- [3] D. I. T. Saleh and N. T. Barat, "Serta Pertumbuhan Biota Penempel Pada Terumbu Karang Buatan," pp. 51–59, 2011.
- [4] D. Yulius, N. N., Taslim, A., Hadiwijaya, L., Salim, Ramdhan M., & Purbani, "Distribusi Spasial Terumbu Karang di Perairan Pulau Wangi-Wangi, Wakatobi," *Jurnal Ilmu dan Teknologi Kelautan Tropis*, vol. 7, no. 1, pp. 59–69, 2015.
- [5] "Undang-Undang (UU) Nomor 1 tentang Pengelolaan Wilayah Pesisir dan Pulau-Pulau Kecil," 2014.
- [6] R. Dahuri, *Pengelolaan Sumber Daya Wilayah Pesisir dan Lautan Secara Terpadu*. Jakarta: Pradnya Paramita, 2001.
- [7] A. D. Purwanto, K. T. Setiawan, and D. N. Br. Ginting, "Pemanfaatan Data Penginderaan Jauh untuk Ekstraksi Habitat Perairan Laut Dangkal di Pantai Pemuteran, Bali, Indonesia," *Jurnal Kelautan Tropis*, vol. 22, no. 2, p. 165, 2019, doi: 10.14710/jkt.v22i2.5092.
- [8] Z. Hidayah and N. I. Nuzula, "Pemetaan Sebaran Terumbu Karang Studi Kasus Selat Madura, Jawa Timur," *Jurnal Kelautan Tropis*, vol. 22, no. 2, p. 127, 2019, doi: 10.14710/jkt.v22i2.5634.
- [9] A. C. Nugroho, "Identifikasi Penyakit Pada Terumbu Karang Menggunakan Ripple Down Rules," *Jurnal Terapan Teknologi Informasi*, vol. 1, no. 2, pp. 165–174, 2018, doi: 10.21460/jutei.2017.12.50.
- [10] S. Suryono, M. Munasik, R. Ario, and G. Handoyo, "Inventarisasi Bio-Ekologi Terumbu Karang Di Pulau Panjang, Kabupaten Jepara, Jawa Tengah," *Jurnal Kelautan Tropis*, vol. 20, no. 1, p. 60, 2017, doi: 10.14710/jkt.v20i1.1363.
- [11] T. Sugito, A. I. Sulaiman, A. Sabiq, M. Faozanudin, and B. Kuncoro, "Community empowerment model of the coastal border based on ecotourism," *Masyarakat, Kebudayaan dan Politik*, vol. 32, no. 4, p. 363, 2019, doi: 10.20473/mkp.v32i42019.363-377.
- [12] I. G. M. Subagiana, I. G. L. S. Artatanaya, and N. L. M. Wijayati, "Model Pemberdayaan Ekonomi Masyarakat Pesisir (PEMP) pada Tiga Perkampungan Nelayan Air Kuning, Pengembangan dan Candi Kusuma Kabupaten Jembrana Propinsi Bali (Suatu Studi Komparatif)," *Jurnal Bisnis dan Kewirausahaan*, vol. 14, no. 2, pp. 92–98, 2018, doi: 10.31940/jbk.v14i2.1042.
- [13] H. S. Yunus, *Metodologi Penelitian Wilayah Kontemporer*. Yogyakarta: Pustaka Pelajar, 2010.
- [14] I. P. Sriartha, *Metodologi Penelitian*. Singaraja: Undiksha, 2010.
- [15] A. A. I. Ari Atu Dewi, "Model Pengelolaan Wilayah Pesisir Berbasis Masyarakat: Community Based Development," *Jurnal Penelitian Hukum De Jure*, vol. 18, no. 2, p. 163, 2018, doi: 10.30641/dejure.2018.v18.163-182.
- [16] Z. M. Muktaf, "Wisata Bencana: Sebuah Studi Kasus Lava Tour Gunung Merapi," *Jurnal Pariwisata*, vol. IV, no. 2, pp. 84–93, 2017.
- [17] R. G. Mandowen and R. H. Mambrasar, "Sistem Informasi Geografi untuk Analisis Potensi Sumber Daya Lahan Pesisir Kepulauan Padaido Kabupaten Biak Numfor, Papua," *Jurnal Teknologi Informasi dan Ilmu Komputer*, vol. 8, no. 5, p. 895, 2021, doi: 10.25126/jtiik.2021853559.

- [18] A. S. Adji, "GEOMORFOLOGI TERUMBU KARANG DI PULAU POMBO GEOBIA METHOD IN THE GEOMORPHOLOGICAL ZONE CLASSIFICATION OF CORAL REEFS IN POMBO ISLAND," vol. 08, no. 02, 2022.
- [19] M. Aris, A. Fahrudin, E. Riani, and E. Muttaqin, "ANALISIS KEBERLANJUTAN PENGELOLAAN TAMAN WISATA ALAM LAUT (TWAL) PULAU WEH BERDASARKAN HUKOM ADAT LAOT (Sustainability Analysis of the Marine Recreational Park (MRP) Management in Weh Island Based on Local Customary Law of the Sea (Hukom Adat Laot)," *Jurnal Manusia dan Lingkungan*, vol. 25, no. 1, p. 25, 2020, doi: 10.22146/jml.23065.
- [20] A. B. Sambah, D. Affandy, O. M. Luthfi, and A. Efani, "Identifikasi Dan Analisis Potensi Wilayah Pesisir Sebagai Dasar Pemetaan Kawasan Konservasi Di Pesisir Kabupaten Banyuwangi, Jawa Timur," *Jurnal Ilmu Kelautan SPERMONDE*, vol. 5, no. 2, p. 61, 2020, doi: 10.20956/jiks.v5i2.8933.