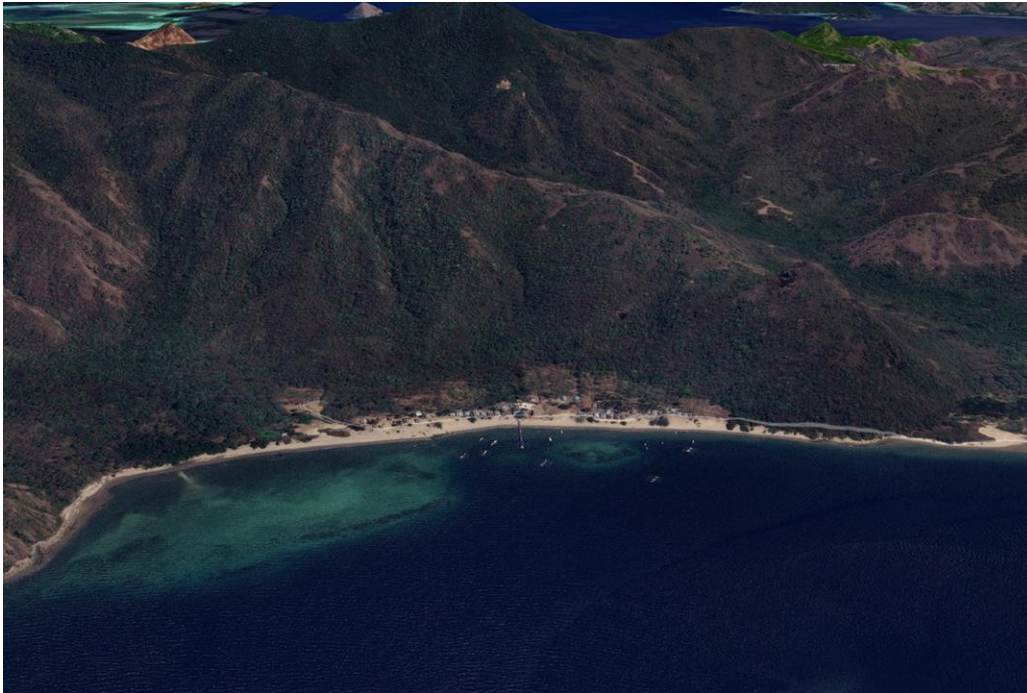




FINAL REPORT

**STUDY OF ECOTOURISM MANAGEMENT BASED ON
TURTLE CONSERVATION AND COMMUNITY CAPACITY
BUILDING IN KAMPUNG KERORA RESORT, KOMODO
NATIONAL PARK.**



Cooperation between

**KOMODO NATIONAL PARK CENTER
DIRECTORATE GENERAL OF NATURAL RESOURCES AND ECOSYSTEM CONSERVATION OF THE
MINISTRY OF ENVIRONMENT AND FORESTRY**

with the FACULTY

**OF FORESTRY
GADJAH MADA UNIVERSITY
2024**

FOREWORD

Praise be to Allah, the Almighty God, for the grace of knowledge and compassion, so that the final report of the Study of Ecotourism Management Based on Turtle Conservation and Community Capacity Building in Kampung Kerora Resort, Komodo National Park can be completed. This report contains the results of field surveys aimed at obtaining information and data on the study location in Kerora village. The data collected includes biophysical, ecological, accessibility, potential, social, cultural, economic, and community development aspects. The data and information will then be analyzed to develop an ecotourism management plan for Kerora village based on turtle conservation and improving community welfare. The development analysis is directed towards turtle conservation by taking into account other ecotourism potentials within Kerora Village and its surrounding areas. The spatial, ecological, socio-cultural and economic approaches were carried out in the preparation of the final report of this study.

In order to produce quality final report results, we need support from various parties. We realize that the preparation of this final report will not be carried out without the support and cooperation of various parties. Therefore, we would like to express our deepest gratitude to the Head of Komodo National Park and all staff, PIC Project IN-FLORES (*Investing in the Komodo Dragon and Other Globally Threatened Species in Flores*) from the Global Environment Facility (GEF), United Nations Development Programme (UNDP), the community of Kampung Kerora, and all teams who have played an active role in this survey activity. The participation and contribution of various elements of the community, both in terms of information, facilities, and time given, greatly helped the smooth running of this activity.

Finally, we realize that this report still has shortcomings, and we are open to constructive suggestions and input for improvement in subsequent reports. May God Almighty always provide guidance and smoothness in our every step forward.

Yogyakarta, November 2024

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1. INTRODUCTION

1.1. Background

Komodo National Park is one of Indonesia's leading conservation areas, globally renowned for its Komodo dragons (*Varanus komodoensis*). The area is also home to many other species of flora and fauna, including sea turtles, which play an important role in maintaining the balance of the marine ecosystem. Sea turtles, as reptiles that live mostly in the sea, only occasionally come ashore to lay their eggs. However, their existence is now endangered due to environmental changes and human activities that destroy their habitat. Based on Government Regulation No.7 of 1999 concerning the Protection of Plant and Animal Species, all sea turtle species are categorized as protected animals (Purwanasari, 2006). In Indonesia, we can find several types of sea turtles, such as the Leatherback Turtle (*Dermochelys coriacea* Linnaeus), Hawksbill Turtle (*Eretmochelys imbricata* Linnaeus), Green Turtle (*Chelonia mydas* Linnaeus), Olive Ridley Turtle (*Lepidochelys olivacea*), Loggerhead Turtle (*Caretta caretta* Linnaeus), and Flatback Turtle (*Natator depressus* Garman) (Carr, 1997 in Parawangsa et al., 2018). There are two types of sea turtles in the Komodo National Park area, namely the Hawksbill Turtle (*Eretmochelys imbricata*) and the Green Turtle (*Chelonia mydas*).

Muang Island is one of the turtle habitats in the Komodo National Park area. Its easily accessible location makes it frequently visited by the public. The island is located close to Kerora Village and Golo Mori Special Economic Zone. Based on Komodo National Park's internal monitoring, Muang Island is an active location for sea turtle nesting. However, there are still people who take turtle eggs illegally. This situation became the basis for designing an ecotourism program based on turtle conservation that also involves community empowerment. This program is expected to increase the income of the people of Kerora Village while preserving the turtle habitat.

Kerora Village is one of the settlements within Komodo National Park that is located very close to Muang Island. In addition, Warloka Pesisir Village and Golomori Village, which serve as buffer zones for Komodo National Park, are also directly adjacent to Muang Island. Kerora Village has great potential as the main attraction center in this area, as it geographically connects Warloka Pesisir Village and Golomori Village with Muang Island. Muang Island itself is known as the center of turtle nesting beaches in Komodo National Park, making it an ideal location for turtle conservation-based ecotourism development. This strategic location gives Kerora Village the opportunity to become a leading ecotourism destination capable of raising awareness of turtle conservation. In addition, the development of ecotourism is also projected to have a positive impact on Warloka Pesisir Village and Golomori Village, by increasing the number of tourist visits while providing economic benefits for the local community.

Kerora Village has high potential for tourist attraction and good accessibility. However, the area faces obstacles such as the lack of supporting tourism facilities and infrastructure, as well as low public awareness of the importance of sea turtle conservation. To overcome these challenges, a comprehensive study of ecotourism potential and sustainable management planning is needed. This study aims to

formulate effective strategies in developing ecotourism based on turtle conservation in Kerora Village. Through this study, the existing ecotourism potential will be identified, turtle conservation needs will be analyzed, and an ecotourism management business plan will be developed. One of the main focuses is to increase the capacity of the local community through programs that encourage awareness and skills in managing ecotourism, while supporting turtle conservation efforts. With this approach, ecotourism development in Kerora Village will not only provide economic benefits for the local community, but also strengthen turtle conservation in Komodo National Park. In addition, it is also expected to strengthen connectivity and tourist attraction around Warloka Pesisir Village and Golomori Village.

1.2. Aims and Objectives

The purpose of the implementation of the Study of Ecotourism Management Based on Turtle Conservation and Community Capacity Building at the Kampung Kerora Resort, Komodo National Park is to maximize and utilize the potential of ecotourism to support turtle-based conservation efforts so as to improve the economic welfare of local communities.

The objectives of the Study of Ecotourism Management Based on Turtle Conservation and Community Capacity Building at the Kampung Kerora Resort in Komodo National Park are as follows:

1. Identifying potential ecotourism attractions in Kampung Kerora and its surroundings.
2. Analyzing the strategy of developing a business plan for ecotourism management based on turtle conservation at the Kampung Kerora Resort
3. Increase the capacity of local communities in managing and supporting ecotourism and conservation activities.
4. Provide recommendations for public policies related to ecotourism management based on turtle conservation at the Kampung Kerora Resort.

1.3. Outputs

Expected outputs in the Study of Ecotourism Management Based on Turtle Conservation and Community Capacity Building at the Kampung Kerora Resort, Komodo National Park:

1. The availability of strategic recommendations for developing a business plan for ecotourism management based on turtle conservation.
2. Implementation of a community capacity building program to support the management of ecotourism and conservation activities.
3. Establishment of a turtle conservation community group through a Decree of the Head of Komodo National Park.

2. GENERAL OVERVIEW

2.1. Overview of the Region

Komodo National Park (TNK) is one of the national parks that implements a resort-based management system. TNK has a vision "As a World Class Ecotourism Destination of National Pride Leading in Conservation Area Governance". Its management aims to protect biodiversity, ecosystems and ecological processes; support education and research; maintain sustainable use of natural resources; and develop natural beauty, biodiversity, culture and customs of local communities as tourist attractions.

Kerora Village Resort, located in Kerora Hamlet, Pasir Pajang Village, Rinca Island, Komodo District, West Manggarai Regency, NTT, is one of the resorts under the National Park Management Section (SPTN) Region I of the Komodo National Park Center. The resort is responsible for supervising the settlement zone in Kerora Hamlet, which is inhabited by around 290 people, the majority of whom work as fishermen.

In the management of national park areas, resorts have an important role as implementers of protection and security, as well as being at the forefront in dealing with various disturbances to the area. TNK focuses on animal conservation while maintaining the integrity of the flora and fauna ecosystem, both on land and sea.

The resort-based management approach is the main strategy in managing the national park. By placing resorts at the forefront of the management of the smallest conservation units, this system allows for more effective and sustainable monitoring and implementation of conservation.

2.2. Turtle Bio-Ecology

2.2.1. Sea Turtle Nesting Habitat

Coastal areas or beaches are habitats that are often chosen by sea turtles as a place to lay eggs. Sea turtles usually dig holes in the sand to make nests and lay their eggs. A beach that is suitable as a turtle nesting habitat generally has several criteria, such as being easily accessible from the sea, being at a sufficient height to avoid the risk of being submerged by the highest tide, and having relatively loose sand with a medium size so that the nest hole does not collapse when formed. The selection of this location is a preferred nesting habitat for sea turtles with a low-salinity, humid environment and good substrate so that the eggs are not waterlogged during the incubation period (Satriadi *et al.*, 2003). Sandy beach characteristics act as an incubator for turtle embryo development. The texture composition of sand is not less than 90% with medium and fine grain diameter, the rest is dust and clay. The coarse texture is more water-flowing than water-holding because coarse-textured sand has larger pores. Medium-sized substrates are suitable for sea turtle habitat (Ackerman, 2017).

Sand is an essential element needed by sea turtles to lay their eggs. Each turtle species has unique characteristics in selecting nesting sites. In general, selected beaches are usually wide, gently sloping, and located at the top of the shoreline with an average of 1.5 meters of sand per hour.

slope of about 30 degrees. In addition, turtle nesting areas are often surrounded by plant species or coastal vegetation formations that are unique to the area.

In general, from the coastal area towards the mainland are as follows: a) Pioneer plants b) Zonation of plant species consisting of *Hibiscus tiliaceus*, *Gynura procumbens*, and others c) Zonation of plant species such as *Hernandia peltata*, *Terminalia catappa*, *Cycas rumphii*, and others d) The deepest zonation of coastal forest formations *Callophyllum inophyllum*, *Canavalia ensiformis*, *Cynodon dactylon*, and others.

2.2.2. Distribution of sea turtle nests

Beach vegetation plays an important role in protecting sea turtle nests, especially in preventing direct exposure of eggs to sunlight. In addition, vegetation can prevent sharp temperature changes around the nest and protect the nest from predators, as well as influence the humidity, stability of the sand (Akbar *et al.*, 2020). Pradana *et al.*, (2013) mentioned that there are some turtle nests found under the shade of vegetation. Vegetation roots function to bind sand grains, thus preventing collapse and facilitating turtles in the process of digging and nesting. The temperature and humidity around vegetation tend to be stable, as sunlight does not directly hit the sand surface, which is ideal for egg development during incubation. In addition, vegetation also helps protect nests from predators and human theft, as nests hidden amongst vegetation are harder to find.

According to Anshary *et al.* (2014), the slope of the beach is very influential on sea turtle activities to land on the beach. The steeper the beach, the more difficult it will be for turtles to see objects in front of them, so the greater the energy required for turtles to climb to the beach. Sea turtle nests located on areas with a greater slope (high) will be safer than sea turtle nests located on a smaller slope (low), which are more easily exposed to the risk of seawater intrusion which will affect the turtle eggs inside. According to Nuijtja (1992), sloping beach conditions (3 - 8%) and sloping (8 -16%) are suitable for turtle nesting habitat, because these sloping conditions can make it easier for turtles to reach nesting sites.

2.2.3. Sea turtle nesting season

Sea turtles lay eggs throughout the year, with each individual laying about 4 to 6 times per year and having a nesting interval of between 12 to 14 days. However, at certain periods, usually during 2 to 5 months of the year, there is a significant increase in nesting activity. In Indonesia, the most abundant production occurs during the dry season, between July and October (Hernino *et al.*, 2021). Olive Ridley sea turtles are a type of sea turtle that nests in four-season areas, especially in the northern part of the equator, which occurs from April to July (Nuijtja, 1992). The average nesting time takes 2 hours or more from the time the mother turtle leaves the sea until she closes her nest. Marcovaldi (1999) reported that the nesting season in the tropics is earlier in December to April and may be carried out by turtles up to several times.

2.2.4. Sea turtle nesting behavior

Sea turtles usually lay their eggs during full tide. The mother turtle will swim to a sandy beach and go through several stages of the nesting process, namely crawling ashore, digging a body hole, digging a nest hole, laying eggs, closing the nest hole, closing the body hole, compacting the sand around the body hole, resting, disguising the nest, and finally returning to the sea. Krismono, et al (2017) describe sea turtle nesting behavior as follows:

a. Emerging to the sea surface

After feeling safe, sea turtles move inland to find a suitable place to lay their eggs. The time required in this stage is between 60-90 minutes. The turtle no longer pays attention to obstacles and continues to move towards the nesting site.

b. Digging a hole

In the process of hole digging, the front *flipper* moves more actively than the rear *flipper*. Digging a hole is done to a certain depth, which is after getting a warm enough place. In addition, it is not uncommon for the hole made to cover the turtle's body. The holes made are body holes and egg holes. Digging the egg hole is done after making a hole for the body. The rear *flipper* moves periodically if the left rear flipper digs the egg hole, the way the rear *flipper* works is similar to a shovel, if the right flipper digs a hole then the left flipper will remove the excavation results. After reaching a certain depth, digging is stopped. The time used in this stage is about 20-40 minutes. The shape of the nest hole is like a gourd with a depth of about 30 cm.

c. Laying eggs

The egg-laying process is carried out with the two rear flippers pressed backwards to close the tail which is folded forward to hang over the egg hole. The eggs are then expelled through the cloaca and covered in mucus. This stage takes approximately 20-25 minutes. The length of the egg-laying process depends on the number of eggs released.

d. Closing the nest

Closing the hole is done by the rear *flipper* alternately picking up sand around the egg hole. Then both rear *flippers* will pat the sand over the hole until it is solid when the entire egg hole has been filled with sand. Closing the body hole is done by throwing the nearest sand to the body hole to thicken the sand pile. This stage takes approximately 15-25 minutes.

e. Camouflaging the nest

After the nest is covered with sand, the green turtle makes a fake nest so that the eggs are difficult for predators to find. This movement is done randomly, sometimes circling around the original nest. The creation of the false nest is the longest of all egg-laying stages, lasting approximately 60-120 minutes.

f. Returning to the sea

After the nesting activity is complete, the turtle returns to the sea. The turtle will stop several times at the edge of the tidal boundary and wait for waves that can help push its body back to the sea. This stage takes 10-20 minutes, depending on the distance traveled to get to the sea.

2.2.5. Semi-Natural Hatching Habitat

2.2.5.1. Condition of Semi-Natural Hatching Habitat

The construction of this semi-natural nest needs to consider several supporting habitat factors that affect the success of turtle egg hatching, such as temperature, humidity, proper pH, light intensity, crown cover, understory vegetation, and density of supporting trees. Some of these factors must have ideal conditions for turtle egg hatching to be successful. If there are factors with conditions that are not ideal, it will affect the growth of the embryo or can even cause the eggs to fail to hatch. The right temperature for turtle egg hatching nests is 28-32°C. (Laloë *et al.*, 2017)). Substrate humidity also affects the growth of embryos. According to Fitri (2023), the humidity of semi-natural nests ranges from 67-80% RH. If too much water is collected in the substrate, the water content and humidity will rise which can cause the eggs to rot and fail to hatch (Sari *et al.*, 2020). In addition, pH also affects the hatching of turtle eggs. A decrease in pH will cause greater toxicity to the sand and turtle eggs, which will adversely affect embryo development (Jakimska *et al.*, 2011).

Light intensity also affects the soil conditions underneath. According to Rianda (2017), differences in soil temperature in each nest are influenced by the amount of light intensity received by the nest surface. In addition to these abiotic factors, there are also biotic factors that influence, namely crown cover, understory cover, and tree density. Each type of vegetation has its own characteristic crown and shape that can affect the condition of the soil underneath. Tree density will also affect the condition of the turtle egg nests underneath, the higher the tree density, the more shaded the soil conditions will be.

2.2.5.2. Turtle Egg Hatching

The right time to transfer turtle eggs from natural to semi-natural nests is 0-2 hours after the mother has laid the eggs. Because at that time, turtle eggs are still tolerant. But after 2 hours, turtle eggs will be very sensitive and sensitive to external factors, so if there are supporting factors that are not suitable, the embryo will be disturbed or can even die and fail to hatch (Rudiana *et al.*, 2004). The critical period of the embryo during the hatching process is from day 3 to day 16. During this period, habitat conditions greatly affect the growth conditions of the embryo. The incubation period of turtle eggs in semi-natural nests is between 46 and 54 days (Retnowati *et al.*, 2016). The incubation period of turtle eggs is influenced by several factors, one of which is temperature. The higher the temperature, the faster the incubation period. However, high temperatures are not allowed to exceed the normal temperature limits used for semi-natural nests, because temperatures that are too high will also cause embryonic development to be disrupted and can cause eggs to fail to hatch. The percentage of successful hatching of Olive Ridley turtle eggs in semi-natural nests is 75% (Umama *et al.*, 2019).

2.2.5.3. *Disturbance in Hatching Habitat*

Because there are many disturbances in natural nests, such as the threat of predators and the number of people who steal turtle eggs for consumption or for sale, one of the conservation efforts to increase the success of hatching turtle eggs is to relocate or transfer eggs from natural nests to semi-natural nests (Kushartono et al., 2016). Semi-natural nests also need to consider various factors such as temperature, humidity, soil pH, light intensity, crown cover, and understory cover. Because if there are factors that are not in accordance with the needs of the embryo to grow, the embryo will be disturbed which can cause the eggs to fail to hatch.

2.3. **Sea Turtle Conservation**

Factors causing the decline of sea turtle populations include coastal habitat destruction, loss of food sources, mortality due to interactions with fisheries activities, inadequate conservation management, climate change, disease, and uncontrolled hunting of sea turtles and collection of their eggs. This hard-backed animal is classified as a protected animal with the category of Appendix I CITES (*Convention on International Trade in Endangered Species*), so all forms of utilization and circulation must receive serious attention. In addition, the life cycle characteristics of sea turtles are very long and unique, so to reach a "stable" condition (a condition where population abundance is relatively constant for the last 5 years) can take quite a long time.

Sea turtle conservation is necessary in order to maintain the population and habitat of sea turtles in their natural areas. The existence of these turtles, if well maintained and protected, can open up opportunities for utilization as turtle-based tourism services. Sea turtle conservation can be carried out with the following steps: (1) sea turtle nesting monitoring, (2) semi-natural egg hatching, (3) hatchling rearing and release, and (4) monitoring.

2.3.1. Sea turtle monitoring at nesting beaches

2.3.1.1. *Sea turtle monitoring on the nesting beach*

When a sea turtle is seen moving to the beach, monitors should not immediately 'disturb' the turtle, let alone immediately try to take measurements and samples. The stages that a turtle will go through when laying eggs should be understood, and monitors should know the stages at which 'disturbance' of the turtle can take place.

2.3.1.2. *Safeguarding Sea Turtle Nests*

Once all of the above nesting processes have been completed, the next main task of the monitors is to secure the turtle egg nests so that they can be incubated properly so that they can hatch naturally to their full potential.

A. In a theft-safe location

If the nest is in a location that is safe from theft or predators, after the nesting process is complete, the nest should be marked and labeled with a sign that states

at least contain information on the nest number, the type of turtle laying eggs and the time of laying (date and time). However, if the nest is safe from theft but prone to predation, then the nest can be bounded or fenced to prevent the hatchlings from going to the sea when they hatch. Monitoring of the nests should be done regularly, not only to secure the nests, but also to monitor the development of the nests until the eggs hatch into hatchlings.

B. In locations prone to theft

On nesting beaches that are prone to theft, monitors should immediately remove traces after the turtle returns to the sea by removing the turtle's tracks (can be done with a broomstick) and burying the turtle's nest.

2.3.1.3. *Natural Hatching of Turtle Eggs*

This method is carried out on sea turtle nests that are guaranteed to be safe from failure to hatch, such as safe from predators, not inundated by sea water during high tides, have no problems with sand conditions and are safe from abrasion. Some of the steps that must be taken in the natural hatching of turtle eggs are as follows:

1. Nests are fenced off and labeled with the nest number, turtle species and date of laying.
2. The turtle egg nests are routinely monitored by officers until the eggs hatch.
3. The hatchlings are immediately released to the sea at night until dawn.

2.3.2. Semi-Natural Turtle Egg Hatching

Relocation or transfer of eggs is carried out from natural hatcheries to semi-natural hatcheries. Egg transfer is done after the mother turtle returns to the sea. The transfer of turtle eggs from natural nests to semi-natural nests must be done carefully because a slight mistake in the procedure will cause hatching failure.

The semi-natural hatching process of turtle eggs is carried out as follows:

- 1) Turtle eggs taken from the natural nest are transferred to the semi-natural hatching site.
- 2) Put the turtle eggs into the hatching media, where the capacity of the media in accommodating eggs is adjusted to the size of the media.
- 3) Duration of hatching until the turtle eggs hatch into hatchlings ± 45-60 days.
- 4) Immediately release the newly hatched hatchlings into the sea.
- 5) For educational, research and tourism purposes, set aside some of the newly hatched hatchlings into rearing tanks to be raised.

The location of semi-natural turtle egg hatching is usually above the supratidal area, which is an area where the highest tide is no longer influenced. In these locations, several artificial turtle egg pits can be made as semi-natural egg hatching sites. The artificial turtle egg pits can be fenced around them, either permanent or semi-permanent fences, and can also be surrounded by trees.

2.3.3. Hatchling Raising, Release and *Monitoing*

Hatchling rearing is carried out using a rearing system on the beach, raising hatchlings to young turtles or to adults, including hatchlings that are physically disabled from birth. The location of hatchling rearing should be in the supratidal area (above the tidal area) to avoid the sea wave cycle on the dead moon and full moon.

Release is the release of hatchlings into the sea as a result of rearing in tanks. These hatchlings can come from natural or artificial hatcheries. The purpose of the release is to increase the population of sea turtles in the sea. Hatchling release is done at night around 19.00-05.30 WIB. This is to prevent the hatchlings from being easily preyed upon by predators.

Monitoring of sea turtles is one of the important steps to evaluate the success of sea turtle conservation management efforts. Monitoring activities in terms of time are carried out routinely, periodically and incidentally, depending on the condition of the turtle population and the intensity of turtle presence in a turtle conservation area. Routine monitoring activities can be carried out at turtle breeding stations, periodic monitoring activities can be carried out within a certain period, for example every week or every month, while incidental monitoring is carried out if there are certain cases out of the ordinary, for example pollution, natural disasters or mass mortality. Monitoring activities can also be carried out directly or with the help of tools, such as to monitor nesting intensity and growth with the help of metal tags, and to monitor turtle migration patterns with the help of satellite tagging. Aspects to be monitored in sea turtle conservation management include:

1. Monitoring of eggs and nests (nesting beaches, dimensions of nests and egg holes, egg dimensions, number of eggs, hatching rate),
2. Monitoring of hatchlings
3. Monitoring of nesting turtles

2.4. Ecotourism Concepts and Principles

Ecotourism can be defined as a form of tourist travel to natural areas that aims to preserve the environment and support the sustainability of life and the welfare of local communities (Fandelli & Mukhlison, 2000). In addition, Ecotourism is an activity carried out in well-preserved areas for recreational purposes while ensuring their preservation (Noriega et al., 2020). Biodiversity, which is one of the important assets in ecotourism and nature-based tourism, provides ecosystem services and resources necessary for sustainable use (Jurkus et al., 2022). By motivating local communities and indigenous people in visited countries, including tourists, to conserve and appreciate natural and cultural heritage, ecotourism has great potential in terms of biodiversity conservation, protection, and sustainable use of conservation areas (Das & Chatterjee, 2015). In addition, ecotourism is also known as an alternative form of tourism that is different from mass or conventional tourism. This alternative form of tourism includes categories such as cultural, educational, scientific, natural adventure, as well as agri-tourism, with subcategories such as rural, livestock, and agriculture (Beaumont, 2011; Wearing & Neil, 2009).

Choy (1997) in Fandeli, et.al (2000) explains that there are five main aspects of the development of ecotourism, namely: (1) the existence of natural and cultural authenticity, (2) the existence and support of the community, (3) education and experience, (4) sustainability, and (5) management capabilities of ecotourism management. Meanwhile, what is developing is that tourism development in conservation forest areas leads to a form of tourism where 90% of visitors are recreational types and only 6% are education-based. Such orientation of natural tourism management will affect forest sustainability. This concern is not excessive considering the development of mass tourism has failed to play its role as a motor of development.

The control of the tourism industry by multinational corporations causes foreign exchange leakage estimated at more than 70%, marginalizing the role and rights of local communities. Protests against the tourism model have given birth to new forms of tourism with various terms of community-based tourism, ecotourism and green tourism (Damanik, 2013; Mowforth & Munt, 2016; Nasikun, 2000). This form of tourism encourages the development of tourism that is oriented towards ecological, socio-cultural and community welfare targets known as ecotourism. The shift in the form of tourism has made forest areas the target of visits and the position of the community as a tour manager is getting bigger.

Ecotourism emphasizes the active role of the community, both as organizers who facilitate tourists, and as owners of tourist attractions. Some reasons why ecotourism is suitable to be developed by local communities include: first, small-scale tourist objects and attractions so that they are more easily accepted and managed by the community; second, there is participation and ownership by local communities; third, the benefits of management are more felt by the community as a tour manager; fourth, increasing tourists' appreciation of local culture and the surrounding environment.

2.5. Tourism Management Based on Turtle Conservation

The management of turtle sandbar tourism is as follows: 1) Create or design the spatial layout of the area or areas that will become turtle-based tourism objects. Some of the minimum spaces that must be present are the management office and turtle information center, nesting sites (can be in other areas, but with a one package tour system), semi-natural hatching sites, hatchling rearing sites, and hatchling release sites. This includes the design of vegetation that is suitable for sea turtle habitat. 2) Construction of turtle-based tourism areas in accordance with the design or spatial layout developed in point 1), including the planting of vegetation suitable for turtle habitat. Materials for buildings are sourced from natural materials while taking into account the strength of the building, such as wood, tree trunks, thatched roofs, stone roads, etc. The use of factory-made building materials is kept to a minimum, such as fiber or ceramic rearing tanks. 3) Create promotional materials, such as leaflets, posters, and booklets. 4) Conduct promotion and socialization, for example through print media, electronic media, presentations to educational institutions. 5) Combine turtle-based tourism packages with existing tourism packages in the vicinity, e.g. establish cooperation with local governments, regional/island managers or travel agents, traditional tourism or other forms of tourism in the vicinity. 6) The development of sea turtle-based tourism must still pay attention to the conditions and comfort for sea turtles to survive.

nesting, given the highly sensitive nature of sea turtles to light, sound, and habitat disturbance.

2.6. Community-based Ecotourism Management

The concept of ecotourism became popular especially in the 1970s as a result of the negative impacts of mass tourism that emphasized income and growth, rather than environmental and socio-cultural conservation of local communities (Cobbinah, 2015; Mowfort & Munt, 2016; Naskun, 2000). The development of tourist visits to natural areas is growing rapidly with a 10%-30% growth that far exceeds the mass growth of only 4% (*The International Ecotourism Society*, 2000). Tourist visits to natural areas that have an interest and concern for environmental, economic and social conditions are then called ecotourism (Western, 1993). Ecotourism combines a commitment to nature and social responsibility. This is illustrated in the definition of *ecotourism* developed by *The International Ecotourism Society* (TIES) as responsible travel to natural areas to preserve the environment and improve the welfare of local communities. Ceballos-Lascurian (1993) emphasizes that ecotourism should not only be developed in protected natural areas that can increase pressure on these areas.

Ecotourism development in unprotected areas can encourage community participation in protecting natural areas and resources, as formulated in the definition of ecotourism. Traveling to a relatively undisturbed or unpolluted natural area for the purpose of studying, admiring, and enjoying the scenery, flora, wildlife, and any cultural manifestations that exist within the area.

The definition contains three perspectives on ecotourism, namely ecotourism as a product, ecotourism as a market and ecotourism as a management approach. Ecotourism as a product is characterized by tourism products based on the potential of natural resources and local culture. The search for unique and diverse tourist objects with high quality has resulted in inland areas, natural forest areas and traditional villages becoming the concern and target of tourist visits. As a market, ecotourism is responsible travel directed at nature conservation efforts. The characteristics of tourists are small groups, have a high appreciation, like challenges, are active, critical and always look for in-depth and unique experiences. Ecotourism as a management approach is an environmentally friendly method of utilizing and managing natural and cultural resources. (Ballantyne & Packer, 2013; Damanik & Weber, 2006, 2013; Fandeli, 2000).

These three aspects are the distinguishing factors between ecotourism and mass tourism. Mass tourism products prioritize attractions that value visual beauty, the development of physical attractions, and excessive services. Mass tourism attractions lack intrinsic values such as ecological and cultural values, so that tourists' appreciation of them is still low. From the market aspect, mass tourism prioritizes a large number of tourists, large groups as a goal for economic gain. Fualkner in Fandeli (2000) describes the differences between mass tourism and ecotourism models in terms of *supply* and *demand* as shown in the following table.

Table 2-1 Differences between Mass Tourism and Ecotourism

	Old/Mass Tourism	New Tourism/Ecotourism
<i>Demand</i>	<i>Package/Group Tourism</i>	<i>Independent traveler</i>
	<i>Psychocentric orientation</i>	<i>Allocentric orientation</i>
	<i>Sight seeing</i>	<i>Seeking a variety of special interests</i>
<i>Supply</i>	<i>Large sale</i>	<i>Small scale</i>
	<i>European style</i>	<i>Indigenous style</i>
	<i>Services/Resorts</i>	<i>Services architecture</i>
	<i>Foreign ownership</i>	<i>Local ownership control</i>
	<i>Greater dependence on man-made attraction</i>	<i>Greater dependence on pristine culture or environment</i>

Meanwhile, Fennel (2002) describes the dimensions of *ecotourism* from ordinary ecotourism (*soft ecotourism*) to *hard/special ecotourism (hard ecotourism)* based on several parameters including *attractions/interest*, number of tourists, environmental changes, activities and length of visit.

Based on some of the descriptions of the concept of ecotourism above, in general ecotourism is a tourist activity that is responsible for environmental conservation and community welfare. Some of the principles contained in ecotourism include the principles of conservation and environmental education, preservation of local culture, economic benefits, and local community participation. These principles are in line with the concept of sustainable tourism development that encourages education, equity, preservation in addition to driving economic growth (Ardika, 2018).

The concept of ecotourism has implications for the parties directly related to ecotourism management. Tourists are not only entitled to enjoy the natural and cultural beauty of tourist attractions, but are also required to have environmental and social awareness in carrying out tourism activities including their willingness to provide conservation funds. While the community as a provider of products and services is required to present products (e.g. attractions, facilities, services) that are environmentally friendly (Damanik & Weber, 2006).

The position of the community in ecotourism has an important role as tourism actors and managers who determine the success of tourism and the preservation of forests and the environment. This position is not found in the mass tourism model which positions the community as objects and servants of tourists. Community-based ecotourism emphasizes the active role of communities who have knowledge about nature and culture that is an attraction for tourists. Ecotourism provides ample space for the community to be involved in management.

This involvement is intended to realize the objectives of ecotourism management in improving community welfare and environmental conservation. The relevance of ecotourism to local communities is based on several reasons, namely first, small-scale tourism objects and attractions so that they are more easily accepted and organized by the community; second, participation and ownership of ecotourism products for local communities; third, the benefits of ecotourism for local communities.

Fourth, the awakening of tourists' appreciation of local culture and the environment. Tourism objects developed by obtaining support from the community is a guarantee of the sustainability of ecotourism development as well as can improve the quality of the tourist experience (Kusworo, 2000; Nasikun, 2000; Wood, 2002).

On the other hand, the rationalization of ecotourism development in community-based rural areas is seen from several things, namely rural areas have the potential for authentic natural attractions, unspoiled environmental conditions, and can increase the participation of the poor and encourage the economic development of slow communities through the utilization of the economic, social and cultural potential of local communities, (Damanik, 2013; Ardika, 2018).

Community-based ecotourism in the history of archipelago tourism has been developed in Ubud Bali in 1947 with the arrival of foreign tourists to enjoy and study the arts, paintings and life of the original Balinese people. The development of ecotourism in Ubud Bali became more apparent in the 1970s with the presence of hotels, inns and art galleries owned by local residents. The development of Ubud ecotourism is a protest against the development of mass tourism that occurred in the Nusa Dua, Sanur and Kuta beach areas controlled by the colonial government, capital owners and the central government (Picard, M. 2006).

Research conducted by Dloyana Kusuma in South Nias as reported by Prasiasa (2013) shows that tourist destinations that have developed with a large number of visitors affect changes in people's livelihoods from farming/fishermen to tourism actors as their main job. Communities in traditional villages are involved in tourism businesses but are still limited as side jobs.

Ecotourism development is a prospective option that can improve community welfare, forest sustainability and tourist satisfaction. The study of ecotourism systems at the destination level that looks at the relationship between the components of tourist objects, communities and tourists was conducted by Tsaor *et al.* (2006) to evaluate the sustainability status of ecotourism management. The influence of the tourist attraction environment on the community is categorized as sustainable, while the influence of tourists on resources is categorized as potentially sustainable. However, Blackstock K. (2005) sees three mistakes in the development of community-based tourism, namely the tendency to a functional approach to employ the community rather than directed at community empowerment; second, tend to treat the community as a homogeneous group and third, ignore the structural limitations of local control in the face of the power of tourism capital. The limitations of local communities in terms of knowledge, skills and funding are opportunities for other parties to be further involved in the management of tourism objects.

2.7. Development of a Community-Based Ecotourism Business Plan

The development of a business plan is critical to the success of a business, both in the early stages of establishment and for long-term growth. A comprehensive plan allows the business to operate more purposefully and address the challenges faced in the marketplace.

market. According to Hisrich, Peters, and Shepherd (2013), a business plan is the blueprint of a company, which allows management to identify opportunities and manage risks. It also serves as an important communication tool with external parties such as investors and banks (Hisrich, Peters, & Shepherd, 2013).

The development of an ecotourism business plan requires a comprehensive approach, covering various aspects such as environmental conservation, local community empowerment, economic sustainability, and traveler management. Effective management can ensure ecotourism provides economic benefits to local communities while supporting nature conservation efforts. The implementation of a good strategy, along with the active involvement of local communities, are important factors to achieve success in sustainable ecotourism management.

2.7.1. Key Components in Ecotourism Business Plan Development

2.7.1.1. *Environmental Conservation*

Conservation is a basic element of any ecotourism project. Sustainability of ecotourism can only be achieved if the natural resources that are the main attraction are properly conserved. Herath (2002) emphasizes that proper planning can reduce the environmental impact of tourism by using analytical tools such as *Carrying Capacity* and *Contingent Valuation Method* which can help determine the limits of environmental carrying capacity of a tourist area (Herath, 2002).

2.7.1.2. *Empowerment and Involvement of Local Communities*

The involvement of local communities in ecotourism planning and management is a key factor to ensure success and long-term sustainability. According to Garrod (2003), full participation of local communities is a fundamental principle in ecotourism, as local communities are the primary custodians of their environment and have an important role in the sustainability of ecotourism (Garrod, 2003).

Ecotourism projects that do not involve local communities often fail due to a lack of community support and ownership of the project. Therefore, empowering local communities, economically, socially and politically, needs to be an integral part of any ecotourism business plan.

2.7.1.3. *Economic Sustainability*

To achieve sustainability, ecotourism must be able to provide significant economic benefits to the local communities and regions involved. Successful ecotourism projects are those that are able to achieve a balance between environmental preservation and economic benefits. For example, community-based ecotourism in the Amazon, such as *Casa Matsigenka* in Peru, has provided income for local communities, although challenges in achieving long-term financial sustainability remain (Ohl-Schacherer et al., 2008).

In the context of a business plan, it is important to ensure that revenue streams from ecotourism activities are not only sufficient for operating costs but also sufficient for reinvestment in the maintenance and continued development of ecotourism.

2.7.1.4. *Traveler Management*

Traveler management in ecotourism aims to ensure that the number of visitors does not exceed the environmental carrying capacity of the tourist area. Improper management can damage the natural attraction that is the center of ecotourism. Cater (1993) emphasizes the importance of understanding the environmental capacity of an area to accommodate tourists, so that ecotourism activities do not damage the natural resources that are the main attraction (Cater, 1993).

2.8. Ecotourism Development Strategy

To achieve effective ecotourism management, a holistic and sustainable development strategy is needed. Nugroho et al. (2018) stated that ecotourism development should involve integration between macro, ecosystem and local levels. At the macro level, a strong legal basis is needed; at the ecosystem level, focus on the vision of environmental and cultural conservation; while at the local level, participatory management and community empowerment are key (Nugroho et al., 2018).

In addition, the SWOT (Strengths, Weaknesses, Opportunities, Threats) framework is often used to identify relevant development strategies for ecotourism areas. Through SWOT analysis, development strategies can be designed based on the advantages and opportunities of a tourist area, as well as anticipating the challenges and threats that may be faced (Jozi & Rezaian, 2010).

3. METHODOLOGY

3.1. Time and Location

Preliminary survey activities were carried out on September 6-9, 2024 located in Kerora Village, Rinca Island, and Muang Island.

3.2. Habitat Condition Data Collection

Data on habitat conditions taken include abiotic and biotic factors, abiotic factors taken are temperature, humidity, pH, light intensity, wind speed, beach slope and sand texture. While the biotic factors taken are crown cover, understory cover, and tree density. Measurement of abiotic and biotic factors in the natural habitat of sea turtle nesting was carried out once at 09.00 with 3 different natural nest conditions, namely: 1) natural nests with canopy cover, 2) natural nests with understory vegetation, and 3) natural nests without canopy cover and understory vegetation. Measurement of abiotic and biotic factors was also carried out in semi-natural turtle nesting habitats 3 times a day, namely in the morning at 06.00 WIB, afternoon at 12.00 WIB and afternoon at 18.00 WIB with 9 semi-natural nests with the same conditions, namely without crown cover and understory plants.

3.2.1. Abiotic

3.2.1.1. *Temperature*

Measurement of sand temperature on turtle nests on the beach which is the location of turtle landing using an anemometer. The mechanism for taking temperature data is by inserting the anemometer sensor into the natural nest and then leaving it for 7-10 minutes. Temperature recording is done when the temperature has stabilized.

3.2.1.2. *Humidity*

Soil moisture data collection in natural nests is carried out using the same tool as the temperature measurement, namely an anemometer. The mechanism for collecting humidity data is also the same as collecting data on temperature, namely by inserting the sensor in the anemometer and then waiting for 7-10 minutes until the humidity begins to stabilize. Then recording is done on the tally sheet.

3.2.1.3. *pH*

Taking pH data on the nest is measured using a digital pH meter. That is by inserting the pH meter sensor into the soil and letting it sit for 7-10 minutes until the pH stabilizes. Then recording is done on the tally sheet.

3.2.1.4. *Light Intensity*

Data collection of light intensity using a lux meter tool by placing a light intensity measuring sensor at the point that becomes a turtle nest. Then recording is done on the tally sheet.

3.2.1.5. *Wind Speed*

Wind speed data is collected using an anemometer by holding the tool according to the wind direction on the anemometer propeller above the point that becomes a turtle nest. Then recording is done on the tally sheet.

3.2.1.6. *Beach slope*

Taking data on the slope of the beach using a Klinometer tool by aiming at the slope using an object that is the same height as the aimer. Then adjust the beach slope based on the line in the shot. Then recording is done on the tally sheet.

3.2.1.7. *Sand Texture*

Data collection on sand texture uses direct observation and direct touching of sand objects to determine the category of sand texture. Then recording is done on the tally sheet.

3.2.2. Biotic

3.2.2.1. *Canopy Cover*

The method of collecting canopy cover data was carried out by protocol sampling, namely by determining the observation points for the placement of nests in a plot that has a diameter of 22.6 meters (Noon, 1981). Data collection on crown cover was carried out using an ocular tube with a cross line at the end. Data were taken at each point in the plot in the north-south and west-east directions, with each direction containing 5 points (Figure 3-1). The observer looks and points the ocular tube upwards to see the crown closure. The plus minus data indicates the presence or absence of green vegetation. It is said to be plus if the vegetation covers the intersection of the cross line more than 50%, and it is said to be minus if the vegetation covers the intersection of the cross line less than 50% on the ocular tube (Noon, 1981).

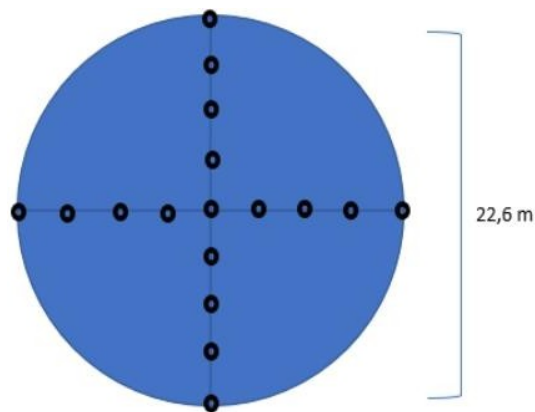


Figure 3-1 Data collection points for canopy cover and understory cover

3.2.2.2. Understory Cover

Understory cover data was collected using the same method as canopy cover. That is by using an ocular tube. The difference in taking the cover of the understory lies in the direction observed. Data collection of lower plant cover is done by pointing the ocular tube downwards. Then it is recorded whether at a point has a plus or minus value with the same conditions as taking crown cover data, which is said to be plus if the vegetation covers the intersection of the cross line more than 50%, and is said to be minus if the vegetation covers the intersection of the cross line less than 50% on the ocular tube (Figure 3-2).

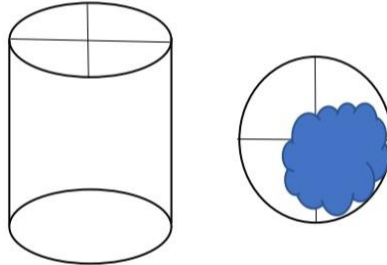


Figure 3-2 Ocular tube (left) and criteria for crown and understory cover (+)

3.2.2.3. Tree Density

In addition to crown cover and understory cover, tree density data were also collected. Tree density data was taken using nested sampling, namely by making a measuring plot measuring 20x20 meters with the center point at the point of natural nest placement (Figure 3-3). Then observations were made and recorded on a tallysheet in the form of the number of trees in one measuring plot at each point that became a natural nest.

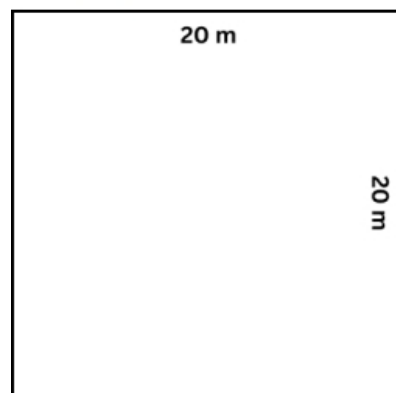


Figure 3-3 Nested Sampling measuring 20x20 meters

3.3. Ecotourism Business Plan Data Collection

The types of data used in the analysis of ecotourism business plan development include primary data and secondary data (Table 3-1). Primary data is data obtained directly through observations in the field or from interviews with parties related to the topic discussed. Meanwhile, secondary data is data obtained from data that has been available mainly in a number of government agencies and from other sources such as books, magazines, reports on the results of ecotourism business plans.

sources such as books, magazines, research reports, information on internet pages, and so on.

Table 3-1 List of data requirements

No	Aspect	Data Type	Data Collection Method	Analysis
1	Aspects of tourist demographic <i>profile</i>	Secondary	Desk Study	Statistical & Narrative Analysis
2	Accessibility	Primary and Secondary	Field Survey and Desk Study	GIS & Narrative Analysis
3	Tourist destination condition	Primary and Secondary	Field Survey, Desk Study, Interview	Narrative Analysis
4	Amenity condition	Primary and Secondary	Desk Study/Secondary Government Data	Narrative Analysis
5	Regional economic analysis	Secondary	Data Processing	Statistical Analysis
6	Economic potential analysis	Primary and Secondary	Field Survey, Desk Study, Interview	Statistical Analysis
7	Economic Impact of Tourism	Primary and Secondary	Desk Study/Secondary Data and Interviews	Statistical Analysis

Source: Compilation Team, 2024

3.3.1. Technical Data Collection

Data collection as listed in the data type table is carried out through 3 methods, namely the field survey method, and secondary data collection at various agencies and other data sources. Some data collection techniques are described as follows:

3.3.2.3. Market Potential Data Collection

Data collection for market potential identification and market segmentation used a combination of qualitative and quantitative methods. A combination of qualitative and quantitative methods was used to obtain a complete picture. As mentioned in the previous section, the data used were sourced from primary and secondary data.

Primary data was obtained through questionnaires or interviews with the community, government, and related parties. The sampling technique used was non-probability sampling, namely purposive sampling. Regarding secondary data, data is obtained through literature studies compiled from books, journals, mass media publications, government documents.

3.3.2.4. Spatial Data

The majority of spatial data was used in two sub-analyses, namely basic physical and infrastructure and public facilities. In general, macro and meso data can be obtained from secondary data that has been processed by relevant agencies, especially the Public Works, Spatial Planning, Housing and Settlement Areas Office. These data can then be completed by *on-screen* digitization through mapping applications, especially for infrastructure and public facilities data. An overview of the digitization process that can be carried out is as follows.

1. Create a map of the digitized area boundaries in KML form through a mapping application such as ArcGIS.
2. Open the Google MyMaps *website* and enter the KML map that has been prepared.
3. Creating a *layer* to add points or lines of infrastructure networks and/or public facilities with representative naming.
4. Entering keywords for types of infrastructure and/or public facilities into Google MyMaps.
5. Checking the suitability of the points or lines that appear in the Google MyMaps search by confirming on the image menu or Google Street View.
6. Adding the appropriate points to each *layer* that has been created for each category of infrastructure and/or public facilities.
7. Downloading the points that have been digitized and saved as KML.
8. Entering the KML data into ArcGIS then converting it into SHP so that it can be processed further in ArcGIS.

In addition to *on-screen* digitization, macro and meso data completion can also be done by observation using field survey applications such as Avenza Maps, but this observation is not carried out in depth. The types of data that can be observed in the field have been listed in the previous data requirements table.

3.3.2.5. Tourism Product Data

The collection of tourism product data which includes tourist attractions, amenities, accessibility and institutions is carried out through potential surveys, interviews and from spatial data. Surveys of potential attractions both natural and landscape attractions are carried out through determining the type of attraction, location and value of the attraction. Cultural attractions were identified through interviews with the community and key persons from the Tourism Office. Accessibility data and supporting infrastructure can be obtained from secondary data and field surveys by recording the type and condition of roads, facilities and supporting tourism infrastructure. Institutional data is collected through interviews with the community, key persons from tourism and culture agencies, the UMKM Office, and tourism area managers.

3.3.2. Data Analysis

3.3.2.1. Macro-Micro Regional Development Analysis

Analysis of tourism development is not only limited to the micro scale of destination locations but also needs to pay attention to a wider scale in the macro scope. Analysis

The macro, meso, and micro levels of regional development can be used to study the *behavior of and the relations* between different areas.

Macro-level regional development analysis will consider society as a whole. The focus is on political, economic, social and more factors that impact communities and individuals. The macro level will represent broader perspectives and impacts. For example, the context of accessibility, amenity, and regional strategic areas. This macro development analysis can be reviewed from development policy documents at the regional scope such as tourism development documents, spatial plans, and other development documents.

3.3.2.2. *Tourism Product Analysis*

Analysis of tourism products that include tourist attractions, accessibility, and amenity is done through scoring and spatial analysis. The potential value of tourist attractions will be grouped data types based on the level of attractiveness, the level of ease and the level of availability and adequacy of infrastructure facilities. The results of the analysis are then outlined in a map of the level of attractiveness, a map of the level of accessibility and a map of infrastructure facilities.

A. Tourist Attractions

Analysis of tourist attractions provides a comprehensive picture of the various aspects that influence the attractiveness of a destination for tourists. Analysis of tourist attractions is a study of the various elements that are the attraction of a tourist destination. Tourist attractions can include various aspects such as natural beauty, cultural wealth, history, and recreational activities that can be enjoyed by visitors. Through the analysis of tourist attractions, destination managers can understand the potential of their tourist attractions, their strengths and weaknesses, as well as opportunities and threats that may affect the sustainability of these attractions.

B. Amenity

Amenity is a facility owned by a tourist destination or destination that is provided for tourists. Besides tourist attractions, tourists in carrying out tourism activities need facilities that support travel and provide various facilities for tourists who come in order to improve their recreational experience. Analysis on amenity aspects such as typical culinary / restaurants, hotels, *resorts*, *homestays* and so on.

C. Accessibility

Accessibility is the ease of reaching a destination, which involves comfort, safety, and travel time. This is important to note because the higher the accessibility, the easier it is to reach, and the higher the level of comfort for tourists to come to visit. Ease of accessibility is one of the important aspects in the development of tourism areas. Ease of access will facilitate tourist visits and then increase tourist visits. This ease of access can be identified by analyzing aspects:

1. Availability of road network;

2. Road network plan;
3. Mode of transportation;
4. Road network condition;
5. *Existence of existing* roads;
6. Road complementary facilities; and
7. Availability of transportation modes to access the location.

D. Market Analysis

The process of collecting and analyzing potential market data is as follows:

1. Estimation of the proportion of foreign tourists (foreign tourists) who will enter the planned ecotourism area, based on travel patterns carried out over the past 5 years.
2. Estimation of the proportion of domestic tourists (wisnus) who come from outside the region over the past 5 years.
3. Estimation of potential market segments based on variables of socio-economic characteristics, geography, psychography, and tourist behavior, obtained through primary data collection of destinations or nearby natural tourism/ecotourism areas.
4. Estimation of regional market opportunities using variables of population, population density, per capita income level, and level of tourism demand.
5. Accessibility from sub-district cities, district capitals, and provincial capitals.
6. Distance to other tourism objects, both similar and dissimilar and the number of other tourism objects within a certain distance.

E. SWOT Analysis

SWOT analysis is used in analyzing strategies in the Tourism Business Planning Study. SWOT analysis is a systematic way to identify factors and strategies that describe the best fit. This analysis is based on the assumption that an effective strategy will maximize strengths and opportunities and minimize weaknesses and threats. SWOT analysis is a tool used to develop alternative strategies based on the external and internal environmental situation. After collecting all information and conducting internal and external analysis, alternative strategy development can be carried out with the help of a SWOT matrix so that it can produce 4 (four) sets of possible strategies, namely:

1. SO (*Strength - Opportunities*) strategy, which uses the strengths of the organization (company) to take advantage of existing opportunities.
2. ST (*Strength - Threats*) strategy, which uses the strengths of the organization (company) to avoid and overcome threats.

3. WO (*Weakness - Opportunities*) strategy, in which the company (organization) benefits from opportunities to overcome its weaknesses.
4. WT (*Weakness - Threats*) strategy, which is basically a defensive strategy so that the common strategy is to minimize weaknesses and exit or avoid threats.

3.4. Social and Cultural Data Collection

Socio-cultural data collected include types of work, sources and levels of income, population structure, community interaction with Komodo National Park, perceptions of turtles and national parks, institutions (types of institutions, groups, rules of the game in institutions), information related to the history of turtle habitat on Kerora island, community tourism actors,

3.4.1. Data Collection Technique

Data was obtained by conducting interviews with potential communities using the in-depth interview method. The people who were the resource persons for the interviews were community leaders, such as the village head, and youth around the village.

4. REVIEW OF TURTLE CONSERVATION AREA DEVELOPMENT

4.1. Overview of Biodiversity and Ecotourism in Komodo National Park

4.1.1. Komodo National Park

Komodo National Park is a conservation area located between Flores Island, East Nusa Tenggara, and Sumbawa Island, West Nusa Tenggara. The area includes several main islands, namely Komodo Island, Rinca Island, Padar Island, as well as other small islands, with a total area of 173,300 hectares. As one of the first national parks in Indonesia established in 1980, this area is known as the original habitat of Komodo dragons (*Varanus komodoensis*), the world's largest ancient reptile found only in Indonesia.

Besides being a sanctuary for Komodo dragons, Komodo National Park is also known for its unique ecosystem. The area consists of vast savannas, monsoon forests, mangroves, and waters with coral reefs that are very rich in biodiversity. The combination of the beauty of land and sea makes this national park an ecotourism destination that attracts local and international tourists.

With its geographical position in the Wallacea transition zone, the area is home to distinctive flora and fauna that represent a mix of Asia and Australia. In addition, Komodo National Park plays an important role in research, environmental education and rare species conservation. Its status as a UNESCO World Heritage Site emphasizes the importance of protecting this area for the global ecosystem.

4.1.2. Zoning of Komodo National Park

Komodo National Park is managed using a zoning system to ensure environmental protection while allowing room for sustainable use. The area is divided into several zones, including a core zone used for pure conservation. The core zone protects the natural habitat of various species, especially Komodo dragons, as well as areas of critical ecosystems such as mangroves and coral reefs that are highly vulnerable to damage.

In addition, there are utilization zones designed to support activities such as nature tourism, research, and environmental education. Activities within these zones are closely monitored to ensure there is no negative impact on the ecosystem. Traditional zones are also available to support the lives of local communities who have long lived in and depended on this area. They can carry out activities such as traditional fishing without damaging the habitat.

Rehabilitation zones complement this zoning system, aiming to restore areas that have been damaged by human activities or natural changes. With its zoning-based approach, Komodo National Park not only protects biodiversity but also creates opportunities for local economic development through sustainable tourism and community empowerment.

Based on the Long Term Management Plan, Komodo National Park has several zoning based on the Decree of the Director General of Forest Protection and Nature Conservation No. SK.21/IV-Set/2012 dated February 24, 2012: SK.21/IV-Set/2012 dated February 24, 2012, the zoning of Komodo National Park consists of 9 Zones, namely the Core Zone (34,311 ha), Jungle Zone (22,187 ha), Marine Protection Zone (36,308 ha), Pelagic Special Zone (59,601 ha), Settlement Special Zone (298 ha), Mainland Traditional Utilization Zone (879 ha), Marine Traditional Utilization Zone (17,308 ha),

Land Tourism Utilization Zone (824 ha), and Marine Tourism Utilization Zone (1584 ha), the total area of Komodo National Park is 173,300 ha.

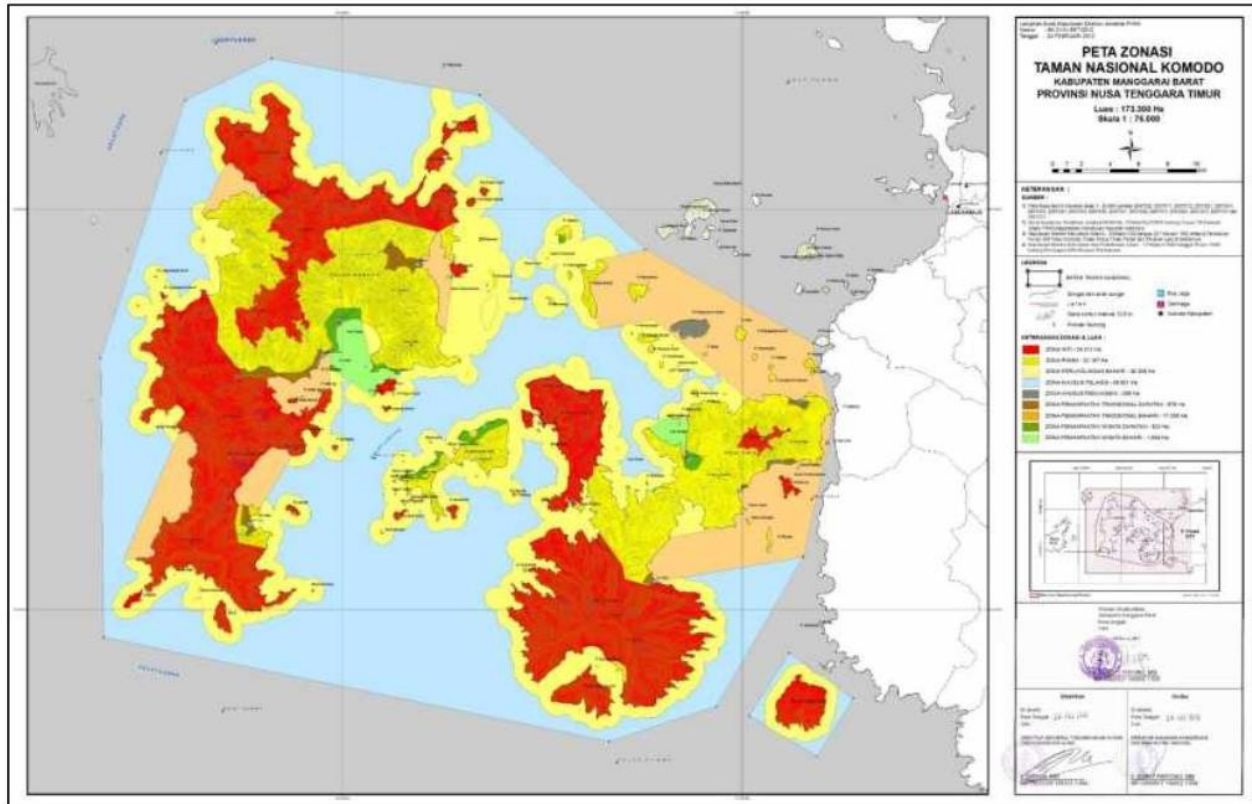


Figure 4-1 Zoning Map of Komodo National Park

4.1.3. Types of Biodiversity in Komodo National Park

Komodo National Park has high biodiversity, both on land and in its waters. One of its main icons is the Komodo dragon, an apex predator that plays an important role in maintaining the balance of the ecosystem. Besides Komodo dragons, the area is home to a variety of bird species, such as the yellow-crested cockatoo (*Cacatua sulphurea occidentalis*), seabirds and birds of prey. In addition, there are also a variety of aves or birds recorded as many as 111 species, including gosong (*Megapodius reinwardti*), parrot (*Geopelia striata*), tekukur (*Streptopelia chinensis*), green pergam (*Ducula aenea*), *Philemon buceroides*, king prawn (*Halcyon capensis*), and sea spectacles (*Zosterops chloris*).

Komodo National Park (NP) is also a habitat for various other endemic fauna, especially mammals such as deer (*Rusa timorensis*), wild boar (*Sus scrofa*), long-tailed macaque (*Macaca fascicularis*), wild horse (*Equus caballus*), wild buffalo (*Bubalus bubalus*), civet (*Paradoxurus hermaphroditus*), *Rinca* big rat (*Rattus ritjanus*), and fruit bats (*Cynopterus brachyotis* and *Pteropsis sp.*). For the reptile group, about 34 species were recorded, such as cobra (*Naja naja*), russel snake (*Viperia russeli*), green tree snake (*Trimeresurus albolabris*), python (*Python sp.*), sea snakes (*Laticauda colubrina*), lizards (from the families Scinidae, Dibamidae, and Varanidae), geckos (*Gekko sp.*), and hawkbill (*Eretmochelys imbricata*) and green turtles (*Chelonia mydas*).

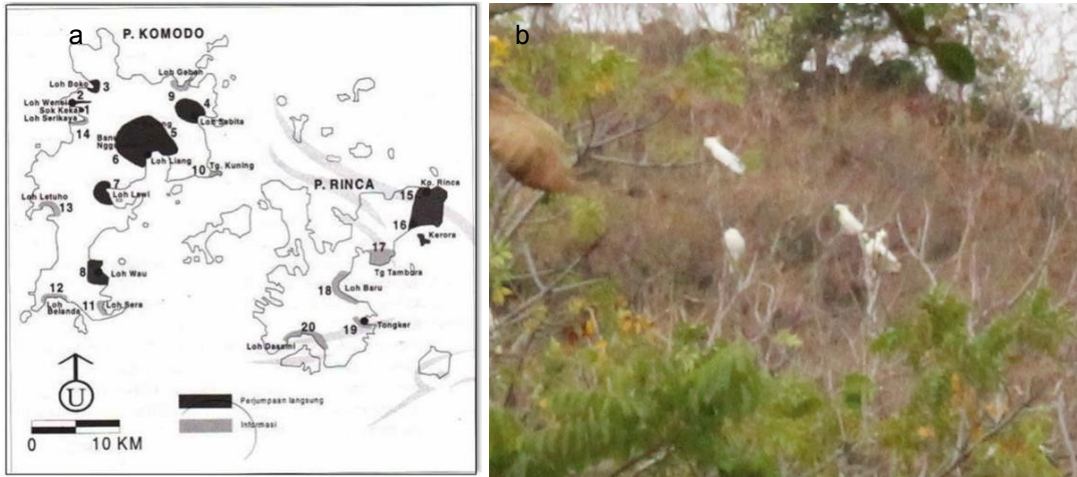


Figure 4-2 Distribution map of Cockatoos in Komodo National Park (a) and Rinca Island (b., authors' documentation)

Komodo National Park's marine ecosystem is no less fascinating. The vast coral reefs in its waters are home to hundreds of species of fish, including ornamental fish, sharks, manta rays and turtles. These reefs also support small biota such as molluscs and crustaceans, which are an important part of the marine food chain. Meanwhile, mangrove ecosystems provide habitat for species such as crabs, shrimps, and various types of water birds.

Inland, vegetation diversity includes savanna, monsoon forest and coastal forest. Palm trees (*Borassus flabellifer*) dominate the savannah, while the monsoon forest is inhabited by plants such as kesambi (*Schleichera oleosa*) and kapok (*Ceiba pentandra*). This vegetation is not only home to but also provides food for many species, including timor deer and wild horses.

Komodo National Park includes a variety of ecosystems, such as savanna, monsoon forest, mangrove forest and coastal forest. In the savanna, lontar trees (*Borassus flabellifer*) are the dominant vegetation. The monsoon forest is dominated by species such as kesambi (*Schleichera oleosa*) and kapok trees (*Ceiba pentandra*), which are important as food sources and habitats for a variety of wildlife, including Komodo dragons and parrots such as the yellow-crested cockatoo.

Vegetation in Komodo National Park provides protection against soil erosion, nesting sites for birds, and food sources for the park's resident animals. Mangrove forests, for example, provide an important habitat for water birds and marine life. Large trees in the monsoon and coastal forests also provide nests for cockatoos and big bats.

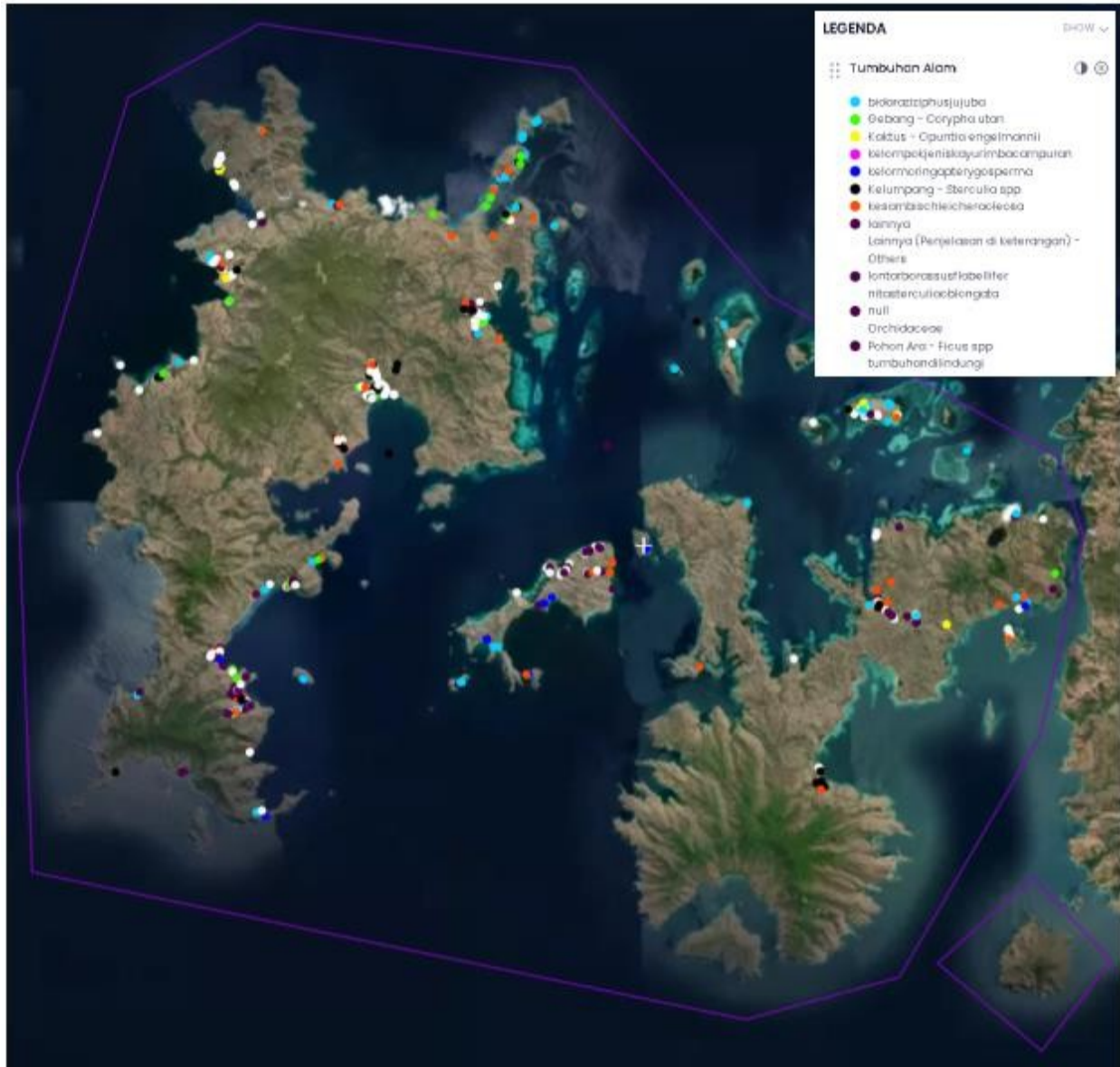
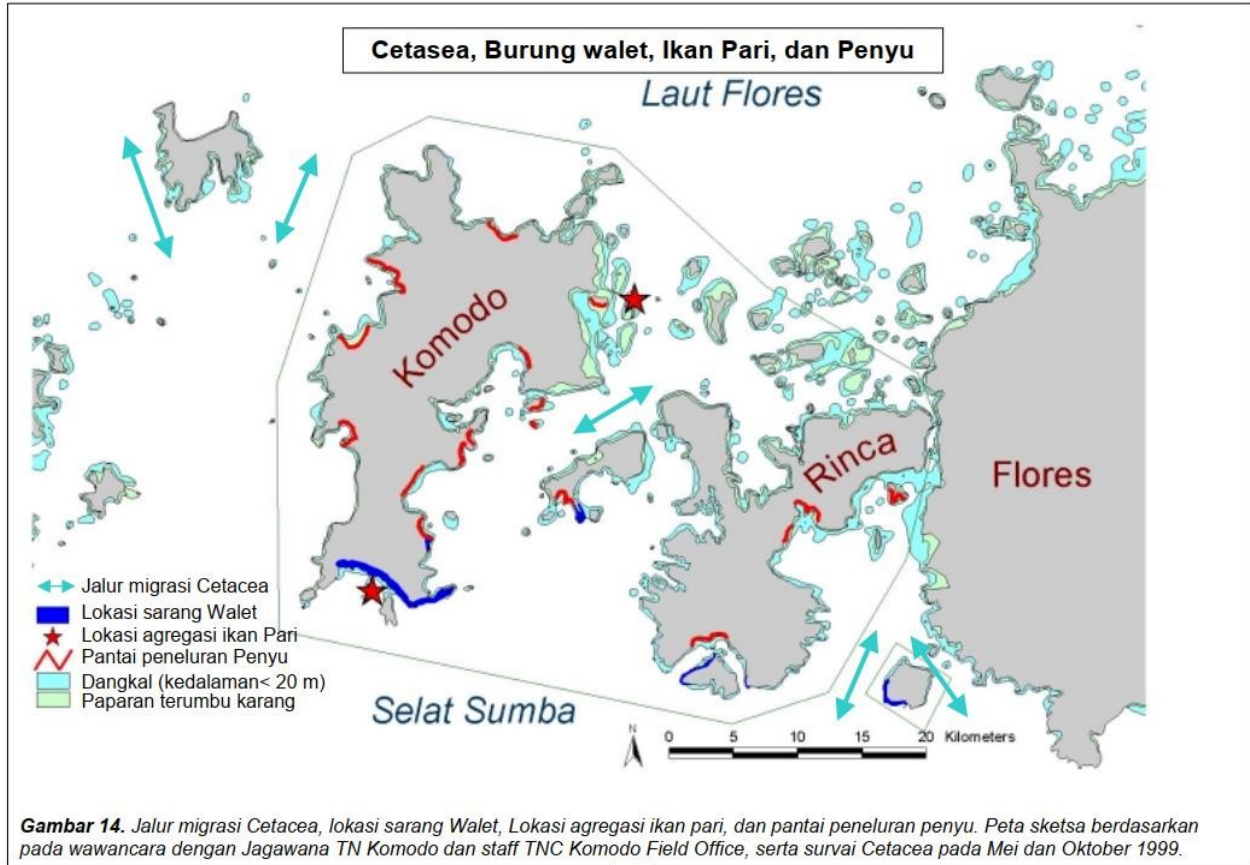


Figure 4-3 Distribution map of flora diversity in Komodo National Park

A variety of plants typical of Wallacea are found in the park, reflecting its position as a transition zone between Asian and Australian fauna and flora. Other significant plants include gebang (*Corypha utan*), nita (*Sterculia oblongata*), and various ficus species used by animals as shelter and food sources. In addition, the park's vegetation is rich in plant species that support insects, birds and other small animals, which form part of the local ecosystem food chain.



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Figure 4-5 Map of sea turtle nesting locations (red line)

4.1.5. Tourist Attractions in Komodo National Park

Utilization of the area related to tourism activities in Komodo National Park is found in the utilization zone, which is divided into Marine Tourism Utilization Zone and Land Tourism Zone. This zone covers land areas that allow activities similar to those allowed in the Core Zone and Jungle Zone. This zone is focused on the development of facilities and infrastructure that support the development of land-based nature tourism and recreation. This zone has an area of 825.16 hectares, covering the mainland of Lasa Island, Loh Buaya on Rinca Island, and Loh Liang and Tanjung Liang on Komodo Island, including Padar Island. This zone covers marine waters and allows similar activities as the Core Zone and Jungle Zone. The focus of this zone is on the development of facilities and infrastructure to support nature tourism and marine recreation. This zone has an area of 1,584.44 hectares, covering the waters of Loh Liang Bay, the area between Lasa Island and Tanjung Liang on Komodo Island, and the waters of Loh Buaya Bay on Rinca Island. While water tourism in the form of diving points is spread almost around the main islands, there are even 2 points around the waters near Gili Motang (Figure 4-6).

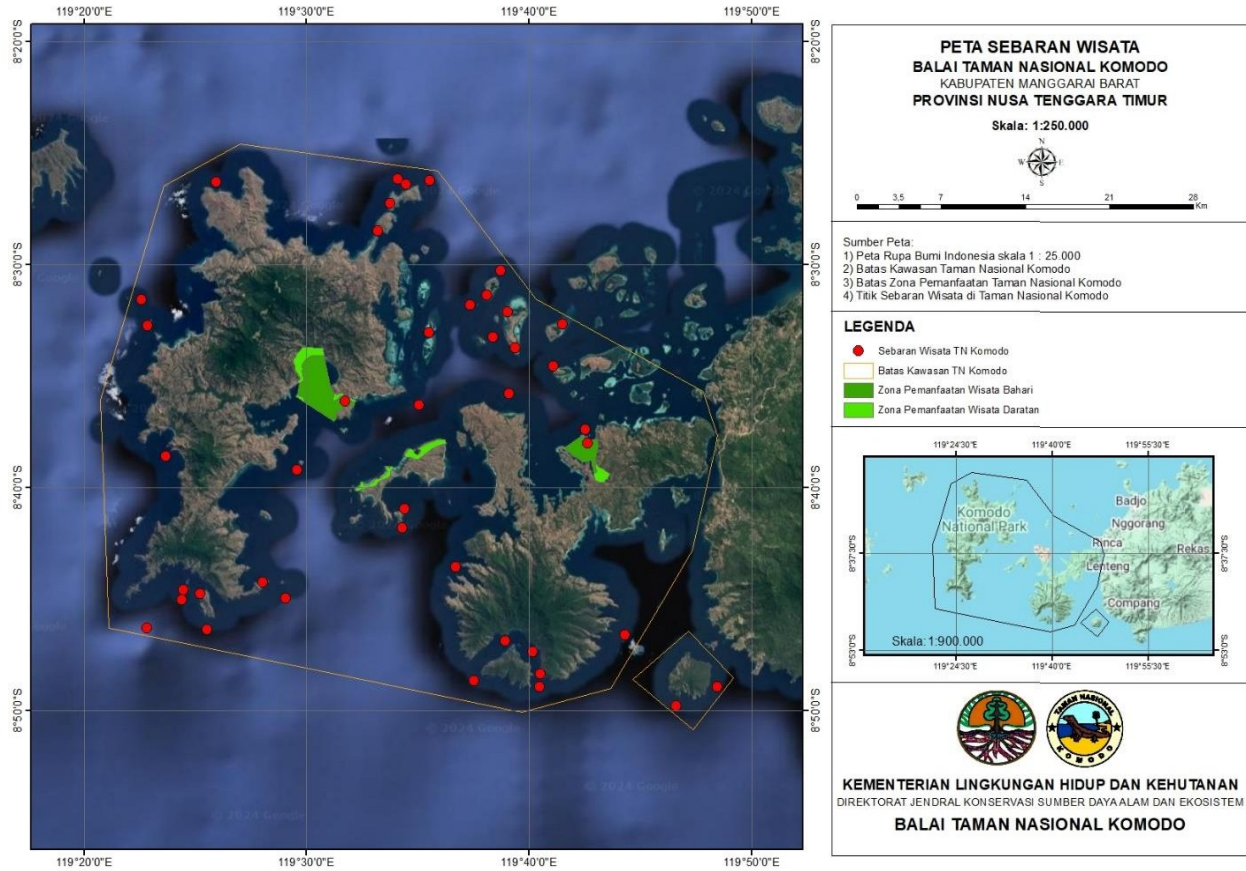


Figure 4-6 Map of the distribution of tourism objects in Komodo National Park

Komodo National Park offers a unique experience of observing Komodo dragons in their natural habitat. In addition, the undulating savannah scenery, steep cliffs and several trekking trails such as on Mount Satalibo add to its appeal. Terrestrial ecosystems, including mangrove forests and grasslands, complement the uniqueness of the land. Land-based tourism activities in Komodo National Park focus on the utilization zones located on Komodo Island, Rinca Island, and Padar Island. The activities that can be done are trekking with various attractions to observe Komodo dragons, enjoy the panorama, walk between savannas, and see wildlife on the islands. Trekking routes are made with 4 levels of path length so that tourists can adjust the route chosen by considering the physical condition and time allocation of each tourist (Table 4-1).

Table 4-1 Tourist trekking routes in Komodo National Park

Location	Route	Distance (km)	Trekking Time (hour)	Attractions
Loh Liang, Komodo Island	Short	± 1.5-2.0	±1	Tracking monsoon forest, acid forest, Komodo dragon observation, and typical Nusa Tenggara animals

	Medium	± 2.0-2.5	± 1.5	Tracking to Suphurea Hill, Loh Liang Bay view and monsoon forest view
	Long	± 4.0-4.5	± 2	Komodo dragon nest watching, monsoon forest tracking and birdwatching
	Adventure	± 8	± 4-7	Tracking to monsoon forest, savanna and quasi-cloud forest, visit Baron Rudolph memorial, animal watching and best views of small islands
Loh Buaya, Rinca Island	Short	± 1.5-2.0	± 1	Komodo dragon nest observation, panoramic view of savanna and monsoon forest, Komodo dragons and red-footed gibbons
	Medium	± 3.0-3.5	± 2	Komodo dragon, wild buffalo, red-footed gibbon, wild boar, deer, extensive savanna and monsoon forest tracking
	Long	± 4.5-5.0	± 3	Tracking open savanna and monsoon forest, passing springs and observing wild buffalo graves, enjoying panoramic views.
	Adventure	± 7-8	± 5-6	Tracking monsoon forest, savanna and observation of wild horses and typical savanna animals of Nusa Tenggara.

Source: Komodo National Park Management Plan 2016-2025

In addition to land tourism, Komodo National Park is also famous for its diversity of coral reefs (253 species), tropical marine fish (more than 1,000 species), and marine ecosystems that support world-class diving and snorkeling. There are about 40 diving and snorkeling spots spread almost throughout the waters of Komodo National Park (Table 4-2). Attractions such as the crystal clear waters around Padar Island and Gili Lawa are an added attraction. Other popular locations include Loh Liang Bay and Loh Dasami for diving activities.

Table 4-2 Diversites in the Komodo National Park area

No.	Location	No.	Location
1	Tatawa besar	22	Torpedo Point
2	Small Tatawa	23	Cannibal Rock
3	Batu Bolong (Current City)	24	Yellow Wall
4	Makassar Coral (Manta Point)	25	Crynoid Canyon

5	Mawan
6	Little Siaba
7	Large Siaba
8	Pengah Island (Middle)
9	Wainilu
10	One Tree (Chinese Mound)
11	Three Rocks
12	Pink Beach (Mera Beach)
13	Castle Rock
14	Cristal Rock
15	Lighthouse
16	Cauldron Passage
17	Golden Passage
18	Pillarsteen
19	Three Sisters
20	Swallow Hole
21	Jimmy Rock

26	Toro Sie
27	Apple Orchard
28	Kerita Tol
29	Indihilang Island
30	Tanjung Lelok Sera
31	Batu Gaja
32	The end of the world
33	German Flag
34	Manta Alley
35	Twins
36	Langkoi Rock
37	Broken Hill
38	Tukoh Serikaya
39	Wizards Hut
40	Toro Muzzle
41	Goat Island
42	Nine Island

Source: Komodo National Park Diversite Map

Tourist attractions both on land and water in Komodo National Park are potential areas, not only to get financial benefits, but also to increase tourists' awareness of environmental and wildlife conservation. However, in managing the Komodo National Park area as a tourist destination, there are several problems that arise. The main problems in Komodo National Park include various aspects that affect the sustainability and management of tourism in this area. One significant problem is the degradation of natural resources, caused by human activities such as savanna fires, forest encroachment, and illegal fishing that damage marine ecosystems, including coral reefs. In addition, tourism management has not been optimal as seen from the limited tourist facilities, such as trekking trails, information centers, and other basic facilities, which affect visitor comfort and operational efficiency.

Another issue is the socio-economic pressure caused by the growing population of villages around the area, which increases the exploitation of natural resources to fulfill daily needs. Lack of coordination between relevant parties, both in tourism and conservation management, poses a challenge in achieving holistic and sustainable management. In addition, different perceptions of the main function of the area, between conservation and tourism use, often lead to conflicts of interest between local communities,

government, and tourism actors. These issues need to be addressed thoroughly to ensure the sustainability of the ecosystem and tourism potential of Komodo National Park.

4.2. Natural Habitat for Sea Turtle Nesting

Komodo National Park is home to natural turtle nesting habitats, one of which is located on Muang Island. Muang Island is a small island of 34.27 hectares with a basin-shaped beach, which is within the area of Kampung Kerora Resort, National Park Management Section (SPTN) Region I, Komodo National Park Office. The island is uninhabited and is one of the main nesting sites for Green Turtle (*Chelonia mydas*) and Hawksbill Turtle (*Eretmochelys imbricata*) in the Rinca Island area. Muang Island is located on the southeastern border of Komodo National Park, adjacent to Flores Island. Its position in the outermost region means that the island is often disturbed by boat traffic. One of the disturbances that occurs is the theft of sea turtle eggs by irresponsible parties. This disturbance has resulted in a continuous decline in the sea turtle population.



Figure 4-7 Muang Island

Source: Field Observation, 2024

Muang Island is the location for sea turtles to lay their eggs because the habitat is still natural and overgrown with vegetation that leads sea turtles to nest. Based on field observations, Muang Island is overgrown with vegetation such as Sea Waru (*Thespesia populnea*), and Tamarind (*Tamarindus indica*) around turtle nests. In addition to these two types of vegetation, the coastal forest on Muang Island also contains vegetation such as Sea Bidara (*Strychnos lucida*), Sea Pandanus (*Pandanus odorifer*), and Kesambi (*Schleichera oleosa*). Muang Island also has understory plants such as Red Castor (*Jathropa gossypifolia*), *ipomea asarifolia*, *Colubrina asiatica* (L.) Brongn., and *Calotropis gigantea* (L.) Dryland.



Figure 4-8 Natural landing and nesting sites for sea turtles

Source: Field Observation, 2024

Beaches are the main habitat for sea turtles to lay their eggs. Sea turtles tend to choose beaches that are easily accessible from the sea, have sufficient elevation to avoid tidal inundation, and relatively loose and medium-sized sand to prevent nest collapse. The ideal nesting site for sea turtles has low salinity, stable humidity, and a suitable substrate to keep the eggs safe during incubation. Medium to fine textured sand supports turtle embryo development. Wide, sloping shorelines, with a slope of about 30 degrees and coastal vegetation, provide optimal nesting sites.

Beach vegetation plays an important role in protecting turtle nests from sunlight, maintaining stable temperature, humidity, and protecting from predators and egg thieves. The roots of the vegetation help bind the sand, making the nesting process easier. The slope of the beach also influences turtle nesting site selection, as steeper beaches make it more difficult for turtles to land, although nests in areas with higher slopes are safer from seawater intrusion. Sloping beaches are ideal as nesting habitat because they make it easier for turtles to reach their nests.

Data collection on sea turtle nesting natural habitat in Muang Island was conducted to determine the characteristics of sea turtle nesting natural habitat in Komodo National Park. Data collection on Muang Island was carried out by measuring abiotic factors of turtle nesting such as temperature, humidity, pH, light intensity, wind speed, beach slope, and sand texture. While measuring biotic factors of turtle nesting such as canopy cover, understory cover and tree density. Habitat data collection was carried out on 3 types of nests, namely, (1) Nests that have crown cover and understory cover, (2) Nests that only have understory cover, and (3) Nests that do not have crown cover and understory cover.



Figure 4-9. Data collection on characteristics of sea turtle nesting natural habitat on Muang Island.

Source: Field Observation (2024)

4.1.1. Nest 1

Nest 1 is located in an enclosed area that has canopy cover and understory vegetation around the nest. Nest 1 has a minimum temperature of 28.2°C and a maximum temperature of 28.6°C. Nest 1 has high humidity, with a minimum humidity of 81% to a maximum humidity of 85%. The low exposure to direct sunlight causes the temperature of the nest to be low and tends to be stable, and the humidity tends to be high. The highest light intensity recorded was 2,550 lux, which caused low evaporation of water content in nest 1 and affected the temperature and humidity of the sand. Nest 1 has a sand pH between 6.7 - 8.5. Wind speed at nest 1 fluctuates depending on the sea breeze, but tends to stabilize at 9 m/s. The sand at nest 1 is fine textured and the beach slope was recorded at 18%. Nest 1 was located in a vegetation-covered area with a crown cover value of 85% and understory cover of 15%. Nest 1, which is in the vicinity of coastal vegetation, has a tree density of 100 ind/ha.

Table 4-3 Data on biotic and abiotic factors in natural nest 1

Variable	Values
Temperature	28,2 - 28,6 °C
Humidity	81 - 85 %
pH	6,7 - 8,5
Light Intensity	2,550 lux
Wind Speed	8 - 9 m/s
Beach Slope	18%
Sand Texture	Fine
Canopy Cover	85%
Cover Tum. Bottom	15%
Variable	Values
Tree Density	100 ind/ha

4.1.2. Nest 2

Nest 2 is located in an open area that has little crown cover and has understory vegetation around the nest. Nest 2 had a minimum temperature of 31.7°C and a maximum temperature of 36.6°C. The lowest humidity in nest 2 was recorded at 60% and the highest humidity was recorded at 76%. The lack of canopy cover on nest 2 caused high sun exposure to the nest directly, thus affecting the temperature which began to rise and humidity levels ranging from low to moderate. The light intensity on nest 2 was highest at 9,150 lux, this affected the evaporation of water content on nest 2 which affected the temperature and humidity of the nest sand. Nest 2 has a sand pH between 7 - 7.8. Wind speed on nest 2 varies but tends to stabilize between 9 - 10 m/s, tending to be faster than nest 1 because nest 2 has little vegetation around it as a windbreak from the sea. The sand at nest 2 is coarse textured and the slope of the beach is recorded at 20%. The location of nest 2 is in a place that has little vegetation so that the value of crown cover around nest 2 is 25% and the cover of lower plants is 40%. Nest 2, which does not have much coastal vegetation around it, has a tree density of 50 ind/ha.

Table 4-4 Data on biotic and abiotic factors in natural nest 2

Variable	Value
Temperature	31,7 - 36,6 °C
Humidity	60 - 76 %
pH	6,7 - 8,5
Light Intensity	9,150 lux
Wind Speed	9 - 10 m/s
Beach Slope	20 %
Sand Texture	Coarse
Canopy Cover	25%
Tumb. Bottom	40%
Tree Density	50 ind/ha

4.1.3. Nest 3

Nest 3 is located in an open area that does not have crown cover and understory vegetation around the nest. Nest 3 had a minimum temperature of 37°C and a maximum temperature of 40°C. The humidity in nest 3 was the lowest recorded at 59% and the highest recorded at 66%. The absence of canopy cover in nest 3 causes high direct sun exposure to the nest, resulting in high temperatures and low humidity levels.

High light intensity on nest 3 was recorded at 12,050 lux, this caused high evaporation of water content on nest 3, which affected the temperature and humidity of the nest sand. Nest 3 has a constant sand pH, which is pH. Wind speed on nest 3 ranges from 9 - 10 m/s, tending to be faster than nest 1 because nest 3 does not have vegetation around it as a windbreak from the sea. The sand at nest 3 was fine textured and the slope of the beach was recorded at 25%. The location of nest 3 is in a place that is not covered by vegetation so that the value of crown cover on nest 3 is 0% and the cover of lower plants is 70%. Nest 3, which has no coastal vegetation around it, has a tree density of 0 ind/ha.

Table 4-5 Data on biotic and abiotic factors in natural nest 3

Variable	Values
Temperature	37 - 40 °C
Humidity	59 - 66 %
pH	7
Light Intensity	12,050 lux
Wind Speed	9 - 10 m/s
Beach Slope	25 %
Sand Texture	Fine
Canopy Cover	0%
Cover Tum. Bottom	70%
Tree Density	0 ind/ha

4.3. Semi-natural Habitat of Kerora Village

Kerora Village, is a hamlet located in Pasir Panjang Village, Komodo Sub-district, West Manggarai Regency. Kerora Village is part of the buffer village in Komodo National Park. Kerora Village is also known as a traditional hamlet that still maintains local wisdom, Kerora Village has great potential in maintaining coastal ecosystems and supporting the development of sustainable ecotourism. Although its potential has not been fully utilized, both in terms of local culture and biodiversity, Kerora Village has valuable natural resources. Geographically, Kerora Village is located on Rinca Island, about 5 km northeast of Muang Island, which is the location of the natural nesting habitat of the Green Turtle (*Chelonia mydas*) and Hawksbill Turtle (*Eretmochelys imbricata*) in Komodo National Park.

In Kerora Village, there is a Komodo National Park Resort post, the National Park Management Section (SPTN) of Region I of the Komodo National Park Center. In recent times, the Resort staff has started trying to relocate turtle eggs obtained from their natural habitat, namely Muang Island. Based on the experiment, the success of egg hatching reached 85.37% in 2021 in Kerora Village. This experiment suggests that relocation of turtle eggs from natural nests to semi-natural nests is possible. This is beneficial for minimizing the theft of sea turtle eggs on

theft of turtle eggs on Muang Island, increase the turtle population, and develop the potential for turtle conservation-based ecotourism in Kerora Village.



Figure 4-10 Kerora Village

Source: Field Observation (2024)

Data collection on semi-natural nests was conducted at 9 points in the same location. Semi-natural nesting sites do not have crown cover or understory vegetation, so measurements are only made on abiotic factors such as temperature, humidity, pH, light intensity, wind speed, beach slope, and sand texture. Measurements of biotic factors such as crown cover, understory cover and tree density were not taken. In nests 1,2 and 3, measurements were taken at night at 18.00 WITA, then in nests 4,5,6 measurements were taken in the morning at 06.00 WITA, and in nests 7,8,9 measurements were taken during the day at 09.00 WITA.

Table 4-6 Data on abiotic factors in semi-natural nests 1, 2 and 3

Variable	Value		
	Nest 1	Nest 2	Nest 3
Temperature	30 - 30,6 °C	30 - 30,7 °C	30,2 - 30,8 °C
Humidity	74 - 94 %	85 - 89 %	78 - 92 %
pH	7	7	7
Light Intensity	0 lux	0 lux	0 lux
Wind Speed	0 - 1 m/s	0 -1 m/s	0 - 1 m/s
Beach Slope	16%	16%	16%
Sand Texture	Fine	Fine	Fine

	Nest 1	Nest 2	Nest 3
Retrieval Time		18.00 WITA	

Based on the table above, it shows that the minimum temperature recorded is 30°C in nests 1 and 2, while the maximum temperature recorded is 30.8°C in nest 3. The humidity of nests 1, 2 and 3 has a moderate to high temperature level, the minimum and maximum recorded humidity of the three nests is in nest 1, namely with minimum humidity is 74% and maximum humidity is 94%. Nests 1, 2 and 3 show the same pH of 7, this is because the nest points are in the same location. Measurements were taken at night at 18:00 WITA, so the light intensity recorded in nests 1, 2 and 3 was 0 lux. Nests 1, 2 and 3 have a beach slope of 16% and have fine-textured sand.

Table 4-7 Abiotic factor data for semi-natural nests 4, 5 and 6.

Variable	Values		
	Nest 4	Nest 5	Nest 6
Temperature	27,1 - 27,9 °C	27,3 - 28,6 °C	30 - 32,5 °C
Humidity	92 - 99 %	91 - 99 %	82 - 97 %
pH	7	7	6.6 - 7
Light Intensity	6,450 lux	8,750 lux	8,550 lux
Wind Speed	4.5 - 6 m/s	4.5 - 6 m/s	4.5 - 6 m/s
Beach Slope	16%	16%	16%
Sand Texture	Fine	Fine	Fine
Retrieval Time		06.00 AM	

Table 4-5 above shows the data measurements taken in the morning at The minimum temperature obtained was 27.1°C in nest 4 and the maximum temperature obtained was 32.5°C in nest 6. Nests 4,5 and 6 had high humidity, with a minimum humidity of 82% in nest 6, and a maximum humidity of 99% in nests 4 and 5. The pH value obtained was 7 in nests 4 and 5, while the minimum pH obtained was 6.6 in nest 6, and had a similar pH in nests 1,2 and 3. The recorded light intensity was not very high because the measurements were taken when sunlight was not optimal, the minimum recorded light intensity was 6,450 lux at nest 4 and the maximum light intensity was 8,750 lux at nest 5. All three nests have a beach slope of 16% and fine textured sand.

Table 4-8 Abiotic factor data for semi-natural nests 7, 8 and 9.

Variable	Values		
	Nest 7	Nest 8	Nest 9
Temperature	36 - 40,5 °C	35,7 - 40 °C	36,6 - 41,2 °C
Humidity	54 - 74 %	54 - 78 %	52 - 73 %
pH	7	7	7
Light Intensity	9,670 lux	9,950 lux	11,000 lux
Wind Speed	3.9 - 7.2 m/s	3.9 - 7.2 m/s	3.9 - 7.2 m/s
Beach Slope	16%	16%	16%
Sand Texture	Fine	Fine	Fine
Retrieval Time	09.00 WITA		

Data measurements taken on nests 7, 8 and 9 were carried out at 09.00 WITA, where the intensity of sunlight had begun to optimize. The temperature recorded in nests 7, 8 and 9 tended to be high. The minimum temperature recorded was 35.7°C in nest 8 and the maximum temperature recorded was 41.2°C in nest 9. Nests 4,5 and 6 had low to moderate humidity, the minimum humidity recorded was 52% in nest 9, and the maximum humidity was 78% in nest 8. The pH value obtained was the same in nests 7, 8 and 9, namely pH 7. The recorded light intensity tended to be high because measurements were taken when sunlight was optimal, the minimum light intensity was recorded at 9,670 lux on nest 7 and the maximum light intensity was 11,000 lux on nest 9. The three nests had the same beach slope of 16%, and had the same sand texture, which was fine textured.

4.4. Sanctuary Habitat Suitability Analysis

Kerora Village as a planned location for semi-natural sea turtle nesting in Komodo National Park has slight differences with the natural sea turtle nesting habitat on Muang Island. The difference is in the form of minimal vegetation cover in Kerora Village, while Muang Island has vegetation canopy cover, dense understory cover and moderate tree density. In addition, there is no scientific data on sea turtle landings in Kerora Village. The oral information obtained is a hereditary story from the community that claims that there were turtles landing in Kerora Village around the 1990s. To date, there is no scientific documentation or survey that comprehensively records sea turtle landing and nesting activities on the coast of Kampung Kerora. However, based on existing information, it can be assumed that increased human activities, such as fisheries and tourism, which have an impact on changes in coastal habitat conditions, are likely to be one of the causes of the reduced frequency of sea turtles landing in Kerora Village.

The semi-natural nesting sites planned to be established in Kerora Village have limiting factors, ranging from biotic factors and abiotic factors. These limiting factors greatly affect the success of the turtle nesting process, especially the percentage of hatching success of turtle eggs. According to (umama, 2020), the presentation of the success of hatching turtle eggs

is categorized as high or good if the success is more than 75%. Abiotic limiting factors include temperature, humidity, pH, light intensity, wind speed, beach slope and sand texture. While biotic factors include canopy cover, understory cover, and tree density. However, according to Bézy et al. (2015) and Sumarmin et al. (2012), biotic factors that affect the hatching success of turtle eggs are predators and microbial contamination found in the nest, while abiotic factors are the influence of physical characteristics, namely the nest substrate or sand and temperature and humidity. Another biotic factor that influences turtle nesting activity is the vegetation around the nest. Coastal areas with dense pandanus (*Pandanus tectorius*) vegetation will tend to be chosen as nesting sites by green turtles (*Chelonia mydas*) (Bustard, 1972).

4.4.1. Abiotic Factors of Natural and Semi-Natural Habitat Suitability

4.4.1.1. Temperature

Based on research by Miller (1985) and Ackerman (1997), optimal development of turtle embryos occurs at temperatures between 24-33°C, and conditions outside this range can potentially cause embryo death. According to Ridla (2007), temperature is an important factor that directly affects the development of embryos and sex determination of turtles during incubation. This temperature includes the temperature of the sand around the hatching container as well as the temperature resulting from the metabolic activities of the developing eggs in the nest. Based on the data obtained, the temperature in semi-natural nests in Kerora Village ranged from 27.1 - 41.2°C. The highest temperature value of 41.2°C was obtained during daytime measurements when light intensity was optimal. According to Miller (1985), the closer and more shade or vegetation to the nest, the lower the temperature will tend to be. Therefore, it is necessary to adjust the environment in semi-natural nests by increasing canopy cover and understory cover so as to condition the nest temperature at an optimal level. This is evidenced by the temperature range obtained in natural nests with canopy cover and understory cover on Muang Island, which was recorded at 28.2 - 28.6°C.

Temperature plays a crucial role in the successful hatching of turtle eggs. The ideal temperature range for embryo development is between 23-33 degrees Celsius. Temperatures outside this range for prolonged periods can cause embryo death. Even within the appropriate temperature range, lower temperatures can slow down the hatching process, while higher temperatures can speed it up. Temperature is very important for turtle egg development. Temperatures that are too hot or too cold can cause hatching failure. Temperature also affects the length of incubation, therefore female turtles are very selective in choosing nesting sites with the right temperature (Booth and Freeman, 2006). Temperature also determines the sex of the hatchlings that will be born; temperatures that are too high produce female hatchlings, while temperatures that are too low produce male hatchlings (Spotila et al., 1987).

4.4.1.2. Humidity

In addition to temperature, an abiotic factor that greatly affects the success of turtle egg hatching is humidity. Miller (1997) states that an environment that is too dry can increase the mortality rate of turtle eggs, because during the incubation period, the eggs will undergo a process of water absorption and exchange, which causes an increase in egg volume.

process of water absorption and exchange, which causes an increase in egg volume. Based on the data obtained, the temperature in semi-natural nests in Kerora Village ranges from 52-99%. The lowest humidity value of 52% was obtained during daytime measurements when light intensity was optimal. The closer and more shade or vegetation around the nest, the humidity tends to increase, because adjacent vegetation and extensive shade can reduce the evaporation process (Miller, 1985). Meanwhile, the natural nests on Muang Island showed a range of humidity between 59 and 85%. The maximum humidity value in natural nests is 85%, this is because humidity measurements were only taken during the day, and not at night and in the morning.

Sand moisture plays an important role in turtle nesting success. Sand that is too dry makes the nest hole easily collapse, making it difficult for turtles to lay eggs (Bustard, 1976). During incubation, sand moisture also affects the weight of hatchlings. Sand that is too dry can cause embryos to lose body fluids and fail to hatch. In contrast, ideal sand moisture favors healthy embryonic growth (Miller, 1995). According to Salomon and Bird (1980), good humidity for hatching turtle eggs is an average of 50-66%. The importance of sand moisture is also related to the slope of the beach. Beaches with a slope of less than 20 degrees tend to be inundated with seawater due to tides or large waves, thus affecting sand moisture in the nesting area (Yustina, et al., 2004; Lory, et al., 2000).

4.4.1.3. Sand Texture

The sand texture obtained from 9 data collection points on semi-natural nests in Kerora Village is fine textured. This result is different from the natural nests on Muang Island, which have fine texture (nests 1 and 2), and coarse texture (nest 3). The difference in sand texture in the natural nests of Muang Island is based on the presence of 2 different types of turtles landing, namely Green Turtle (*Chelonia mydas*) and Hawksbill Turtle (*Eretmochelys imbricata*). This result is in accordance with the statement (Herawaty & Adawiyah Mahmud, 2020), namely hawksbill turtles like fine and medium-sized coral-sand substrates, while green turtles tend to favor sand substrates for laying eggs (Sari et al., 2018).

Basically, sea turtles will use the texture of the sand as an initial clue in determining the nesting location. Some sea turtle species, such as the Green Turtle, only land on beaches with fine, nutrient-rich sand to hatch their eggs; sand grains that are too coarse make it difficult for sea turtles to nest in nesting sites. The larger and coarser the grain size, the greater the frictional force and effort required by the turtle to make a nest. The turtle will land on the beach and observe the surrounding environment, then move to explore the sand that is suitable as a nesting site. Turtles will look for other nesting sites if they find the sand too dry. Based on the results of research by Abelino, et al (2022), the highest percentage of hatching is in semi-natural nests that have fine sand texture (0.25-0.125 mm) by reaching 71%, while coarse, medium and very fine textures show a low percentage of egg hatching (0%-42%). The type and quality of sand will affect two important aspects, namely the determination of the nest by the female turtle, and the survival of the eggs laid in the nest. Sand texture that is too fine or too coarse can cause failure in the hatching process (Mortimer, 1982). Therefore, choosing the quality and type of sand is

Therefore, choosing the quality and type of sand is an important criterion in making semi-natural nests, because the texture of sand affects the reproductive success of sea turtles.

4.4.1.4. *Other Abiotic Factors*

In addition to temperature, humidity and sand texture, other abiotic factors that affect the success rate of sea turtle egg hatching are pH and light intensity, beach slope. The pH range obtained in measurements on natural nests is between pH 6.7 - 8.5. While the pH of semi-natural nests in Kerora Village is between pH 6.7-7. This value is in accordance with turtle nesting habitat because neutral pH is more suitable for hatching turtle eggs Samosir et al. (2018). According to Sipayung (2003), sandy soils that have a pH of less than 8.5 are dominated by salts of Na, Ca and Mg in the form of chlorides or sulfates. Based on observations, the pH of semi-natural nests tends to be close to neutral pH.

Light intensity can also affect the evaporation process and indirectly affect the sand in the nest. Light intensity that is too high will increase evaporation and result in decreased sand moisture. Light intensity in semi-natural nesting sites in Kerora Village ranges from 6,400 - 11,000 lux in the morning and afternoon, while light intensity at night is 0 lux. Meanwhile, the light intensity at the natural nesting site on Muang Island showed light intensity between 2,550 - 12,050 lux. According to Rianda et al. in Kasmeri et al. (2022), variations in soil temperature at each nest are influenced by the level of light intensity received by the nest surface, where some heat is absorbed and conducted to deeper soil layers, while others are reflected. Light intensity also has an impact on the underlying soil conditions. The difference in temperature at each nest is related to how much or how little light intensity the nest surface receives.

Furthermore, wind speed and beach slope are abiotic factors that also affect turtle landing and nesting. Wind speed at semi-natural nests in Kerora Village ranged from 0 - 7.2 m/s, while wind speed at natural nests on Muang Island ranged from 8 - 10 m/s. Sea turtles tend to choose sheltered shorelines and avoid shorelines that are exposed to the wind. Turtles that land on a strong windy beach will try to face the opposite direction to reduce wind resistance, so this condition makes the turtle spend extra energy to move in the direction it wants. In addition to wind speed, beach slope is also considered an important marker for turtles in choosing nest sites, as changes in beach elevation indicate safe areas for egg hatching. A significant increase in slope indicates that the turtle has reached the optimal elevation to increase the chances of hatching success. The slope of the beach in the natural habitat on Muang Island was 18%, while in the semi-natural habitat of Kerora Village it was 16%. Sea turtles prefer warmer beaches with wide and sloping sand, and the backwind makes it easier for them to reach the beach. These conditions increase the turtles' chances of laying eggs on these wide beaches.

Based on measurements of natural habitat characteristics on Muang Island, and semi-natural characteristics in Kerora Village, there are several differences that may affect sea turtle nesting.

turtle nesting. A comparison of the characteristics of the two habitats is presented in Table 4-7 below:

Table 4-9 Comparison of natural and semi-natural nests

No.	Abiotic Factors	Natural Habitat* (Muang Island)	Semi-natural habitat** (Kerora Village)
1	Temperature (°C)	28,2 - 28,6	35,7 - 41,2
2	Humidity (%)	81 - 85	52 - 78
3	pH	6,7 - 8,5	7
4	Intensity Light Intensity (lux)	2,550	11,000
5	Wind Speed (m/s)	8 - 9	3,9 - 7,2
6	Beach Slope (%)	18	16
7	Sand Texture	Fine	Fine

Description: *nest 1 Pulau Muang, **nests 7,8,9 Kampung Kerora

Table 4-7 shows a comparison between nest 1 from the natural habitat of Muang Island, and nests 7, 8 and 9 in the semi-natural habitat of Kerora Village. The selection of nest 1 in the natural habitat on Muang Island over nests 2 and 3 is because nest 1 reflects the most ideal characteristics as a natural turtle nesting habitat. Comparisons were then made with nests 7, 8 and 9 in the semi-natural habitat of Kerora Village. This comparison was made because the measurement of habitat characteristics in these nests was carried out at the same time as the measurement on Muang Island, which was at 09.00 WITA.

Based on the above comparison, the temperature range in the semi-natural habitat of Kampung Kerora is higher than the temperature range in the natural habitat of Muang Island. Then the difference is also seen in humidity, namely the humidity in the natural habitat of Kampung Kerora is lower than the humidity of the natural habitat of Muang Island. While the pH range has a different range, but both habitats have the same tendency, namely a pH that is close to neutral. Furthermore, the light intensity in the semi-natural habitat of Kampung Kerora is much higher than the light intensity in the natural habitat of Muang Island. Other characteristics such as wind speed and beach slope in the semi-natural habitat of Kampung Kerora have a range that is not much different from the natural habitat of Muang Island. Based on the above comparison, the sand in the natural habitat of Muang Island and the semi-natural habitat of Kampung Kerora shows similarities, namely a thirsty texture, although there are some parts of the habitat on Muang Island that have coarser sand.

4.4.2. Biotic Factors

4.4.2.1. Vegetation

The success of turtle egg hatching is influenced by vegetation because it affects temperature and humidity as well as environmental conditions around nests. Vegetation measurement parameters as a biotic factor of turtle nesting habitat are crown cover, understory cover, and tree density. Each vegetation has a different crown shape that affects the condition of the sand underneath. In addition, understory cover also affects the sand because its roots are able to bind the sand around the nest. In addition, tree density also affects turtle nesting, because the higher the tree density, the more shaded the conditions around the nest and the appropriate environmental conditions. Muang Island as a natural habitat shows the distribution of nests that are mostly under or around vegetation.

Muang Island has nesting sites with a percentage of crown cover and understory cover that varies from high (>85%), medium (40-85%) and low (<40%) categories. Likewise with tree density, Muang Island has variations in tree density ranging from high (>100 individuals/ha), medium (50 - 100 individuals/ha) and low (<50 individuals/ha) categories. The natural habitat on Muang Island has a coastal forest consisting of several types of canopy cover vegetation such as Bidara Laut (*Strychnos lucida*), Pandan Laut (*Pandanus odorifer*), and Kesambi (*Schleichera oleosa*). Muang Island also has understory plants such as Red Castor (*Jathopha gossypifolia*), *ipomea asarifolia*, *Colubrina asiatica* (L.) Brongn., and *Calotropis gigantea* (L.) Dryland. P. Canopy cover and understory cover are ideal for turtle nesting sites.



Canopy cover on Muang Island



Understory cover on Muang Island Figure 4-

11: Vegetation conditions on Muang Island

Source: Field Observation (2024)

Vegetation measurements were not taken on the coast of Kampung Kerora, field observations showed a low percentage of canopy cover, understory, and very low tree density along the coast. Around the location of the semi-natural nesting site that will be built in Kerora Village, there is no vegetation that meets the needs of sea turtle nesting habitat. The semi-natural sea turtle nesting habitat in Kerora Village

has not met the required biotic factors, so this is the reason why there is no scientific data showing that sea turtles have landed on the coast of Kampung Kerora. Nests in natural habitats are located along the coast so that they have high temperatures, therefore vegetation is needed to block direct sunlight so that it can maintain the temperature and humidity of the nest. Temperature and humidity are very important for the nesting process, because inappropriate temperature and humidity will cause turtle egg hatching failure.



Figure 4-12 Semi-natural nest site, lack of canopy cover and no understory cover.

4.4.2.2. *Predators of turtle eggs*

Sea turtle hatchlings and eggs have natural predators on land such as beach crabs, birds, rats, monitor lizards, wild boars, and other animals. While in the sea, the main predators of hatchlings and adult turtles are large fish in the sea. The threat of these natural predators is difficult to avoid, therefore, efforts can be made to minimize the cycle to save the turtle population. In addition to natural predators, turtle eggs still in semi-natural nests are also threatened by humans. Egg theft is still common in Muang Island, usually taken by passing fishermen or local people. The eggs are usually taken for personal consumption or sold to turtle egg enthusiasts.

In the case of Komodo National Park, especially Kerora Village, Komodo monitor lizards (*Varanus komodoensis*) are the main predators of hatchlings and turtle eggs that have been relocated to semi-natural nests. There are \pm 3,156 individual Komodo dragons spread across five islands: Komodo Island, Rinca Island, Padar Island, Gilimotang Island, and Nusa Kode Island (Komodo National Park, 2022). Kerora Village, which is geographically located on Rinca Island, is the original habitat of Komodo dragons and was recorded to have \pm 1,427 individual Komodo dragons on Rinca Island in 2024, an increase of 169 individuals compared to the previous year (Metro TV, 2024). Based on this data, Rinca Island has the largest population in Komodo National Park, which is around 45% of the total Komodo population.

In an effort to minimize natural disturbances, turtle eggs should be kept in semi-natural nests to protect the eggs from predators. Semi-natural nests should be designed to match the Komodo dragons' hunting behavior, as adults and small Komodo dragons often dig nests to eat other Komodo dragons' eggs, leaving the eggs vulnerable. Once the eggs hatch, they should naturally be allowed to move

towards the sea. However, to minimize natural disturbance, hatchlings should be kept in a holding pond for ± 3 days, so that the hatchlings lose their fishy smell and do not attract predators such as Komodo dragons.



Figure 4-13: (a) Komodo dragons as natural predators, (b) Turtle eggs stolen and sold Source: Komodo National Park and Berau Police

4.4.3. Semi-natural Nesting Site and Nesting Plan

Determining the location for semi-natural nesting sites should be based on the natural nesting habitat, if there is no specific suitability, environmental adjustments should be made by following predetermined standards. The description of the location chosen as a semi-natural nesting site in Kerora Village is as follows:

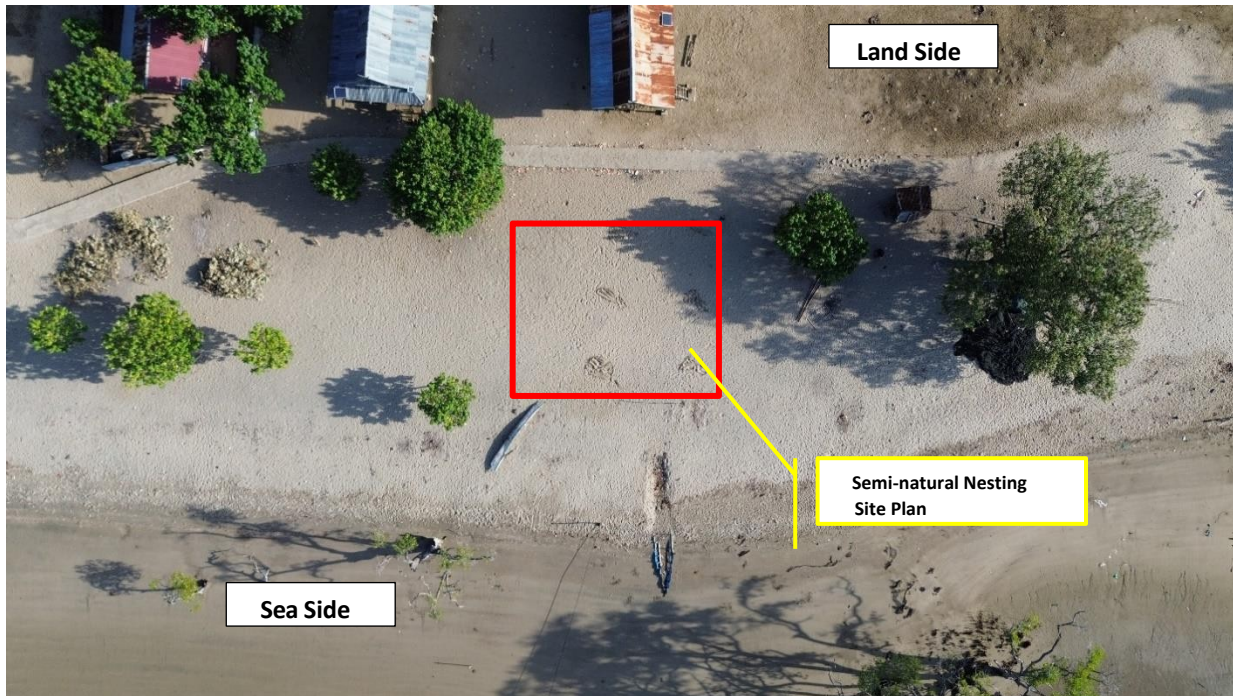


Figure 4-14 Drone documentation of the semi-natural nesting site plan

Source: Field Observation, 2024

Based on Figure 4-14, it can be seen that the semi-natural nesting site in Kerora Village that has been determined already has only a few trees and has a low density, and has no undergrowth. The trees around the nests are not yet very tall, so the canopy cannot act as a canopy cover that affects the temperature and humidity of the semi-natural nests. The semi-natural nesting site also lacks understory cover, so it is necessary to adjust the environment by planting trees and understory vegetation, with the aim of adjusting the semi-natural nesting site in Kerora Village to be the same or similar to the natural nesting site on Muang Island.

4.4.4. Semi-natural Turtle Hatching Technique

4.4.4.1. *Semi-natural nest*

The semi-natural nest technique is the most commonly used technique. It is the closest hatching method to a natural nest. The process begins with selecting a location that is safe from predators and humans, then digging a hole about 50-60 cm deep. Turtle eggs are carefully collected and transferred one by one into the semi-natural nest, keeping the eggs in the same position as they were found to avoid damaging the embryos. The nest is then covered with sand and annotated. Temperature and humidity monitoring is conducted periodically to ensure conditions remain optimal. During the hatching period, the nest is kept free from predators and human activities. After about 45-60 days, the eggs will begin to hatch and the hatchlings will be transferred to temporary holding tanks.

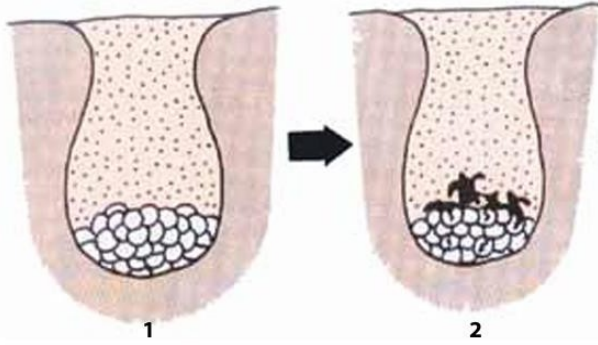


Figure 4-15 Hatching Technique with Semi-Natural Nests Source: Directorate General of Marine, Coastal, and Small Island (2009) and Rainbow Beach Turtle Conservation

4.4.4.2. Bucket Hatching Technique

The bucket technique is claimed to increase the percentage of turtle egg hatching. This technique requires regular trial & error in order to get optimal results. This hatching technique is similar to semi-natural nesting, but uses a bucket container. The bucket used can be buried in sand or not buried in sand, depending on the situation and conditions in the field. The bucket is filled with sand that has the appropriate texture, temperature and humidity. After that, the sand in the bucket is dug out like a semi-natural nesting technique. The turtle eggs are then carefully transferred into the holes made in the bucket, making sure to keep the eggs in the same position to avoid damaging the embryos. The hole filled with eggs is then covered with sand. The bucket is then closed so that no water enters the bucket and is protected from predators. After about 45-60 days, the eggs will begin to hatch and the hatchlings will be transferred to temporary holding tanks.

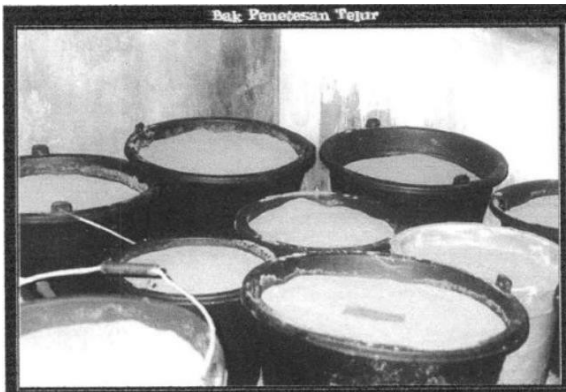


Figure 4-16 Hatching Technique with Bucket Containers Source: Maulidah (2004) and Hengky FJ (2019)

4.4.4.3. Incubator Box Hatching Technique (Pelangi Beach Turtle Conservation)

This technique was developed by Mr. Sarwidi, a conservator at Pelangi Beach Turtle Conservation, Bantul, Yogyakarta. Mr. Sarwidi has consistently innovated to increase the success of sea turtle nesting in the area. This technique is an adaptation of the turtle egg hatching incubator, utilizing a plastic box as a simple hatching tool. This technique uses a plastic box that is given a little sand about a third to a quarter, then closed tightly. A thermometer controller is required in the box, so that temperature and humidity can be monitored regularly. Hatching time with this technique tends to be longer than other techniques. The incubation time is about 60 days or more. This technique can increase the percentage of hatching success of sea turtle eggs. However, this technique still requires a trial and error process to optimize the results.

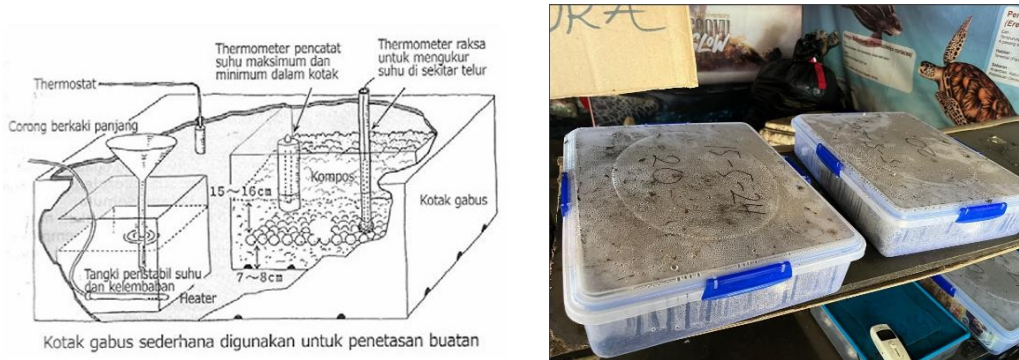


Figure 4-17 Hatching Technique with Box Incubators

Source: Directorate General of Marine, Coastal, and Small Island (2009) and Pelangi Beach Turtle Conservancy

5. ECOTOURISM DEVELOPMENT OF KAMPUNG KERORA

5.1 Overview of Labuan Bajo and Komodo National Park Tourism

5.1.1. Accessibility Overview

5.1.1.1. Macro Accessibility

Komodo National Park in general has strategic accessibility with routes, quantity of travel accommodations, number of *hubs* or strategic areas passed through, and diverse options by air and sea. If accessed by air, Komodo National Park has affordable tourism accessibility given its position with Java Island, Bali Island, and the rest of the Lesser Sunda group of islands allowing for one-way urban *hubs* and tourism-economic centers. In addition, flight travel times are short and directly accessible from economic centers such as Jakarta, Surabaya, and Denpasar. Currently, there are 6 transit domestic flights, 4 domestic flights without transit, and 2 international flights to Komodo International Airport (LBJ) to Komodo National Park if all are taken from international airports. Airlines

Domestic airlines serving flights to Komodo International Airport (LBJ) include AirAsia, Garuda Indonesia, Batik Air, Pelita Air, Lion Air, and Citilink. While international airlines to Singapore (SIN) and Malaysia (KLU) include AirAsia, Garuda Indonesia, and Batik Air. The macro tourism constellation shows that Komodo National Park gets *exposure* as one of the KSPPs that is easily reached by international airlines with two routes (from Singapore/SIN or Kuala Lumpur, Malaysia (KLU)). In addition, international flights that require transit also allow for additional foreign exchange in transit cities or indirect economic support. There needs to be further meso accommodation support to reach Komodo International Airport to Labuan Bajo Port to access Komodo National Park. The following is an overview of the constellation of Komodo International Airport (LBJ) to other international airport *hubs* within the national scope along with routes and travel time information.



Figure 5-1 Constellation of Flights to TNK and Its Nearby Accesses

Source: Compilation Team (2024) via tiket.com

In addition, based on the maritime review, macro accessibility to Komodo National Park can also be reached by sea with the closest macro *hub* and access at Labuan Bajo Port. *Hubs* or port points that serve ship trips to Labuan Bajo Port are mostly located in urban areas that support the tourism economy such as urban Makassar (there is Makassar Port), Denpasar (there is Benoa Port), Gorontalo (there is Gorontalo Port), and Manado (there is Bitung Port). In addition, port *hubs* serving routes to Labuan Bajo Port are also located near national tourist activity centers such as Wanci Port (adjacent to Wakatobi) and Ambon's Poka and Halong Ports. These routes connect the maritime KSPN (National Tourism Strategic Area) of Wakatobi, KSPN Mandalika, KSPN Labuan Bajo, and KSPN Morotai which are all located in eastern Indonesia. All ship routes to Labuan Bajo Port serve direct ships or require transit at the nearest port. Java Island only has Tanjung Perak Port Surabaya which serves the route to Labuan Bajo directly. Meanwhile, Bima Port, Makassar Port, and Waingapu Port are the three busiest ports and are located at the top of the list.

The three ports are close to serving ship routes to Labuan Bajo Port so that it is possible for them to become auxiliary ports for meso access to the Komodo National Park area if there is a ferry port. Passenger motorboats (KM) serving routes to Labuan Bajo Port are mostly managed by PT PelnI such as KM Leuser, KM Tlongkabila, and KM Binaiya with a total of 33 routes from the *hub* serving trips to Labuan Bajo Port. The above access certainly needs to be supported by meso accessibility in terms of mode switching, the scale of passenger travel services, and the quantity of routes to Komodo National Park. The following is an illustration of the constellation of Labuan Bajo Port with other eastern Indonesian ports serving trips to Labuan Bajo Port along with the maritime position of Komodo National Park on the existing route.



Figure 5-2 Constellation of Shipping to Komodo National Park and Nearby Access

Source: Compilation Team (2024) via official website www.pelni.co.id

5.1.1.2. Meso Accessibility

Accessibility to Kerora Village located on Rinca Island, Pasir Panjang Village can be reached through several types of integrated transportation. Currently, tourists can take advantage of air transportation via Komodo International Airport in Labuan Bajo. When reviewing the ship route to Kerora Village, ships need to rotate quite far by taking a route across the West - South - East side of Rinca Island with an estimated distance of 87 km. Therefore, it is necessary to develop alternative accessibility to Kerora Village by road.

Upon arrival at Komodo International Airport, tourists can continue the road trip to several alternative docks on the coast of Warloka Village to Golo Mori Village. This road trip crosses the new road section built from Labuan Bajo to Golo Mori Village along 25 km in order to facilitate access to the Golo Mori MICE SEZ. However, the accessibility conditions on the new road section still experience several challenges, especially related to the availability of complementary facilities.

challenges, especially related to the availability of complementary road facilities that are not yet adequate, as well as public transportation modes that are not yet available. Several docks around Warloka Village and Golo Mori Village include the following.

1. Lenteng Pier - 26 km from Komodo International Airport

At Lenteng Pier, there are already community activities such as a floating market, a place where fishing boats lean, and a place to repair ships (both fishing boats and phinisi boats). Currently, Lenteng Pier is the recommended pier if tourists want to cross to visit Kerora Village by using a fishing boat for ± 30 minutes.

2. Golo Mori MICE Pier - 31 km from Komodo International Airport

Currently, Golo Mori MICE Jetty is available, but it is still not widely used as a boat crossing. In the future, if MICE Golo Mori is completed, this jetty will become one of the potentially busy jetties in terms of boat traffic and can be used for tourists who want to cross to Rinca Island, including Kerora Village.

3. Soknar Pier - 25 km from Komodo International Airport

Soknar Pier is close to Lenteng Pier and can be used as the last alternative for crossing to Rinca Island.

4. Warloka Pesisir Pier

Access to Warloka Pesisir Pier has dirt pavement conditions, besides that if you want to cross to Kerora Village, ships need to cross the Molo Strait which has dangerous currents so it is not recommended to cross through this pier.



Figure 5-3 Land Accessibility to Kerora Village Source: Compilation Team, 2024

If we look more broadly related to ship activities around Labuan Bajo, currently ship activities are still centered at Labuan Bajo Pier visiting several destinations such as Komodo Island, Animal Museum, Loh Buaya, Padar Island, Pink Beach, Papagarang Island, Sebayur Besar Island, Siaba Besar Island, and Gili Lawadart Island. Based on the *marinetraffic.com website*, it can be known about ship traffic around Labuan Bajo, where there are six groups of ship types, including the following.

1. Oil Tanker
2. Cargo Ship
3. Cruise Ship / Pinisi
4. Passenger Ships (transportation to various tourist destinations in Komodo District)
5. Fishing Boats
6. Others (Medical Ship, Patrol Ship, Utility Ship, *Diving* Ship, etc.)

Ship traffic at Labuan Bajo Pier and its surroundings is dominated by cruise ships & pinisi, as well as passenger ships. However, ship activities approaching Kerora Village are still minimal. ±This is due to the absence of interesting tourist attractions in Kerora Village and its surroundings, as well as the long distance of the sea route because it must go around the West - South - East side of Rinca Island with an estimated distance of 87 km. There is a closer route through the Molo Strait, but this route is considered dangerous due to strong and unpredictable ocean currents, potentially causing shipwrecks. These conditions make boat traffic to Kerora Village

has not been well developed, although the potential for tourism in the vicinity is still open for the future.

Pinisi and passenger ships sailing in the waters around Labuan Bajo are dominated by Indonesian-flagged vessels. These ships are the main choice to bring tourists to visit various destinations around Labuan Bajo. However, in addition to ships with Indonesian flags, there are also a number of ships with foreign flags such as the United Kingdom, Canada, Lichtenstein, the United States, and Australia. The ships of these foreign countries are also dominated by the type of sailboat / pinisi with specifications of the size of the ship that is not too large.

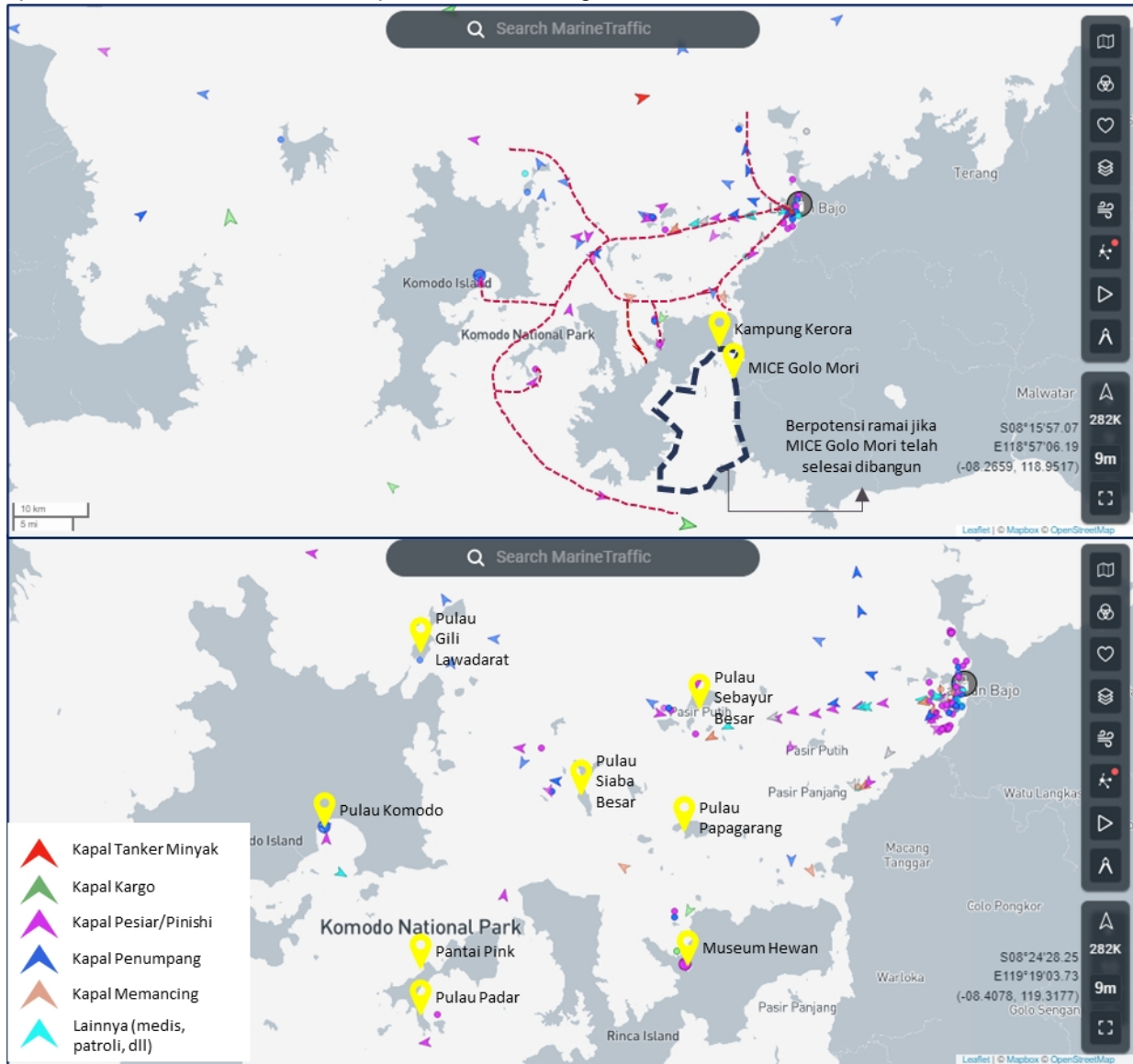


Figure 5-4 Ship Traffic Around Kerora Village - Labuan Bajo

Source: Compilation Team, 2024

The Golo Mori MICE development along with its pier has great potential to become one of the centers of maritime activity in the surrounding area. With the existence of a pier as

supporting facilities, this area can potentially be traversed by many ships, especially across the Golo Mori - Kampung Kerora Sea Corridor. The potential for increased ship traffic in the corridor will certainly create new dynamics, especially in terms of economic and social activities of coastal communities.

Kerora Village, which is in the direct path of this corridor, has a great opportunity to gain positive impacts. Increased ship and visitor traffic, both for business and tourism purposes, will encourage people in Kerora Village to become more actively involved in maritime economic activities. This can be seen by the increase in services that support the Golo Mori MICE industry, such as the provision of logistics, sea transportation services, accommodation, and new business opportunities for local fishermen.

In addition, with increased ship traffic, local trade activities can also grow rapidly, opening up opportunities for businesses in fisheries, tourism, and handicrafts. This increased interaction between regions through sea routes not only revives the economy of local communities, but also has the potential to accelerate the development of sea transportation infrastructure in the region. This should be a concern for relevant agencies to ensure that heavy ship traffic is well-managed and environmentally friendly, in order to maintain the sustainability of the marine ecosystem, which is one of the region's main assets.

5.1.2. *Amenity Overview*

5.1.2.1. *Macro Amenity*

On a macro scale, the development of tourism in the planning location, namely the Kerora Village Resort, cannot be separated from the development of tourism in East Nusa Tenggara (NTT) and Komodo National Park which goes hand in hand. Tourism development in NTT is directed by national policies that focus on improving 10 Priority Tourism Destinations, where Labuan Bajo as the main gate to Komodo National Park is one of the prioritized destinations. The government through the Ministry of Tourism and Creative Economy is working with the private sector, local governments, and international organizations to accelerate the development of tourism infrastructure, ranging from airport and port improvements to access roads to tourist areas. This development is targeted to optimize the *multiplier effect* of tourism on the local economy, with the hope of creating jobs, increasing the income of local communities, and improving living standards around tourist destinations. Labuan Bajo, which has now become a Tourism Special Economic Zone (SEZ), plays a vital role as the center of tourism growth in NTT and is expected to become the main entrance to the Komodo National Park area as well as the main transit point for tourists.



Figure 5-5 Overview of Macro Amenity around Kampung Kerora Resort Source: BPS per Regency and City in 2023

The improvement of accommodation facilities in NTT, especially in Labuan Bajo, has greatly influenced the development of tourism in Komodo National Park. From simple inns to star hotels, everything is built to meet the needs of tourists with various budgets. Recorded from BPS data, Manggarai Regency has a total of 106 hotels and 131 restaurants in 2023. This condition is certainly in stark contrast to regencies/cities outside the Komodo National Park area such as Manggarai Regency, Bima Regency, and regencies/cities on Sumba Island. The development of accommodation in Labuan Bajo has several implications including

1. The development of new hotels and resorts in Labuan Bajo provides more options for tourists who want to stay longer and explore the Komodo National Park area.
2. Local villas and homestays are also starting to develop, providing a more authentic experience for travelers while empowering local communities.
3. Restaurant and café facilities with ocean views are increasingly popping up around Labuan Bajo, providing more convenience for tourists who want to enjoy a culinary experience after traveling in Komodo National Park.

The existence of adequate accommodation facilities is a special attraction for tourists who want to visit Komodo National Park. With the development of lodging facilities, tourists feel more comfortable and tend to spend more time exploring Komodo National Park.

to explore Komodo National Park, which has implications for increasing income for local communities and national park managers.

Labuan Bajo as a Tourism Special Economic Zone (SEZ) also encourages the government together with private investors to work together in building various supporting facilities, including entertainment facilities, shopping centers, and tourist services, which aim to make Labuan Bajo a major tourism hub. The development of MICE (Meeting, Incentive, Conference, Exhibition) facilities in Labuan Bajo makes it not only a nature destination, but also a center for international conferences and business activities. This attracts more business-class travelers who are also interested in visiting Komodo National Park. In addition, public infrastructure improvements such as health services, security, and tourism information are also prioritized in the development of this SEZ, all of which support a safer and more comfortable tourist experience.

5.1.2.2. Meso Amenity

The rapid development of tourism in Labuan Bajo, which is the gateway to Komodo National Park, has a direct impact on the surrounding areas, including Komodo sub-district. Komodo Sub-district, which includes several villages around Komodo National Park, ranging from coastal villages to small islands that are part of Komodo National Park, has also felt the impact of development in Labuan Bajo, one of which is Pasir Panjang Village on Rinca Island. Facilities on Rinca Island and its surroundings have developed to support sustainable tourism.

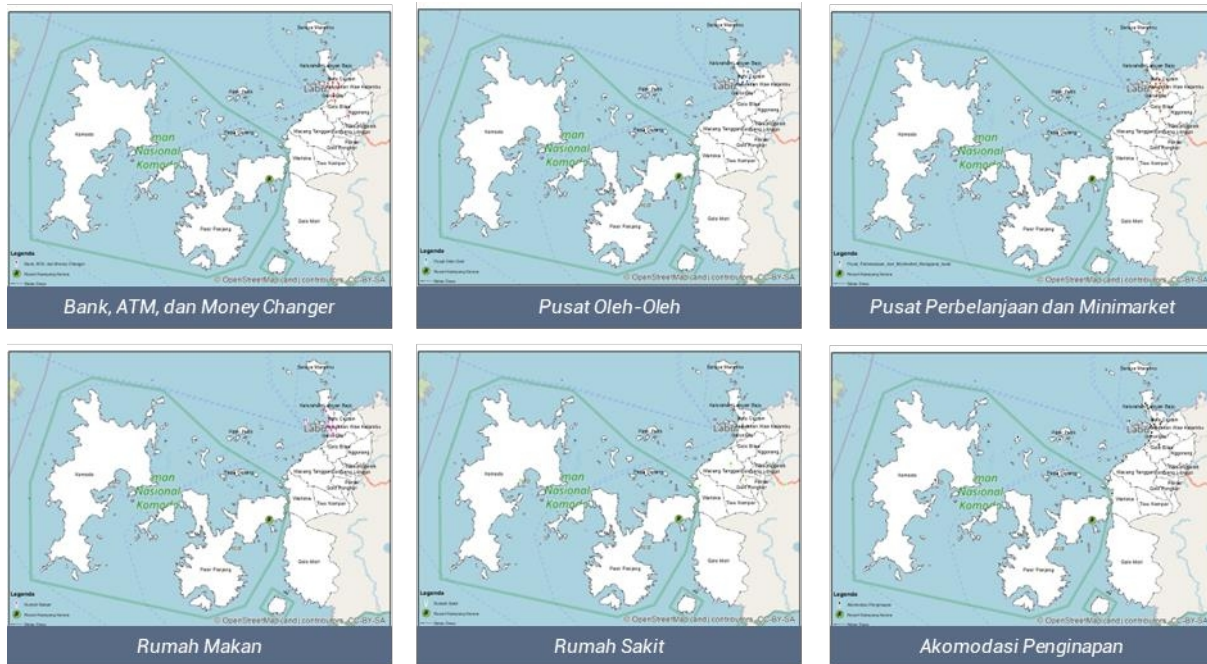


Figure 5-6 Meso Amenity Overview around Kerora Village Resort

On Rinca Island, there are no tourism amenities and accommodations such as banks, ATMs, money changers, shopping centers, minimarkets, restaurants, souvenir centers, hospitals,

or lodging. However, there is an information center managed by the Komodo National Park authorities to welcome and provide directions to tourists. The visitor information center provides maps, guides, and information about the flora and fauna of Rinca Island, especially the Komodo dragons. To ensure the safety of tourists, especially in interaction with Komodo dragons, which are wild animals, there are guard posts and professional guides. The guard post is located near the main entrance on Rinca Island.

Although Rinca Island does not have as many accommodation options as Labuan Bajo, some basic facilities are available for tourists who wish to stay around the island. There are homestays in some of the surrounding villages, such as in Komodo Village and on nearby small islands, which can be accessed by boat. These homestays are managed by locals and provide a simple and authentic stay. According to Komodo Sub-District in Figures 2023 data, in 2021 there were 5-unit homestays in Pasir Panjang Village that were not specifically listed. Many tourists also choose to stay on liveboard boats that provide floating accommodation, which is a popular choice for those who want to tour Rinca Island and other islands in Komodo National Park.

Rinca Island and its surroundings have developed tourism facilities to support sustainable nature tourism experiences. Although facilities on the island are more modest compared to those in Labuan Bajo, they are designed to support ecotourism that maintains a balance between tourist visits and environmental preservation. The limited facilities on Rinca Island reflect conservation efforts, with a focus on authentic wilderness experiences, especially regarding the Komodo dragon habitat and beautiful underwater life.

5.1.3. Attraction Overview

5.1.3.1. *Macro Attractions*

In the macro scope around the planning location, namely the Kampung Kerora Resort, Pasir Panjang Village, Rinca Island, a macro analysis is reviewed which includes several administrative areas in East Nusa Tenggara (NTT) Province. NTT Province has 24 districts / cities with the potential for unique and authentic tourist attractions that can be used as economic drivers. In general, existing tourist attractions can be grouped into three types, namely natural, cultural, and artificial tourist attractions. Natural tourist attraction is a tourism potential based on the diversity and uniqueness of the natural environment both in marine and land areas. Cultural tourism attraction is the potential of tourism in the form of the results of copyright, taste, and human spirit as a living being both *tangible* and *intangible*. Artificial tourism attraction is tourism potential in the form of artificial creations and other human activities outside of natural and cultural tourism. These various tourism potentials make NTT Province as *The Ring od Beauty* or the gateway and center of national tourism development and as a world-class tourist destination.

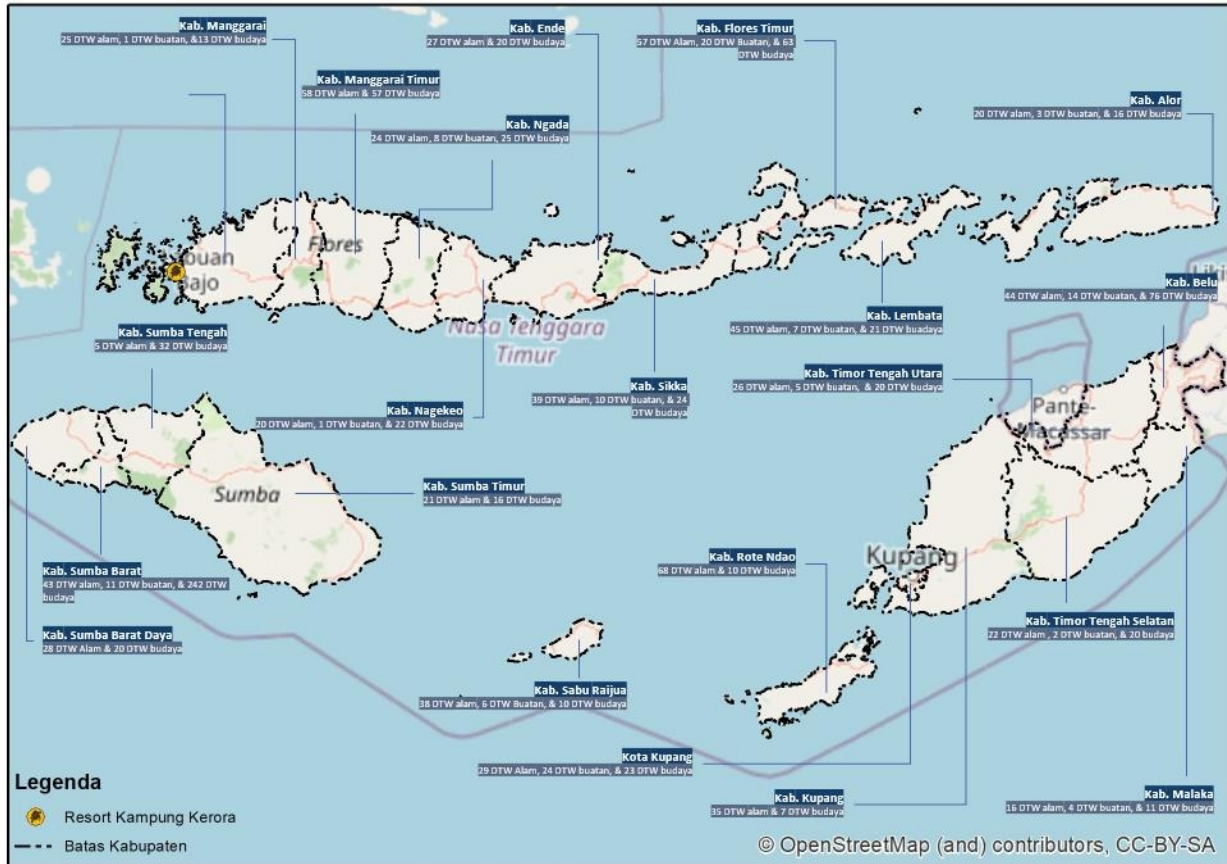


Figure 5-7 Overview of Macro Attractions Around Kampung Kerora Resort

Source: Nusa Tenggara Province in Figures 2024

According to Nusa Tenggara Province in Figures 2024, there are 1,637 tourist attractions in NTT Province consisting of natural tourist attractions, cultural tourist attractions, and artificial tourist attractions. There are 759 natural tourist attractions such as beaches, hills, waterfalls, and caves with the most distribution in Rote Ndao Regency. Most of the natural tourist attractions in Rote Ndao Regency are beaches because the area is surrounded by white sandy beaches. One of the famous natural attractions in Rote Ndao Regency is Nembrala Beach and Bo'a Beach, which are characterized by waves suitable for *surfing*, so that during the *surfing* season (August - September) they are usually used as locations for regional and international *surfing* sports events (Government of Rote Ndao Regency, 2024).



Figure 5-8. Nembrala Beach

Source: atourin.com

There are 762 cultural tourism attractions such as traditional villages and community tradition festivals with the most distribution in West Sumba Regency. Most of the cultural tourism attractions in West Sumba Regency are in the form of traditional villages that still preserve culture such as rituals, ceremonies, and festivals on a regular basis. The existence of these traditional villages is able to attract tourists by offering a different tourism experience by participating in existing cultural activities while interacting directly with local communities. One of the famous cultural villages in West Sumba Regency is Prai Ijing Traditional Village as the most popular tourist village in West Sumba. The attractions offered in the tourist village are weaving culture, traditional houses, traditional activities, traditional house architecture, natural scenery, and cultural heritage.



Figure 5-9 Prai Ijing Traditional Village Source:

atourin.com

There are 116 artificial tourist attractions such as monuments, parks, ponds, and monuments with the most distribution in Kupang City. Artificial tourist attraction in Kupang City

Kupang include swimming pools, fishing ponds, city squares, monuments, artificial parks, forts, and monuments. Kupang City as the capital city of NTT Province is the smallest urban area among other districts/cities in NTT Province, so it has limited natural tourism potential while there is a need for community recreation space. This underlies the development of artificial tourism to be the right choice to attract tourists. One of the artificial tours that is a favorite of the local community is Taman Nostalgia as a city park with the main attraction in the form of the Gong Perdamaian Nusantara (GPN) Monument (Indonesia Kaya, 2024). The city park is equipped with supporting facilities such as a play area, *jogging track*, culinary park, and basketball court.



Figure 5-10 Nostalgia Park

Source: indonesiakaya.com

5.1.3.2. *Meso Attractions*

Tourism development in West Manggarai has experienced significant growth, especially with Labuan Bajo as the main gateway to Komodo National Park. Tourism in this area is driven by natural beauty, cultural richness, and strong conservation management efforts that are a magnet for local and foreign tourists. Attractions in West Manggarai are not only famous at the national level, but have also gained international recognition, especially with the Komodo National Park. According to BPS data, there are 73 Tourist Attractions (DTW) in Kabupaten Manggarai Barat with DTW concentrated in Kecamatan Komodo.



Figure 5-11 Overview of Meso Attractions around Kerora Village Resort

Komodo National Park is the main tourist attraction in West Manggarai which includes Komodo Island, Rinca Island, Padar Island, and other small islands. This attraction has been recognized as a World Heritage Site by UNESCO. Many tourists come to West Manggarai specifically to see Komodo dragons in their natural habitat. In addition to seeing komodo dragons, trekking on the hills of Rinca and Komodo Islands with spectacular natural scenery is also a major attraction sought by tourists. Furthermore, attractions on Padar Island are also one of the icons of West Manggarai which is famous for its view of three bays with different colored sand (white, black, and pink). Around Labuan Bajo, there are also Bukit Sylvia and Bukit Cinta, which offer beautiful sunset views against the backdrop of the sea and small islands.



Figure 5-12 Komodo Island, Padar Island and Rinca Island

Source: *atourin.com*

West Manggarai is known as one of the best diving destinations in the world, especially in the Komodo National Park area. The marine biodiversity, such as reef sharks, sea turtles, manta parrots, as well as various types of coral reefs, attracts many divers. Batu Bolong, Crystal Rock and Karang Makassar are some of the favorite spots frequented by international divers. For tourists who do not dive, snorkeling in the waters of West Manggarai also offers a great experience. The shallow waters around Kanawa Island, Seraya Island, and Pink Beach are some of the locations that offer underwater beauty that is easily accessible to tourists.



Figure 5-13 Diving in West Manggarai

Source: pandoo.in.com

Furthermore, in terms of cultural attractions, Wae Rebo Traditional Village is located in the mountains and is one of the leading cultural tourism attractions in West Manggarai. The village is known for its cone-shaped traditional houses made from natural materials and is a Manggarai cultural heritage. Tourists can see and learn about the original culture of the Manggarai people, including their way of life, traditional ceremonies and traditional music. Todo Village also offers a rich history and culture of the Manggarai tribe. Todo was once the center of power for the Manggarai Kingdom. Tourists can visit the main traditional house which is a witness to history and a center of local culture. The Caci dance, a traditional Manggarai war dance, is often performed in Todo Village as part of the cultural attractions for tourists.



Figure 5-14 Wae Rebo Traditional Village

Source: tourism.manggarai.kab.go.id

Golo Mori is one of the locations projected by the government as a MICE (Meetings, Incentives, Conferences, and Exhibitions) destination, mainly because of its strategic location.

strategic location. The government and private sector are working together to create infrastructure that supports large events, such as international conferences, seminars, exhibitions, and corporate incentive events. The development of MICE in Golo Mori is expected to raise the profile of West Manggarai and NTT at the international level as a destination that not only excels in natural and cultural tourism, but also in business tourism. The presence of the Golo Mori MICE Area can provide economic opportunities for local residents of Warloka Village and Golo Mori Village, including those involved in ecotourism and turtle conservation activities at the Kampung Kerora Resort. This is in the form of increasing the number of visitors with promotion, because the view of Golo Mori MICE is directly facing Rinca Island (including Resort Kampung Kerora in it) and Muang Island (turtle conservation site).



Figure 5-15 Golo Mori

Source: itdc.co.id

5.2. Economic, Sociodemographic and Environmental Overview

5.2.1. Population

5.2.1.1. Population Composition, Distribution and Density

The location of Kampung Kerora Resort is located in Pasir Panjang Village, Komodo Sub-District, West Manggarai Regency. The discussion related to the population of Kampung Kerora is reviewed based on the population on a broader scale, namely Komodo District as a whole. The following is the composition, distribution, and population density of Komodo Sub-district in 2022.

Table 5-1 Composition, Distribution, and Population Density of Komodo Sub-district in 2022

Village/Kelurahan	Population (people)			Area Area (ha)	Density Population (people/ha)
	Male	Female	Total		
Komodo	913	933	1.846	29.137	0.06≈ 1
Papa Garang	848	790	1.638	673	2.43≈ 2
Long Sand	897	844	1.741	18.248	0.10≈ 1
Golo Mori	1.039	1.037	2.076	11.946	0.17≈ 1
Village/Kelurahan	Population (people)			Area Area (ha)	Density Population (people/ha)
	Male	Female	Total		

Warloka	956	940	1.896	3.211	0.59≈ 1
Tiwu Nampar	594	558	1.152	2.418	0.48≈ 1
Golo Pongkor	511	531	1.042	739	1.41≈ 1
Macang Tanggar	1.757	1.628	3.385	4.265	0.79≈ 1
White Sand	1.037	1.086	2.123	517	4.11≈ 4
Goron Talo	3.692	3.688	7.380	623	11.85≈ 12
Golo Rinse	2.798	2.725	5.523	1.775	3.11≈ 3
Nggorang	1.154	1.059	2.213	1.768	1.25≈ 1
Watu Nggelek	472	498	970	498	1.95≈ 2
Wae Kelambu	3.905	3.886	7.791	1.449	5.38≈ 5
Mirror Stone	3.315	3.176	6.491	641	10.13≈ 10
Labuan Bajo	3.616	3.371	6.987	1.165	6.00≈ 6
Pantar	426	418	844	1.034	0.82≈ 1
Serayu Maranu	315	297	612	633	0.97≈ 1
Compang Longgo	682	685	1.367	613	2.23≈ 2
Total	28.927	28.150	57.077	81.553	0.70≈ 1

Source: Komodo Sub-district in Figures (2023)

Based on the table above, it can be seen that Pasir Panjang Village has a population of 1,741 people with a male population composition of 897 people or more than the female population of 844 people. Pasir Panjang Village is the second largest village in Komodo Sub-district after Komodo Village with an area of 18,248 ha. This has an impact on the population density of Pasir Panjang Village, which is in the bottom two with a population density of only 0.10 people per ha or rounded up to 1 person per ha. This can occur because land use in Pasir Panjang Village is a Conservation Area in the form of a National Park, so residents tend to be on the coast of the island, including Kerora Village which is on the East Coast of Pasir Panjang Village.

±Meanwhile, based on data from the Komodo National Park Center in 2021, Kerora Village has 290 inhabitants with 60 households. Based on the survey results as of September 2024, there are 74 families spread across two hamlets, namely Dusun Besar (64 families) and Dusun Wae Rebo (14 families). The average population in

Kerora Village are migrants from outside Rinca Island, such as from Manggarai, Labuan Bajo, and Bima.

When viewed by age group, Pasir Panjang Village is dominated by residents with the age group of children (5 - 9 years) with a total of 190 people or 11% of the total population. In addition, if you look at the population diagram by age group, it can be seen that Pasir Panjang Village is also dominated by the productive age population in the Gen Z population group (10 - 24 years) with a total of 522 people or 30% of the total population. This certainly affects the need for educational facilities, employment opportunities, and other public facilities to facilitate people of productive age.

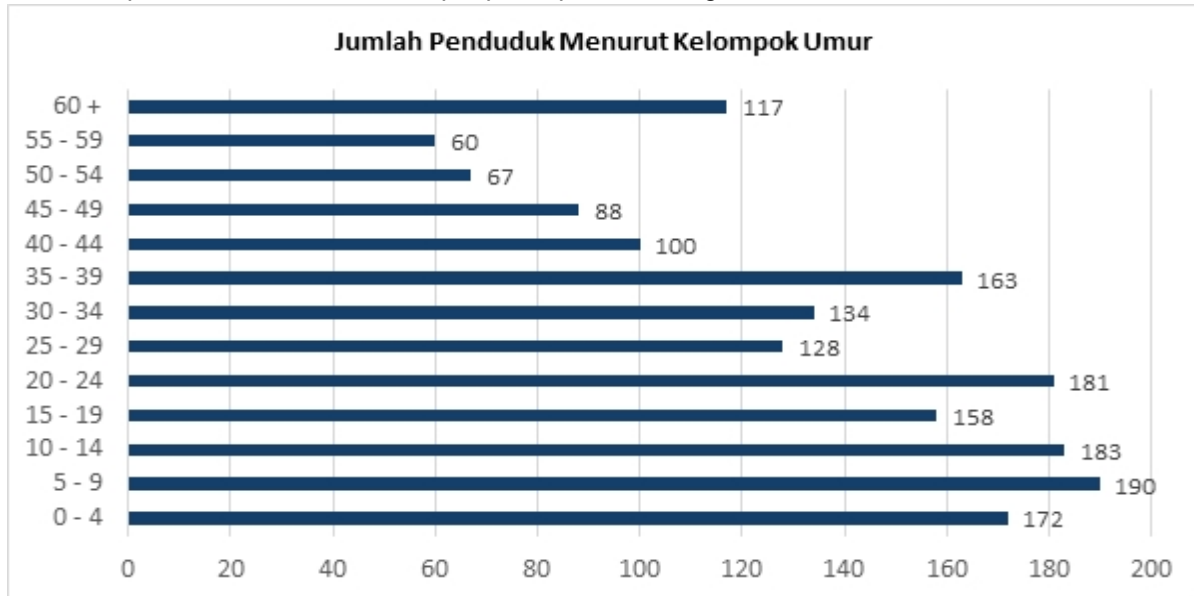


Figure 5-16 Total Population of Pasir Panjang Village by Age Group in 2022 (Source: Komodo Sub-district in Figures 2023)

5.2.1.2. Population Growth Rate

Next is a discussion of the population growth rate of Pasir Panjang Village from 2018 to 2022. This population growth rate figure is intended to determine how much the population of each village in Komodo Sub-district increases or decreases, especially in Pasir Panjang Village where Kerora Village is located. To find out the population growth rate, it is first necessary to know the total population from 2018 to 2022. More details about the population growth rate in Komodo Sub-district from 2018 to 2022 can be seen in the following table.

Table 5-2 Komodo Sub-district Population Growth Rate from 2018 to 2022

Village/Kelurahan	Total Population Year 2018	Total Population Year 2019	Total Population Year 2020	Total Population 2021	Total Population Year 2022
Komodo	1.789	1.791	1.845	1.819	1.846
Papa Garang	1.538	1.511	1.493	1.593	1.638
Long Sand	1.668	1.688	1.644	1.714	1.741
Golo Mori	2.013	2.034	2.002	2.107	2.076
Warloka	1.745	1.804	1.773	1.891	1.896
Tiwu Nampar	1.099	1.117	1.090	1.113	1.152
Golo Pongkor	962	976	984	1.042	1.042
Macang Tanggar	3.106	3.179	3.079	3.339	3.385
White Sand	1.979	1.953	1.992	2.054	2.123
Goron Talo	6.983	7.166	7.292	7.306	7.380
Golo Bilas	4.389	4.622	4.906	5.073	5.523
Nggorang	1.900	2.018	2.201	2.154	2.213
Watu Nggelek	876	880	848	926	970
Wae Kelambu	6.308	6.704	7.676	7.523	7.791
Batu Cermin	5.569	5.712	6.024	6.134	6.491
Labuan Bajo	6.848	6.915	6.154	6.986	6.987
Pantar	781	817	776	847	844
Serayu Maranu	574	619	614	608	612
Compang Longgo	1.302	1.307	1.331	1.357	1.367
Total	51.429	52.813	53.724	55.586	57.077

Source: Komodo Sub-district in Figures 2019 - 2023

Based on the table above, it can be seen that the population in Pasir Panjang Village decreased in 2020. In addition, during the years 2018 - 2019, 2020 - 2021, and 2021 - 2022, the population in Pasir Panjang Village has increased. The following is the population growth rate of each village/sub-district, especially Pasir Panjang Village from 2018 to 2022. More details can be seen in the following table.

Table 5-3 Komodo Sub-district Population Growth Rate from 2018 to 2022

Village/ Village	Rate Population Growth Rate 2018-2019	Rate Population Growth Rate 2019-2020	Rate 2020-2021 Population growth rate	Rate Population Growth Rate 2021-2022	Average Population Growth Rate Population Growth Rate 2018-2022
Komodo	0,11	2,93	-1,43	1,46	0,77
Papa Garang	-1,79	-1,21	6,28	2,75	1,51
Long Sand	1,18	-2,68	4,08	1,55	1,04
Golo Mori	1,03	-1,60	4,98	-1,49	0,73
Warloka	3,27	-1,75	6,24	0,26	2,01
Tiwu Nampar	1,61	-2,48	2,07	3,39	1,15
Golo Pongkor	1,43	0,81	5,57	0,00	1,95
Macang					
Tanggar	2,30	-3,25	7,79	1,36	2,05
White Sand	-1,33	1,96	3,02	3,25	1,72
Goron Talo	2,55	1,73	0,19	1,00	1,37
Golo Rinse	5,04	5,79	3,29	8,15	5,57
Nggorang	5,85	8,31	-2,18	2,67	3,66
Watu Nggelek	0,45	-3,77	8,42	4,54	2,41
Wae Kelambu	5,91	12,66	-2,03	3,44	4,99
Mirror Stone	2,50	5,18	1,79	5,50	3,74
Labuan Bajo	0,97	-12,37	11,91	0,01	0,13
Pantar	4,41	-5,28	8,38	-0,36	1,79
Serayu					
Maranu	7,27	-0,81	-0,99	0,65	1,53
Compang					
Longgo	0,38	1,80	1,92	0,73	1,21
Total	2,62	1,70	3,35	2,61	2,57

Source: Compilation Team (2024)

Based on the table above, it can be seen that Pasir Panjang Village experienced a significant change in population growth rate from year to year. In the year

2019 - 2020 there was a decrease in population of -2.68%, but in 2020 - 2021 Pasir Panjang Village recorded an increase in population of 1.55%. On average, the population growth rate in Pasir Panjang Village during the 2018-2022 period was recorded at 1.04%. This figure is slightly lower than the total average population growth rate of Komodo Sub-district, which is 2.57%. When compared to other villages, Pasir Panjang Village has a relatively stable population growth rate, showing no extreme spikes or declines in population numbers as occurred in Serayu Maranu Village where the growth rate varied widely from 9.09% to -5.65%.

5.2.1.3. Population Projections

A review of population projections is an estimate of the population of each village in Komodo Sub-district, especially Pasir Panjang Village as the location of Kerora Village. Population projections are calculated for the next 10 years. The population projection is calculated using the geometric formula which utilizes data on the average population growth rate from 2018 to 2022 from each village, then entered into the calculation with the following equation.

$$P_n = P_0(1+r)^n$$

Notes:

P_n : Total population in year-n

P_0 : Total population in the initial year r :

Population growth rate

n : Period of time in years

Through this equation, the results of population projections are obtained. The calculated population projections always increase from year to year so that the positive trend of population growth is maintained. The following are the population projection results of each village in Komodo Sub-district, especially Pasir Panjang Village as the location of Kerora Village from 2025 to 2034.

Table 5-4 Population Projections for Komodo Sub-district from 2025 to 2034

Village/ Village	Population Projection (people)									
	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Komodo	1.889	1.903	1.918	1.933	1.948	1.963	1.978	1.993	2.008	2.023
Papa Garang	1.713	1.739	1.765	1.792	1.819	1.846	1.874	1.902	1.931	1.960
Sand Long	1.796	1.814	1.833	1.852	1.871	1.891	1.910	1.930	1.950	1.970
Village Village	Population Projection (people)									
	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Golo Mori	2.122	2.137	2.153	2.169	2.185	2.201	2.217	2.233	2.249	2.266
Warloka	2.012	2.053	2.094	2.136	2.179	2.223	2.267	2.313	2.359	2.406

Tiwu Nampar	1.192	1.206	1.220	1.234	1.248	1.262	1.276	1.291	1.306	1.321
Golo Pongkor	1.104	1.126	1.148	1.170	1.193	1.216	1.240	1.264	1.289	1.314
Macang Tanggar	3.597	3.671	3.746	3.823	3.901	3.981	4.063	4.146	4.231	4.318
White Sand	2.235	2.273	2.312	2.352	2.393	2.434	2.476	2.519	2.562	2.606
Goron Talo	7.687	7.793	7.899	8.007	8.117	8.228	8.341	8.455	8.571	8.688
Golo Bilas	6.498	6.860	7.241	7.645	8.070	8.519	8.994	9.495	10.023	10.581
Nggorang	2.465	2.555	2.649	2.746	2.846	2.951	3.059	3.171	3.287	3.407
Watu Nggelek	1.042	1.067	1.093	1.119	1.146	1.174	1.202	1.231	1.260	1.291
Wae Kelambu	9.018	9.468	9.941	10.437	10.958	11.506	12.080	12.683	13.317	13.982
Batu Cermin	7.248	7.519	7.801	8.093	8.396	8.710	9.036	9.374	9.725	10.089
Labuan Bajo	7.015	7.024	7.033	7.042	7.052	7.061	7.070	7.080	7.089	7.098
Pantar	890	906	922	939	955	973	990	1.008	1.026	1.044
Serayu Maranu	641	650	660	670	681	691	702	712	723	734
Compang Longgo	1.417	1.434	1.452	1.469	1.487	1.505	1.523	1.541	1.560	1.579
Total	61.591	63.174	64.797	66.462	68.170	69.921	71.718	73.561	75.451	77.390

Source: Compilation Team (2024)

Based on the table above, it can be seen that every year Pasir Panjang Village experiences an increase in population of around 30-40 people. This shows that Pasir Panjang Village has a fairly consistent population growth rate. From 2025 to 2034, the population of Pasir Panjang Village is projected to increase by around 270 people over 9 years. This shows that the average population growth from 2025 to 2034 is 15% of the total initial population. When compared to several other villages in Komodo Sub-district, population growth in Pasir Panjang Village is quite slow. For example, Macang Tanggar Village and Golo Bilas Village show a much larger increase in population over the same period. With this projected

population growth, Pasir Panjang Village needs to be supported by improvements in infrastructure, facilities, utilities, and public facilities to be able to serve the growing population every year.

5.2.1.4. Education Level

The level of education illustrates the quality of human resources that affect regional development. An overview of the education level of the residents of Kampung Kerora can be seen from the macro level of West Manggarai Regency, Komodo District, to the micro level of Pasir Panjang Village.

Table 5-5 Levels of West Manggarai Regency, Komodo Sub-district, and Pasir Panjang Village in 2022

Education Level	Percentage of Education Level Education Level West Manggarai District (%)	Percentage of Education Level Kecamatan Komodo	Percentage of education level Pasir Panjang
Not/not yet School	1%	26,37%	31,40%
Did not finish elementary school	27%	14,09%	15,03%
Completed elementary school	36%	25,37%	38,48%
JUNIOR HIGH SCHOOL	20%	11,42%	6,43%
HIGH SCHOOL	11%	22,76%	8,65%
Higher Education	5%	Unknown	Unknown

Source: Education Statistics of Kabupaten Manggarai Barat Year 2023, Komodo Dalam Angka Year 2023

Based on BPS 2023 data, it is known that the highest level of education in Kabupaten Manggarai Barat is dominated by people who have graduated from primary school (Table 5-5). Then the education level in Kecamatan Komodo is dominated by people who are not/not yet in school and elementary school graduates, both of which have a small difference. Meanwhile, the education level in Pasir Panjang Village is dominated by people who have graduated from primary school. This education level data is in line with the school participation rate (APS) in Kabupaten Manggarai Barat (Figure 5-17).

5.2.1.5. Employment

Labor is a factor that determines the achievement of productive employment and the economic effectiveness of a region. This happens because labor is not merely a recipient of the results of growth but as a creator of growth and even assets. Labor conditions can be seen from various aspects, including the level of labor force participation, labor force and non-labor force, unemployment rate, and types of employment. Kerora Village is located in Pasir Panjang Hamlet, Komodo District, West Manggarai Regency. The employment condition of Kerora Village can be seen from the macro employment in West Manggarai Regency.

The labor force participation rate (TPAK) is the first aspect that can be seen to determine employment conditions. TPAK is an estimate of the active workforce in a regional economy. TPAK is calculated by dividing the number of adults who are working or looking for work by the total adult population, which is then multiplied by 100 to get the percentage. The labor force participation rate of Kabupaten Manggarai Barat can be seen for the last ten years from 2013-2023.

Table 5-6 Labor Force Participation Rate (TPAK) of Kabupaten Manggarai Barat (%)

Year	Male (%)	Female (%)	Total (%)
2013	82,92	55,03	68,78
2014	85,08	60,46	72,52
2015	84,01	59,24	71,39
2016	84,01	59,24	71,39
2017	86,65	69,41	77,87
2018	82,37	52,78	67,24
2019	85,49	60,77	72,87
2020	85,89	71,34	78,52
2021	81,27	65,34	73,18
2022	87,29	73,77	80,46
2023	81,65	59,69	70,71

Source: BPS Kabupaten Manggarai Barat Year 2024

Based on the table above, it can be seen that the labor force participation rate in Kabupaten Manggarai Barat over the last ten years has fluctuated. On average, only 73.2% of the adult population is working or looking for work. This TPAK shows the amount of labor supply that is available to produce goods and services in supporting the economy of Kabupaten Manggarai Barat.

In addition to the labor force participation rate, the employment condition can be seen from the level of the labor force and non-labor force. The labor force is the working-age population (15 years and above) who are working, looking for work, or temporarily unemployed. This means that the labor force includes the working population as well as the unemployed population. The number of labor force and non-labor force in Kabupaten Manggarai Barat in 2021-2023 is shown below.

Table 5-7 Labor Force and Non-Labor Force of Kabupaten Manggarai Barat

Year	Labor Force	Non-labor Force
2021	140.595	51.533
2022	158.269	38.437
2023	130.856	54.211

Source: BPS Kabupaten Manggarai Barat Year 2024

Meanwhile, the unemployment rate in Kabupaten Manggarai Barat for the last three years from 2021 to 2023 was 3.72%, 4.91%, and 4.42%. Based on the BPS data, it can be seen that from 2022 to 2023 (the last one year), Kabupaten Manggarai Barat had a declining labor force while the number of people who were not in the labor force experienced a surge. Although the number of labor force members decreased from 2022 to 2023, the unemployment rate in Kabupaten Manggarai Barat decreased.

Employment can also be seen from the type of employment available in a region. Based on BPS data for 2024, Kabupaten Manggarai Barat has three main types of employment, namely primary, secondary, and tertiary employment. The following is the number of people working in the primary, secondary, and tertiary sectors of Kabupaten Manggarai Barat in 2023.

Table 5-8 Number of Residents of Kabupaten Manggarai Barat Based on Primary Employment Fields

Primary Employment Field	2021	2022	2023
Primary	86.821	93.528	71.191
Secondary	12.954	14.169	11.291
Tertiary	33.879	42.802	42.588

Source: BPS Kabupaten Manggarai Barat Year 2024

From BPS data for 2024, it can be seen that the majority of the population of Kabupaten Manggarai Barat work in the primary sector, followed by the tertiary sector and then the secondary sector. The primary sector is a type of employment in the agrarian sector, including Agriculture, Plantations, Forestry, Hunting, and Fisheries. Secondary sectors include Mining and Quarrying, Industry, Electricity, Gas, and Drinking Water, Construction. While the tertiary sector includes Trade, Restaurants and Accommodation Services, Transportation, Warehousing and Communication, Financial Institutions, Real Estate, Rental Businesses and Corporate Services, Community, Social and Individual Services.

Then from a micro perspective, the employment of Kampung Kerora can be seen from the condition of the workforce in Pasir Panjang Village. Pasir Panjang Village has a population of 1,741 people. 90% of the population work as fishermen. Residents utilize aquatic resources by looking for fish and sea cucumbers (RPM 2023-2027). Meanwhile, Kerora Village itself has around 290 people (60KK) with the majority of the population working as fishermen (Komodo National Park, 2021). From these data, it can be concluded that most of the population in both West Manggarai Regency, Pasir Panjang Village and Kerora Village work in the primary sector. Pasir Panjang Village, especially Kampung Kerora, has primary sector specifications in the fields of forestry and fisheries.

5.2.1.6. *Social Culture*

Pasir Panjang Village is a village in Komodo Sub-district. The people of this village survive by utilizing the potential of water resources and fisheries.

forest. Based on data from the Komodo National Park Community Empowerment Plan (RPM) for 2023-2027, 90% of Pasir Panjang Village residents work as fishermen. The other 10% utilize the forest for firewood, honey, tamarind fruit, and angkor. Pasir Panjang Village has the potential for elder birds and bats. In addition, the village also has cultural diversity such as dance, traditional architecture, and various local culinary. The existence of this potential is an opportunity for Pasir Panjang Village to be developed towards nature, culture and non-timber forest products (NTFPs) tourism.

Kerora Village is a village located in Pasir Panjang Village. Kerora Village is surrounded by a dense and dense primary mangrove ecosystem which is also a habitat for yellow-crested cockatoos. The majority of the people in this village work as fishermen. The fishermen utilize the waters by catching fish and developing mangroves. However, the presence of parrot animals living in mangrove habitats has not been fully preserved by the community. Some people have a habit of capturing animals for sale, which requires further education. In addition to relying on aquatic resources for their livelihoods, most of the people of Kerora Village also raise goats. Every house has goats and they are released around the beach.

Kerora Village has a Community Empowerment group managed under the Komodo National Park Center, namely Wani Kerora and Nusa Kampas. Wani Kerora is a community group that accommodates forest honey seekers. This group takes honey from the forest, processes it, and markets it to the port. Meanwhile, Nusa Kampas is a salt cultivation community group. Salt cultivation in Kerora Village aims to fulfill the need for sea salt for fishermen and community households as well as maintaining the existence of the mangrove ecosystem around the cultivation site. The people of Kerora Village have a tradition of buying and selling with a commodity barter system. Lenteng Pier is utilized by the community to hold the Morning Market every Saturday.

5.2.2. Regional Economy

5.2.2.1. *Economic Composition and Growth*

Kabupaten Manggarai Barat, located in West Nusa Tenggara Province, has a diverse and dynamic economic landscape. These diverse economic conditions are projected by Regional Gross Domestic Product data. According to Sukirno (2016), GRDP is the sum of gross value added from regions within a province or district. Gross value added results from the value added of production (output) minus intermediate costs. Production value added is an increase in the *value of* a product or service that occurs when raw materials or components are processed into finished or semi-finished products through the production process. Meanwhile, intermediate values are costs that occur in the production or operation process before the final product is produced or before the service is completed. According to the Central Statistics Agency (BPS) Gross Regional Domestic Product (GRDP) serves as an indicator of economic growth in a region in a certain period, because it reflects the economic wealth of a region and is an important tool for assessing economic development and policy planning at the regional level. According to the Central Bureau of Statistics (BPS), there are two

types of Gross Regional Domestic Product (GRDP) calculations, namely GRDP at current prices and GRDP at constant prices as follows.

- GRDP at current prices

GRDP at current prices is the gross value added of all goods and services produced by a region in a certain period, valued at prices prevailing at the time of the period. This means that this value is affected by price changes or inflation.

- GRDP at Constant Prices

GRDP at Constant Prices: Uses prices in a particular base year (e.g., 2010) to value production. This aims to remove the influence of inflation, thus reflecting real economic growth over time without distortions due to price changes.

Based on the above definition, GRDP at current prices measures the value of production based on current market prices, while GRDP at constant prices adjusts the figures for inflation, enabling analysis of real economic growth so that the data used in analyzing the economic profile of Wonosobo Regency is GRDP at constant prices. The following is the GRDP data at constant prices projected by Table 25 below.

Table 5-9 GRDP at Constant Prices of Kabupaten Manggarai Barat 2019-2023

Sector	GRDP at Constant Prices				
	2019	2020	2021	2022	2023
A. Agriculture, Forestry and Fisheries	920.230	927.920	940.770	973.870	990.100
B. Mining and Quarrying	40.930	43.130	44.450	45.950	48.390
C. Processing Industry	10.290	10.170	9.680	10.340	11.640
D. Electricity and Gas Procurement	1.060	1.150	1.330	1.440	1.600
E. Water Supply, Waste Management, Waste Management and Recycling	20	20	30	30	30
F. Construction	285.070	304.690	323.860	338.980	375.050
G. Wholesale and Retail Trade; Car and Motorcycle Repair	227.980	216.440	227.920	242.820	260.560
H. Transportation and Warehousing	100.830	79.710	82.180	89.130	102.060
I. Provision of Accommodation and Meals Drinking	17.580	11.520	12.840	17.470	23.340
J. Information and Communication	178.620	201.040	207.550	214.190	221.860
K. Financial and Insurance Services	13.560	13.690	13.610	14.010	14.170
L. Real Estate	66.400	65.080	67.470	70.360	73.750
M,N. Company Services	11.780	6.560	5.600	5.790	6.140
Sector	GRDP at Constant Prices				
	2019	2020	2021	2022	2023

O. Government Administration, Defense and Compulsory Social Security	289.910	300.890	273.120	282.020	287.060
P. Education Services	59.950	61.690	60.390	58.410	61.250
Q. Health Services and Social Activities	20.510	21.560	23.720	24.270	26.090
R,S,T,U. Other services	2.730	2.310	2.240	2.280	2.420
Gross Regional Domestic Product	2.247.440	2.267.550	2.296.740	2.391.360	2.505.520

Source: Kabupaten Manggarai Barat Dalam Angka Tahun 2024

The GRDP data of Kabupaten Manggarai Barat in 2019-2023 consists of 17 business fields or economic sectors that project the economic structure in Kabupaten Manggarai Barat. Sectoral contributions to the structure are projected in Table 5-10 below.

Table 5-10 Sectoral Contribution of GRDP at Constant Prices of Kabupaten Manggarai Barat in 2019-2023

Sector	Sectoral Contribution					Average- Average
	2019	2020	2021	2022	2023	
A. Agriculture, Forestry and Fisheries	41%	41%	41%	41%	40%	41%
B. Mining and Quarrying	2%	2%	2%	2%	2%	2%
C. Processing Industry	0%	0%	0%	0%	0%	0%
D. Electricity and Gas Procurement	0%	0%	0%	0%	0%	0%
E. Water Supply, Waste Management, Waste and Recycling	0%	0%	0%	0%	0%	0%
F. Construction	13%	13%	14%	14%	15%	14%
G. Wholesale and Retail Trade; Repair of Cars and Motorcycles	10%	10%	10%	10%	10%	10%
H. Transportation and Warehousing	4%	4%	4%	4%	4%	4%
I. Provision of Accommodation and Drinking Meals	1%	1%	1%	1%	1%	1%
J. Information and Communication	8%	9%	9%	9%	9%	9%
K. Financial Services and Insurance	1%	1%	1%	1%	1%	1%
L. Real Estate	3%	3%	3%	3%	3%	3%
M,N. Corporate Services	1%	0%	0%	0%	0%	0%
O. Government Administration, Defense and Compulsory Social Security	13%	13%	12%	12%	11%	12%
Sector	Sectoral Contribution					Average- Average
	2019	2020	2021	2022	2023	

						average
P. Education Services	3%	3%	3%	2%	2%	3%
Q. Health Services and Social Activities	1%	1%	1%	1%	1%	1%
R,S,T,U Other services	0%	0%	0%	0%	0%	0%
Gross Regional Domestic Product	0%	0%	0%	0%	0%	0%

Source: Kabupaten Manggarai Barat Dalam Angka Tahun 2024, Processed by the Compilation Team (2024)

Based on Table 5-10, the economic structure of Kabupaten Manggarai is dominated by the Agriculture, Forestry, and Fisheries sector (41%). This indicates that the majority of the community's economy in Kabupaten Manggarai Barat depends on production activities in these sectors, such as farming, fishing, or processing forest products. This is related to the geographical location of Kabupaten Manggarai Barat, which has a strategic geographical location at the western tip of Flores Island, East Nusa Tenggara Province, which borders the sea on the west and north sides, allowing the local community to utilize the wealth of the sea and natural beauty as the main economic potential.

The existence of the Komodo National Park tourist attraction triggers investment in the construction, infrastructure, and trade sectors. This can be evidenced from the contribution of the Construction sector contributing the second highest contribution to the economy of Kabupaten Manggarai Barat (14%), followed by the administration, defense, and mandatory social security sector (13%) and trade (10%). The high contribution of the construction and government administration sectors indicates that the government and the private sector are working to develop supporting infrastructure for tourism and accessibility in the region. These construction activities usually include the construction of roads, hotels, ports, and other tourist facilities that are essential to accommodate tourists. Meanwhile, the large contribution of the trade sector indicates the high demand of this sector in accommodating the needs of tourists visiting Kabupaten Manggarai Barat.

The combination of these sectors shows that the economic structure of West Manggarai is still in the development and transition stage from an agrarian-based economy to a diversified one with an emphasis on infrastructure and the service sector, which is expected to grow along with the development of tourism in this region. The agriculture, construction, government administration and trade sectors have contributed highly to the economy of West Manggarai Regency, but this is not always in line with the growth performance of these sectors. The economic growth of Kabupaten Manggarai Barat from 2019 to 2023 is projected below.

Most sectors experienced a decline in growth during the covid pandemic. 19. The sector that recorded the highest growth after the covid-19 pandemic was the Accommodation and Drinking Food Provision sector with a growth value of 30%. Another sector that recorded high growth after that was the transportation and storage sector. This is closely related to the increase in the number of tourists to Komodo Island in 2022 to 2023. According to Kompas (2024), the number of tourist visits to Komodo National Park increased by 107.6% from 2022 to 2023, with total visits reaching 300,488 people in 2023. This indicates that the

Accommodation and Drinking Food Provision is a sector that has the potential to become an attractive sector to be developed in West Manggarai Regency.

5.2.2.2. *Leading Sectors*

Assessment of the performance of economic sectors in Kabupaten Manggarai Barat was conducted using the Location Quotient (LQ) and Dynamic Location Quotient analysis methods. This analysis was conducted to understand the structure and dynamics of the economy of Kabupaten Manggarai Barat, as well as to identify leading sectors that can become the focus of economic development. The following is an explanation of the two analysis methods and their implications in assessing the performance of economic sectors in Kabupaten Manggarai Barat.

1. *Location Quotient* (LQ) Analysis

Location Quotient or LQ is a quantitative analysis method that serves to identify the comparative advantage of a sector or business field within the scope of a region against a broader area such as a province or country. The LQ value is obtained by comparing the proportion of GRDP of a sector in Kabupaten Manggarai Barat to the proportion of GRDP of the same sector at the provincial or national level. The LQ value has a certain interpretation. If the LQ value is > 1 , then the sector is considered a basic sector, which means that the sector is more dominant or more developed in the region compared to other regions. Conversely, if the $LQ < 1$, the sector is considered non-base, whose role is relatively smaller. The results of the *Location Quotient* value calculation processed using the GRDP data of West Manggarai Regency for 2019-2023 are projected in Table 5-11.

Table 5-11 LQ Calculation Results of Economic Sectors in West Manggarai Regency

Sector	Year					LQ	Ket.
	2019	2020	2021	2022	2023		
Agriculture, Forestry, and Fisheries	1,54	1,51	1,47	1,46	1,43	1,48	Base
Mining and Quarrying	1,35	1,61	1,65	1,65	1,66	1,58	Base
Processing Industry	0,35	0,36	0,36	0,36	0,37	0,36	Non Base
Electricity and Gas Procurement	0,63	0,60	0,67	0,67	0,66	0,64	Non Base
Water Supply, Garbage, Waste Management and Recycling	0,01	0,01	0,02	0,02	0,02	0,02	Non Base
Construction	1,16	1,35	1,36	1,42	1,43	1,35	Base
Wholesale and Retail Trade; Automobile and Motorcycle Repair and Motorcycles	0,84	0,83	0,85	0,84	0,84	0,84	Non Base
Transportation and Warehousing	0,85	0,76	0,77	0,79	0,86	0,81	Non Base
Sector	Year					LQ	Ket.
	2019	2020	2021	2022	2023		

Provision of Accommodation and Drinking Meals	1,03	0,92	0,99	1,12	1,34	1,08	Base
Information and Communication	0,90	0,89	0,91	0,89	0,88	0,89	Non Base
Financial and Insurance Services	0,16	0,14	0,14	0,14	0,14	0,14	Non Base
Real Estate	1,24	1,21	1,23	1,24	1,25	1,23	Base
Company Services	2,00	1,80	1,83	1,81	1,83	1,85	Base
Government Administration, Defense and Compulsory Social Security	0,98	0,95	0,91	0,91	0,90	0,93	Non Base
Education Services	0,31	0,31	0,31	0,30	0,31	0,31	Non Base
Health Services and Social Activities	0,40	0,40	0,41	0,41	0,42	0,41	Non Base
Other services	0,06	0,05	0,06	0,06	0,06	0,06	Non Base

Source: Kabupaten Manggarai Barat Dalam Angka Tahun 2024, Processed by the Compilation Team (2024)

Based on the calculation results projected in Table 5-11, there are several sectors that are currently the basic sectors in Kabupaten Manggarai Barat. These sectors are categorized as basic sectors because they show a value higher than 1. These basic sectors have a vital role in the economy of Kabupaten Manggarai Barat because they have the capability to fulfill the need for output production within and outside the region. The basic sectors in Kabupaten Manggarai Barat are Agriculture, Forestry and Fisheries (1.48), Mining and Quarrying (1.58), Construction (1.35), Accommodation and Food Supply (1.08), Real Estate (1.23) and Corporate Services (1.85). Of the various sectors that fall into the base category, the sectors that have a high base value are the Corporate Services, Mining, and Agriculture sectors. Corporate Services has a high Location Quotient value due to the high demand for tourism services in West Manggarai Regency, especially in the Labuan Bajo area which is an international tourist destination. The Mining and Quarrying sector has a high Location Quotient value due to the significant potential of mining resources, such as primary gold, manganese and iron sand. While the high Location Quotient value of the Agriculture sector is due to its large natural resource potential and the livelihoods of people who still depend on the sector. Optimizing these sectors can strengthen the regional economy of West Manggarai Regency.

2. Dynamic Location Quotient (DLQ) Analysis

Dynamic Location Quotient is a development of the *Location Quotient* method. *Dynamic Location Quotient* (DLQ) is an analytical method used to measure changes in the specialization of economic sectors in a region over a period of time. DLQ compares changes in the level of specialization of economic sectors over time, so it can be used to predict whether a sector will become a base sector or lose that status in the future. DLQ helps in identifying sectors that are experiencing growth or decline relative to the reference region. By using DLQ, economic analysts can determine whether a sector that is currently non-base has the potential to become base in the future, or vice versa. The results of the *Dynamic Location Quotient* calculation have a certain interpretation, if the *Dynamic Location Quotient* (DLQ) value is more than 1, it indicates that the sector grew faster in a particular region compared to the same sector in the reference region during the analyzed time period. The implications are as follows.

- Increased specialization: The sector becomes more important or dominant in the region than the reference region, indicating increased specialization.
- Base Sector Potential: The sector has the potential to become or remain a base sector, meaning its contribution to the local economy is greater than other regions.

Whereas if the *Dynamic Location Quotient* (DLQ) value is less than 1 then there is an indication of slowing growth of a sector when compared to other sectors in the reference region. In an economic context, this can be interpreted as:

- Decreased specialization: The sector has become less important or less specialized in the region compared to the reference region.
- Potential decline: It is possible that the sector could lose its dominant role in the region's economy if this trend continues.

The following are the results of the *Dynamic Location Quotient* (DLQ) calculation processed based on the GDRP data of West Manggarai Regency for 2019-2023 which are shown in Table 5-12 below.

Table 5-12 Results of DLQ Calculation in West Manggarai Regency

Sector	DLQ	Ket.
Agriculture, Forestry, and Fisheries	0,73	Not Prospective
Mining and Quarrying	0,96	Not Prospective
Processing Industry	0,85	Not Prospective
Electricity and Gas Procurement	0,83	Not Prospective
Water Procurement, Waste Management, Waste and Recycling Ulang	1,00	Prospective
Construction	0,96	Not Prospective
Sector	DLQ	Type.
Wholesale and Retail Trade; Car and Motorcycle Repair Motorcycle	0,79	Not Prospective
Transportation and Warehousing	0,82	Not Prospective
Provision of Accommodation and Drinking Food	1,12	Prospective

Information and Communication	0,77	Not Prospective
Financial and Insurance Services	0,70	Not Prospective
Real Estate	0,80	Not Prospective
Corporate Services	0,75	Not Prospective
Government Administration, Defense and Compulsory Social Security	0,73	Not Prospective
Compulsory Social Security		
Education Services	0,77	Not Prospective
Health and Social Services	0,82	Not Prospective
Other Services	0,81	Not Prospective

Source: Kabupaten Manggarai Barat Dalam Angka Tahun 2024, Processed by the Compilation Team (2024)

Based on the calculation results in Table 28, some sectors that were previously categorized as basic sectors are not included in the prospective sectors. This is because the growth of these sectors tends to be stagnant or slower than other sectors, both at the local and national levels. As a result, they are not considered as prospective sectors according to the DLQ calculation results. Based on Table 28, the sectors that fall into the prospective category are the accommodation and food supply sector and the water supply, waste management, waste and recycling sector. The provision of accommodation and food and beverages sector is included in the prospective sector category due to the increase in domestic and foreign tourist visits to Labuan Bajo, Komodo National Park and surrounding areas. This creates a growing need for accommodation and attracts investors to invest in the sector. The development of the Accommodation and Drinking Food Provision sector increases the need for clean water for accommodation facilities, restaurants, and public infrastructure.

The water supply and accommodation provision sectors have characteristics that allow them to continue to grow dynamically in the future. The growth of both sectors can be encouraged by tourism development efforts and government policies of West Manggarai Regency. The results of LQ and DLQ analysis are often combined with the aim of knowing which sectors should be supported or prioritized for further investment. Sectors with $LQ > 1$ and $DLQ > 1$ are growing sectors and have great potential to continue to contribute significantly to the economy. The economic sector in Kabupaten Manggarai Barat that meets the criteria as a sector that has great potential to continue to contribute significantly to the economy in the region is the Accommodation and Food Supply sector. The sector shows a value of $LQ > 1$ and DLQ

> This indicates that the Accommodation and Food Supply sector is a growing sector and has great potential to contribute significantly to the economy of West Manggarai Regency.

3. Shift Share Analysis

Shift-Share Analysis is an analytical method used to identify factors that influence the economic growth of a region, by comparing the growth of economic sectors in the region with a wider region, such as the national level. *Shift-Share Analysis* assists in decomposing regional economic change into two main components:

- **Industry Mix Effect:** Shows how the industrial structure of the region contributes to economic growth. If the region has many industries that are growing rapidly nationally, this will be positive for the region.
- **Regional Shift Effect or Competitive Effect:** Measures the competitive advantage of the region. If sectors in the region are growing faster than the same sectors nationally, the region has a competitive advantage.

With the above components, it can be seen which sectors have fast growth and high competitiveness. If the value of *industry mix effect* is more than 0 then the sector has fast growth and vice versa. Meanwhile, if the *regional shift effect* value is more than 0 then the sector is indicated to have high competitiveness. The results of the *shift share* analysis calculation are projected in Table 5-13 below.

Table 5-13 Shift Share Analysis Calculation Results of West Manggarai Regency

Sector	Mij	Cij	Description
A. Agriculture, Forestry and Fisheries	38881,61	-46840,40	Fast growth, not competitive
B. Mining and Quarrying	-6134,52	10132,86	Slow growth, not competitive
C. Processing Industry	-586,38	1066,10	Slow growth, competitive
D. Electricity and Gas Procurement	334,76	115,59	Fast growth, competitive
E. Water Supply, Waste Management Garbage, Waste and Recycling Management	2,94	5,36	Fast growth, competitive
F. Construction	-13622,97	79493,07	Slow growth, competitive
G. Wholesale and Retail Trade; Car and Motorcycle Repair	5213,71	8084,80	Fast growth, competitive
H. Transportation and Warehousing	-10817,50	3519,77	Slow growth, competitive
Sector	Mij	Cij	Description
I. Accommodation and Food Provision Drink	-1496,89	5770,06	Slow growth, competitive
J. Information and Communication	27638,04	495,11	Fast growth, competitive

K. Financial Services and Insurance	867,50	-1404,34	Fast growth, not competitive
L. Real Estate	-1073,78	2807,98	Slow growth, competitive
M,N. Corporate Services	-6247,70	-388,60	Slow growth, not competitive
O. Government Administration, Defense and Compulsory Social Security	-13015,23	-14354,01	Slow growth, not competitive
P. Education Services	-4033,14	262,85	Slow growth, competitive
Q. Health Services and Activities Social Activities	2285,54	1559,82	Fast growth, competitive
R,S,T,U Other services	-651,29	110,40	Slow growth, competitive

Source: Kabupaten Manggarai Barat Dalam Angka Tahun 2024, Processed by the Compilation Team (2024)

Based on Table 5-13, the fast-growing and highly competitive sectors are Electricity and Gas Procurement, Water Procurement, Waste Management, Waste and Recycling, Wholesale and Retail Trade; Automobile and Motorcycle Repair, Information and Communication, and Health and Social Services. Rapid growth indicates that the sector has experienced an increase in output, income, or employment over a period of time, which is usually due to high demand, productivity improvements, or the adoption of new technologies. Competitiveness indicates that the sector has comparative advantages, such as lower production costs, better product quality, access to wider markets, or faster innovation than its competitors. The sector is also more likely to be able to survive in the long run as it has a strong position in economic competition. Overall, the Electricity and Gas Procurement, Water Procurement, Waste Management, Waste and Recycling, Wholesale and Retail Trade; Car and Motorcycle Repair, Information and Communication, and Health Services and Social Activities sectors are the main driving force in the regional economy of Kabupaten Manggarai Barat such as creating jobs and improving community welfare.

5.2.3. Environment

5.2.3.1. Land Use

Kerora Hamlet is one of the settlements located in the Komodo National Park area on Rinca Island. The location of Kerora Hamlet is adjacent to Muang Island which is

is one of the turtle habitats in the Komodo National Park area. The delineated area of Kerora Hamlet is 22.02 ha. There are five types of uses found in Kerora Hamlet, namely beach shoals, beach sand, forest, built-up land, and settlements. Kerora Hamlet is dominated by forests covering 13.73 ha or equivalent to 62% of the total area of Kerora Hamlet. This forest is scattered to the north of Kerora Hamlet, namely in areas with greater elevation and slope. Meanwhile, residential settlements covering an area of 2.18 ha (10%) tend to be scattered in flatter areas and close to the sandy beach.

Table 5-14 Types of Land Use in Kerora Hamlet

No.	Land Use	Area (ha)	Percentage
1.	Beach shoals	2,06	9%
2.	Beach sand	3,96	18%
3.	Forest	13,73	62%
4.	Built-up Land	0,10	1%
5.	Settlement	2,18	10%
Total		22,02	100%

Source: Compilation Team (2024)

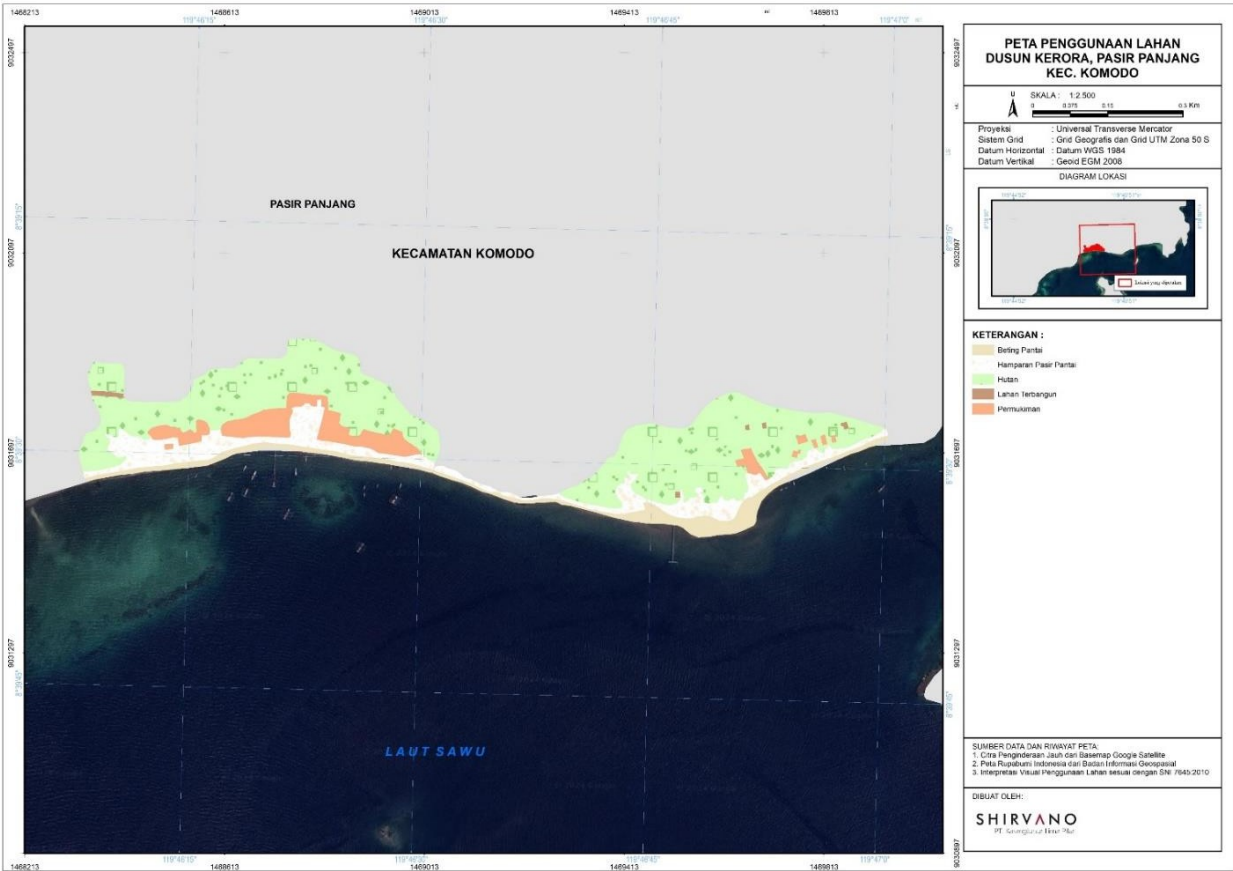


Figure 5-17 Land Use Map of Kerora Hamlet, Pasir Panjang, Komodo District Source: Compilation Team (2024)

Kerora Hamlet has a fairly large stretch of beach sand, which is 3.96 ha (18%) and is the land use type with the second largest percentage in Kerora Hamlet. (18%) and is the type of land use with the second largest percentage in Kerora Hamlet. Beach sand is open land associated with *marine* activities with the constituent material in the form of sand. Based on the survey results (Table 4-7), the character of sand in semi-natural habitats in Kerora Hamlet shows similarities with natural habitats on Muang Island. The characteristics in question include having fine-textured sand, although in some parts of Muang Island the sand has a coarser texture. However, there are differences in vegetation type characteristics. There is no understory cover in the semi-natural habitat, namely in the sandy beach of Kerora Hamlet.

5.2.3.2. Impacts of Climate Change

Climate change is one of the global threats that is very dangerous for life on earth. Indonesia is one of the countries that is very vulnerable to the effects of climate change. This is because Indonesia has a large population and high biodiversity. Climate change can impact water availability, sea level rise, biodiversity and environmental services, and human health (Sagala, 2019).

As a country with more than 80,000 km of coastline, sea level rise is potentially the most serious impact of climate change in Indonesia. The short-term impacts of sea level rise are inundation, saltwater intrusion, and increased frequency of flooding in coastal areas. Meanwhile, long-term impacts that can occur are shoreline changes, abrasion, erosion, and seawater intrusion through groundwater (Bappenas, 2018). Kerora Hamlet, which is located on the coast and Muang Island, has a high hazard to sea level rise.

Modeling of sea level rise in Kerora Hamlet and Muang Island was carried out using NASADEM images to obtain elevation data. The spatial resolution of the NASADEM image is 30 meters, so in this modeling there is a possibility of *overestimation* or *underestimation*. Even so, the results of modeling with NASADEM images can be used as an illustration of the impact of sea level rise. Meanwhile, sea level rise data was obtained from projections by the *Indonesia Climate Change Sectoral Roadmap (ICCSR)* and the 2018 RAN API Reassessment. It is estimated that sea level rise in Indonesian waters could reach 22.5 ± 1.5 cm by 2030 and reach 30 cm by 2040. The results of sea level rise modeling in Kerora Hamlet and Muang Island can be seen in the figure below.

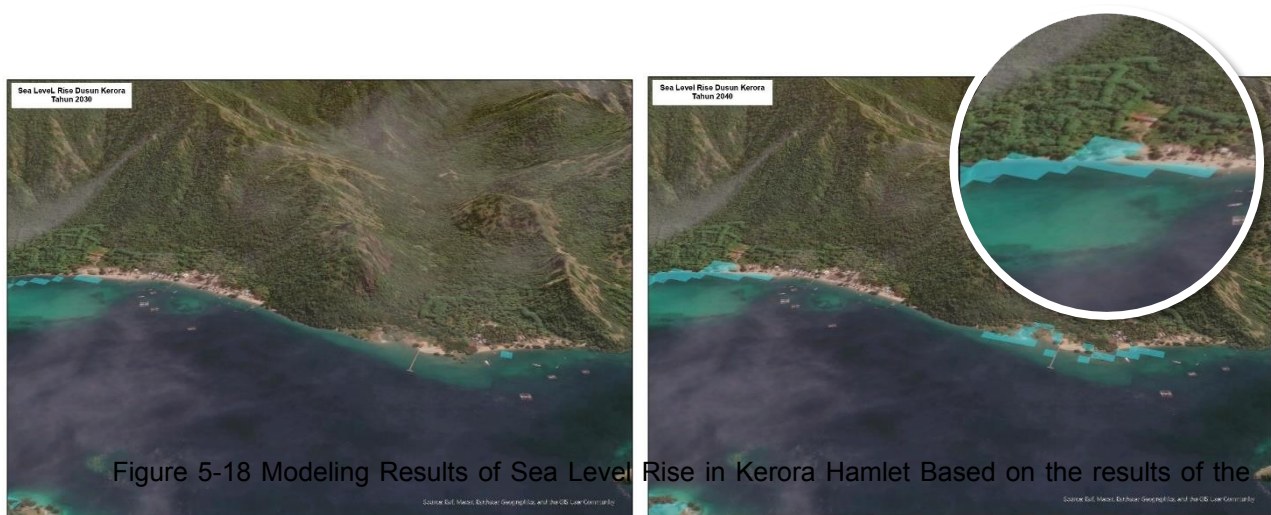


Figure 5-18 Modeling Results of Sea Level Rise in Kerora Hamlet Based on the results of the modeling conducted, there has been no significant inundation.

in 2030 in Kerora Hamlet. Even so, inundation began to occur in the western area of Kerora Hamlet in 2040. The inundation that occurs is located close to residential areas. Sea level rise can cause the loss of coastal areas in Dusun Kerora and change the coastline significantly. The International Union for Conservation of Nature (IUCN) (2021) reports that rising global temperatures and SSL are expected to reduce komodo dragon habitat by 30% in 45 years. This could threaten the existence of Komodo dragons that live in lowland savannahs. This is because dragons cannot live above an altitude of 700 meters.



Figure 5-19 Modeling Results of Sea Level Rise on Muang Island

Muang Island, a habitat for sea turtles, is also threatened by the impacts of sea level rise. In 2030, some areas of the beach were submerged, but not significantly. By 2040, there is an increase in the area submerged and covers a larger part of the coast. Without significant mitigation efforts, this will severely affect the turtle population on Muang Island.

Sea turtles rely heavily on beach areas as their habitat for nesting and egg laying. The reduction of beach areas will affect the success of sea turtle nesting. This is because these conditions will force turtles to find new locations to nest and lay eggs. Changes in the coastal area will also affect the temperature of the sand, which can lead to an imbalance in the population of male and female turtles. In the long term, this disrupts the turtle's life cycle and could lead to a decline in the turtle population on Muang Island.

The long-term impact of sea level rise is coastal erosion, which causes the land area to narrow. Naturally, beaches are also subject to erosion. However, these conditions can be exacerbated by human activities, storms, extreme waves and sea level rise. Land area changes in Kerora Hamlet and Muang Island were analyzed by utilizing Landsat imagery and using the *Normalized Difference Water Index* (NDWI). The analysis was conducted over the period 1990 to 2024. Images of changes in land area in Kerora Hamlet and Muang Island can be seen in the figure and table below.

Table 5-15 Changes in Land Area in Kerora Hamlet and Muang Island, 1990-2024

Year	Kerora Hamlet		Muang Island	
	Area (ha)	% Area Change	Area (ha)	% Change in Area
1990	24,64	-	40,81	-
2000	24,29	-1,42%	40,55	-0,64%
2005	24,46	+0,7%	40,46	-0,22%
2010	25,53	+4,37%	40,28	-0,44%
2015	23,84	-6,62%	38,15	-5,29%
2020	23,49	-1,47%	37,45	-1,83%
2024	23,40	-0,38%	37,18	-0,72

Total Area Change Land Area 1990-2024	-1,24	-5%	-3,63	-8,9%
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Source: Compilation Team (2024)

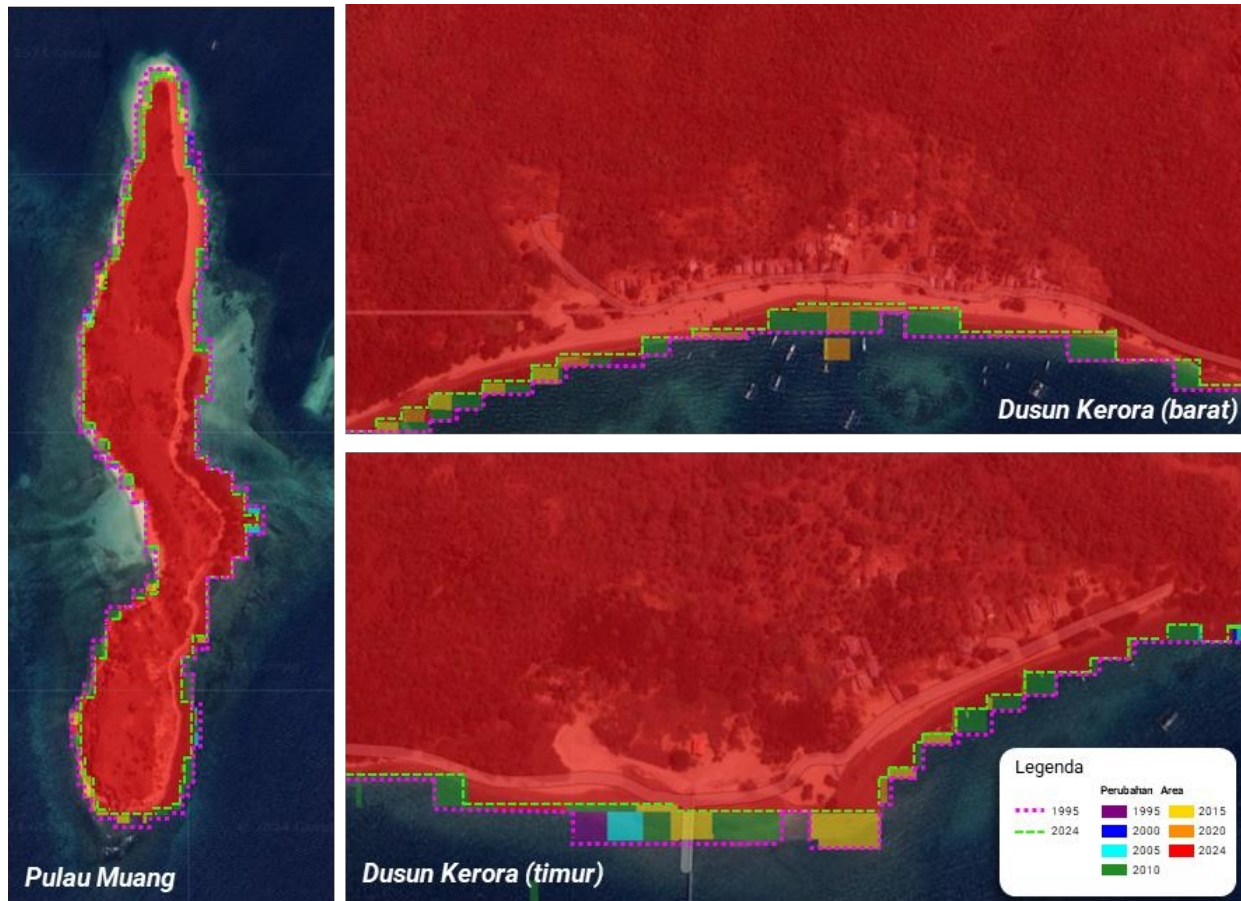


Figure 5-20 Shoreline Changes in Muang Island and Kerora Hamlet 1990-2024 Source: Compilation Team (2024)

Based on the modeling results during the period 1990-2024, there was a reduction in the land area of Dusun Kerora by 1.24 ha. Kerora Hamlet by 1.24 ha or equivalent to 5%. Meanwhile, Muang Island experienced a reduction in land area of 3.63 ha or 8.9%. The most significant reduction in land area, both in Kerora Hamlet and Muang Island, occurred in 2015, which reached more than 5%. In 2005-2010, there was an increase in beach area or accretion in Kerora Hamlet.

5.3. Kerora Ecotourism Business Analysis

5.3.1. Analysis of Ecotourism Product Potential

Kerora Village, located on Rinca Island, is an area rich in natural potential. As part of the Komodo National Park area, Kerora Village has a great opportunity to be developed into a conservation-based ecotourism destination. This potential analysis identifies several points that currently exist as tourist attractions and several new potentials that can be developed. In addition, there is relevant supporting infrastructure to facilitate tourism development in the area in the future. Kerora Village is identified as having several potential points to be developed into conservation ecotourism, both within the Kerora Village area and its surroundings.



Figure 5-21 Identification of Tourism Potential Distribution

Source: Compilation Team (2024)

Kampung Kerora and its surrounding area have great potential to be developed into a sustainable ecotourism destination. The combination of existing potential, such as diving spots and local culture, and new potential, such as turtle sanctuary, can increase the attractiveness of this area. Supporting infrastructure, such as the Golo Mori MICE and jetty, are also important factors in ensuring successful tourism development. A conservation-based approach and local community participation should be the main focus to maintain the sustainability of this area.

Proper management can result in harmony between environmental preservation and sustainable tourism development. With further development, Kerora Village can become a leading ecotourism destination that combines conservation, local culture, and education for tourists.

The identification of potential in Kerora Village includes the traditional village area in it that offers cultural values and local customs. Tourists can get to know traditional community life and enjoy the hospitality and uniqueness of village life. In addition, the area is also a traditional fishing spot that is popular among locals and tourists. With stunning sea views, this location is an attractive destination for fishing enthusiasts.

Diving and snorkeling spots are also one of the attractions. The area has abundant marine biodiversity, including healthy coral reefs and a variety of tropical fish species. This activity is suitable for tourists seeking an underwater exploration experience. In addition, existing community-initiated wildlife observation tours have developed, namely at Wae Dese, which is the source of water for wildlife on Rinca Island. This location plays an important role in the island's ecosystem, especially as a habitat for wildlife such as Komodo dragons.

In addition, there is new potential to be developed as a turtle sanctuary. The site is proposed for the development of a turtle sanctuary, which aims to conserve endangered turtle populations. The sanctuary can also be a conservation education center for tourists and local communities. This potential supports the vision of sustainable ecotourism.

Table 5-16 Identification of Potential Activities in the Area

No	Activity	Detail
1	Village Tour	<ul style="list-style-type: none"> Jelajah kampung nelayan lokal yang bebas polusi, mempelajari tradisi menangkap ikan secara berkelanjutan dan kehidupan sehari-hari nelayan Menjelajahi UKM/produk lokal serta olahan hasil laut
2	Bird Watching	<ul style="list-style-type: none"> Mengamati burung kakak tua dan burung-burung langka lainnya di pulau terdekat, menggunakan teleskop dan panduan dari ranger lokal
3	Sanctuary Tour	<ul style="list-style-type: none"> Mengunjungi sanctuary laut dan darat, belajar tentang program pelestarian yang sedang dijalankan, baik untuk kehidupan laut maupun hewan darat.
4	Program Edukasi: Lingkungan Laut dan Konservasi	<ul style="list-style-type: none"> Workshop singkat mengenai pelestarian ekosistem laut, konservasi penyu, dan upaya penyelamatan spesies terancam lainnya seperti: 1) Penyu, 2) Komodo, 3) Burung Kakak Tua
5	Eksplorasi Habitat Komodo	<ul style="list-style-type: none"> Wisata trekking ke habitat komodo, ditemani oleh ranger. Mempelajari ekosistem daratan, flora, dan fauna di sekitar habitat ini.
6	Fishing Tour	<ul style="list-style-type: none"> Mengikuti tur memancing dengan nelayan lokal, menjelajahi keanekaragaman hasil laut setempat. Edukasi tentang cara memancing yang ramah lingkungan.
7	Snorkeling	<ul style="list-style-type: none"> Snorkeling di dekat pantai, area terumbu karang dengan keanekaragaman hayati yang tinggi. Melihat habitat ikan tropis dan kehidupan bawah laut yang indah.
8	Diving di Lokasi Terdekat	<ul style="list-style-type: none"> Menyelam di lokasi diving untuk melihat kehidupan bawah laut, termasuk ikan manta, terumbu karang, dan makhluk laut lainnya

Source: *Compilation Team (2024)*

In addition, the people of Kerora Village also have socio-cultural and institutional potential that can be developed & integrated with ecotourism development. The people of Kerora Village have a tradition of buying and selling with a commodity barter system. Lenteng Pier is utilized by the community to hold a morning market every Saturday morning.

Local institutions play an important role in supporting community life and ecotourism. Some of the institutions identified are groups that utilize forest honey (Wani Kerora) as a superior product that is traditionally harvested and sold at the port. This activity not only supports the community's economy but also maintains the sustainability of the forest ecosystem. There is also Nusa Kampas, which is a local salt farmer that aims to fulfill the sea salt needs of the fishing community. The group also contributes to the preservation of the mangrove ecosystem, which is an important habitat around the cultivation site.

the cultivation site. There is also a Fishermen's Group and several homestay providers when there are existing tourists visiting Kerora village.

Interestingly, there are groups that develop local tourism. The community has played an active role in managing tourist attractions, such as hiking in wild natural habitats to watch endemic animals such as Komodo dragons. This group has been running exploration tours, although without the permission of the Komodo National Park Office.

5.3.2. Positioning against Similar Development

In particular, the Labuan Bajo area does not yet have a special sanctuary for sea turtles. However, the cluster of islands scattered in the Komodo National Park area is known as a natural habitat for various types of sea turtles. Sea turtles in this region are scattered throughout the archipelago, utilizing white sand beaches and clean waters as a place to live and lay eggs. This biological richness demonstrates the importance of maintaining the marine ecosystem in the region to support the lives of rare animals such as sea turtles, which are also a tourist attraction and symbol of environmental sustainability.

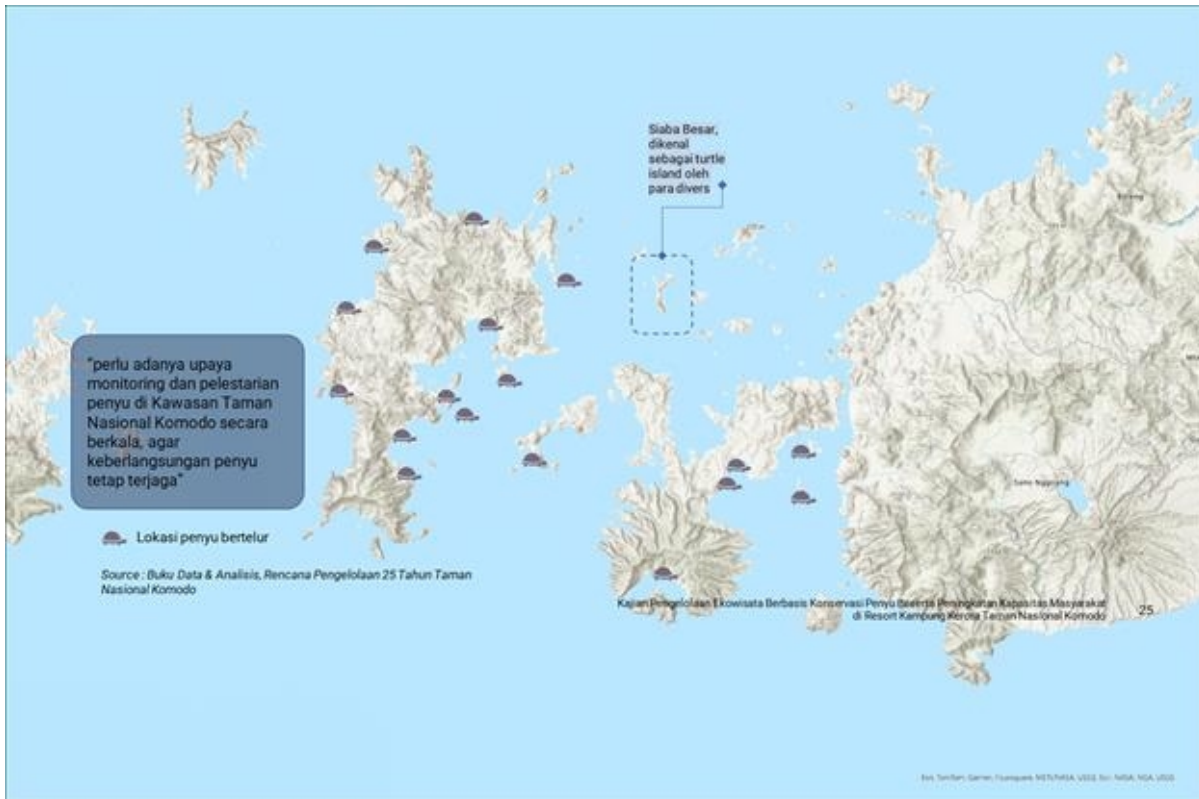


Figure 5-22 Turtle Natural Habitat in Labuhan Bajo Area

Source: *Data & Analysis Book, 25 Year Management Plan of Komodo National Park*

Monitoring and conservation efforts for sea turtles in Komodo National Park need to be carried out regularly to ensure the sustainability of the sea turtle population is maintained. This step is important considering that the area is a natural habitat for sea turtles, whose existence plays an important role in maintaining the balance of the sea turtle population.

whose existence plays an important role in maintaining the balance of the marine ecosystem. Structured monitoring can help detect threats to sea turtles, such as habitat destruction, pollution, or uncontrolled human activities. In addition, conservation through education programs, conservation, and monitoring of turtle nesting beaches will support the sustainability of this animal population in the future. With concerted efforts, Komodo National Park can continue to be a safe haven for turtles and its marine ecosystems. The following is an assessment of the various *Sanctuaries* in Komodo National Park.

5.3.2.1. *Turtle Conservation and Education Center*

Turtle Conservation and Education Center (TCEC) is a turtle conservation center located on Serangan Island, Bali, Indonesia. Established in 2006, TCEC is the result of collaboration between the local government, non-governmental organizations, and local communities to protect endangered sea turtle populations, especially in Bali. In general, TCEC has comparative advantages in terms of complete facilities & a large enough area, but information about the hatchling release schedule is still lacking. The following is the tourists' assessment of TCEC.

A. Positive Assessment

- Fun experience, adoption and release of hatchlings (foreign)
- Free admission and informative local guide (foreigner)
- There are turtle care and education facilities
- Offers complete education on sea turtles, hatching, and care (foreign)

B. Negative Assessment

- Poor treatment of animals (foreigners)
- Hatchling release and adoption can only be done from 09:00-14:00 (foreigners)
- The rearing pond is too small (foreigners)





Figure 5-23 Turtle Conservation and Education Center

5.3.2.2. *Kurma Asih Sea Turtle Conservation Center*

Kurma Asih Sea Turtle Conservation Center is a sea turtle conservation center located in Perancak Village, Jembrana Regency, Bali. Managed by the local community, the center was established in response to the threats faced by sea turtles due to poaching, habitat destruction, and marine pollution. Kurma Asih focuses on conserving several sea turtle species, such as the *Olive Ridley* turtle (*Lepidochelys olivacea*), which often nests on the beaches around Perancak. The center runs various activities, including the rescue of sea turtle eggs from the beach to be incubated in a safe place, to the release of hatchlings (sea turtle hatchlings) to the sea once they are strong enough. In addition, Kurma Asih also actively educates the community and tourists about the importance of protecting sea turtles and preserving marine ecosystems. Visitors can get involved in hatchling release activities and learn more about the life cycle and threats faced by sea turtles. The following is the tourists' assessment of TCEC.

a. Positive Assessment

- Sea turtle breeding center equipped with a café resto processed seafood
- Education is quite informative & interesting
- Pampering beachfront view

b. Negative Assessment

- Some tourists view this activity as concentrating only on money



Figure 5-24 Kurma Asih Sea Turtle Conservation Center

5.3.2.3. *Sindu Dwarawati Turtle Conservation*

Sindu Dwarawati Turtle Conservation is a sea turtle conservation center located in Sindu Beach, Sanur, Bali. The center was established with the main goal of protecting sea turtle populations that are increasingly threatened by human activities, such as poaching, marine pollution, and habitat destruction. Managed by the local community, Sindu Dwarawati focuses on the rescue of sea turtle eggs, the hatching process in a safe environment, and the release of hatchlings to the sea to ensure population sustainability. In addition, the center also plays an active role in educating the public and tourists about the importance of maintaining marine ecosystems and conserving protected animals. With a community-based approach, Sindu Dwarawati Turtle Conservation is not only a turtle sanctuary, but also supports environmental awareness and sustainable ecotourism in the Sanur area. The following is the tourists' assessment of TCEC.

a. **Positive Assessment**

- No admission fee (free)
- Breeding & maintenance facilities are in good condition
- Staff & volunteers explain well about sea turtles

b. **Negative Assessment**

- The beach where the hatchlings are released looks dirty with plastic waste
- The breeding pond is too small for the turtles.
- Large turtles are deliberately placed in the pond as an attraction
- Profit oriented rather than conservation

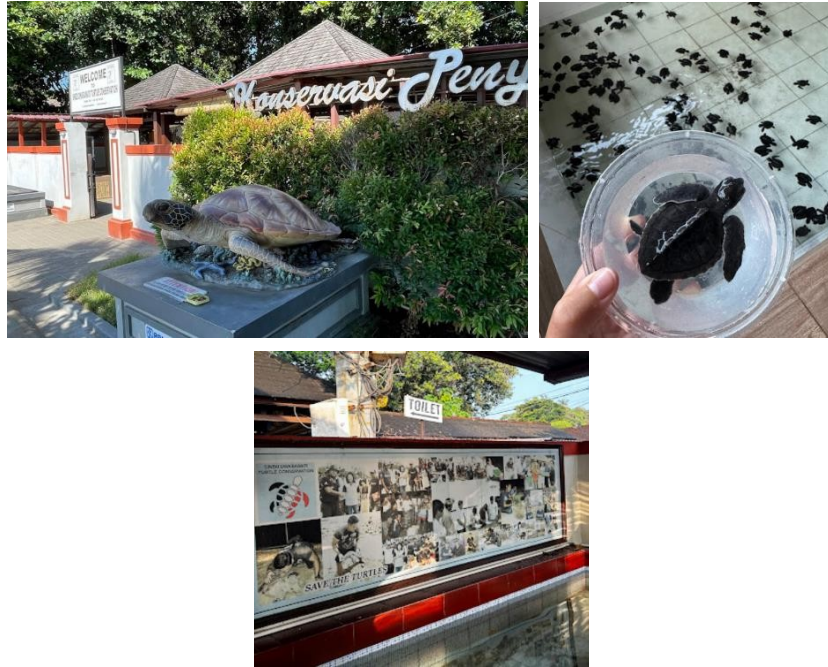


Figure 5-25 Sindu Dwarawati Turtle Conservation

5.3.2.4. *Sea Turtle Village*

Sea Turtle Village is a turtle conservation center located in Kuta Beach, Bali. The center was established to protect sea turtles whose populations continue to decline due to threats such as poaching, habitat destruction, and marine pollution. Operating with the support of the local community and government, Sea Turtle Village focuses on rescuing and hatching sea turtle eggs found around Kuta beach. By integrating conservation and tourism, Sea Turtle Village sets an example of sustainable marine wildlife protection while attracting visitors from around the world.

a. Positive Assessment

- Very well-maintained & organized location, can jog & bike around the area.
- Friendly staff & capacity to explain about educational activities
- The place is neat, clean, and has attractive ornaments

b. Negative Assessment

- The hatchling pool is too small for the large number of hatchlings.



Figure 5-26 Sea Turtle Village

5.3.2.5. *Bali Sea Turtle Society*

Bali Sea Turtle Society (BSTS) is a non-profit organization that focuses on the protection and preservation of sea turtles in Bali. Established with the aim of raising public awareness about the importance of protecting sea turtle habitats, BSTS actively conducts various activities such as beach patrols to protect sea turtle nests, rescuing hatchlings, and releasing them back to the sea. The organization also works with local communities, tourists, and the government to reduce threats to sea turtles, such as poaching, environmental pollution, and habitat destruction. Through education, volunteer programs, and conservation activities, BSTS seeks to ensure the survival of sea turtles as an important part of Bali's marine ecosystem. The advantage of BSTS is that this organization actively holds volunteer & educational activities and is supported by informative social media. The following are travelers' assessments of BSTS.

1. **Positive Assessment**

- A memorable experience, the release was done at night
- Has an Instagram account so information can be obtained easily
- Has a unique hatchery

2. **Negative Assessment**

- There is no clear information regarding the hatchling release schedule, which is confusing because tourists have already come to the location.
- The hatchling container is too small,
- There is no quota, giving the impression of mass tourism

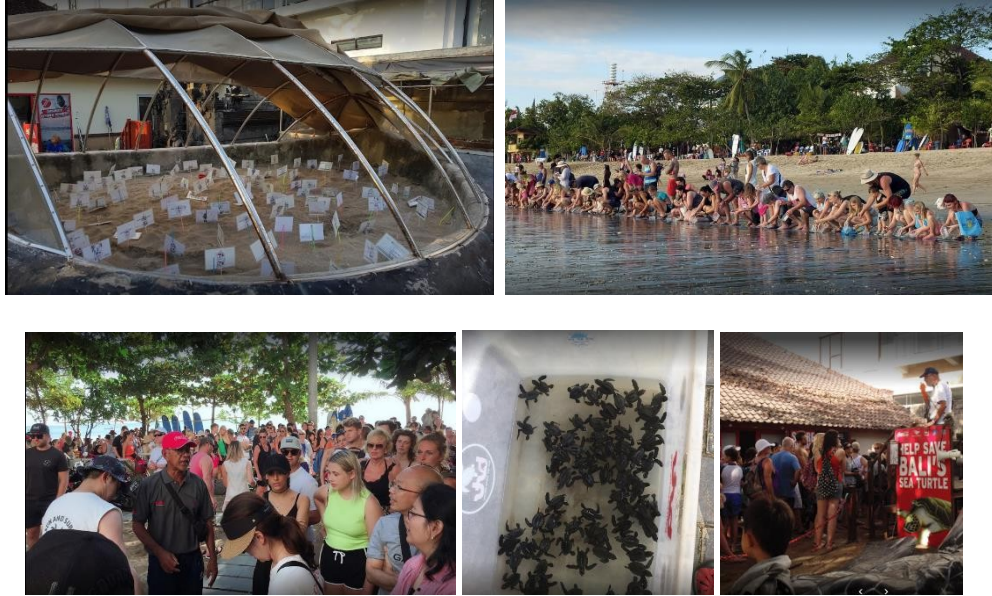


Figure 5-27 Bali Sea Turtle Society

5.3.3. Market Insight

5.3.3.1. Supply-Demand

The average sanctuary supply has a segmentation of foreign tourists with various educational activities. The following is data on *Sanctuary* development competitors based on their services, activities, offerings, and partnerships.

Table 5-17 Details of Sanctuary Development

No	Property	Service	Activity	Offer	Partnership
1	Turtle Conservation and Education Center	Educational tour about turtle conservation	<ul style="list-style-type: none"> Hatchery (egg hatching) Care Enlargement Education Hatchling release 	<ul style="list-style-type: none"> Admission= free Adoption fee= 150k Transportation fee= 80k 	<ul style="list-style-type: none"> Filantra Pertamina Patra Niaga BKSDA
2	Dates Asih Sea Turtle Conservation Center	<ul style="list-style-type: none"> Educational tour about sea turtle conservation 	<ul style="list-style-type: none"> Hatchery (egg hatching) Care Enlargement Education 	<ul style="list-style-type: none"> Entrance ticket= free Adoption fee= free 	<ul style="list-style-type: none"> BKSDA BPSPL DAIHATSU INDOSAT OOREDOO WWF

No	Property	Service	Activity	Offer	Partnership
		<ul style="list-style-type: none"> F&B 	<ul style="list-style-type: none"> Hatchling release 		
3	Sindu Dwarawati Turtle Conservation	Educational tour about turtle conservation	<ul style="list-style-type: none"> Hatchery (egg hatching) Maintenance Education Hatchling release 	<ul style="list-style-type: none"> Entrance ticket= free Adoption fee= 100k 	<ul style="list-style-type: none"> BKSDA BRI Insurance
4	Sea Turtle Village	Educational tour about sea turtle conservation	<ul style="list-style-type: none"> Hatchery (egg hatching) Care Enlargement Education Hatchling release 	<ul style="list-style-type: none"> Admission= free Adoption fee= free 	<ul style="list-style-type: none"> Andaz Bali Hyatt Regency
5	Bali Sea Turtle Society	Educational tour about sea turtle conservation	<ul style="list-style-type: none"> Hatchery (egg hatching) Maintenance Education Hatchling release 	<ul style="list-style-type: none"> Entrance ticket= free Adoption fee= free 	<ul style="list-style-type: none"> HSI (Humane Society International) Australia

5.3.3.2. Funding Source Management

Sanctuary management activities can be sourced from corporate CSR funds as well as partnering with star hotels/resorts as part of educational offerings. The following table contains the partner's contribution to the *Sanctuary* development.

Table 5-18 Details of Sanctuary Development Competitors

No	Stakeholder (Partner)	Contribution
1	BKSDA	Conservation permit grantor, supervision and mentoring during the program
2	CSR <ul style="list-style-type: none"> Pertamina Patra Niaga 	Funding and assistance during the program

No	Stakeholder (Partner)	Contribution
	<ul style="list-style-type: none"> Daihatsu Indosat Ooredoo BRI Insurance 	
3	Andaz, Hyatt, HSI	Funding and mentoring (international) during the program, as well as sanctuary initiator
4	WWF	Funding and mentoring (international) throughout the program, as well as sanctuary initiator
5	Turtle Conservation Management Group	Initiator, technical implementer of conservation, education, and asset manager
6	Fishermen	Turtle egg collector and education partner
7	Tourists	Donation, adoption, and education goals

5.3.4. Business Model Canvas Analysis

Business Model Canvas is used to provide a structured overview of the ecotourism business development strategy in Kerora Village. This approach includes various important elements, such as partnerships, key activities, value propositions, key resources, customer relationships, customer segments, distribution channels, cost structures, and revenue sources. With this approach, Kampung Kerora is expected to develop sustainable ecotourism that contributes to environmental conservation, empowerment of local communities, and creation of unique tourism experiences.



Figure 5-28 Business Model Canvas

Source: Drafting Team (2024)

5.3.4.1. *Key Partnerships*

Key partnerships in the project include working with marine conservation organizations that can provide technical support and additional resources. The government and Komodo National Park management are also important partners in maintaining the sustainability of the ecosystem around Rinca Island. In addition, the local community in Kerora Village plays an important role in supporting daily operations and providing cultural value in the tourism experience. Travel agents who organize tour packages in Labuan Bajo are also essential partners to promote and sell turtle conservation tour packages.

5.3.4.2. *Key Activities*

Key activities in this tourism development include the management of sea turtle conservation programs, including captive breeding, hatchling release, and rehabilitation of injured adult turtles. In addition, educational tours are a major part, where tourists are given insights into the importance of marine animal conservation and biodiversity on Rinca Island. Environmental awareness campaigns through social media, articles and local events will also be conducted to attract community and tourist interest in conservation activities. Training of local communities in tourism and conservation is also an important activity to support smooth operations.

5.3.4.3. *Key Resources*

Key resources supporting the conservation tourism operation include the strategic location on Rinca Island, which is already recognized as an ecotourism area. In addition, a team of conservation experts experienced in sea turtle breeding and rehabilitation is critical to maintaining the continuity of the program. Breeding facilities and access to clean and safe waters are also key resources that need to be well managed. The local community in Kerora Village is also an important resource, as they will play a role in day-to-day operations and provide cultural experiences for tourists.

5.3.4.4. *Value Proposition*

The value proposition offered by turtle conservation tourism in Kerora Village includes unique experiences and direct opportunities to contribute to the conservation of turtles, which are endangered species. Visitors can participate in activities such as releasing sea turtle hatchlings to the sea, observing the captive breeding process, and getting educated about the marine ecosystem. In addition, it offers a combination of nature and cultural tourism, where visitors can interact with local people, learn about their lives, and participate in conservation activities managed by the local community. It also provides strong social and environmental value, as each visitor contributes directly to sustainable conservation efforts.

5.3.4.5. *Customer Relationships*

Customer relationships will be built through direct interaction and participatory experiences. Travelers will feel involved with conservation activities, such as assisting with

hatchling release or volunteering in rehabilitation programs. In addition, the turtle adoption program allows tourists to continue supporting the conservation program even after the visit ends, giving them an emotional and long-term bond with the project. In addition, interactive tours guided by conservation experts will give travelers an in-depth experience of marine wildlife conservation efforts. This personalized experience is supported by after-sales service, where tourists can stay connected with the development of their adopted turtles.

5.3.4.6. Channels

To reach tourists, these conservation tours use various channels, both digital and in-person. Online media, such as the official website, travel booking platforms like TripAdvisor, and social media (Instagram, Facebook), are the main tools to promote and attract tourists. In addition, cooperation with local travel agents in Labuan Bajo and hotels is also an important channel to offer turtle conservation tour packages as part of their tours to Komodo National Park. Offerings are also made through partnerships with schools and universities, which can organize educational visits for students interested in marine ecosystems.

5.3.4.7. Customer Segments

Turtle conservation tourism in Kerora Village, Rinca Island, targets several customer segments with an interest in ecotourism and environmental conservation. The main segments include ecotourists who care about the preservation of marine animals and ecosystems, who usually come from international circles such as Europe and Asia. In addition, domestic travelers, especially families and students, are also important targets as they are interested in educational aspects and travel experiences that benefit children. Professional groups and environmental organizations seeking volunteer experiences are also a potential segment, especially for turtle adoption programs and involvement in environmental research. This diverse segmentation ensures the appeal of this conservation tour to a wide range of people.

5.3.4.8. Cost Structure

The cost structure in the management of this conservation tour covers the operational costs of conservation, such as turtle care, maintenance of breeding facilities, and salaries of conservation staff. Promotion and marketing costs, especially through social media and partnerships with travel agents, are also important components in attracting tourists. In addition, infrastructure development in Kerora Village, such as visitor facilities and transportation facilities, requires significant initial investment. Training and empowerment expenses for the local community are also costs that need to be considered, given the large role of the community in the sustainability of this project.

5.3.4.9. Revenue Streams

The main source of revenue for this conservation tour comes from the sale of tour tickets, which cover the cost of educational tours, captive observation, and the hatchling release experience. In addition, there is revenue from the turtle adoption program, where tourists can financially support a turtle and receive information about its development.

turtles financially and get information about the turtles' development. Educational tour packages for students and universities are also a potential source of income, where educational institutions can organize field study visits. Donations from conservation organizations or tourists who care about the environment can also add to the revenue, in addition to the sale of conservation-related merchandise.

Through the description of the ecotourism business model of Kerora Village, the design or direction of development is carried out to support sustainable tourism by involving local communities, nature conservation, and educational tourism experiences. With a holistic strategy and cross-sector cooperation, ecotourism in Kampung Kerora has great potential to become a leading destination that contributes to the local economy while preserving the environment.

5.4. Development Strategy

5.4.1. SWOT Analysis

5.4.1.1. *Strengths*

One of the superior potentials of Kerora Village is that it has a market segment that has been formed and has the potential to be developed. The village is located in a fairly strategic area because it is close to Labuan Bajo, which is one of Indonesia's main tourism centers, besides that, Kerora Village also has good land infrastructure. The existence of an advanced tourism industry around this area provides an opportunity for synergy between natural tourist destinations to increase attractiveness for tourists. Physically, the sloping land in this area is ideal to be developed as a turtle *sanctuary*.

In terms of tourism potential, Kerora Village is a natural fishing village, without vehicles, access within the village is only by foot, using solar electricity, has a culture of catching bagang fish, high humidity, natural beach environment.

Human resources and institutional aspects, Kerora Village has a large number of youth around 35 people who can become ecotourism motors, there are community empowerment groups that have been formed in this area which are important assets in preparing local human resources in carrying out ecotourism development plans, support for Komodo National Park policies that support the development of Ecotourism based on local community groups. The percentage of productive age population that dominates, also provides labor that can support the development of the tourism sector. The existence of fishing boats that are used as the main transportation from Golo Mori Village to Kerora Village is also a logistical advantage that supports connectivity. All of these factors make Kampung Kerora a strategic location with great potential to grow as a leading ecotourism destination.

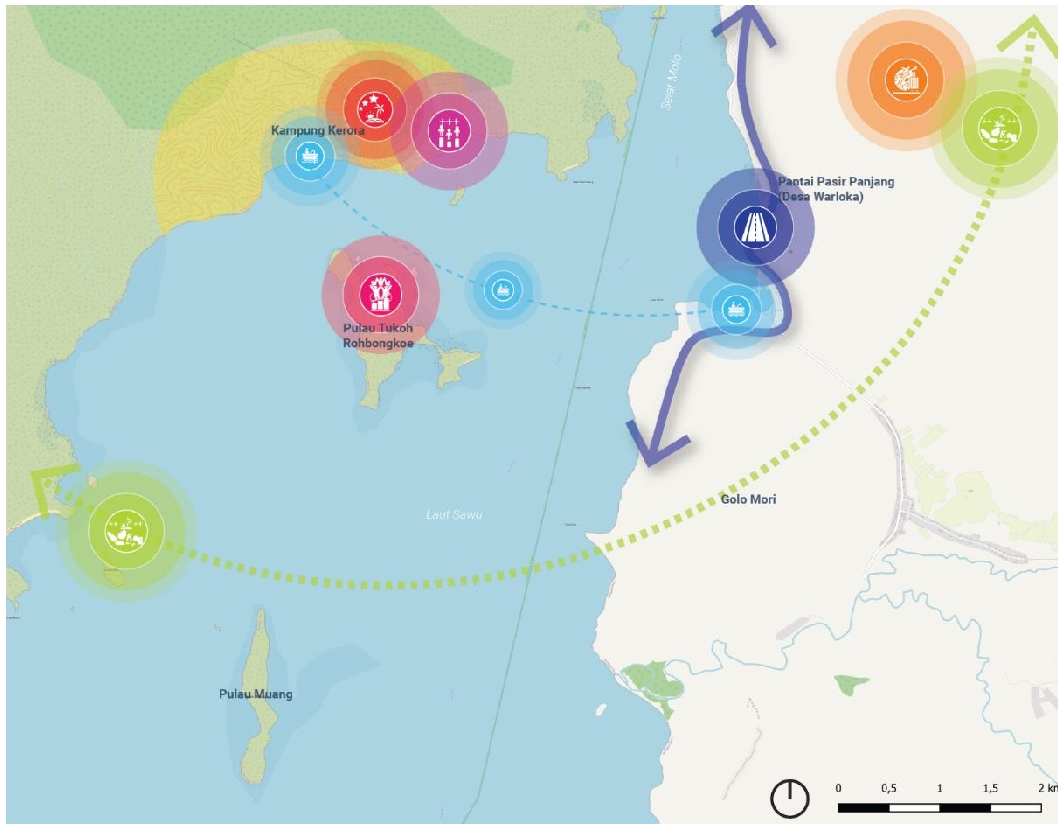


Figure 5-29 SWOT Analysis: Strength

5.4.1.2. Weaknesses

Kerora Village faces a number of challenges that need to be overcome to support its development as a tourist destination. Sea access through the Molo Strait is considered unsafe for tour boat sailing, reducing the attractiveness for tour operators. The lack of tour boat activity is also due to the absence of attractive tourist attractions in this area. In addition, the damaged jetty in Kerora Village further limits accessibility.

The education level of the community in Pasir Panjang Village, which is dominated by elementary school graduates (38.48%), is an obstacle in developing the capacity of local human resources. This fishing village is also considered less suitable to be a tourist attraction, considering that 90% of the population works as fishermen, and the area still lacks basic infrastructure, such as electricity and adequate communication networks. Limited clean water sources are also a major obstacle in creating an environment that supports tourists. These factors require special attention to improve the competitiveness of Kampung Kerora as an attractive tourist destination.

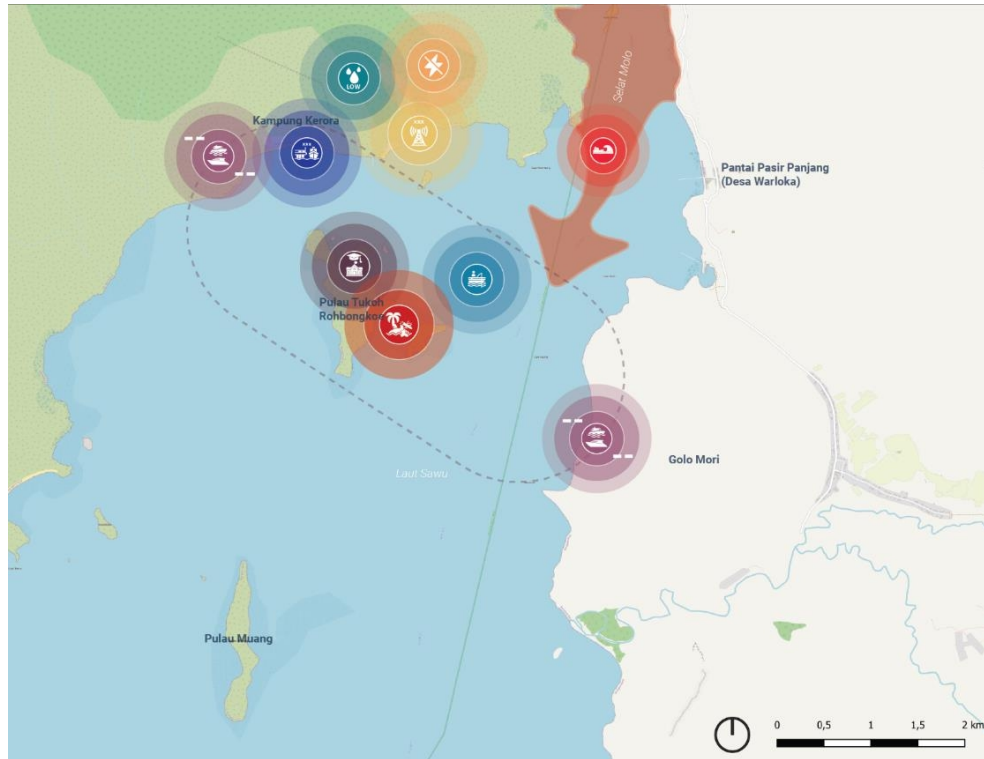


Figure 5-30 SWOT Analysis: Weaknesses

5.4.1.3. Opportunity

Kampung Kerora has a variety of potentials that can be utilized to encourage growth as a leading tourist destination. The diversity of tourist attractions, including the beauty and authenticity of the area, provides a strong basis for the development of community-based ecotourism. The potential to be integrated with the development of surrounding areas, such as MICE Golo Mori, also opens up opportunities for synergies that can increase tourist visits. In addition, Kerora Village has the potential to be a strategic location for monitoring and saving sea turtle habitats, which can attract conservation tourists.

Improved land access, including through Lenteng Jetty, can support more economical mobility while reviving the local economy. The community's unique tradition of buying and selling commodities using a barter system can be a cultural attraction in itself. The potential for processing livestock waste into biogas energy and developing renewable energy adds to the sustainability value of this area. With proper management, Kerora Village can become an ecotourism destination that combines natural beauty, cultural preservation, and sustainability innovation.



Figure 5-31 SWOT Analysis: Opportunity

5.4.1.4. Challenge (Threat)

The development of Kerora Village as a tourist destination faces various challenges that require serious attention. One of the main issues is the risk of disturbance to the Komodo dragon habitat due to increased human activity in the *sanctuary* area. In addition, the need for logistics and materials to build the *sanctuary* can also be a challenge, while conflicts between tourists, local communities, and dragons around the *sanctuary* risk disrupting the conservation balance.

The lack of public transportation to Lenteng Pier and Golo Mori MICE may limit tourist accessibility. Pressure from the tourism industry to exploit the area to support MICE development also has the potential to damage local authenticity and ecosystems. Climate change threats, such as rising sea levels, risk disrupting turtle habitats and even threatening human settlements. In addition, the downgrading of the status of some airports in NTT, which forces international flights to transit Java or Bali, could reduce the attractiveness of foreign tourists. All of this requires careful planning to ensure the development of Kerora Village remains sustainable and in line with conservation principles.



Figure 5-32 SWOT Analysis: Threat

5.4.1.5. Strategy

The implementation of turtle conservation and breeding tourism to be developed in Kerora Village requires planning that considers the potential and challenges that have been identified previously. Based on the results of the analysis obtained during the survey and supported by various documents as secondary data, several strategies were formulated that can be used for the development of turtle conservation tourism in Kerora Village. The aspects that need to be considered and developed include infrastructure, economy, attractiveness and environment, social, and policy.

A. Infrastructure

1. Development of infrastructure and accessibility to develop the tourist attraction of Kampung Kerora through the Labuan Bajo-Golo Mori Road infrastructure.
2. Development of basic infrastructure such as electricity, communication networks, and sanitation to support ecotourism, and avoid threats to coastal habitats and natural disasters.
3. Development of renewable energy potential (solar panels) to overcome limited energy sources, increase resilience and attractiveness of ecotourism areas.
4. Utilization of accessibility to handle transportation challenges and natural disasters so that the emergency response system can be strengthened.

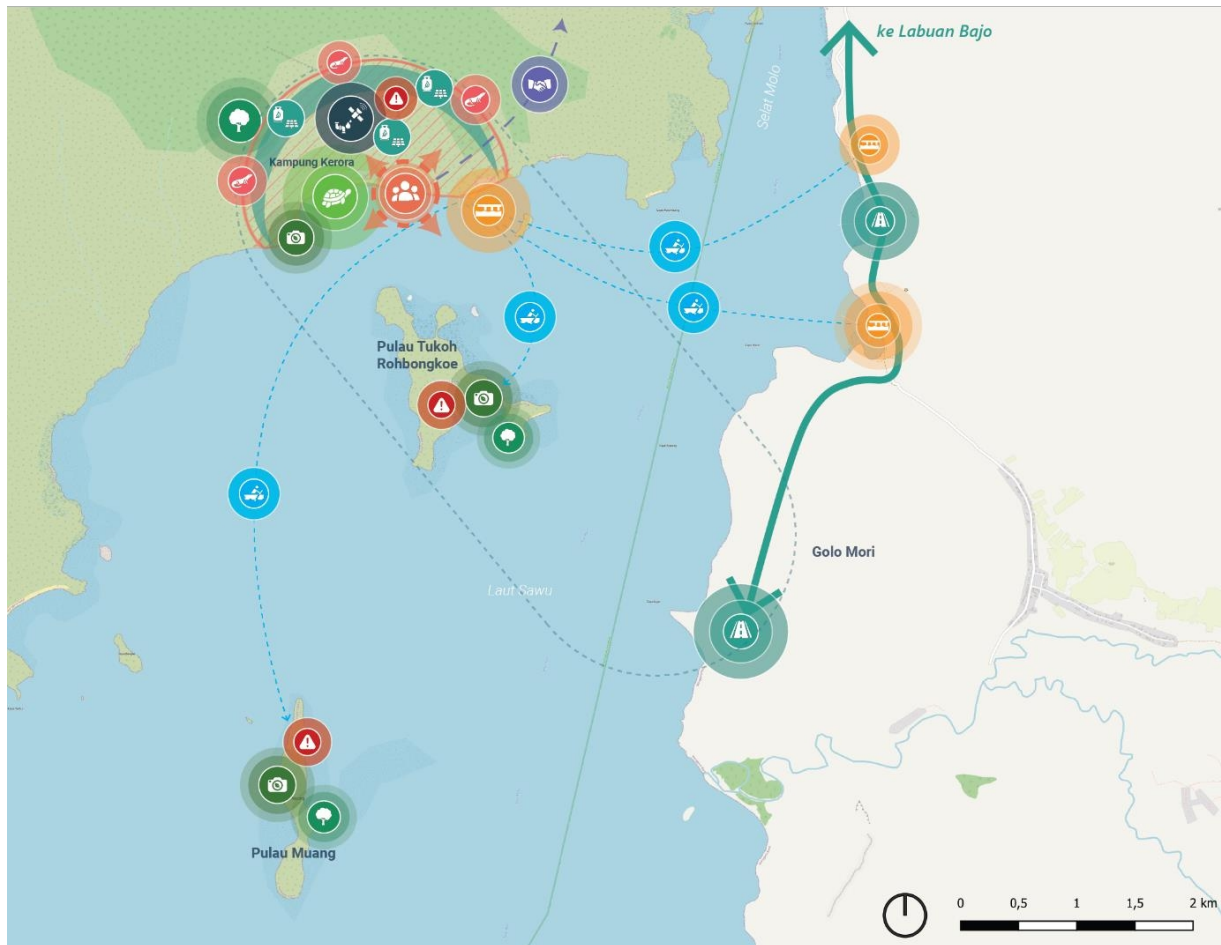


Figure 5-33 Kerora Village Development Strategy

Source: Compilation Team (2024)

B. Economy

1. Utilization of fishing boats as environmentally friendly transportation to improve access and the community's economy and overcome rising sea water.
2. Improvement of docks and port infrastructure to improve access and security to Kerora Village, support marine tourism and open new economic opportunities.

C. Attraction and Environment

1. Development and integration of tourism attraction and environmental sustainability.
2. Development of a turtle sanctuary that supports conservation efforts and is based on sustainability.
3. Development of green tourism concepts and utilization of the growing tourism industry that emphasizes authenticity and natural preservation.
4. Improved security and access to avoid disturbance to wildlife and maintain the sustainability of the sanctuary.

D. Social

Collaboration with local communities for the development and management of ecotourism and conservation of turtles, animals and other biodiversity through community capacity building and training. This is intended to create a cadre of turtle conservationists and ecotourism managers who have a high commitment to preserving and sustaining turtles, commodities and ecotourism.

E. Policy

Development of ecotourism based on local community groups, turtle conservation groups. Increased collaboration with government and tourism stakeholders and companies to support the development of ecotourism based on turtle conservation in Kerora village.

5.4.2. Development Plan & Target Market

5.4.2.1. Target Market

Table 5-19. Target Market

Market Segment	Characteristics	Motivation	Marketing Strategy
Ecotourism and Sustainability Travelers	Concerned about the environment and conservation, seeking positive impact experiences	Ecotourism, conservation and community-based activities	Eco-friendly packages, community-based tours, Komodo dragon and coral reef conservation contributions
Adventure and Outdoor Travelers	Young/adult travelers who seek challenges and a direct connection with nature	Trekking, snorkeling, diving, outdoor activities	Personalized adventure packages with varying levels of difficulty and immersive experiences in nature
Educational and Family Travelers	Families/groups seeking education for children or group members	Environmental education, Komodo dragon conservation, local culture	Interactive educational tour packages, child-friendly facilities, visits to traditional and conservation villages
Socially Connected Millennials and Gen Z	Young travelers looking for photogenic experiences to share on social media	Photogenic spots, unique activities	Visual destination development, Instagrammable photo spots, activities that attract attention on social media
Special Interest Travelers	Travelers with special interests such as bird watching, scuba diving, or culture	Unique experiences according to interests (bird watching, diving, etc.)	Specialized guides or guides for each interest, facilities as needed such as bird watching trails or diving equipment

5.4.2.2. Tourism Travel Pattern

The development of effective tourism travel patterns that are in accordance with the characteristics of the area and the needs of tourists is key in supporting tourism sustainability. The development of tourism travel patterns in Kerora Village, Komodo National Park, can be seen from three different homebase approaches, each of which has advantages in enriching the tourist experience.

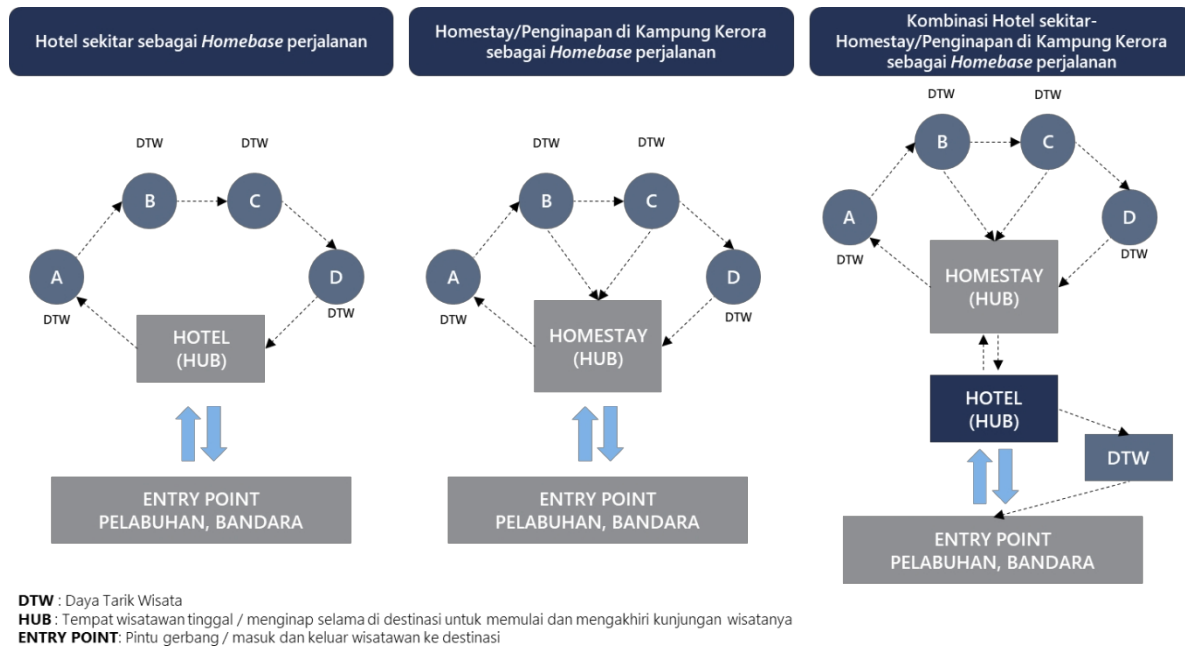


Figure 5-34 Travel Pattern Model

Source: Compilation Team (2024)

In the first pattern, tourists make hotels around the Kerora Village area, especially in the Labuan Bajo area, their homebase. By staying in hotels, tourists have access to various modern facilities such as comfortable rooms, restaurant services, swimming pools, fitness centers, and others. They will make daily visits to Kerora Village (*one day trip*) to enjoy the natural scenery, take a cultural tour, or interact with local residents. This pattern provides optimal comfort for tourists who want modern facilities while on vacation. Hotels around the area are already supported by better infrastructure and offer a variety of additional services that support the tourist experience. Easy accessibility from Labuan Bajo to Kerora Village allows tourists to make visits without having to stay long in the village. This pattern is also likely to attract international tourists who may have high expectations of accommodation facilities. This pattern can provide indirect economic benefits to local communities through tour guide services, local transportation services, and the sale of souvenirs or crafts. However, since tourists only make day visits, the potential economic impact is more

However, since tourists only make daily visits, the potential economic impact is more limited for the residents of Kerora Village when compared to other patterns that allow tourists to spend the night in the village so that it can be optimized with the development of craft workshops to provide more benefits for local communities.

In the second pattern, tourists make local accommodation in Kerora Village their main homebase. This accommodation can be in the form of homestays or cottages managed by local communities, with simple facilities but offering basic comfort. Tourists can experience firsthand living among the people of Kerora Village and interact intensively with local residents. This pattern is very suitable for tourists who are looking for a more in-depth and authentic tourism experience. Travelers can interact directly with the community, learn about the local culture, and even participate in daily activities, such as cooking, farming, or other cultural activities. This pattern also has a direct economic impact on local communities, as tourists spend money on accommodation, consumption, and other tourist activities in the village. With tourists staying in the village, direct economic benefits are more pronounced for the community. In addition, the presence of tourists staying with the community can support the preservation of local culture because of the demand to show local cultural traditions and activities. This pattern also provides opportunities for local communities to develop skills in tourism, such as homestay management, hospitality, and cultural recognition.

In the third pattern, tourists start their trip by staying at a hotel around the area for one or two nights, then move to accommodation in Kerora Village to spend the next few days, before returning to the hotel at the end of the trip. This pattern combines the convenience of modern accommodation with the authentic experience of staying in a village. This combination provides great flexibility for travelers. They can enjoy the comfort of modern hotels and facilities at the beginning and end of the trip, but still get an authentic experience in Kerora Village. This pattern can also attract various segments of travelers, both those who like comfort and those who seek cultural experiences. For the local community, this pattern allows more tourist spending in Kerora Village, without sacrificing the number of tourists who may still need modern facilities. Tourists who stay for several days in the village will have a more sustainable economic impact on the community. In addition, this pattern supports the growth of community capacity in managing accommodation and introducing local culture with a structured approach. Tourists can join a more in-depth cultural tour package and have the opportunity to see the daily activities of the community more thoroughly.

5.4.3. Tour Package Development Plan

5.4.3.1. *One Day Trip Itinerary & Price Indication*

This *One Day Trip* itinerary is designed to provide an educational and conservation tourism experience in Kerora Village, with a focus on marine ecosystems, wildlife habitats, and the lives of local people who mostly work as fishermen. Travelers are invited to get to know and appreciate the local biodiversity and culture through various and interactive activities.

various diverse and interactive activities. The following is the *One Day Trip* itinerary that has been prepared.

Indikasi Itinerary One Day Trip	
Waktu	Aktivitas
08.00 – 08.30	Penjemputan dan briefing mengenai area konservasi, aturan keselamatan, dan aktivitas yang akan dilakukan
08.30 – 10.00	Aktivitas snorkeling atau diving di Lokasi yang ditentukan
09.30 – 10.00	Perjalanan ke Pulau
10.00 – 11.00	Mengunjungi Sanctuary Penyu
11.00 – 12.30	Makan siang dengan menu seafood lokal
12.30 – 13.30	Village Tour di Kampung Nelayan
13.30 – 15.00	Fishing Experience - Memancing Tradisional (opsional) /
15.00 – 16.00	Pelepasan Tukik Saat Musim Penetasan
16.00 – 17.00	Bird Watching- Pengamatan kakak tua dari kapal dengan menggunakan alat bantu teropong.
17.00 – 17.30	Mengakhiri perjalanan dan berlayar kembali ke dermaga

Figure 5-35 *One Day Trip* Itinerary

Source: *Compilation Team (2024)*

This itinerary offers a balance between educational, recreational, and participatory experiences, so that tourists not only enjoy the beauty of nature, but also understand the importance of conservation and engage in activities that support ecosystem preservation. This approach allows tourists to have a memorable experience while contributing to environmental sustainability and the welfare of local communities.

Table 5-20 Price Indication of One Day Trip

Trip	Component	Domestic Travelers	Overseas Travelers
One Day Trip	One Deck Boat (PP)	130.000	130.000
	Komodo National Park Retribution	50.000	250.000
	Bird Watching	50.000	50.000

	Turtle Sanctuary	-	-
	Lunch	50.000	50.000
	Snorkeling Gears & Life jacket	50.000	50.000
	Tourism Village Retribution	10.000	10.000
	Hatchling release/adoption	100.000	100.000
Tour Package Rates		440.000	640.000

Source: Author's Research, 2024

This one-day trip tour package has different rates for domestic and foreign tourists, with the following details. For domestic tourists, the rate of Rp440,000 applies on weekdays, while on weekends there is a levy adjustment of Rp75,000 for access to Komodo National Park. For foreign tourists, the rate is Rp640,000 and is valid for both weekday and weekend. This package includes additional personal expenses, such as consumption, snorkeling equipment rental, and other needs according to the itinerary. Retribution rates are subject to change at any time according to Komodo National Park policy.

5.4.3.2. 3 Days 2 Night Trip Itinerary & Price Indication

The Full Trip Itinerary is designed to provide a more in-depth educational, conservative and cultural travel experience. This 3 days 2 nights trip offers travelers the opportunity to deeply understand the marine ecosystem, animal conservation efforts, as well as the local culture of Kerora Village. With a longer duration, tourists can enjoy a variety of conservation activities, social interactions, and more intensive nature recreation activities, providing a rich and meaningful experience.

Indikasi Full Trip (3D2N)		
Time	Activity	
Day I	08.00 – 09.00	Tiba di dermaga terdekat, diantar dengan perahu dari pulau terdekat.
	09.00 – 10.30	Village Tour di Kampung Nelayan
	10.30 – 12.00	Snorkeling di dekat pantai
	12.00 – 13.00	Makan siang dengan menu seafood lokal.
	13.00 – 15.00	Tur ke pusat konservasi penyu
	15.00 – 17.00	Aktivitas eksplorasi terumbu karang, Diving di Lokasi Terdekat
	17.00 – 19.00	Istirahat di penginapan yang telah disediakan
	19.00 – 20.30	Makan malam bersama dengan pembicaraan mengenai upaya konservasi dan pentingnya pelestarian laut.
Day II	07.00 – 08.00	Sarapan.
	08.00 – 10.00	Bird Watching di Pulau Sebelah
	10.00 – 12.00	Eksplorasi Habitat Komodo
	12.00 – 13.00	Makan siang
	13.00 – 15.00	Aktivitas diving dan tanam terumbu karang
	15.00 – 17.00	Fishing Tour
	17.00 - 18.00	Waktu istirahat dan menikmati pemandangan sunset di pantai.
Day III	07.00 - 08.00	Sarapan
	08.00 - 12.00	Sanctuary Tour: Workshop singkat mengenai pelestarian ekosistem laut, konservasi penyu, dan upaya penyelamatan spesies terancam lainnya.
	12.00 – 14.00	Makan siang dan kembali ke Dermaga. Tour selesai.

Figure 5-36 Full Trip Itinerary

Source: Compilation Team (2024)

This itinerary provides a balance of educational, participatory and recreational activities suitable for travelers who want to get to know the culture and contribute to environmental conservation. With a duration of 3 days, tourists have time to understand conservation values and experience the lives of local communities more deeply. Lodging and consumption made by tourists while in the village have a direct economic impact on the community. In addition, community involvement as guides, workshop instructors, and cultural program organizers enriches the skills and economic opportunities of local communities.

Table 5-21 3 Days 2 Night Price Indication

Day	Component	Domestic Travelers	Overseas Travelers
Day 1	One Deck Boat (PP)	130,000	130,000
	Breakfast	50,000	50,000
	Tourism Village Retribution	10,000	10,000
	Snorkeling Gears & Life jacket	50,000	50,000
	Lunch	50,000	50,000
	Turtle Sanctuary	-	-
	Komodo National Park Retribution	50,000	250,000

	Homestay	200,000	200,000
	Dinner	50,000	50,000
	Day 1 Package Price	590,000	790,000
Day 2	Breakfast	50,000.00	50,000.00
	Bird Watching	50,000.00	50,000.00
	Komodo National Park Retribution	50,000.00	250,000.00
	Komodo Habibat Trekking	-	-
	Lunch	50,000.00	50,000.00
	One Deck Boat (PP)	130,000.00	130,000.00
	Diving & Coral Reef Planting	1,340,130.05	1,340,130.05
	Homestay	200,000.00	200,000.00
	Dinner	50,000.00	50,000.00
	Day 2 Package Price	1,920,130	2,120,130
Day 3	Breakfast	50,000.00	50,000.00
	Mangrove Planting	100,000.00	100,000.00
	Lunch	50,000.00	50,000.00
	One Deck Boat (Travel to Pier)	65,000.00	65,000.00
	Day 3 Package Price	265,000	265,000
	Total Package Price	2,775,130	3,175,130

Source: Author's Research, 2024

This one-day trip tour package has different rates for domestic and foreign tourists, with the following details. For domestic tourists, the rate of IDR 2,775,130 applies on weekdays, while on weekends there is a levy adjustment of IDR 75,000 for access to Komodo National Park. For foreign tourists, the rate is IDR 3,175,130 and applies to weekdays and weekends. Retribution rates are subject to change at any time according to Komodo National Park policy.

5.4.4. Institutional Development Plan

Komodo National Park (TN) is a conservation and biodiversity area for komodo monitor lizards, yellow-crested cockatoos, and various other species including sea turtles. Komodo National Park is managed by the Komodo National Park Center, which is under the Ministry of Environment and Forestry (KLHK). To optimize the potential of the Komodo National Park area, KLHK collaborates with the *Global Environment Facility* (GEF) and the *United Nations Development Programme* (UNDP) Indonesia to run the *Investing in the Komodo Dragon and Other Globally Threatened Species in Flores* (IN - FLORES) project. The IN - FLORES project aims to support the management of Komodo National Park and its buffer zone. IN - FLORES is expected to be a means of multi-stakeholder engagement and diversified financing for biodiversity conservation and improved community livelihoods.

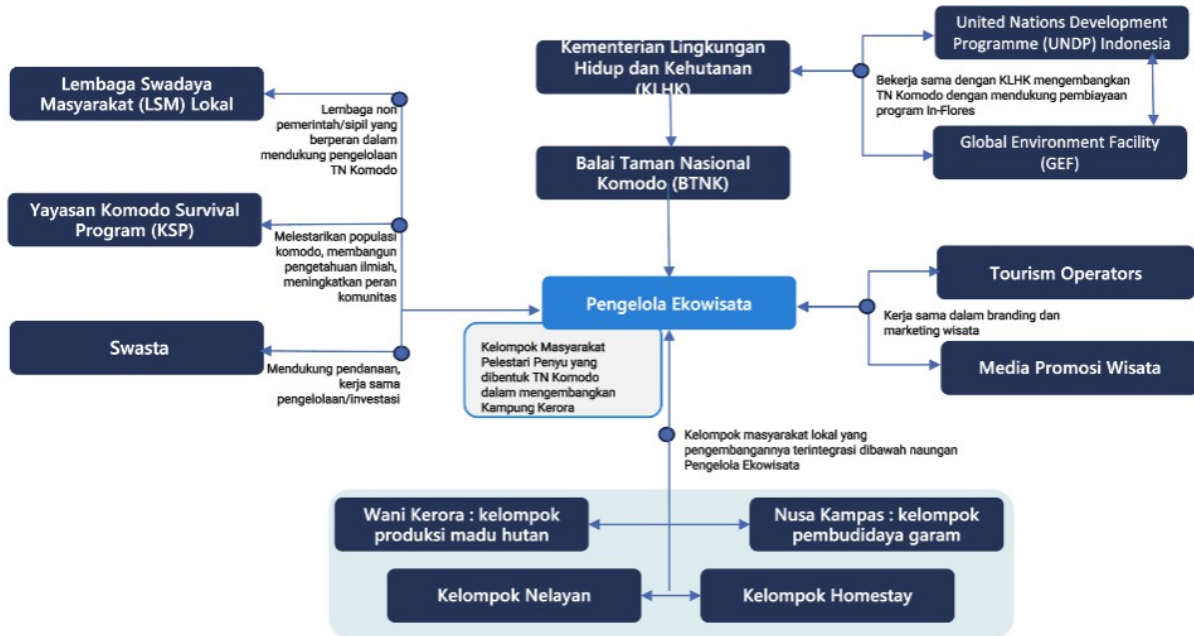


Figure 5-37 Kerora Village ecotourism development as part of IN - FLORES

The Kerora Village ecotourism development program focuses on turtle conservation programs, educational tourism, and environmental awareness campaigns. To optimize the management of Kerora Village ecotourism, Komodo National Park needs to establish a special institution (Ecotourism Manager) that comes from the local community. This Ecotourism Manager is a community group that will be responsible for turtle conservation activities. The turtle conservation-based Ecotourism Manager has a role to conserve turtles in their natural habitat and at the sanctuary location, as the main actor of ecotourism in Kerora village, as a motor to empower local communities that already exist in Kerora Village, and build networks and partnerships for conservation and ecotourism development in Kerora Village.

Existingly, Kerora Village already has two community groups formed by the Komodo National Park Office, namely Wani Kerora and Nusa Kampas. Wani Kerora is a community group that produces forest honey, while Nusa Kampas is a community group that cultivates salt. These two community groups were formed by the Komodo National Park Office in 2023 as a form of local community empowerment in optimizing the potential of Kerora Village. In addition, two other community groups were also formed, namely fishermen groups and homestay groups. However, these community groups have not run optimally. The existence of Ecotourism Managers is important to empower these existing local community groups. The involvement of local communities can indirectly increase community awareness and skills in managing ecotourism and supporting turtle conservation efforts. Thus, turtle conservation-based ecotourism in Kerora Village not only provides economic benefits for the local community, but also ensures the preservation of turtle species in Komodo National Park.

In addition to involving local communities, Ecotourism Managers supported by TNK also need to build networks with other relevant parties such as local NGOs, private sector, and promotional media. Local NGOs can play a role in ecotourism development through empowerment activities or grant distribution. One of the NGOs that supports the development of Komodo National Park is the Komodo Survival Program (KSP) Foundation. The KSP Foundation contributes to preserving the Komodo dragon population, developing scientific knowledge about environmental sustainability, and increasing the role of local communities. Private sector can also play a role in the development of turtle ecotourism, for example through funding support, technology, and CSR programs. Ecotourism managers also need to build networks with tourism promotion media and *tour operators*. The existence of promotional media is important because the development of ecotourism in Kampung Kerora needs to campaign for conservation to build public awareness. While the existence of *tour operators* will assist Ecotourism Managers in promoting and marketing ecotourism.

5.5. Kerora Ecotourism Development

5.5.1. Benchmarking

5.5.1.1. Turtle Conservation Guidelines

In turtle conservation efforts, there are several aspects that need to be considered. Technically, there are four main steps in turtle conservation, namely:

- A. **Egg Transfer.** The transfer of eggs to the natural hatchery is done in no more than 2 hours. Next, the eggs are planted in holes with a depth and diameter that resembles the original nest with a minimum distance of 1 m between nests.
- B. **Semi-Natural Hatching.** Hatching time from eggs to hatchlings is 45-60 days. Once hatched, hatchlings should be released to the sea immediately.
- C. **Hatchling rearing.** Maintenance is carried out in the subratidal area and only for sick or disabled hatchlings with the Beach rearing system.
- D. **Hatchling Release.** Hatchling release is done at night around 19.00-05.30. Hatchlings in captivity can be released in the morning or afternoon. The release is done in different locations to anticipate predatory fish in groups.



Figure 5-38 Turtle Conservation Stage

Source: Compilation Team (2024)

Sea turtle conservation still has its pros and cons. In-situ conservation is still the best way to go if there is no threat from predators. It should be noted that the process of relocating turtle eggs to the *hatchery* often carries greater risks.

Space division according to sea turtle conservation guidelines.

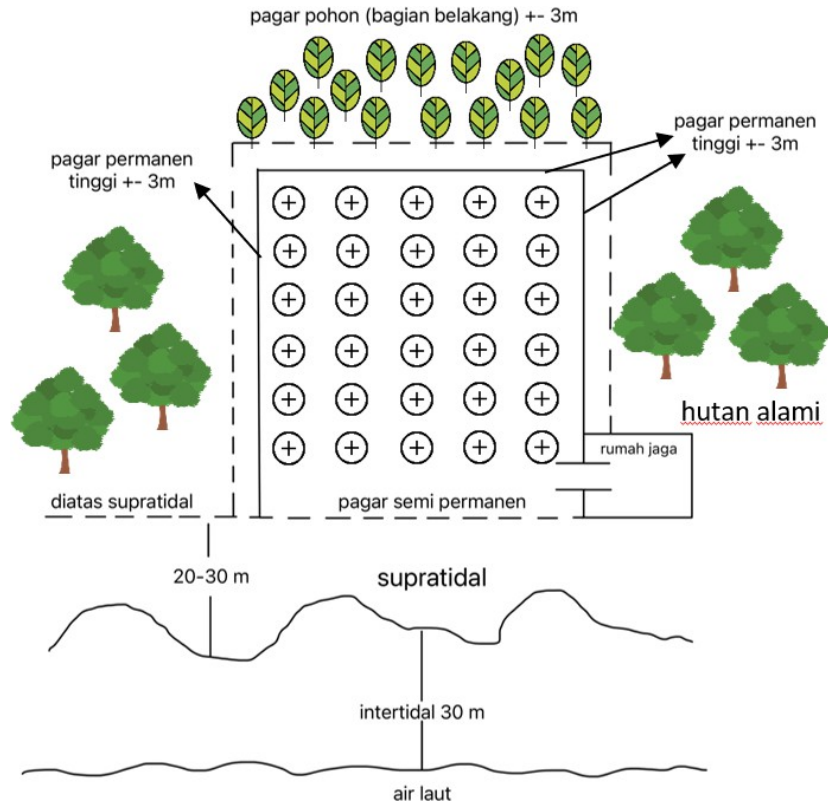


Figure 5-39 Design of a semi-natural turtle egg hatching site

Source: *Technical Guidelines for Turtle Conservation Management, 2009*

Things that need to be considered in turtle conservation-based tourism management:

- Management office, nesting site, semi-natural hatchery site, rearing site, and release site.
- Vegetation design that is in line with the turtle's native habitat
- Use of natural materials rather than manufactured materials
- Litter or disturbance around nesting sites
- Sand temperature 24-33 degrees Celsius. Cold temperatures (<29 degrees Celsius) produce male hatchlings, while hot temperatures (>29 degrees Celsius) produce female hatchlings.
- Sufficient oxygen content in the water and enough water content in the sand to keep the sand moist
- Light, sound, and campfire disturbances



Sumber: yayasanpenyu.org

Figure 5-40 Example of Turtle Conservation

Source: yayasanpenyu.org

Exitu conservation of sea turtles should ideally be carried out as naturally as possible without breeding and captive breeding practices. Sea turtle farming and sea turtle head starting are often misunderstood as conservation activities. In addition, sea turtle conservation must pay attention to animal welfare aspects: free from hunger, discomfort, pain, stress, and free to express their natural behavior. The concept of sea turtle conservation that can be used as an example is sea turtle conservation in Jemaja Island, Jeen WOMOM coastline, Costa Rica coastline. Sea turtle conservation with educational purposes can adopt the sea turtle laboratory in Malaysia.

5.5.1.2. Case study

Turtle Sanctuary Center, Pramuka Island, Thousand Islands, DK Jakarta. This conservation effort is located in the east of Pramuka Island and has an area of 0.05 hectares. It is part of the Thousand Islands National Park, which is also part of Indonesia's conservation areas. It is managed by the Ministry of Environment and Forestry. The Turtle Sanctuary Center was inaugurated by PT Astra Daihatsu Motor in collaboration with the Thousand Islands National Park Office under the title of the "Turtle for Indonesia" program. Visitors can do activities offered such as educational tours themed on turtle conservation, safe interaction with turtles in captivity, and turtle release activities to the sea.

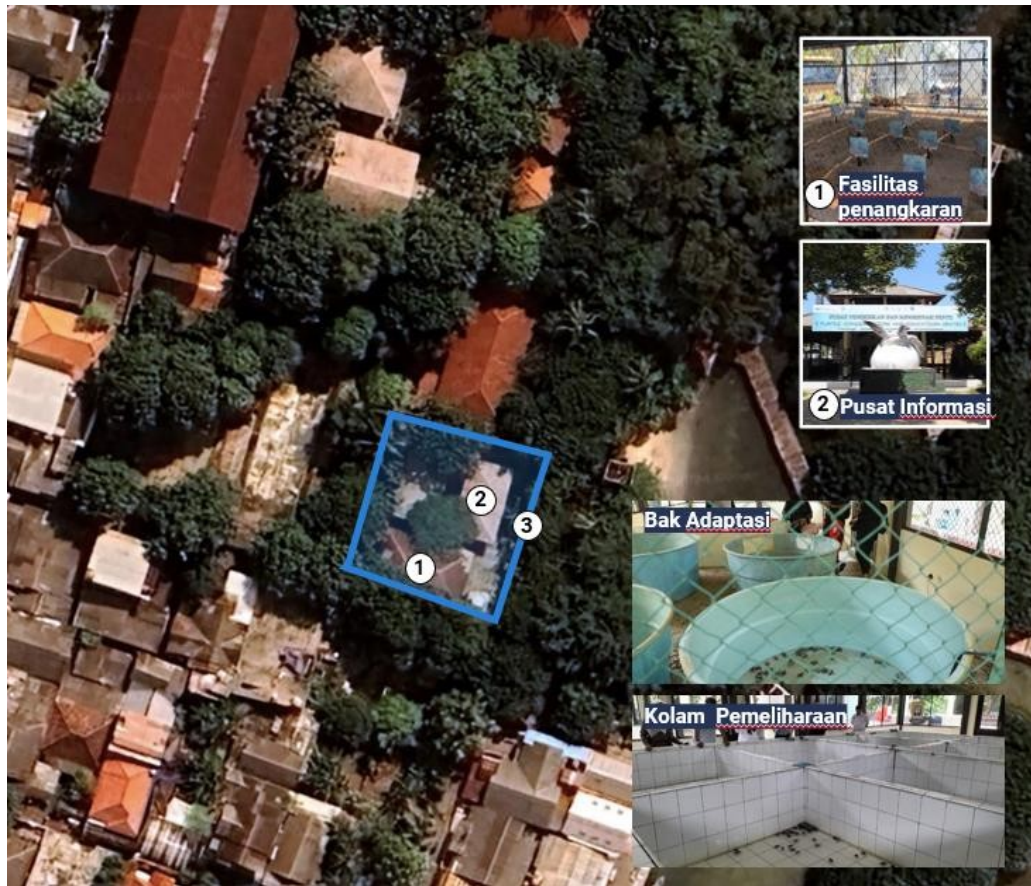


Figure 5-41 Map of Pramuka Island Turtle Sanctuary Center

Source: Author Team (2024)

In the aspect of space division, all facilities are located semi-outdoor in roofed buildings. Within the conservation area there are three main facilities, namely: (1) breeding facilities (including breeding ponds, breeding tanks and *hatching sand*), (2) information center, and (3) *hatching sand*.

(3) supporting facilities. Breeding facilities include:

- a) Hatchling rearing pond (2mx2mx1m)
- b) Turtle breeding pond: 2.0x2.0mx1m, with a maximum capacity of 3 turtles.
- c) Hatching tank: using a 35 liter plastic bucket.
- d) Adaptation basin, 1.2m in diameter with a depth of 50cm.

The Information Center is a hawksbill turtle education area, a semi-open room measuring 6x4x4m that contains information panels on turtles and conservation activities. In addition, there are supporting facilities for sanctuary operational activities which include a warehouse (3x2x3m), water installation, and visitor parking.



Figure 5-42 Rainbow Beach Turtle Conservation Map

Source: Author Team (2024)

Pelangi Beach Turtle Conservation, Bantul, Yogyakarta. This turtle conservation is located at Pelangi Beach, south coast of Bantul Regency, Yogyakarta. This conservation activity was initiated by a beach resident, Sarwidi, supported by local residents, 4K Yogyakarta, the Department of Fisheries and Marine Affairs and the DIY Natural Resources and Conservation Center. The conservation area is located within the Pelangi Beach area and is surrounded by settlements, vacant land, and green areas. Turtle conservation activities are **transitioning towards ecotourism-based activities** from conservation based on conservators' personal money. Funding at Pantai Pelangi comes from cleanup and training activities. Conservation at Pelangi Beach is also supported by **incentives** from the Marine and Fisheries Agency, which are not regular. Activities carried out as part of the turtle conservation program include turtle conservation patrols, hatchling releases, beach cleaning in preparation for turtle landings, *ecobricking* training and sea pandanus planting to maintain sand conditions.

In terms of spatial distribution, this turtle conservation is quite simple, with conservation facilities consisting of one semi-open building or shelter with ponds and a hatching area. As of May 2024, there are 15 turtle nests in the hatchery, each with about 80 eggs, with one nest measuring 4.5 x 6m. After hatching, the hatchlings will stay in captivity for 2-3 days in a rearing tank (1m x

1m). There is 1 permanent turtle pond (3.5m x 1.5m), 2 individual turtle tanks (2.0x2.0m) with a total capacity of 4 adult turtles. The education hallway is a semi-open space with turtle education posters. Specifically, the main design features in the conservancy are three sand-breeding media (semi-natural planting, buckets in sand and jars). The materials used are also simple wood and brick. In addition, the surrounding conservation area is open to the beach and surrounded by warungs and public beach recreation areas.

Juara Turtle Project, Kampung Juara, Tioman Island, Malaysia. This turtle conservation project is located in Kampung Juara, Tioman Island in the Pahang area of Malaysia. Juara Turtle Project (JTP) is a conservation project started by the Malaysian Fisheries Department in 2001. Today, Juara Turtle Project is an independent non-governmental organization that involves volunteers from all over the world. The area around JTP is a forest, beach and resort. Visitors can engage in activities such as beach monitoring (night and morning), hatchery management (including nest observation, turtle hatchling release, and beach cleaning); and recreational activities (swimming, snorkeling, kayaking, guided trekking, local agriculture farm visit). According to (Nor et al., 2022), local residents of Kampung Juara have a positive perception of the Juara Turtle Project as it enhances tourist, cultural and environmental conservation activities. However, local community involvement is considered minimal as the focus is limited to turtle conservation. To increase local participation, JTP diversified activities and focus such as coral reef conservation and environmental issues in general to increase local participation (Berg et al., 2017).

The division of JTP space consists of a *visitor center*, rehabilitation *tank* area (*coral reef rehabilitation tank / sea turtle rehabilitation tank*), *on-beach fenced hatchery* and cabins for volunteers. *The Visitor Center* is an enclosed building that serves as the educational, administrative and commercial center (*gift shop*) of JTP. As an extension of the educational function, there is a rehabilitation tank with an estimated diameter of 7.5m, for turtle education. On the beach area there is a *fenced hatchery* located on the beach, measuring approximately 8 x 12m, with a depth of 50-60cm. This *hatchery* has a capacity of about 18 nests, with 90 eggs per nest. The hatchery facility uses a bamboo structure and netting with wiremesh for each nest. The bamboo structure is used as protection against monitor lizards and other predators. The cabin facility consists of two rooms with a maximum capacity of 10 people. The distance between facilities is about 5-15m and open to the beach. In addition, to support operational activities there are recycling and waste sorting facilities for processing beach waste.

5.5.2. Sanctuary Development Design

5.5.2.1. Semi-natural Nesting Site Design

Based on the Technical Guidelines for Turtle Conservation Management published by the Directorate General of Marine, Coastal, and Small Islands in 2009, the standard for the development of semi-natural turtle egg hatching sites is as follows:

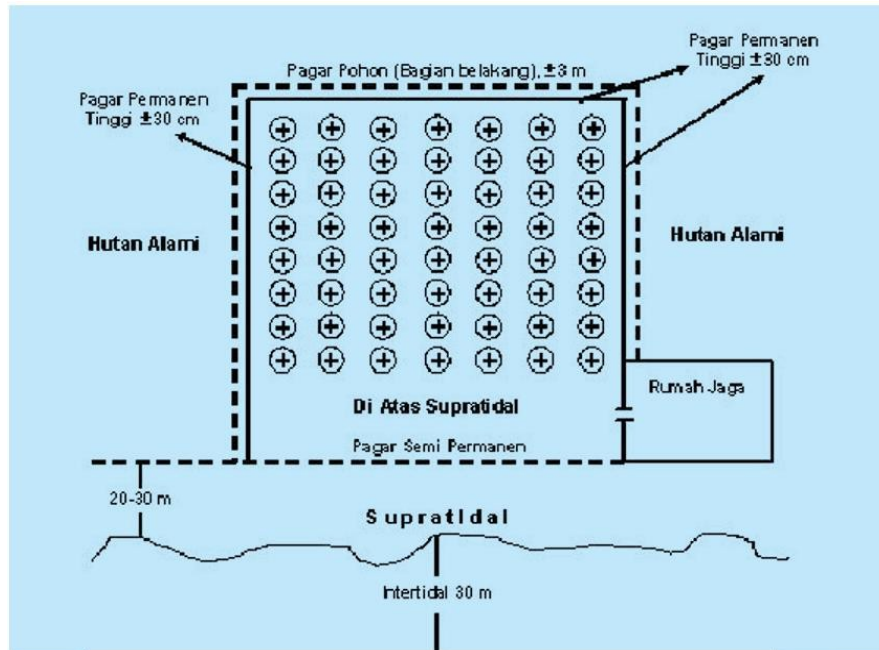


Figure 5-43 Semi-natural nest design reference

Based on the semi-natural nest design reference above, there are several factors that need to be considered in the construction of semi-natural nesting sites in Kerora Village. Semi-natural nesting sites are usually built in the supratidal zone or above the supratidal zone, where the zone is no longer influenced by the tides. The next consideration for semi-natural nests in Kerora Village is the need for natural forest around the nest, which is in accordance with the condition of the natural turtle nesting habitat on Muang Island. The vegetation required is canopy cover and understory cover, in accordance with the natural habitat of sea turtle nesting on Muang Island.

Based on the reference design of semi-natural nests, the following design for semi-natural nests in Kerora Village:

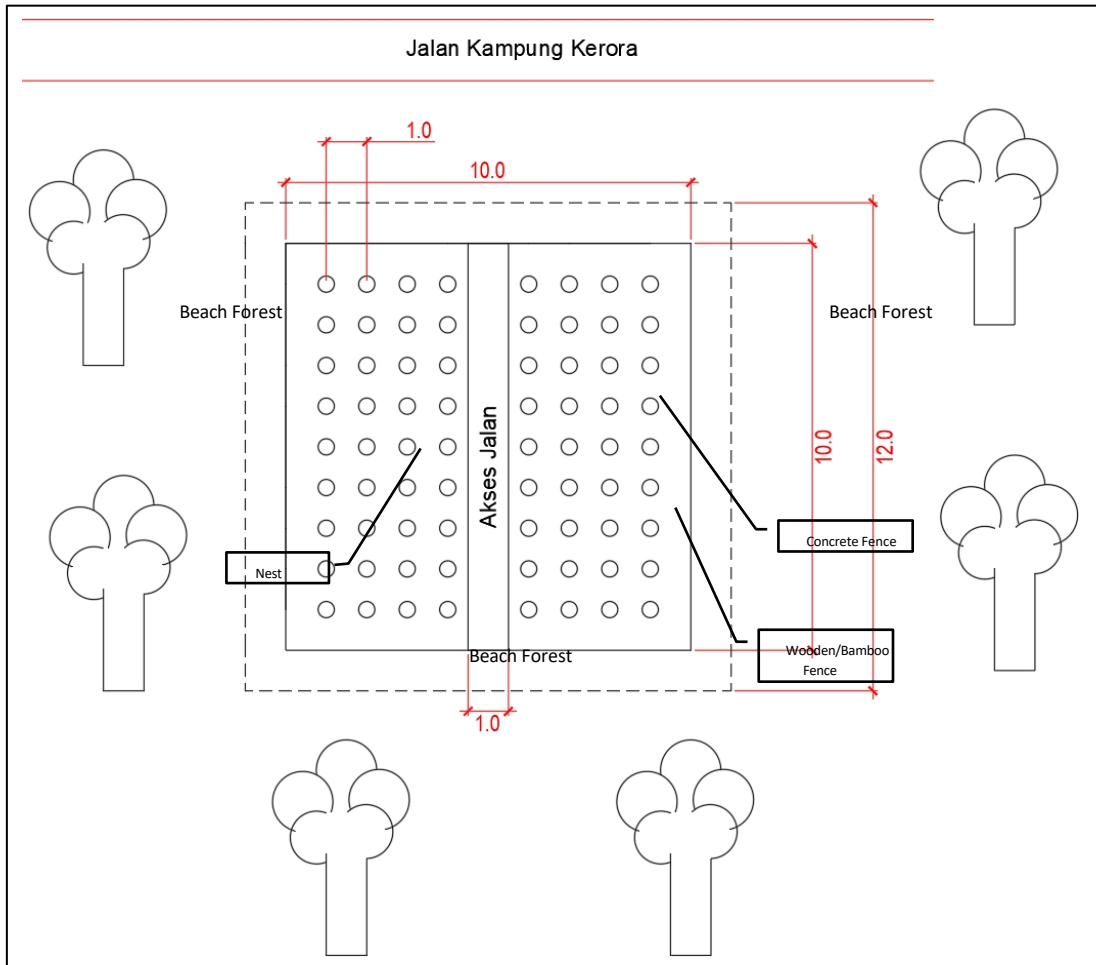


Figure 5-44 Natural nest design

Based on the design of the semi-natural nest above, some previously unqualified criteria, namely the absence of coastal forest vegetation around the semi-natural nest, will be met. Planting is required for tree species that can support the semi-natural nest. Trees that can be recommended are Sea *Pandanus* (*Pandanus odorifer*) and Sea Waru (*Thespesia populnea*). Both trees are tree species in coastal forest ecosystems that are suitable for sea turtle nesting habitat, and are the most common tree species in coastal forest ecosystems. The semi-natural nest design above shows an area of 100m² with a length of 10m and a width of 10m. The capacity of the semi-natural nest that can be accommodated in the semi-natural nest is 72 semi-natural nests, with a distance of ± 1 meter for each nest. The materials used to build the fence of the semi-natural nest are concrete fences as the main fence, and wooden / bamboo fences as a tourist boundary fence.

5.5.2.2. Shelter Design

Development should not only focus on the semi-natural nesting site in Kerora Village, but also build a holding tank to store the newly hatched hatchlings before they are released. The shelter also serves to raise some of the hatchlings to adulthood for educational purposes.

hatchlings to adulthood for educational purposes to tourists and research purposes. The following reference is based on the Technical Guidelines for Turtle Conservation Management published by the Directorate General of Marine, Coastal and Small Island Affairs in 2009:

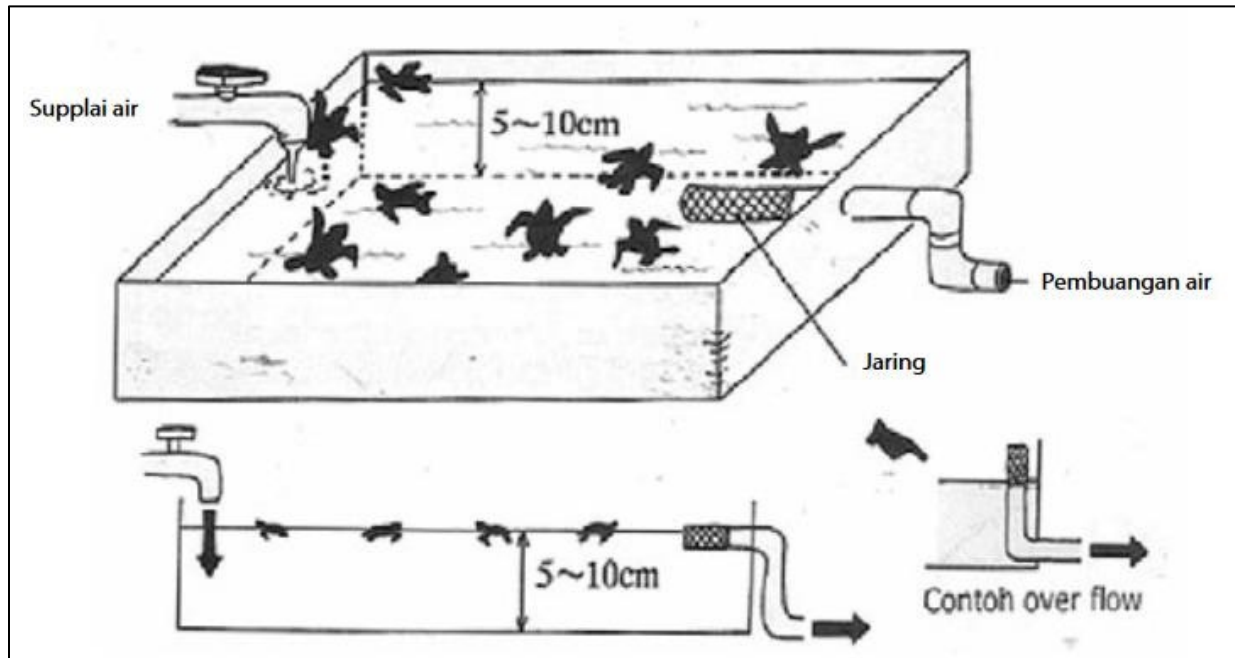


Figure 5-45. Reference to the design of the shelter

The picture above is a reference to a hatchling shelter. The picture does not explain the size of the tank, but it only explains that the water height is 5 - 10 cm from the bottom of the tank. Based on a survey by the Faculty of Forestry team to one of the turtle conservation centers located in Pelangi Beach, Bantul Regency, it was found that the small hatchling holding ponds are 0.8 x 1 m and 1 x 1 m, while the large ponds are about 3 x 1.5 m in size.

Based on this information, adjustments were made to the design for the hatchling tanks in Kerora Village as follows:

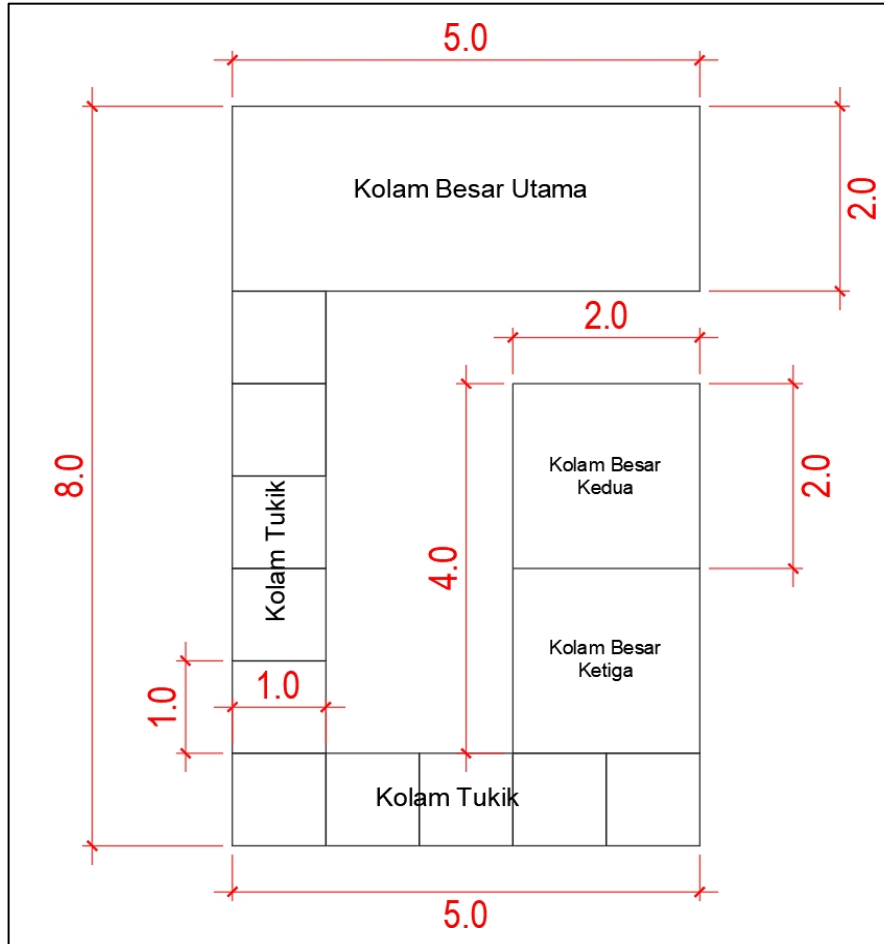


Figure 5-46 Hatchery Design

The design was adapted from Pelangi Beach Turtle Conservation, Bantul Regency. A small pond measuring 1 m² was created as the first transfer location from newly hatched nests. The number of hatchlings put into the small ponds is based on the number of hatchlings, if one hatchling nest exceeds the capacity of the pond (>100 individual hatchlings), it can be divided into different small ponds. Furthermore, the second and third large ponds function as ponds for hatchlings that have been in captivity for >2 days, because small ponds will be filled by new hatchlings. In addition, the second and third large ponds are used as emergency ponds if the small ponds are *overloaded with* hatchlings during the turtle breeding season. While the main large pond, is used for large / adult turtles as an educational purpose to visitors who come. Large turtles / adults also act as education in ecotourism when it is not turtle breeding season, because when it is not the breeding season there are no hatchlings to be seen by tourists who come.

Based on the above considerations and adjustments, the following is a description of the design of semi-natural nests and shelters:

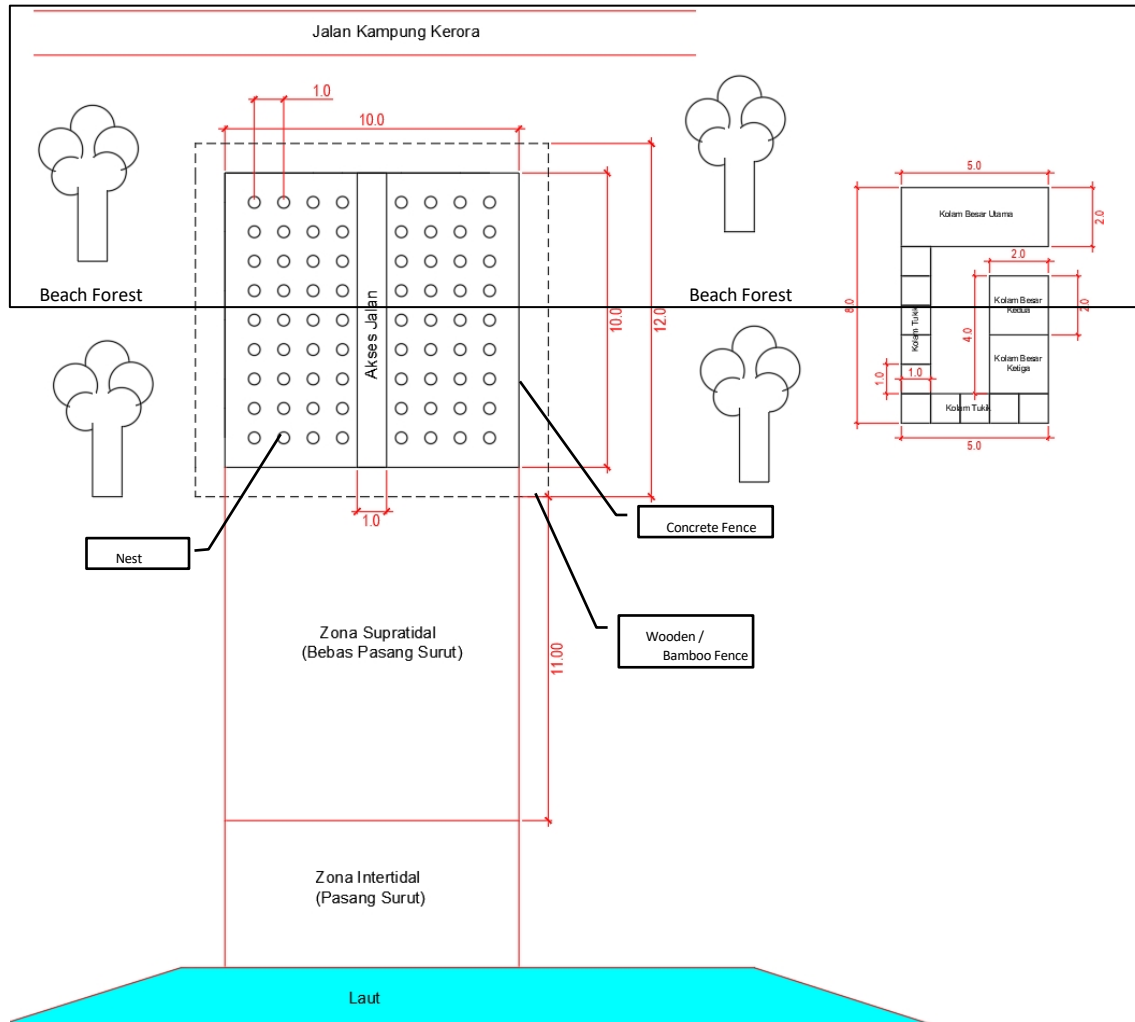


Figure 5-47 Design of Semi-Natural Nests and Shelters

5.5.3. Kerora Ecotourism Block Plan

Zoning at the sanctuary is divided into two major zones, namely, the Sanctuary Core Zone and the Supporting Zone. The Sanctuary Core Zone includes facilities and activities that are directly related to the conservation function, especially with the maintenance of turtles, turtle eggs, and hatchlings. To ensure the safety of turtles and eggs, this zone has more protection at the scale of buildings and areas. In addition, this zone is flanked by 2 (two) types of buffer zones (buffer level 1 and level 2) to ensure the safety of turtles, turtle eggs, and hatchlings from threats from humans and their activities and wild animals. While the Supporting Zone includes facilities and activities that support conservation activities and sanctuary operations such as commercial activities, related to educational and recreational tourism, and utility needs used in the sanctuary. The two zones are separated to minimize disturbance to the artificial habitat for sea turtles and maintain the safety of conservation activities. The division of space and zoning in the sanctuary is as follows

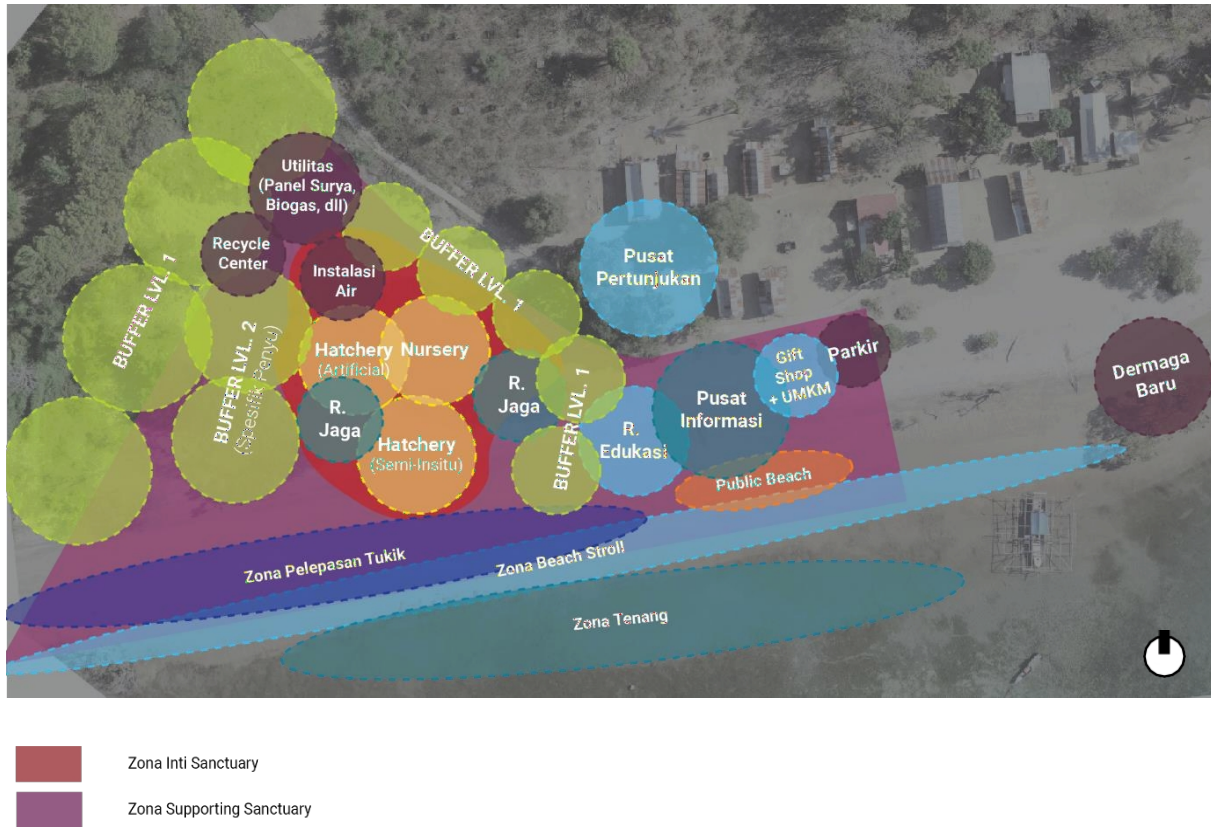


Figure 5-48 Zoning and Activity Diagram of Sanctuary Area

Source: Author Team (2024)

Activities that can be done on the coast are also divided into several zones, namely, the Hatchling Release Zone, *Beach Stroll* Zone, Quiet Zone, and Public Beach Zone. This is done to ensure that activities carried out by humans do not interfere with turtle sanctuary activities. According to sea turtle conservation guidelines, sea turtles are sensitive to sound and light intensity, so the brighter the light or sound source, the more disoriented the turtle may become. Therefore, activities in commercial areas and beaches should be limited to certain hours and distances, especially at night until dawn, the time when turtles usually move.



Figure 5-49 Block Plan of Turtle Sanctuary Area

Source: Author's Team (2024)

The area block plan is developed from the Zoning Plan, so that the sanctuary area at Kampung Kerora Beach can be divided into 3 main zones, namely the Sanctuary Core Zone, Commercial Zone and Utility Zone. In addition, outside the sanctuary area there is a performance center and a pier.

Sanctuary Core Zone. This zone is the center of sea turtle conservation activities equipped with two types of *hatchery*, beach hatchery (8 x 12m) and artificial hatchery (8 x 12m), *nursery* (8 x 10m, with a recommendation of 6 hatchling/turtle ponds measuring 2 x 2m), turtle pond (7.5m x 7.5m), research room (6 x 6m), and guard room (maximum size 3 x 6m), which is limited by a buffer of turtle-friendly trees and uses coastal plant species. Within this zone there are two levels of protection from predators and humans, the first is through the building structure and fencing of the hatchery and nursery (semi-open buildings and the use of bamboo and wiremesh fencing at the beach hatchery). The second level of protection is through tree buffers that can be fenced to protect the main sanctuary area. Within the core zone area, sound, light, air and other environmental disturbances should be kept to a minimum, so lighting for visitors and other purposes should be considered.

The Commercial Zone is the entrance to the turtle conservation area and is one of the areas supporting conservation activities through education and recreation. There are two main facilities, namely the commercial / SME (sized and information center for tourists).

In addition, there is a public sitting area using gazebos or lounge chairs for visitors that is directly connected to the public beach area. To support the core zone activities well, the commercial zone activities must be limited in time and distance. Therefore, there is a separation buffer between the commercial zone and the sanctuary core zone.

The **Utility Zone** is a zone that consists of various functions that support operational needs such as waste management, control rooms for solar panels, and water installations. All these facilities are located far away and limited by buffers from the core zone to maintain the environmental quality of the core zone and minimize pollution.

The Performance Center is an area outside the sanctuary that is intended for the needs of the Kerora Village community and additional areas to support sanctuary educational or commercial activities. This performance center is opposite the sanctuary area, equipped with toilets and water installations that also serve the sanctuary area. In order not to disturb conservation activities in the core zone, there is a separation buffer between the performance center and the sanctuary core zone.

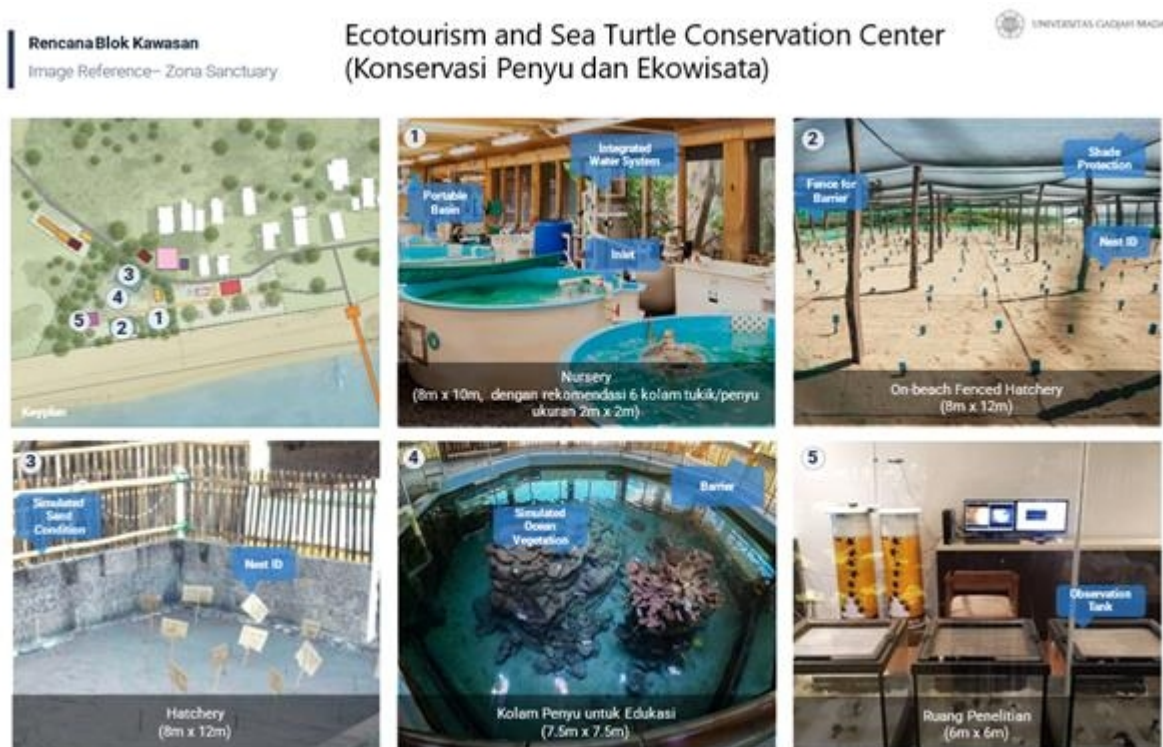
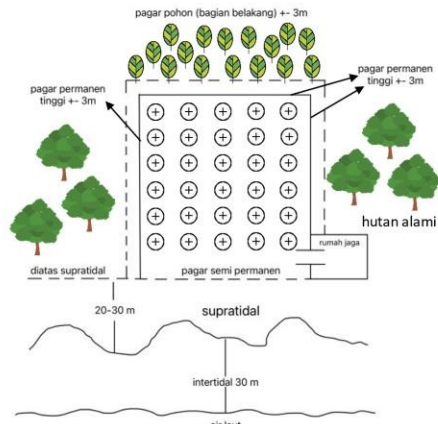


Figure 5-50 Sanctuary Design Reference

Conservation Benchmark

Teknis Pengelolaan Wisata Berbasis Konservasi Penyu



Desain Lokasi Penetasan Telur Penyu secara Semi Alami

Sumber: Pedoman Teknis Pengelolaan Konservasi Penyu, 2009



- A. Pemindahan Telur.** Pemindahan telur ke penetasan alami dilakukan tidak lebih dari 2 jam. Selanjutnya, telur ditanam pada lubang dengan kedalaman dan diameter yang menyerupai sarang aslinya dengan jarak minimal 1 m antar sarang.
- B. Penetasan Semi Alami.** Lama penetasan telur menjadi tukik 45-60 hari. Ketika menetas, tukik harus segera dilepaskan ke laut.
- C. Pemeliharaan Tukik.** Pemeliharaan dilakukan pada daerah subratidal dan hanya untuk tukik yang sakit atau cacat dengan system rearing Pantai.
- D. Pelepasan Tukik.** Pelepasan tukik dilakukan di malam hari sekitar pukul 19.00-05.30. Tukik yang berada di penangkaran, bisa dilepaskan pada pagi atau sore hari. Pelepasan dilakukan di lokasi yang berbeda untuk mengantisipasi predator ikan yang berkelompok.

Konservasi penyu masih menuai pro dan kontra. Kegiatan konservasi secara insitu masih menjadi cara terbaik bila tidak ada ancaman dari predator. Perlu menjadi perhatian bahwa proses relokasi telur penyu *khaticry* seringkali mendatangkan resiko lebih besar.

Hal-hal yang perlu diperhatikan dalam pengelolaan wisata berbasis konservasi penyu

- Dilengkapi Kantor pengelolaan Lokasi peneluran Lokasi penetasan semi alami Lokasi pemeliharaan dan Lokasi pelepasan
- Penggunaan material alami dibanding material buatan pabrik
- Suhu pasir 24-33 derajat celsius. Suhu dingin (<29 derajat celsius) menghasilkan tukik jantan sementara suhu panas (>29 derajat celsius) menghasilkan tukik betina
- Gangguancahaya suara dan api unggun
- Desain vegetasi yang sesuai dengan habitata asli penyu
- Sampah atau gangguan di sekitar lokasi peneluran
- Kandungan oksigen dalam air cukup dan kandungan air dalam pasir cukup hingga pasir lembab

Figure 5-51 Reference technical design of turtle conservation-based tourism management

Rencana Blok Kawasan

Image Reference: Dermaga

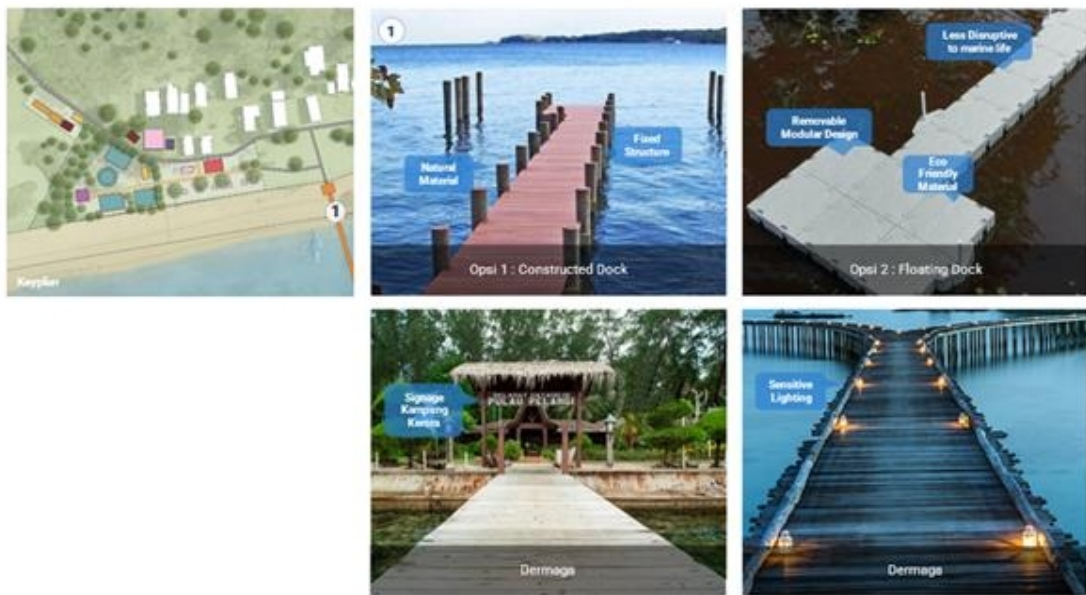


Figure 5-52 Reference dock design

Rencana Blok Kawasan

Image Reference- Zona KomersialSanctuary

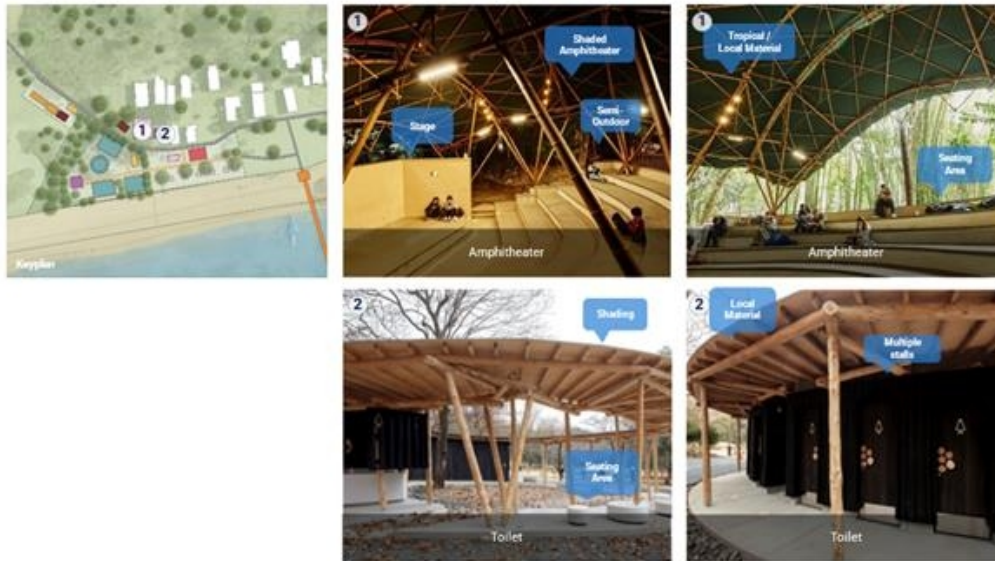


Kajian Pengelolaan Ekowisata Berbasis Konservasi Penyru Beserta Peningkatan Kapasitas Masyarakat di Resort Kampung Kerons Taman Nasional Komodo

Figure 5-53 Reference design of Conservation Zone / Sanctuary

Rencana Blok Kawasan

Image Reference- Pusat Pertunjukan



Kajian Pengelolaan Ekowisata Berbasis Konservasi Penyru Beserta Peningkatan Kapasitas Masyarakat di Resort Kampung Kerons Taman Nasional Komodo

Figure 5-54 Reference design of performance center

5.6. Socialization of Turtle Sanctuary Development and Ecotourism of Kerora Village

The development plan of Kerora Village Ecotourism is based on sea turtle conservation as an ICON that is a differentiator from existing attractions in Komodo National Park. So far, the icon of tourist attractions in Komodo National Park is more focused on Komodo animals and underwater tourism. Meanwhile, Komodo National Park has high biodiversity, one of which is sea turtles. Among the people of Kerora Village, the majority of whom are fishermen, have an interest in becoming managers of nature tourism or ecotourism in Komodo National Park. The people of Kerora Village are interested in playing an active role in the sustainable management of their natural resources, especially in turtle conservation in Komodo National Park. The relocation of turtle eggs from Muang Island to Kerora Village not only aims to increase hatching success, but also opens up new opportunities for the community to contribute to turtle conservation while utilizing economic opportunities from ecotourism activities. Currently, sea turtles are facing challenges such as the threat of predators, coastal abrasion, and the impact of human activities such as egg theft in their natural habitat. To maintain the sea turtle population, relocated eggs were moved from natural nests on Muang Island to semi-natural nests in Kerora Village.

This process requires community involvement at every stage, from egg collection, semi-natural nest management, to the release of hatchlings into the sea. This activity can be developed into an ecotourism attraction based on local wisdom. Tourists can be invited to participate in activities such as observation of turtle nesting, hatchling release, and nest adoption programs. Thus, turtle conservation management provides opportunities for the community to gain economic benefits through tourism services and local products that support ecotourism. The community of Kerora Village has great potential to be the main driver in this conservation-based ecotourism. Their involvement not only improves the sustainability of the turtle population, but also builds a sense of ownership over natural resources. Therefore, this socialization aims to strengthen the capacity of the community in understanding the importance of sea turtle conservation, managing semi-natural nests, and utilizing the potential of ecotourism in a sustainable manner.

5.6.1. Time and Place of Socialization

Socialization activities in the framework of Ecotourism Development Based on Turtle Conservation at the Resort Kampung Kerora Komodo National Park. The socialization was held on Sunday, November 24, 2024. The socialization starts at 08.30 WITA - finished, at the Kampung Kerora Resort, Komodo National Park.

5.6.2. Target of Socialization

The target of the socialization activity is the community of Kampung Kerora, Pasir Panjang Village, West Manggarai Regency, NTT. The number of people involved consisted of 20 participants. This socialization also identifies prospective members of the turtle conservation group and ecotourism manager of Kerora Village.

5.6.3. Description of Socialization Implementation

Kerora Village has natural tourism potential that can integrate natural beauty with local culture-based activities and environmental conservation. The tourism potential in Kerora Village not only offers a unique tourism experience, but also provides opportunities for local communities and local fishermen to increase their income through the integration of biological resource conservation activities with the tourism sector.

5.6.3.1. *Socialization of nature tourism potential in Kerora Village*

The socialization material related to the plan and design of ecotourism development in Kerora village was delivered by Dr. Ir. Kaharuddin S.Hut., M.Si. The subject matter presented was about the integration of natural tourism potential in Kerora Village. Turtle conservation ecotourism is the main superior potential that can be developed in Kerora Village. This activity is designed to educate tourists about the importance of sea turtle conservation as one of the endangered species. Tourists who come will be given education about the life cycle of sea turtles, the challenges faced in conservation efforts, and the importance of maintaining the natural habitat of sea turtles. This education aims to increase tourists' awareness about the importance of sea turtle species conservation. One of the most popular activities for tourists is the release of sea turtle hatchlings into the sea. This activity not only provides a memorable experience, but also strengthens tourists' involvement in sea turtle conservation efforts. The development of turtle conservation ecotourism opens opportunities for the people of Kerora Village to engage in activities that support environmental conservation while creating added economic value. Tourists who are interested in this activity also tend to have high environmental awareness, thus supporting the concept of sustainable tourism.

In addition to turtle conservation-based ecotourism, there are other potential natural attractions that can be integrated into a tour package in Kerora Village, namely Bagang tourism. Bagang tourism is one of the unique attractions of Kerora Village that offers an experience for tourists to get to know the life of traditional fishermen. In this tour, tourists are invited to board a bagang (fishing boat) with local fishermen and spend one night in the bagang. Tourists can be directly involved in the process of catching fish in certain locations that are favorite spots for fishermen. This activity provides an opportunity for tourists to understand how fishermen work and traditional techniques in fishing. One of the main attractions of bagang tours is that tourists can enjoy their catch directly. The caught fish can be processed on the bagang by grilling, so tourists can enjoy fresh dishes while experiencing the night atmosphere in the middle of the sea. The combination of turtle conservation-based ecotourism and bagang tourism can make Kampung Kerora an attractive destination. Tourists can enjoy cultural-based tourism experiences and environmental education in one travel package. With good management, these two potentials will not only increase tourist visits but also strengthen the sustainability of the ecosystem and the welfare of the local community.



Figure 5-55 Ecotourism Socialization in Kerora Village

5.6.3.2. *Socialization of turtle conservation-based ecotourism management*

The second presentation was delivered by Dr. Subeno, drh. M.Sc, about turtle conservation-based ecotourism by the people of Kerora Village. The subject matter presented was about turtle egg hatching techniques in Kerora village. In managing ecotourism based on turtle conservation, the community needs to be equipped with skills in professional ecotourism management, such as being a tour guide who is able to provide education to visitors about the life cycle and important role of sea turtles in the marine ecosystem. In addition, the community needs to be equipped with technical skills in semi-natural turtle hatching techniques in Kerora Village. The community can also be trained in monitoring hatching success, protecting turtle habitat from predators, and handling eggs transferred to semi-natural nests.

There are three main approaches to turtle egg hatching: semi-natural, bucket container and incubator box. The semi-natural technique involves building artificial nests using sand as the main medium, mimicking the natural nesting conditions of sea turtles. The nest site is usually fenced off to protect it from predators and humans. This technique is simple and effective in creating natural conditions, but is vulnerable to extreme weather such as heavy rain or high temperatures, as well as predator disturbance. Meanwhile, the bucket technique uses plastic buckets filled with sand or other substrates, placed in a controlled environment such as a closed room. This technique makes temperature and humidity control easier and more flexible, but has limited capacity and requires regular supervision. A more innovative technique is the box incubator which uses a plastic box, and contains a small amount of sand with temperature monitoring using a temperature controller. This technique allows for more precise and efficient temperature control, thus increasing hatching success. This innovation is adapted from the hatching technique at Pelangi Beach Turtle Conservation, which was invented by Mr. Sarwidi, a conservator at Pelangi Beach, Yogyakarta. This method

Hatching success rates are better and more consistent than other methods. However, this technique still requires regular trials for optimal results in Kerora Village. These three techniques have their own advantages and disadvantages, so they can be applied according to the needs and conditions in the field.



Figure 5.-5-56 Socialization in Kerora Village

5.6.3.3. *Simulation of the implementation of sea turtle hatching techniques*

Simulation of the implementation of the three egg hatching techniques can be the first step to increase community understanding. The simulation began with the practice of semi-natural nesting techniques, where participants were invited to dig a nest hole using a small shovel with a depth of 50-60 cm according to the natural nesting of sea turtles. The sand used was explained to be sterile from debris or other contamination. Participants were then taught the technique of carefully moving the eggs by hand, ensuring the eggs were not upside down, and placing them into the semi-natural nest.

Then, simulations were conducted for the bucket and incubator box techniques. The community was shown how a plastic bucket is filled with sterile sand until it is full, then dug to make a turtle nest hole and followed by careful placement of turtle eggs. For the box incubator technique, participants were taught to prepare a plastic box filled with a small amount of sand and directed to use a thermometer to monitor the temperature inside the incubator. An explanation was given on the importance of maintaining the optimal temperature to determine the sex of the hatchlings. In this simulation, participants were asked to take turns practicing each step directly, including recording the date the eggs were put into the container. With this simulation, the people of Kerora Village not only understand the concept but also gain technical skills that they can apply independently in the management of sea turtle egg hatching.



Figure 5-57 Simulation of the Implementation of Turtle Hatching Techniques

5.7. Follow-up Recommendations

The ecotourism development design based on the Turtle Sanctuary in Kerora Village requires follow-up including:

- 1) training and mentoring of turtle egg hatching models using several treatments and hatching media in the form of research scale. This activity will produce the best hatching technique while obtaining hatching calendar data that is useful in determining hatchling release tour packages.
- 2) Following point (1), a hatchling release was held in conjunction with the launching of the Turtle Sanctuary and Ecotourism in Kerora Village by presenting various parties from the Ministry of Forestry, Local Government, Komodo National Park Office, Tour Operators from Labuan Bajo and other related parties.
- 3) The formation of a turtle conservation group whose members come from the people of Kerora Village who are committed to turtle conservation. This group has the task of being a turtle conservation ranger, as well as an ecotourism actor. In addition, the formation of other tourism actor groups needs to be established, such as guide groups, homestays, boats, masts, and other groups.
- 4) Training and mentoring on ecotourism management for community groups of tourism actors and the Kerora community in general; standardize management, SOPs that are adhered to by tourism actors and tourists; legally establish tourism objects and routes.

- 5) Revision of zoning to accommodate locations that will be used as tourism objects and attractions.
- 6) Making DED and construction of basic facilities to support ecotourism in Kerora Village.

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