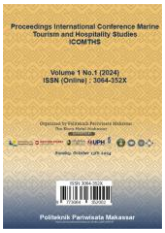

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Nusa Penida Diving: Visit Bali Waters to See Manta Rays

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Abstract
In nations with large archipelagos, marine ecotourism is becoming more popular. Ecotourism itself is a concept of tourism activities that contain elements of conservation. An integrated coastal management approach must be carried out comprehensively. This study aims to find out the challenges of marine ecotourism of special interest in Nusa Penida Bali Indonesia. The research was conducted in July 2024 using a survey method. The results showed that the challenges to marine tourism activities are getting bigger because there are so many foreign tourists who want to do diving and snorkeling at Manta Point. There were 13 species of manta rays (*Manta alfredi*) found. Temperature is 29ºC and salinity 33 ppt is ideal for Manta rays live. Management in ecotourism with manta rays must be integrated so that this achieve sustainable tourism.
Keywords: Marine ecotourism, manta rays, nusa penida, sustainable tourism

1. INTRODUCTION

The waters in Indonesia have been used by the people in various ways. A rich marine ecology and marine biodiversity can be found in the archipelago nation of Indonesia (Prihadi et al., 2024a).The use of waters is used by humans as a transportation route, fishing, multiplying oil and gas resources, energy, health and natural tourism. Indonesia has a huge potential for marine ecotourism destinations, expanded from Sabang to Papua, creating marine national parks and conservation forest areas on land as well as in the ocean. The main driver of the Indonesian archipelago's economy is tourism (Prihadi et al., 2024b).

Ecotourism can be used optimally and correctly according to observation orders or experimental methods, all of which have the potential to boost the nation's foreign exchange earnings, employ people, develop prospective coastal and marine areas, enhance the wellbeing of the community and fishers, and strengthen the sustainability of fishery biological resources (Prihadi, 2003). Environmental resources, including land, water, air, and biota, can provide goods and services that are used directly or indirectly to generate income (Djajadiningrat et al., 2011). Damanik J & Weber, H.F (2006) stated that a study conducted on nine conservation areas in Indonesia reveals that there is a significant deal of potential for the development of ecotourism due to the items' uniqueness and diversity. According to Damanik J., & Weber H.F. (2006) research of TIES (2000) the ecotourism market is growing between 10 % and 30 % annually, but the growth of tourists as a whole is only 4%. About 20% of ecotourism grew, according to WTO estimates in 1998. In the middle of the 1990s, the growth rate in the Asia Pacific area itself varied from 10% to 25%. Approximately 25% of foreign visitors to Indonesia in 1996 were thought to be ecotourists. These figures indicate that the tourism industry is currently undergoing a change in behavior, and ecotourism is predicted to grow significantly in the next years (Damanik J., & Weber H.F. 2006). The 20,057 Ha Regional

Marine Conservation Area (MPA) Nusa Penida, which has been named a Marine Tourism Park, is situated southeast of Bali (Darma, Basuki, & Welly, 2010).

A prime example of a coastal region rich in significant marine ecosystems is Bali, Indonesia's Nusa Penida area. Here, marine species of all kinds can be found in seagrass beds, mangrove forests, and coral reefs (Jubaedah & Anas, 2019). At about 45,000 people, seaweed farming is the primary industry in Nusa Penida. Despite the fact that there are frequently conflicts of interest between tourist, fishing, and other industries in the area, seaweed farming, marine ecotourism, and catch fisheries are the main sources of income for Nusa Penida (Fauzi et al.,). Area activities include fishing, tourism, and other pursuits (Fauzi et al., 2009; Harjadi, 2016). Small islands in the province of Bali, including Nusa Penida Island, Menjangan Island, Nusa Lembongan Island, Serangan Island, and Nusa Ceningan Island, are part of the government area (Figure 1 below).

The coordinates of Bali Island are 8º 25’ 23’’ LS dan 115º 14‘ 55’’ BT, and have a tropical climate. Due to its convenient location close to the provincial capital, Nusa Penida Island is in high demand from tourists with particular interests. As a result, many visitors come to take in the breathtaking natural beauty. From the port at Sanur Beach, Nusa Penida Island is accessible for a crossing fee of Rp. 25,000 per person for public boats that take two hours to reach, and Rp. 50,000 per person for fast boats that take 40 minutes to reach. Situated in the southeast of Bali, the island of Nusa Penida is divided from the main island by the Badung Strait. Special interest tourism, including coastal and marine tourism, is well-known in the waters around Nusa Penida Island. Activities for those interested in coastal and marine tourism on Nusa Penida Island include snorkling, diving, sailing, sea fishing, surfing, and basic beach tours. Currents, waves, and wind are three physical characteristics of seawater that affect how long it takes to get to the dive site in Nusa Penida, Bali.

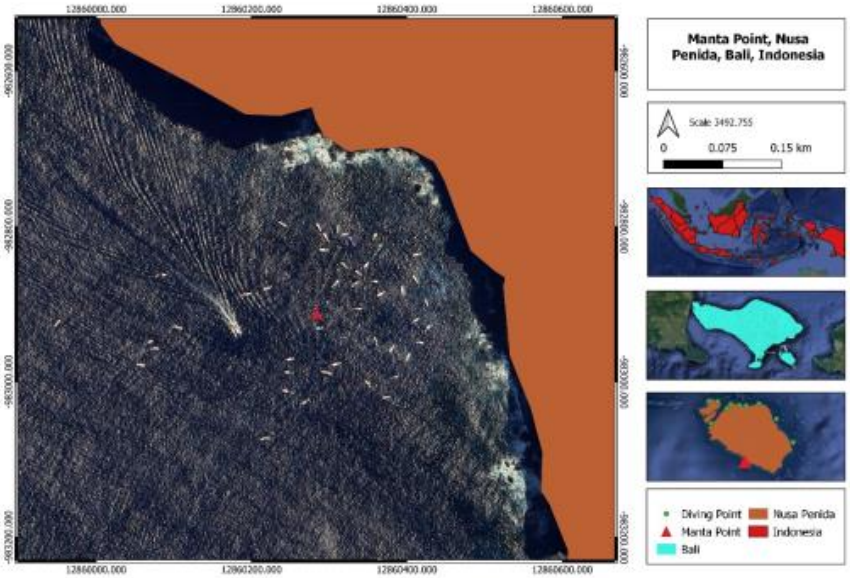

Figure 1. Manta Point, Nusa Penida, Bali, Indonesia

The Manta Point area on the southernmost part of Nusa Penida Bali is home to a greater number of manta rays than other parts of the island. Together, these sites have developed into Indonesia's top destinations for manta ray tourism, accounting for the second-biggest manta ray viewing market globally (Couturier et al., 2012). With a total area of 7.7 million km² of land and sea, comprising 17,504 islands spread across 95,181 km^2 of coastline, ranging from Sabang to Merauke, Indonesia is the world's largest archipelago (Prihadi, 2015). More than thousands of islands have been owned by Indonesia.

Sustainable tourism is closely related to ecotourism. The latter is dependent upon how tourism and the environment interact (Ab, Ahmad, et al., 2020). One way to characterize ecotourism is as a means of financing for pertinent stakeholders and advancing societal values in protected regions (Bunruamkaew, 2012). One of the ways that the global economy is growing the fastest is through international tourism. The only significant service industry in which developed districts have continuously reported trade surpluses in comparison to the global average is tourism (Neto Frederico, 2003). These days, one of the second-biggest sources of income and foreign cash is tourism. One of the main drivers of the growth in the number of islands in small developing states (SIDS) is tourism (Neto Frederico, 2003).

The interaction between manta rays and divers feels scientific and fun for divers at Manta Point, Nusa Penida, Bali. According to information gathered, the expenses paid annually on average by those who travel expressly to observe manta rays total USD 1,826,060.04, or 24 billion rupiah. 5,790 visitors to Manta Point who were there for the manta rays' marine tourism provided this data (Lazuardi et al., 2015). Research shows that Manta Rays are often located and live in Manta Point. Diving with manta rays in Nusa Penida is a dive spot that is one of the busiest stations/points for diving in the Nusa Lembongan and Nusa Penida areas, Bali. According to Prabuning, D., et al. (2015) manta rays are the main draw for 80% of diving and snorkling activities. Manta rays are the primary draw for tourists to Labuan Bajo (70%–100%). In the event if the number of manta rays decreased, 40% of visitors said they would not visit Labuan Bajo again.

The biodiversity below sea level is the stunning coral reef forests and thousands of marine fish that inhabit it. A competitive advantage for tourism products in the global market is the diversity of tourist objects and attractions (ODTW). He clarified that the benefits of ODTW variety can only be realized if it is created appropriately based on quantifiable planning findings (Damanik J & Weber, H.F, 2006). According to (Tuwo A, 2011) stated that ecotourism can increase economic opportunities in the form of: 1). Expansion of employment, 2). Increase in local community income, 3). Increase in regional income.

Marine tourism in Nusa Penida from time to time is always in demand by many divers every semester. Various products from marine tourism special interest diving and snorkling, become one of the most common suppliers of local and foreign tourists to take marine ecotourism packages for diving. Developing an efficient ecotourism management plan requires careful consideration of its requirements and active participation from stakeholders (Tuwo, A. 2011).

One kind of special tourism activity is ecotourism. Ecotourism is frequently positioned in a region alongside mass tourism, owing to its unique shape. The features of the product and market are actually what set it apart from mass tourism more. This distinction undoubtedly affects the need for standard planning and administration (Damanik J., & Weber H.F. 2006).

2. RESEARCH METHODOLOGY

This study was carried out in July 2024 in the Bali Province's Nusa Penida using the survey method. The secondary data provided as reinforcement and the survey method as the primary source of data. The Marine Science Laboratory at Padjadjaran University's Faculty of Fisheries and Marine Sciences conducted the study of the pictures and plankton samples. The survey approach involves diving into the location of choice. Purposive sampling, which was used in this method, was used to choose the place. Manta Point, Toyapakeh, Crystal Bay, and SD Point were used to determine the presence of manta rays and diving site information. The research was carried out at 13:00 am WIT. The survey approach uses direct field observation and measurement to gather information on fish, and oseanography factors.

3. FINDINGS AND DISCUSSION

A leisure activity, manta ray watching involves diving, snorkling, and other methods of observation to view manta rays in their natural habitat. This is according to O'Mally et al., (2013) twenty-five nations, including the Maldives, Australia, Mozambique, Indonesia, and Hawaii, were identified in their analysis as manta ray tourism hotspots worldwide. Most popular tourist things between Indonesian and international tourists are gradually increasing in number (Bunruamkaew K., 2012). The most common nationalities of foreign visitors to Manta Point are Chinese, European, Singaporeans, Australians. Enhancing regional income in Bali is made possible by protecting and conserving manta rays. The principal tourist attraction in this study is the manta ray, an endearing animal. When environmentally conscious travel has an impact on social, cultural, ecological, and/or environmental processes, the idea of biodiversity is relevant (Hani et al., 2019). Marine wildlife tourism, which is fueled by tourists' desire to observe these animals, propels economic growth for charismatic species of marine wildlife (Kruger, 2005; Gallagher et al., 2011).

3.1 Manta Ray Identification (*Manta alfredi*)

Manta-watching offers the ideal setting for more involved wildlife tourism activities, which are becoming more and more in demand from travelers (Birtles et al., 2001; Lück, 2015). Manta ray observations have been carried out at Manta Point, Toyapakeh, Crystal Bay, and SD Point are the four dive destinations on Nusa Penida Island. Manta point has become a favorite tourist spot for divers to dive with manta rays. Indeed, divers are not always able to see or meet manta rays. Table 1 displays the findings of the manta ray presence at each diving site.

Table. 1 Manta Ray Observation Results on Nusa Penida Island

No	Dive Location	Manta Ray Population
1	Manta Point	13
2	Toyapakeh	-
3	Crystal bay	-
4	SD Point	-

According to the table 1 above, 13 manta rays were discovered in Nusa Penida, and they were only discovered in the Manta Point dive site, which is located between 0.4 and 18 meters below sea level, with temperature 29^{o} C and salinity 33 ppt. There were no manta rays discovered during the research at Toyapakeh, SD point, and the Crystal bay dive site. It is said by multiple sources, including dive operators who have met in the field, that manta ray groups are typically visible to divers at Manta Point; however, it is uncommon to encounter manta rays at Toyapakeh, SD Point, and Crystal Bay. This is mentioned that the naming of the Manta Point diving location is because since long ago this location has often been found by manta ray groups both in summer and rainy seasons.

Manta rays (*Manta alfredi*) are one of the fish that have a large size and are the largest fish for the group of stingrays that exist and have ever been found in this world. Like other marine fish, manta rays choose environments where the temperature and salinity of the waters are suitable for living. According to (Nontji, 2007) stated that the surface water temperature in the waters in Indonesia is generally at 28 - 31^{o} C and salinity ranges from 17 - 35 ppt. According to (Nontji, 2007) stated that sting rays can be divided into two categories, specifically: 1. In actuality, the tail comprises the body portion, and 2). The tail is merely an extra appendage or whip shape. Generally, the food of stingrays is small fish, squid, crabs, clams and plankton. However, manta rays are included in fish that eat by opening their mouths wide and food such as plankton can enter their digestive tract. Manna rays are in the eating position when they open their mouths and filter plankton (Lazuardi, et al., 2015). The way manta rays eat is different from other stingrays. The results of observation of plankton identification in the laboratory can be found that several dominant types of plankton are: *Acartia omorii, Oncaea conifer, Acrocalanus gibber, Euphausea pacifica, dan Oncaea venusta*.

In Indonesia, there are nearly always coral reefs along the coast. In tropical regions, coral reefs are characteristic ecosystems (Nontji, 2007). Due to the large number of visitors who wish to enjoy it, the coral reef area on Nusa Penida Island is extremely attractive and diverse, including the presence of colorful coral fish. Manta tourists in the area look forward to witnessing the feeding process of manta rays in the waters surrounding Nusa Penida's cliffs and southern bays (Lazuardi et al., 2015). The following is how manta rays are classified, using (Thomas P. Peschak, 2011):

Kingdom : Animalia
Phylum : Chordata
Class : Chondrichthyes
Subclass : Elasmobranchii
Order : Myliobatiformes
Family : Myliobatidae
Genus : Manta
Species : Manta alfredi

Figure 2. Manta ray (*Manta alfredi*)
Source: Nusapenida.org (2024).

The results of the observation of the existence of 13 manta rays (*Manta alfredi*). Many stingrays have one or more poisonous needles on their tails (Allen, 2000). Unlike other stingrays with potentially harmful spines on their tails, manta rays are not harmful to people. According to (Allen, 2000) statement that the length of the manta ray's fins is 670 cm and the body weight of the manta ray is more than 2 tons. Manta rays have gill gaps under their bodies. From observations in the field, it can be stated that all stingrays have gill gaps. Manta rays are fish that have cartilage. According to (Nontji, 2007) stated that cucut fish (shark) and stingray are classified as cartilaginous fish (Elasmobranchii). The upper body color of the manta ray is black and the lower part is white. Underwater observations can state that manta ray skin is like a thick carpet that is hard. Plaque scales, like fine, tipped spines, cover the skin. When we massage the body from the head to the rear, it feels rather smooth; nevertheless, if we rub from the opposite way, it feels differently (Nontji, 2007). The general shape of the stingray is flattened and observations in the field state that manta rays are flattened and have wide pectoral fins. Manta rays can see a collection of plankton as their main food while swimming wagging their pectoral fins. According to (Nontji, 2007) stated that the diet consists entirely of small animals and zooplankton obtained using the filtering organs contained in the gill arc. The currents wash the krill and plankton to the surface of the waters, they wash up the coral walls of the bay and spin out towards the open sea (Bruce, 2009).

a. Sustainable Tourism in Bali

The desire of tourists is to get up close and personal with these creatures in their natural habitat. This is why protecting marine species is beneficial for ecosystem services that the species provide, in addition to non-consumptive uses (Hani et al., 2019). According to (Tuwo A, 2011), ecotourism

destinations may have the following possible advantages: 1. More economic prospects; 2. Preservation of cultural and natural resources; and 3. Enhancement of living standards. Increasing economic potential in ecotourism destinations has the following advantages: 1. expanding the community's or the local population's work fields, 2. raising income, 3. Establishing new companies and boosting the regional economy; 4. Growing companies or producing handicrafts made from regional products; 5. Increasing commerce and foreign exchange receipts; 6. Raising living conditions and regional/local tax receipts; 7. Encouraging staff members and the community to acquire new skills and 8. Expanding the sources of finance for local community empowerment and environmental preservation. The economic, social, and physical problems that provide significant obstacles to sustainable development are never easy to address, claims (The L and Cabanban, 2006).

The Maldives, who have one of the oldest manta ray viewing industries in the world, mostly depend on tourism related to its marine biodiversity, with manta rays being their most beloved symbol. Visitors spend an astounding to watching and interact with manta rays in the waters of the Maldives would cost U$8.1 million (Hani et al., 2020). With an estimated direct economic impact of U$15.1 million, the manta ray viewing sector is very advantageous to Indonesia, ranking second only to Japan (O'Malley et al., 2013; Lazuardi et al., 2015). Although there are many leading destinations on the island of Bali, the excitement of marine tourism, in Nusa Penida and Nusa Lembongan is still always chosen.

Mantas are an asset that needs to be managed and protected because they are a popular tourist attraction for snorkling and diving at manta point. In addition to ensuring that mantas survive, management and conservation will also benefit the local economy and promote sustainable tourism. Effective tourism planning and policy making have been somewhat neglected. The process of ecotourism development is seen as a learning process and ecotourism as a process to maintain environmental and ecological values, promoting local participation in tourism development.

Enhancing quality on life have long-term advantages, such as: 1. Boosting spirituality, aesthetics, and other well-being-related values; 2. Assisting in the growth of environmental education for visitors and local communities; 3. Fostering intercultural understanding; 4. Supporting the development of culture, crafts, and art; 5. Raising the standard of education in the local community; 6. Enticing managers and the general public to become conversant in the languages and customs of foreign visitors, and 7. Motivating local communities to preserve the environment and value their own culture.

The ideas of environmentally sustainable development and sustainable tourism are strongly tied to ecotourism. The goal of ecotourism should always be sustainable development; the industry is built on standards, rules, and principles; and emerging sectors require certification or a regulatory framework for the standard requirements to be applicable. According to Bunruamkaew K. (2012) ecotourism is regarded as a part of sustainable tourist development. According to Bunruamkaew K. (2012) ecotourism needs to integrate idea development and conservation holistically, which implies that all of the elements must be interconnected and balanced with one another. The following are some benefits of protecting natural resources and cultural values, according to Tuwo A. (2011): 1. Maintenance of ecological systems and sustainability of biodiversity 2. The creation of economic value from natural resources that previously did not support the local economy, 3. Enhancing the area's infrastructure, communications, and transportation; 4. Helping to create a separate funding source for ecotourism management; 5. Safeguarding and maintaining the region's cultural heritage,6. Assisting in the interpretation and communication of the value of nature preservation to visitors and nearby communities to still a sense of responsibility in the next generation, 7). To help managers and tourists improve environmental and business management systems and methods, and support research and development initiatives.

Marine tourism has been able to increase the income of people who work in the Nusa Penida and Nusa Lembongan areas and surrounding areas. The benefits of special interest tourism activities diving with manta rays are much more and greater when compared to manta rays that are only caught and sold for consumption both for local and international markets. The ability of the local community

to remain competitive in the marine tourism industry is bolstered by the administrative role of the area manager, which is shared by both migrants and locals and encourages the growth of tourism.

4. CONCLUSION

Manta rays (*Manta alfredi*) have become one of the big fish that provide a spectacular experience for divers. Manta Point is a diving location that interests divers visiting Nusa Penida Island. 13 manta rays were found at Manta Point, Nusa Penida Island, Bali at a depth of 0.4 – 18 meters, temperature 29^{o} C and salinity 33 ppt. European, Australians, Singaporeans, Chinese are the countries of origin of the most foreign tourists in Manta Point. Maintaining and preserving manta rays at Manta Point Nusa Penida Bali makes regional income in Bali even better than before. Marine tourism with a special interest in diving with manta rays has shown that with the contribution of marine life types that are protected by the aquatic environment and preserved manta rays, many people have a better chance of living sustainably.

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