



# Optimizing sustainable ecotourism management for aquatic ecosystem preservation and fishermen empowerment: A descriptive and exploratory research

Dedi Armayadi<sup>1,\*</sup>, Nadia Afifah<sup>1</sup>, Rizal Rifai<sup>1</sup>

<sup>1</sup> School of Environmental Science, Universitas Indonesia, Central Jakarta, DKI Jakarta 10430, Indonesia.

\*Correspondence: dedy.armayadi@ui.ac.id

Received Date: December 6, 2024

Revised Date: January 29, 2025

Accepted Date: January 30, 2025

## ABSTRACT

**Background:** Ecotourism has significant potential to support the sustainability of aquatic ecosystems while also providing economic and social benefits to fishing communities in coastal areas. This study focuses on optimizing sustainable ecotourism management to support the preservation of aquatic ecosystems and empower fishermen in Raja Ampat Regency. **Methods:** The research is descriptive and exploratory, aiming to describe and analyze the existing facts, phenomena, or situations related to sustainable ecotourism management. Data collection techniques include observation and the analysis of literature and documents relevant to the research topic. **Findings:** The study suggests that the integration of education and ecology through the EduEco Tourism concept can help preserve the region's ecological integrity while benefiting local communities. The concept also emphasizes fostering responsibility among visitors. **Conclusion:** Sustainable ecotourism, supported by effective policies and fishermen empowerment, plays a key role in preserving aquatic ecosystems and improving the livelihoods of local communities. The EduEco Tourism model offers a balanced approach to environmental conservation and community development in Raja Ampat. **Novelty/Originality of the Study:** This study highlights the dual role of ecotourism in preserving aquatic ecosystems while simultaneously fostering the socio-economic empowerment of local fishing communities, offering policy recommendations for more sustainable management practices.

**KEYWORDS:** sustainable ecotourism; aquatic ecosystem preservation; fisherman empowerment; Raja Ampat.

## 1. Introduction

Aquatic ecosystems, including rivers, lakes and coastal areas, are natural assets that are important for life on Earth. These aquatic ecosystems are not only home to various forms of life, but also provide ecosystem services that support human life. One of the big challenges facing aquatic ecosystems today is maintaining the sustainability of its natural resources while supporting human welfare, especially fishing communities who depend on them. Ecotourism is an approach that has great potential in maintaining a balance between preserving aquatic ecosystems and empowering fishing communities. Ecotourism not only provides economic opportunities through sustainable tourism, but also raises awareness of the importance of preserving the natural environment. However, to achieve this sustainable

### Cite This Article:

Armayadi, D., Afifah, N., & Rifai, R. (2025). Optimizing sustainable ecotourism management for aquatic ecosystem preservation and fishermen empowerment: A descriptive and exploratory research. *Journal of Character and Environment*, 2(2), 149-167. <https://doi.org/10.61511/jocae.v2i2.2025.1448>

**Copyright:** © 2025 by the authors. This article is distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).



goal, wise and sustainable ecotourism management ecotourism is the key (Damanik & Weber, 2006).

Raja Ampat is a marine tourism destination with an ecotourism concept. The group of islands that make up Raja Ampat displays extraordinary underwater natural beauty, making it one of the most famous underwater tourism icons in Indonesia. These islands have developed into a major attraction for tourists, both domestic and international. Raja Ampat's popularity as an ecotourism destination is not only supported by the beauty of its underwater world, but also by the sustainability of environmental conservation efforts. Conservation efforts and wise management of natural resources are key in ensuring that Raja Ampat's natural beauty can be enjoyed by future generations. Thus, Raja Ampat is not only an attractive tourist destination, but also acts as a positive example in efforts to preserve Indonesia's natural wealth (Isti'anah, 2019).

The Raja Ampat Islands, as the center of the world's coral triangle (Heart of The Coral Triangle), are known as an underwater paradise with the best coral reefs in the world. Apart from that, their beauty also radiates through vast seagrass beds, lush mangrove forests, sandy beaches, seashore, and stunning rocky cliffs. In this area, a number of local species face the threat of extinction, including turtles, sharks, whales, manta rays, dugongs and dolphins. This fact makes Raja Ampat waters qualify as a conservation area that not only protects biodiversity, but is also an attractive tourism destination. Raja Ampat has become an icon of Indonesian maritime tourism, inviting travelers from all over the world to experience its unique charm and natural beauty, while supporting sustainable management and conservation efforts.

Ensuring the survival of every potential resource that exists, tourism development in Raja Ampat Regency needs to carry the concept of ecotourism. This concept refers to tourism that is based on understanding and caring for the environment. Environmentally friendly tourism is defined as tourism activities that are sustainable, do not have a negative impact on the ecosystem, do not damage the social life of the community, provide economic contributions to local residents, do not pollute the environment, and most importantly, do not reduce the quantity and quality of natural resources. Although the tourism sector makes a positive contribution to the country's economic growth, it is often highlighted because of the negative impact it has on the environment. Therefore, a number of countries in the world have initiated efforts to develop sustainable tourism with the aim of promoting the growth of the tourism industry without harming the environment (Alam & Paramati, 2017).

Empowering fishermen in ecotourism management can provide benefits to improve the welfare of fishing communities by maintaining and restoring damaged aquatic ecosystems. However, successful ecotourism management requires close collaboration between government, communities and other stakeholders. This involves thoughtful policy development, effective oversight, public education and awareness, and the development of sustainable business models. Therefore, this research aims to optimize sustainable ecotourism management in supporting efforts to preserve aquatic ecosystems and empower fishermen. By understanding the challenges, opportunities and best practices in sustainable ecotourism management, this research seeks to contribute to efforts to maintain the sustainability of aquatic ecosystems and the welfare of fishing communities.

## 2. Methods

This research is descriptive and exploratory research which aims to obtain existing facts to describe or describe a phenomenon or situation, focusing on presenting data and characteristics of the research topic. The descriptive method used by the authors as a data collection technique is observation and analysis of literature and documents.

Secondary data is the main foundation of this research, providing historical information, geographical conditions and the development of ecotourism area that is the research focus. Secondary data sources involve government reports, documentation of previous projects, survey results, and related scientific literature. Analysis of this data helps develop a comprehensive understanding of the specific context of ecotourism locations and

the condition of aquatic ecosystems. Secondary data also provides a detailed view of the impact of ecotourism activities on aquatic ecosystems and fishing communities.

This literature analysis aims to understand the impact and benefits of ecotourism development on human resources, with a focus on social, economic and environmental dimensions. After the literature analysis is complete, the next step is to formulate a more in-depth research methodology by considering the findings and views from the literature study. This research methodology will then become the basis for further empirical research regarding the development of human resources from ecotourism activities in the Raja Ampat Islands. By detailing secondary data, this research builds a solid framework for designing more sustainable policy recommendations, ecotourism management strategies and fishermen empowerment programs.

The data analysis method in this research involves several stages of analysis to understand and evaluate the concepts presented in the literature, begins by analyzing text content from a literature review to identify main themes, ecotourism management approaches, and their impact on preserving aquatic ecosystems and empowering fishermen. Through content analysis authors will identify key words, phrases, or main concepts in literary texts. Assess the extent to which the literature supports or opposes certain ideas in the context of sustainable ecotourism management. In addition, the author uses an analytical framework to organize and understand information from the literature, along procedures for mapping important elements of sustainable ecotourism management and identifying relationships and patterns between variables discussed in the literature.

This research carried out in the coastal area of Raja Ampat Regency which stretches as an archipelago covering an area of 6,084.5 km<sup>2</sup>, covering around 15% of the total area, consisting of around 600 large and small islands. Among them, the four main islands that stand out are Misool, Salawati, Batanta, and Waigeo. As a large archipelago, sea transportation is the main means of mobility in this district. The importance of selecting this location is also due to high visitor activity, so it is urgent to give priority to approaches that can be utilized by industry to implement new interventions independently.

### 3. Results and Discussion

Raja Ampat, a district that was formed in 2003 after the expansion of Sorong Regency, presents extraordinary natural beauty and rich ecosystems. This district includes 12 sub-districts and 88 villages, with a population of around 31,000 people. Consists of 610 islands, four of which are large islands, namely Misool, Salawati, Batanta and Waigeo Islands. Only 35 islands are inhabited, giving tourists an exotic and beautiful impression. With an area of around 46,000 km<sup>2</sup>, Raja Ampat offers 6,000 km<sup>2</sup> of land and 40,000 km<sup>2</sup> of sea (Adesetiani et al., 2021).

Located in the centre of the world's coral triangle, the Raja Ampat Islands are the centre of the richest tropical marine biodiversity in the world. In an area of 4.6 million hectares, 1,104 types of fish, 699 types of molluscs and 537 types of coral animals were found. The potential for ecotourism is huge with a diversity of coral reefs, seagrass beds, mangrove forests and beautiful rocky cliff beaches. The development of ecotourism in Raja Ampat is also supported by the proposal as a World Heritage Location by the Indonesian Government.

The islands in Raja Ampat, such as Misool, Waigeo, Batanta and Salawati, offer extraordinary natural charm. Misool, with its wide-open sea, is a route for whales and octopuses. Waigeo, known as Amberi, offers beautiful diving locations and beautiful cliff-walled bays. Batanta, with its waterfall in the interior of the mangrove forest, enriches the tourist experience. Meanwhile, Salawati, which is still natural, is a witness to the history of World War II with the remains of Dutch and Japanese bunkers.

Socially, Raja Ampat is inhabited by traditional communities who live in harmony with the surrounding natural environment. Their local culture and traditions have become an integral part of the tourism attraction in this region. This social aspect provides great potential for ecotourism development involving the active participation of local

communities in tourism activities, which can improve the welfare and sustainability of local communities.

From an economic perspective, the Raja Ampat Islands have great potential as a tourism destination that supports local economic growth. Research on the economic impact of tourism shows that Raja Ampat can be a significant source of income for the community through various tourism activities, such as diving, snorkelling and marine tours (Honey, 2008). Ecotourism development that focuses on economic inclusion can provide further benefits by ensuring fair distribution of income among local communities.

From an environmental perspective, the Raja Ampat Islands play a crucial role as one of the world's biodiversity "hotspots", with a very productive coral reef ecosystem. The implementation of sustainable ecotourism principles must pay attention to the protection and preservation of these fragile marine ecosystems (Mous et al., 2017; Frias-Torres, 2018). Wise use of natural resources, effective tourism zoning, and environmental education for tourists and local communities are the keys to preserving the environment of the Raja Ampat Islands.

Sustainable ecotourism management in the Raja Ampat Islands, Southwest Papua, is an integral approach in preserving aquatic ecosystems while empowering local fishermen. From a social perspective, the potential of ecotourism can make a positive contribution to the welfare of local communities through creating new job opportunities, increasing income and empowering communities. Various ecotourism activities, such as snorkelling tours, diving, and cultural interactions with local communities, can strengthen social ties between tourists and residents (Blancas et al., 2016; Gössling et al., 2013).

From an economic perspective, the potential for ecotourism in the Raja Ampat Islands can be a significant source of income. Increasing tourist visits can encourage the growth of the tourism sector, which then has a positive impact on various local businesses, such as homestay management, local culinary delights and traditional handicrafts (Honey, 2008; Weaver, 2011). Sustainable utilization of ecotourism potential can also create an inclusive business model, where income from the tourism sector can be enjoyed fairly by local communities (Suman et al., 2017).

From an environmental perspective, sustainable ecotourism management in the Raja Ampat Islands requires an approach that focuses on conserving unique and vulnerable aquatic ecosystems. Measures such as tourist zoning, environmental education, and sustainable infrastructure development are key in preserving the environment and marine biodiversity in the region (Frias-Torres, 2018; Mous et al., 2017).

The people of Raja Ampat are known as a traditional community who have succeeded in maintaining their local wisdom amidst the flow of global progress. This research aims to describe how the local wisdom of the community guides the interconnection between cultural values, daily living practices, and their perceptions of the impact of the rapid development of the tourism industry. This social and lifestyle is considered the main basis for the social welfare of citizens.

The dynamic process of tourism development provides benefits for the people of Raja Ampat, such as general education, knowledge about the outside world, and increased income. However, the other side of this development includes the increase in prices of goods and the gradual dimming of cultural values, along with the degradation of the environment and natural quality in the region (Bhati & Pearce, 2016; Salvatierra & Walters, 2017).

Despite living with limited physical infrastructure and modern technology, Raja Ampat residents continue to live traditionally and depend on natural resources. Their views on nature, culture, and traditional beliefs shape the way they think about living side by side with other humans, living creatures, and nature itself. This way of thinking is intrinsically linked to the local wisdom they adhere to (Adapted from Bhati & Pearce, 2016; Salvatierra & Walters, 2017; Ratana-Ubol & Henschke, 2015).

In line with the concept of local wisdom and maintaining cultural identity, empowering local communities, several criteria have emerged that include efforts to improve the quality of life while maintaining and preserving local cultural heritage and traditions. This empowerment not only aims to increase income economically, but also to distribute it

evenly to the local population. The focus lies on developing small and medium scale businesses with a large workforce absorption capacity, while implementing appropriate technology. Meanwhile, the spirit of healthy competition and cooperative cooperation is the central value of empowerment, creating the foundation for sustainability. In the tourism context, empowerment is also directed at optimizing the role of tourism as a positive contributing agent to cultural traditions, with maximum efforts to minimize its negative impacts (adapted from Pratiwi et al., 2015).

Communities, especially indigenous people who live in tourism areas, play a key role in the tourism industry, because they are the ones who present the main attractions and play an important role in determining the quality of tourism products. The role of indigenous communities is manifested in various forms, such as providing accommodation and tour guide services, contributing labor, and maintaining traditions and local wisdom in protecting tourism resources, including natural and cultural riches. Local wisdom includes noble values that guide people's daily lives, aiming to protect and maintain the environment in a sustainable manner (Damanik & Weber, 2006).

According to Nugroho (2015) local communities with their unique cultural richness are one of the main potential tourism resources, parallel to the charm of natural beauty that the area has. With good understanding, local potentials can be managed efficiently and competitively, becoming an attraction for tourists who continue to be interested in visiting. This not only contributes to the tourism sector, but also has a positive impact on improving the welfare of local communities. Apart from that, interactions between indigenous people and visitors and tourists not only enrich cultural experiences, but also have a positive impact in the form of understanding and acceptance of local culture, without eliminating their cultural values.

The development of the tourism sector is recognized as making a positive contribution to the community's economy (Vargas-Sanchez et al., 2011). This process opens new employment opportunities (Capacci et al., 2015) and plays an important role in supporting local governments in formulating economic policies that are beneficial to its citizens (Seetanah, 2011). However, there are also negative impacts that need to be considered, such as spikes in goods price inflation which can affect stakeholders, especially those who are vulnerable to economic insecurity due to deficiencies in tourism management (Andereck & Nyaupane, 2011).

Apart from economic aspects, tourism activities also have significant socio-cultural impacts. The socio-cultural dimension involves the expression of behaviour, rules of belief, social life, and use of the environment (Alland, 1980). In the context of tourism, the development of this sector practically results in social and cultural changes in society (Frent, 2016). There are several positive impacts from community efforts to preserve local traditions to support tourism needs. Without tourism, the risk of losing local traditions, values and assets may increase. In addition, tourism can act as a trigger for the creation of new jobs related to it, such as jobs as tour guides and in the hotel sector. However, this aspect of work must be balanced with increased knowledge and skills (Leu et al., 2018). On the other hand, negative socio-cultural impacts can also be observed in various tourism destinations, including changes in cultural values that may exploit society or nature (Seymour, 2016).

From an environmental aspect, tourism development includes several locations experiencing a decline in natural quality due to irresponsible management by the government and community. Specifically, in this context, Raja Ampat experienced very negative environmental impacts at the beginning of the 21st century (Varkey et al., 2010).

The relationship between the impact and perception of tourism is closely related to whether tourism provides more opportunities and better living conditions to people, such as developing other sectors simultaneously with tourism. If facilities and conditions improve, positive perceptions such as acceptance and support for tourism growth in the area will emerge. In other words, positive perceptions arise because of the benefits obtained by residents (Brida et al., 2011). However, as subjects of society, some residents may also have negative perceptions of tourism development. In addition, tourism does not always

have an even positive impact on society. Even though residents live in the same area, it is natural that each resident experiences different impacts, due to the unequal distribution of rights or gaps in perception of what they receive. Therefore, negative perceptions can arise from these conditions. Residents who are not involved as tourism stakeholders or experience structured exclusion are more likely to experience negative impacts from tourism, which will be reflected in their more negative perceptions. This concept believes that costs and benefits will drive various perceptions about tourism (Ap, 1992).

### 3.1 Tourist growth in Raja Ampat

Raja Ampat is an area with very high tourism potential, most of the waters of this archipelago offer extraordinary tourism value and potential when packaged in tourism event packages and supported by appropriate facilities. Since Raja Ampat began to be promoted, the number of visits to this destination has continued to increase, involving both foreign and domestic tourists. Over the last 15 years, Raja Ampat's tourism industry has shown excellent, positive and stable growth. Although initially foreign tourists dominated the market significantly, the growth of domestic tourists is slowly but surely also showing significant growth rates.

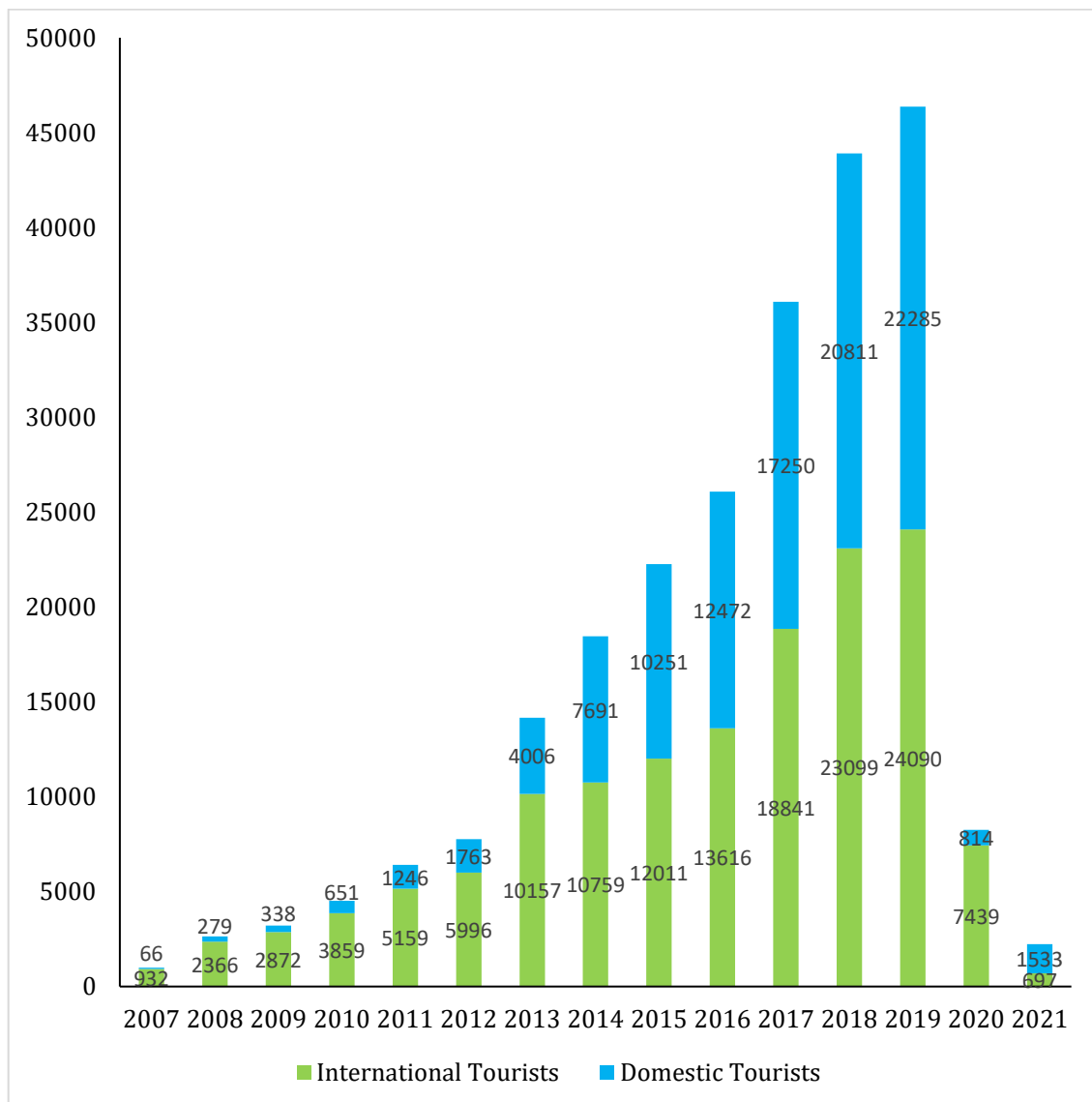


Fig. 1. Graph of the growth trend of foreign (green bar) and national tourists (blue bar) in Raja Ampat Regency (Rasyid et al., 2022)

Tourist growth in Raja Ampat shows a very positive trend, with the Compound Annual Growth Rate (CAGR) from 2014 to 2019 reaching 21.86% per year. On average, tourist growth from 2007 to 2019 reached 37.70% per year. Even though the number of domestic tourists in 2013 was smaller compared to foreign tourists, the domestic tourist market had the highest average growth rate, namely 33.11% per year. In the 2020-2021 period, the CAGR for Raja Ampat tourists reached 2.7%, indicating positive developments after the COVID-19 pandemic (Fig. 1). If this growth trend continues to increase in the next 5-10 years, it can be anticipated that the number of Raja Ampat tourists will experience a significant increase. However, this rapid growth requires improving the quality of good tourism management, considering that Raja Ampat has a natural tourist attraction that is very dependent on its physical aspects.

According to Rasyid et al. (2022), referring to tourist growth data, tourist growth projections were carried out using the Least Square Method (Trend Analysis). This projection involves a time period up to 2042, or the next 20 years, which is divided into four growth phases with each phase based on certain contextual assumptions. The Covid-19 pandemic in 2020 is also a factor to be taken into account, so that the tourism sector which has experienced a significant decline requires a recovery phase.

Tourist attractions in the Raja Ampat tourist area are very diverse, involving various interesting activities such as diving tours, swimming tours, snorkeling, photography, birdwatching, especially the exotic bird of paradise, and exploring the islands spread throughout Raja Ampat Regency. This diversity creates unique and engaging tourism experiences, meeting the needs of different types of travelers with different interests and preferences. The following is a map of the distribution of tourism potential in Raja Ampat Regency (Fig. 2).

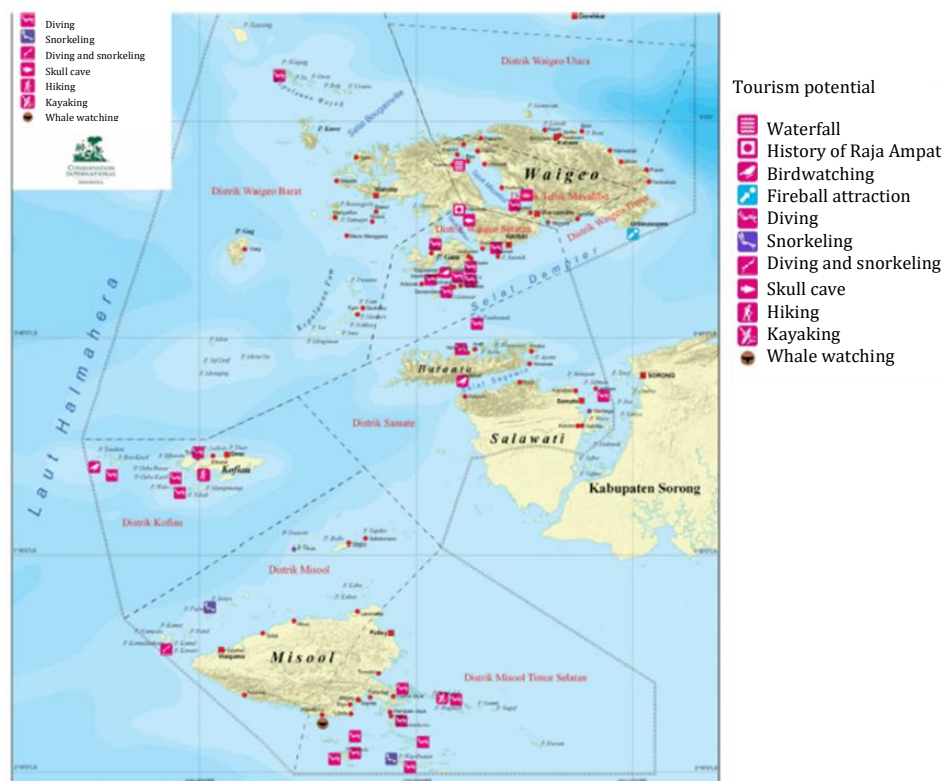


Fig. 2. Map of the Distribution of Tourism Potential in Raja Ampat Regency (Ministry of Tourism and Creative Economy, 2016 in Rasyid et al., 2022)

### 3.2 Community preferences on the impact of tourism development on the economy

Based on research conducted by Ling et al. (2011), the impact of tourism on the economy can be analyzed in terms of the profits and losses generated. In the profit aspect,

tourism makes a positive contribution through increasing foreign exchange, increasing income for local communities, creating jobs, opening investment opportunities, and also stimulating entrepreneurial activities. On the other hand, adverse impacts include the risk of over-dependence on the tourism industry, increased frequency of imports, and the possible dominance of seasonal products which could have a negative impact on the local economy.

Table 1. Percentage of perceptions of the impact of tourism development on the economy

No	Economic impact element	Performance					Score
		Very important	Important	Fairly important	Not important	Very unimportant	
1	Increase in community employment	38.46	38.46	12.09	10.99	0.00	100
2	Increase in community income	43.96	38.46	12.09	5.49	0.00	100
3	Improvement community living standards	31.87	53.85	6.59	7.69	0.00	100
4	Opportunities for investment, development, and infrastructure spending	8.79	49.45	24.18	5.49	12.09	100
5	Improvement in the quality of local services	23.08	50.55	15.38	10.99	0.00	100
6	Increase in living cost	5.49	41.76	14.29	28.57	9.89	100
7	Creation of new markets for local products	38.46	21.98	29.67	9.89	0.00	100
Total		190.11	294.51	114.29	79.12	21.98	
Total percentage		27.16	42.07	16.33	11.30	3.14	

(Iriani, 2019)

Based on the analysis of 7 indicators of the perception of the impact of tourism on the economy carried out by Iriani (2019), the community gave a very positive response to the development of tourism which increased community income with a value of 4.21 on a scale of 5. It can be seen that the majority of the community comes from fishermen, who in parallel, involving themselves in the tourism sector as side workers, have a higher average monthly income compared to those who only focus as fishermen or farmers. Apart from that, another economic impact that is considered positive by the community is "tourism improves people's living standards" with a score of 4.10. This reflects the public's perception that with the growth of income through the tourism sector, their standard of living has also increased. Through data analysis and interviews, it was revealed that the majority of people had their main job as fishermen or farmers (73.63%), with monthly income ranging from IDR 300,000 to IDR 700,000. However, those who combined their main job as a fisherman or farmer with a side job as a homestay owner or tourist guide, showed a significant increase in monthly income, ranging from IDR 4,000,000 to IDR 6,000,000.

### 3.3 Human resource capacity in Raja Ampat

Based on population developments that occurred from 2010 to 2015, it shows that there is human resource potential, seen from the increase in population over 5 years in each tourist village even though there are also villages that have experienced a decline in



population. The decrease in population occurred due to the expansion of sub-districts into new sub-districts (the location of the tourist village). This human resource potential can be developed, especially in tourism activities in the Raja Ampat Islands. The following is a diagram of population development in the tourist villages of the Raja Ampat Islands (Fig. 3).

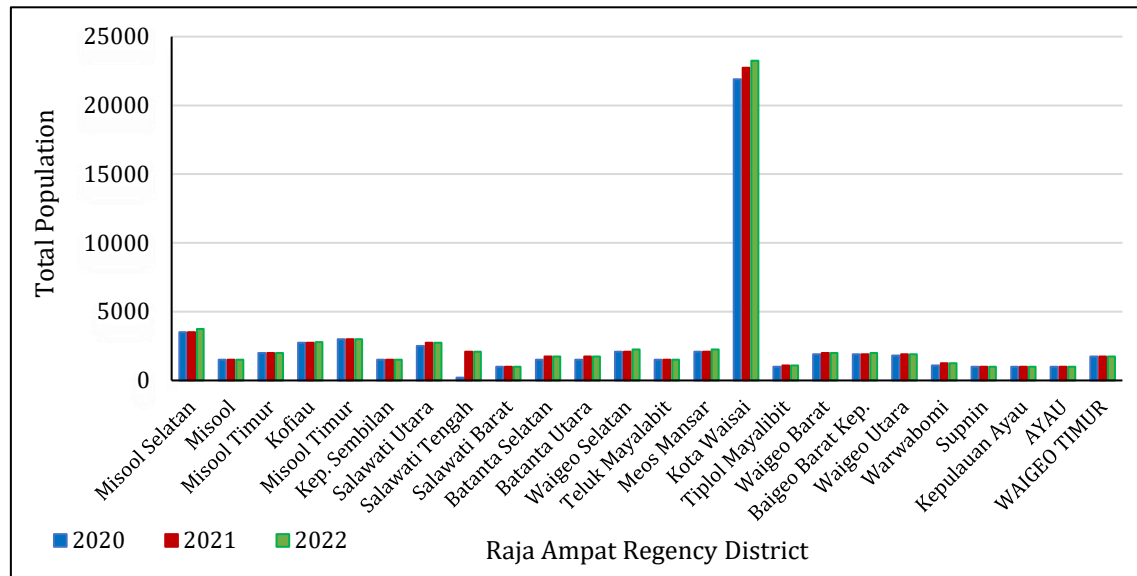


Fig. 3. Diagram of population development in the tourist villages of the Raja Ampat Islands

Based on population development from 2020 to 2022, significant Human Resources (HR) potential is visible. The increase in population over the 3 year period in most tourist villages showed positive growth, although several villages experienced a decline in population. This decline is related to the division of sub-districts into new sub-districts, which affects the location of the tourist villages. The potential of existing human resources can be optimized, especially in the context of developing tourism activities in the Raja Ampat Islands. The following graph of population development in the tourist villages of the Raja Ampat Islands can provide a more detailed picture of population dynamics in the area.

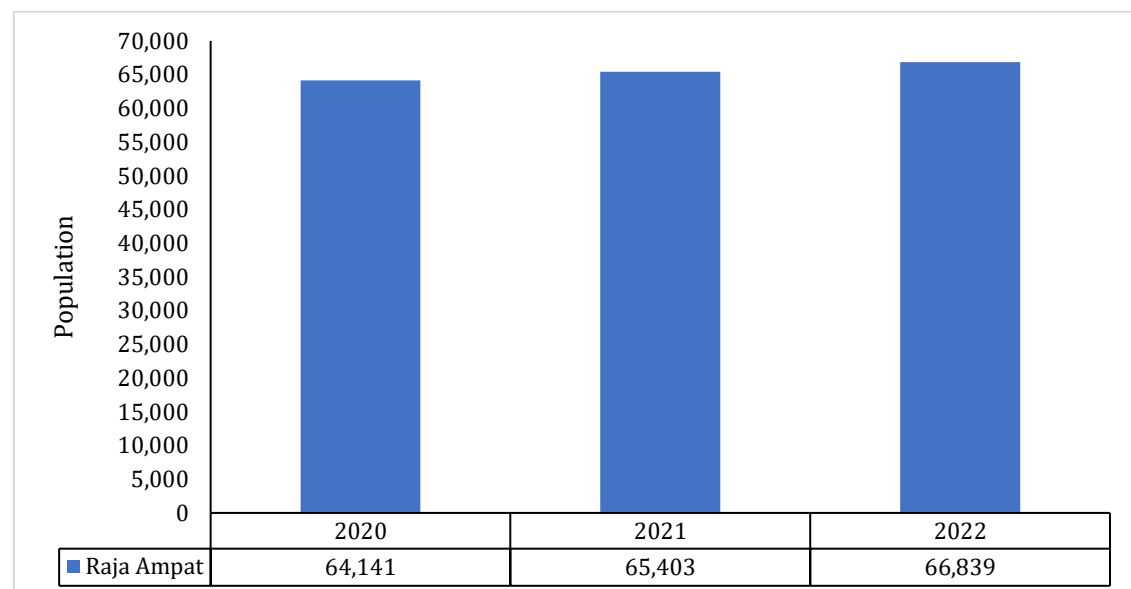


Fig. 4. Population development of Raja Ampat Tourism Village 2020 until 2022 (Raja Ampat Regency BPS and Population and Civil Registration Service, 2023)

Education has a central role in the development of the tourism sector. However, data regarding the number of educational facilities in Raja Ampat Islands tourist villages over the

last 5 years shows a lack of significant development. This situation reflects the lack of attention from the community and local government to the urgency of increasing human resources through education. The uneven distribution of educational facilities in these villages also indicates that the development of educational facilities is still not evenly distributed in every village and the number is still very limited. This shows the need for further efforts to improve educational infrastructure to support the growth of human potential in the tourism sector.

### 3.4 Environmental conservation

Environmental conservation plays a central role in efforts to develop ecotourism in the Raja Ampat Islands, Southwest Papua. By becoming the main focus, environmental conservation is the basis for maintaining the sustainability of the abundant tropical marine biodiversity in this region. Environmental conservation initiatives include the establishment of marine conservation zones, including the Raja Ampat National Park, which aims to protect coral reefs, seagrass beds and other marine habitats (Green et al., 2015). Within the framework of environmental conservation, ecotourism activities are strictly regulated and monitored to ensure that human interaction with the marine environment does not damage natural ecosystems and create negative impacts (Fennell, 2015).

Environmentally friendly ecotourism guidelines serve as a guide for managing tourism destinations, by prioritizing conservation principles. The involvement of local communities, including fishermen, in ecotourism activities is an important step to ensure understanding and active participation in preserving the environment (Froemke & Marques, 2019). Apart from that, educational efforts for tourists are also carried out to increase awareness of the importance of preserving the unique marine environment in Raja Ampat (Higham et al., 2013). Environmental preservation is not only the responsibility of the government and tourism managers, but also involves the active participation of local communities. By combining the principles of ecotourism and environmental conservation, the Raja Ampat Islands show that tourism development can be in line with sustainable nature conservation.

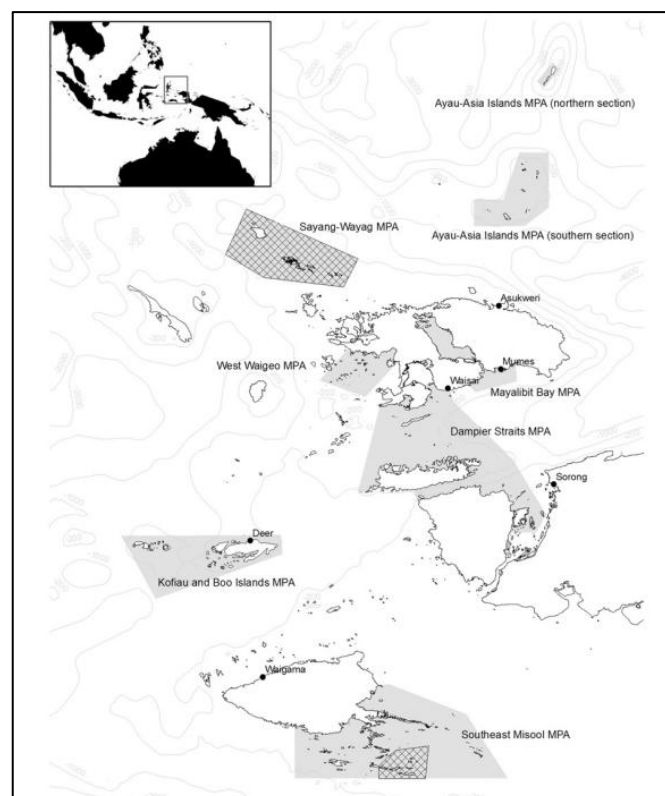


Fig. 5. Spatial Zone in Marine Protected Area in Raja Ampat Regency (Grantham et.al., 2013)

In the context of environmental conservation in Raja Ampat, marine protected area zoning management is the main foundation of conservation efforts. The concept of marine protected area zones involves establishing functional boundaries based on potential resources, carrying capacity, and ecological processes within the area as an ecosystem unit. The rules outlined in the Regulation of the Minister of Marine Affairs and Fisheries of the Republic of Indonesia (PER.30/MEN/2010) regarding the management plan and zoning of marine protected areas divide the zones of Marine Protected Areas (MPAs) into four categories, namely core zones, sustainable fisheries zones, utilization zones, and other zones.

These zones have specific roles in maintaining the sustainability of biota stocks, improving habitat, restoring ecosystem functions, and supporting the increase of marine biodiversity. For example, core zones may serve as highly protected areas to maintain high biodiversity, while sustainable fisheries zones may offer space for fisheries activities that can be managed sustainably. By linking these zoning principles with the results of research and implementation in Raja Ampat, it can be concluded that marine protected area zoning management is an effective instrument in maintaining the sustainability of the region's biodiversity-rich marine ecosystems.

### *3.5 Fisherman community participation*

Tourism has become the main foundation in the economic development process, occupying a central position as a crucial economic activity. It has been proven that carefully managed tourism development can make a very significant contribution to the progress of a region. The positive impacts of the tourism sector include opening new job opportunities, increasing business opportunities, increasing income for local communities, as well as increasing regional revenues through tax levies and other aspects. The existence of the Fisherman's Village tourism with the community can be used as an educational tourist destination that focuses on the fish processing industry and natural beauty. It is hoped that this will be able to develop the village, improve family welfare, and provide additional income through managing the natural resources it owns. This process involves the participation of the entire community or group, where they learn about their strengths and assets so that they can be utilized constructively, inclusively and collaboratively to achieve predetermined aspirations and goals (Manshur et al., 2021).

The participation of the fishing community is the main pillar in efforts to develop ecotourism in the Raja Ampat Islands, Southwest Papua. In this context, fishermen are not only considered as beneficiaries, but also as partners who play an active role in managing and caring for marine natural resources. These participatory steps arise from the understanding that direct involvement of local communities, especially fishermen, is key to sustainable ecotourism development (Buckley et al., 2019).

The participation of fishing communities covers various aspects, starting from joint management of aquatic resources, drafting ecotourism policies, to the role of local guides in marine tourism activities. Involving fishermen in decision making can ensure that the policies implemented reflect the needs and aspirations of local communities (Diedrich, 2007). Empirical research shows that the active participation of fishing communities can increase the effectiveness of ecotourism management and support local economic sustainability (Pomeroy & Douvere, 2008).

Along with the active participation of fishing communities, equitable and sustainable local economic empowerment occurs. This sustainability is reflected in support for small-scale ecotourism businesses owned and operated by local communities (Buckley et al., 2019). Thus, the participation of fishing communities is not only as beneficiaries, but also as main actors in maintaining the sustainability of aquatic ecosystems and ensuring that the impact of ecotourism makes a positive contribution to local welfare.

### 3.6 *The impact of ecotourism on fishermen's income*

Ecotourism has become a significant alternative source of income for fishermen. Income from ecotourism activities has improved the welfare of fishing communities. Ecotourism can have a positive impact on ecological aspects by promoting natural resource conservation and environmental sustainability. Through sustainable practices, such as wise tourism management, ecotourism can help preserve marine and mangrove ecosystems, which are important habitats for various types of fish and marine biota (Higham & Lück, 2008).

Tourism development, as stated by Cohen (1984) in Iriani (2019), brings several advantages and disadvantages that can be felt in the economic context. The positive impacts include increasing people's income, wider employment opportunities, positive influence on prices in local markets, increasing foreign exchange earnings from tourist visits, equal distribution of benefits and profits among various levels of society, as well as contributions to development and government revenues through various taxes and retribution. However, on the other hand, tourism development can also bring disadvantages, including potential vulnerability to market fluctuations, imbalance in the distribution of benefits, and negative impacts on the environment and local culture. Therefore, it is important to manage tourism development wisely to maximize positive benefits while minimizing risks and negative impacts.

From a social perspective, ecotourism can open up new opportunities for fishermen to participate in tourism activities. This can create employment opportunities and increase fishermen's income. In addition, interactions between tourists and fishermen can strengthen conservation awareness among local communities, thereby encouraging shared responsibility for the marine environment (Honey, 2008).

Economically, ecotourism can be a significant alternative source of income for fishermen. The development of tourism infrastructure, such as homestays and transportation facilities, can improve the local economy. However, proper management is needed to ensure that income is distributed fairly among local communities (Cater & Cater, 2018). As a sustainable ecotourism effort, it is necessary to apply ecotourism principles that focus on nature conservation, community participation, and fair distribution of benefits. Strengthening local capacity in environmental management and training to involve fishermen in ecotourism activities can be the key to sustainability (Buckley, 2012).

### 3.7 *Environmental carrying capacity*

The potential for tourism development in Raja Ampat has a carrying capacity of 91,275 people per year, but on the same day, the natural tourism resources in Raja Ampat are able to accommodate or support 7,675 visits. Assuming a tourist visits 3-4 types of tourism in one day, Raja Ampat's carrying capacity can reach 2,103 tourists. Of the total carrying capacity, 96% is the carrying capacity of marine tourism. The five largest potentials which respectively contribute around 80% of the total tourism carrying capacity in Raja Ampat are swimming throughout the Raja Ampat area, beach tourism involving sand-bathing and beach-based activities throughout the Dampier and Misool areas, kayaking in the Dampier Strait, diving in the Dampier Strait, and diving in South East Misool.

Assessment of the carrying capacity of the area is an invaluable tool for managers to take action. Assessment of carrying capacity plays an important role in the Raja Ampat Marine Protected Area, reflecting the level of sustainable development, and serving as an instrument in maintaining the balance between development and conservation. It acts as a benchmark that should be monitored on an ongoing basis and adjusted if necessary, to measure changes and their causes. This not only supports environmental conservation but also ensures quality visits by tourists.

### *3.8 Proposed ecotourism management strategy for Raja Ampat*

Ecotourism management in Raja Ampat can be formulated and implemented by considering several important aspects that aim to protect the environment and support economic development and the welfare of the local community. One of the initial steps that needs to be taken is to determine the target of visits by considering the carrying capacity of each destination or activity, to ensure that the number of tourists visiting does not exceed the environmental and social limits that can be overcome. In addition, regular monitoring and evaluation are also very necessary to broadcast the impact of tourism activities and assess whether existing strategies are effective or need to be adjusted. It is also important for Raja Ampat ecotourism managers to implement education and awareness programs for visitors, by providing information on the bioecological performance of each area visited so that tourists better understand and appreciate the ecological values of the destination.

Carrying capacity reviews should be carried out routinely every three to five years to determine development targets and management strategies for the following year. Another important step is to ensure that every tourist pays the Environmental Service Card (KJL) to support environmental conservation efforts. Developing the capacity of local human resources (HR) is also very important so that they can take advantage of existing economic opportunities, through the development of craft products, business services, or organizing cultural performances such as traditional dances. In addition, there needs to be a new regulation that regulates the number of ships and resorts that are licensed to operate in Raja Ampat, including regulating ship permits for one trip, as well as regulating the number of trips that can be made by each ship in a year.

Regulations regarding plastic use policies in Raja Ampat tourist destinations are also very important to support the ecosystem, considering that many tourist destinations in Indonesia and abroad have successfully implemented similar systems to reduce plastic waste. Regulations for homestay investments managed by local communities also need to be considered, in order to optimize economic benefits for the local community. Homestays that were previously managed by foreign parties or in collaboration with foreign parties in providing diving services, need to be considered as resorts and must comply with applicable tax regulations. Finally, the development of a tourism information system that includes a database on types of tourists, duration of stay, tourist destinations, and travel costs is very important as a basis for planning future tourism development, in order to be able to analyze and formulate more in-depth and appropriate strategies in an effort to improve the tourism sector in Raja Ampat. By considering all these aspects, it is hoped that ecotourism in Raja Ampat can develop sustainably, provide benefits to local communities, and maintain environmental sustainability.

Raja Ampat, as a major ecotourism destination in Indonesia, presents a great opportunity to combine the welfare of local communities and environmental conservation. Empowering fishermen is a key strategy in designing a sustainable ecotourism development model, with a focus on social, economic and environmental aspects. Empowering fishermen in Raja Ampat is not only a social imperative, but also the key to building sustainable ecotourism. Through an approach that includes social, economic and environmental aspects, we can create a development model that cares for nature and supports the welfare of local communities. Fisherman empowerment strategies can be implemented through:

Social empowerment of fishermen in Raja Ampat includes increasing their participation and involvement in natural resource management and local decision making. Skills training, increasing environmental literacy, and forming joint work groups are examples of social empowerment (Gelcich et al., 2006). Social empowerment of fishermen in Raja Ampat involves increasing knowledge and participation in natural resource management. Training on sustainable fishing techniques, waste management, and marine ecosystem conservation are examples of social empowerment strategies (Cinner et al., 2009).

Some activity programs that can be implemented to support ecotourism management in Raja Ampat include the formation of Fishermen's Conservation Groups, where local

fishermen can jointly manage fishing zones and involve the community in conservation activities. Educational programs on the importance of preserving marine resources and biodiversity also need to be carried out to increase public and tourist understanding of the importance of preserving marine ecosystems. The formation of community monitoring groups (Pokmaswas) can also be carried out to involve the community in maintaining and protecting the ecotourism environment. In addition, education on coral reef conservation and marine biodiversity is very important to raise awareness of the need to protect vital marine ecosystems.

Economic empowerment of fishermen involves increasing their access to local resources and marketing. Micro business development, business management training, and income diversification are examples of economic empowerment strategies (Cinner et al., 2012). Economic empowerment of fishermen can also include income diversification and strengthening local business capacity. Developing micro-enterprises, marketing local products, and integrating fishermen into the ecotourism supply chain are strategies to improve their economic welfare (Pomeroy et al., 2004).

Some activity programs that can be carried out include the development of homestays by local communities to attract tourists, which would provide an additional source of income for the region. Additionally, training in sustainable fisheries business management is essential to ensure long-term viability in the sector. Offering alternative livelihood training would help diversify income sources for local fishermen. Fishermen in Raja Ampat could also develop culture-based tourism businesses, such as homestays or cultural experiences, which would enhance their economic opportunities. Another potential initiative is creating handicrafts from recycled materials, like bags or souvenirs, by local fishing groups, which could provide an extra income stream. Finally, providing marketing and business management training, alongside a loan or credit program with affordable interest rates, could support fishermen's micro-enterprises. This would be coupled with assistance in financial management, marketing strategies, and business development, helping local products reach the tourist market effectively.

Environmental empowerment focuses on increasing fishermen's awareness and responsibility for environmental sustainability. Sustainable fishing practices, ecosystem rehabilitation, and waste management are examples of environmental empowerment (Satria et al., 2018). Environmental empowerment of fishermen in Raja Ampat includes efforts to preserve nature and environmental management. This initiative involves the introduction of environmentally friendly practices in fishing, waste reduction, and participation in ecosystem monitoring (Douve, 2008). Some activity programs that can be carried out are the implementation of sustainable fishing methods, such as environmentally friendly fishing techniques, to ensure the long-term health of marine resources. A marine waste management program could be introduced to reduce pollution's impact on the local ecosystem. In addition, a coral reef restoration program, such as coral planting, would help increase fisheries productivity and protect marine biodiversity. The use of eco-friendly fishing nets is essential to preserving fish populations and underwater ecosystems in Raja Ampat. Fishermen can also participate in monitoring and managing activities within marine protected areas to safeguard local marine life. Increasing awareness of the importance of environmental conservation and preservation is critical for fostering sustainable practices. Mangrove rehabilitation and planting can restore vital coastal ecosystems that protect against erosion and support marine life. Development planning that incorporates environmental values will ensure the sustainability of future projects. Lastly, raising environmental awareness among local communities and tourists can encourage responsible practices and support the long-term ecological health of the region.

The concept of tourism development based on EduEco Tourism in Raja Ampat Regency is a conceptual design prepared by Rasyid et al. (2022) which is a tourism development, especially tourism with its natural and cultural potential (ecotourism) which can be as a reference for a sustainable ecotourism concept. There are several basic principles according to Fennell, 1999 in Iriani 2019 which play an important role: provide the least negative impact on the environment and local communities, increase awareness and knowledge of

visitors and local residents, educational and research materials for local residents and visitors, involving all actors involved in tourism and nature activities for conservation activities, and maximize local community participation in decision-making processes related to area management.

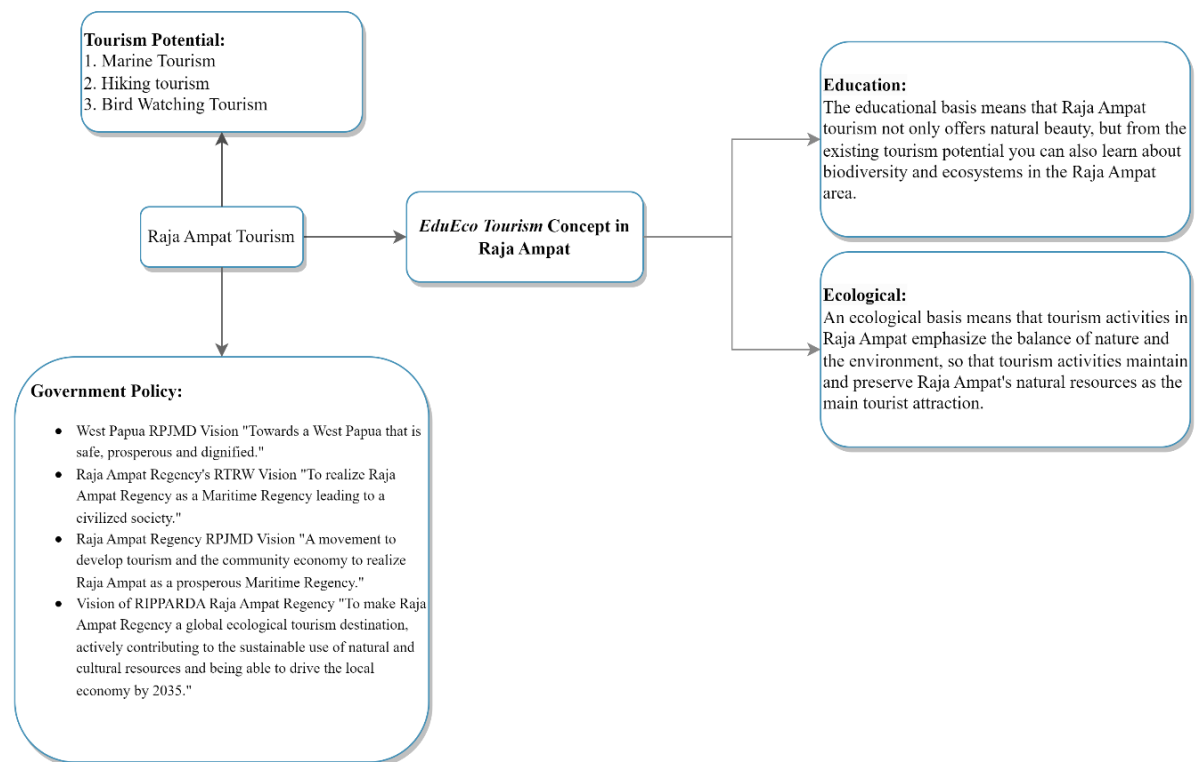


Fig. 6. Raja Ampat Regency EduEco Tourism Development Concept (Rasyid et al., 2022)

In designing the tourism development concept in Raja Ampat Regency, it is important to consider aspects of natural resource potential, the attractiveness of artificial resources, and applicable regulatory provisions. Several regulations that are considered factors in formulating this concept include tourism policy, development policy and spatial planning policy.

#### 4. Conclusions

Research on "Sustainable Ecotourism Management Supports the Preservation of Aquatic Ecosystems and Empowerment of Fishermen" shows that sustainable ecotourism has great potential to have a positive impact on the preservation of aquatic ecosystems and the empowerment of fishing communities. The concept proposed in this research is based on a literature review, namely implementing environmental policies in managing marine ecotourism in Raja Ampat. Apart from that, implementing a fishermen empowerment program that covers economic, social and environmental aspects.

The EduEco Tourism concept, as a model of sustainable tourism, emphasizes the integration of educational and ecological elements to preserve the unique environmental values of Raja Ampat. This concept seeks to promote awareness and responsibility among visitors while ensuring that tourism activities do not compromise the region's ecological integrity. To support this approach, policy recommendations are proposed to strengthen sustainable ecotourism management practices, fostering long-term environmental conservation and community benefits.

## Acknowledgement

This paper and the research behind it would not have been possible without the exceptional support of our SKML coordinator, who provides us with guidance in preparing this research paper based on complying requirements.

## Author Contribution

The authors contributed equally to the development and execution of this research.

## Funding

This research received no external funding

## Ethical Review Board Statement

Not available.

## Informed Consent Statement

Not available.

## Data Availability Statement

Not available.

## Conflicts of Interest

The authors declare no conflict of interest.

## Open Access

©2025. The author(s). This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The images or other third-party material in this article are included in the article's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this license, visit: <http://creativecommons.org/licenses/by/4.0/>

## References

- Adesetiani, S., Kolopaking, L. M., & Eriyatno. (2021). The development strategy of community-based homestay tourism business in Raja Ampat Regency, West Papua Province. *Sodality: Jurnal Sosiologi Pedesaan*, 9(3). <https://doi.org/10.22500/9202136386>
- Alam, M. S., & Paramati, S. R. (2017). The dynamic role of tourism investment on tourism development and CO2 emissions. *Annals of Tourism Research*, 66, 213–215. <https://doi.org/10.1016/j.annals.2017.07.013>
- Alland, A., Jr. (1980). *To be human: An introduction to anthropology*. Wiley & Sons.
- Andereck, K. L., & Nyaupane, G. P. (2011). Exploring the nature of tourism and quality of life perceptions among residents. *Journal of Travel Research*, 50(3), 248–260. <https://doi.org/10.1177/0047287510362918>
- Ap, J. (1992). Residents' perceptions on tourism impacts. *Annals of Tourism Research*, 19(4), 665–690. [https://doi.org/10.1016/0160-7383\(92\)90060-3](https://doi.org/10.1016/0160-7383(92)90060-3)
- Bhati, A., & Pearce, P. (2016). Vandalism and tourism settings: An integrative review. *Tourism Management*, 57, 91–105. <https://doi.org/10.1016/j.tourman.2016.06.002>
- Blancas, F. J., González, M., Lozano-Oyola, M., Guerrero-Ginel, J. E., & Caballero, R. (2016). Analyzing the effect of motivations, satisfaction, and constraints on the loyalty of visitors



- to natural areas. *Tourism Management*, 53, 36–48. <https://doi.org/10.1016/j.tourman.2015.09.002>
- Brida, J. G., Osti, L., & Faccioli, M. (2011). Residents' perception and attitudes towards tourism impacts: A case study of the small rural community of Folgaria (Trentino–Italy). *Benchmarking: An International Journal*, 18(3), 359–385. <https://doi.org/10.1108/14635771111137769>
- Buckley, R. (2012). Sustainable tourism: Research and reality. *Annals of Tourism Research*, 39(2), 528–546. <https://doi.org/10.1016/j.annals.2012.02.003>
- Buckley, R., Zhong, L., Ma, J., Yang, Y., Lei, J., & Wang, Y. (2019). Sustainable community-based tourism: A comparative study of two villages in China. *Journal of Sustainable Tourism*, 27(9), 947–965. <https://doi.org/10.1080/09669582.2019.1615489>
- Capacci, S., Scorcu, A. E., & Vici, L. (2015). Seaside tourism and eco-labels: The economic impact of Blue Flags. *Tourism Management*, 47, 88–96. <https://doi.org/10.1016/j.tourman.2014.09.003>
- Cater, E., & Cater, T. (2018). *Marine ecotourism: Between the devil and the deep blue sea*. Channel View Publications.
- Cinner, J. E., Daw, T., & McClanahan, T. R. (2012). Socioeconomic factors that affect artisanal fishers' readiness to exit a declining fishery. *Conservation Biology*, 26(5), 867–877. <https://doi.org/10.1111/j.1523-1739.2012.01864.x>
- Cinner, J. E., McClanahan, T. R., Daw, T., Graham, N. A., Maina, J., Wilson, S. K., & Maire, E. (2009). Linking social and ecological systems to sustain coral reef fisheries. *Current Biology*, 19(3), 206–212. <https://doi.org/10.1016/j.cub.2008.11.055>
- Damanik, J., & Weber, H. F. (2006). *Perencanaan ekowisata: Dari teori ke aplikasi*. Andi.
- Diedrich, A. (2007). Local perceptions of tourism as indicators of tourism impacts on local communities at Rapa Nui National Park, Chile. *Conservation Biology*, 21(3), 872–879. <https://doi.org/10.1111/j.1523-1739.2007.00667.x>
- Douve, F. (2008). The importance of marine spatial planning in advancing ecosystem-based sea use management. *Marine Policy*, 32(5), 762–771. <https://doi.org/10.1016/j.marpol.2008.03.021>
- Fennell, D. A. (2015). A content analysis of ecotourism definitions. *Current Issues in Tourism*, 18(12), 1–18. <https://doi.org/10.1080/13683500.2013.802579>
- Frent, C. (2016). An overview on the negative impacts of tourism. *Journal of Tourism Studies and Research in Tourism*, 22, 32–37. <http://www.revistadeturism.ro/rdt/article/view/344/>
- Frias-Torres, S. (2018). Hope for reefs: From coral transplantation to assisted evolution. *Sustainability*, 10(3), 864. <https://doi.org/10.3390/su10030864>
- Froemke, T., & Marques, L. (2019). Community-based tourism management in Raja Ampat, Indonesia: A review and analysis of the value-based approach. *Journal of Outdoor Recreation and Tourism*, 25, 50–58. <https://doi.org/10.1016/j.jort.2019.03.001>
- Gelcich, S., Hughes, T. P., Olsson, P., Folke, C., Defeo, O., Fernandez, M., & Castilla, J. C. (2006). Navigating transformations in governance of Chilean marine coastal resources. *Proceedings of the National Academy of Sciences*, 103(39), 15210–15217. <https://doi.org/10.1073/pnas.0602175103>
- Gössling, S., Scott, D., & Hall, C. M. (2013). *Tourism and water: Interactions and impacts*. Channel View Publications.
- Grantham, H. S., Agostini, V. N., Wilson, J., Mangubhai, S., Hidayat, N., Muljadi, A., ... & Possingham, H. P. (2013). A comparison of zoning analyses to inform the planning of a marine protected area network in Raja Ampat, Indonesia. *Marine Policy*, 38, 184–194. <https://doi.org/10.1016/j.marpol.2012.05.035>
- Green, A. L., Maypa, A. P., Almany, G. R., Rhodes, K. L., Weeks, R., Abesamis, R. A., & White, A. T. (2015). Larval dispersal and movement patterns of coral reef fishes, and implications for marine reserve network design. *Biological Reviews*, 90(4), 1215–1247. <https://doi.org/10.1111/brv.12155>
- Higham, J., & Lück, M. (2008). *Marine wildlife tourism: Impacts and management*. Channel View Publications.

- Higham, J. E., Lück, M., & Lübbert, C. (2013). Indicators of best practice for the sustainable development and management of marine wildlife tourism. *Marine Policy*, 39, 21–30. <https://doi.org/10.1016/j.marpol.2012.10.001>
- Honey, M. (2008). *Ecotourism and sustainable development: Who owns paradise?* Island Press.
- Iriani, A. Y. (2019). Strategi pengembangan pariwisata berdasarkan preferensi masyarakat asli: Studi kasus di Raja Ampat. *Jurnal Masyarakat & Budaya*, 21(3).
- Isti'annah, A. (2019, August). Appreciation for Raja Ampat in the official website of Indonesian tourism: Ecolinguistic study. In *Fifth Prasasti International Seminar on Linguistics (PRASASTI 2019)* (pp. 64–70). Atlantis Press. <https://doi.org/10.2991/prasasti-19.2019.9>
- Leu, T. C., Eriksson, M., & Müller, D. K. (2018). More than just a job: Exploring the meanings of tourism work among Indigenous Sámi tourist entrepreneurs. *Journal of Sustainable Tourism*, 26(4), 567–582. <https://doi.org/10.1080/09669582.2018.1428333>
- Ling, L. P., Jakpar, S., Johari, A., Myint, K. T., & Rani, N. S. (2011). An evaluation on the attitudes of residents in Georgetown towards the impacts of tourism development. *International Journal of Business and Social Science*, 2(1), 264–277. <http://hdl.handle.net/20.500.11937/31548>
- Manshur, A., Minarti, S., & Indriana, N. (2021). Pemberdayaan masyarakat melalui pengembangan wisata edukasi dan rekreasi Kampung Nelayan. *Mafaza: Jurnal Pengabdian Masyarakat*, 1(1), 44–51. <https://doi.org/10.32665/mafaza.v1i1.264>
- Mous, P. J., Vercruisje, H. J., Hoogerwerf, M., Mambrasar, R., & Yusuf, Y. (2017). Ecotourism in Raja Ampat, Papua, Indonesia. In *Island Futures: Conservation and Development Across the Asia-Pacific Region* (pp. 161–174). Springer. [https://doi.org/10.1007/978-3-319-60916-4\\_9](https://doi.org/10.1007/978-3-319-60916-4_9)
- Nugroho, I. (2015). *Ekowisata dan pembangunan berkelanjutan* (2nd ed.). Pustaka Pelajar.
- Pomeroy, R. S., & Douvère, F. (2008). The engagement of stakeholders in the marine spatial planning process. *Marine Policy*, 32(5), 816–822. <https://doi.org/10.1016/j.marpol.2008.03.017>
- Pomeroy, R. S., Parks, J. E., & Watson, L. M. (2004). *How is your MPA doing? A guidebook of natural and social indicators for evaluating marine protected area management effectiveness*. IUCN.
- Pratiwi, W. D., Tribiani, W. W. P., Rindawati, I., Samsirina, Sidhi, P. A., & Suryansyah, A. F. (2015). *Pengembangan pariwisata berbasis masyarakat*. Sekolah Arsitektur Perencanaan dan Pengembangan Kebijakan, Institut Teknologi Bandung.
- Rasyid, R., Karmilah, M., & Kesaulya, H. M. (2022). Pengembangan pariwisata berbasis edueco tourism di Kabupaten Raja Ampat, Papua Barat. *Jurnal Kajian Ruang*, 2(2). <https://doi.org/10.30659/jkr.v2i2.27308>
- Ratana-Ubol, A., & Henschke, J. (2015). Cultural learning processes through local wisdom: A case study on adult and lifelong learning in Thailand. *International Journal of Adult Vocational Education and Technology*, 6(2), 41–60. <https://doi.org/10.4018/ijavet.2015040104>
- Salvatierra, J., & Walters, G. (2017). The impact of human-induced environmental destruction on destination image perception and travel behaviour: The case of Australia's Great Barrier Reef. *Journal of Vacation Marketing*, 23(1), 73–84. <https://doi.org/10.1177/1356766715618523>
- Satria, A., Rumawas, F., & Novaczek, I. (2018). The challenge of governing for sustainable ecosystem services in Raja Ampat, Eastern Indonesia. *Ocean & Coastal Management*, 163, 1–11. <https://doi.org/10.1016/j.ocecoaman.2018.06.012>
- Seetanah, B. (2011). Assessing the dynamic economic impact of tourism for island economies. *Annals of Tourism Research*, 38(1), 291–308. <https://doi.org/10.1016/j.annals.2010.08.009>
- Seymour, V. (2016). The human–nature relationship and its impact on health: A critical review. *Frontiers in Public Health*, 4, 260. <https://doi.org/10.3389/fpubh.2016.00260>

- Suman, D., Dwyer, L., & Mistilis, N. (2017). Tourism, economic growth, and job creation: An analysis of inter-industry linkages for the Turkish economy using input–output analysis. *Tourism Economics*, 23(3), 592–610. <https://doi.org/10.5367/te.2015.0541>
- Vargas-Sanchez, A., Porras-Bueno, N., & Plaza-Mejia, M. A. (2011). Explaining residents' attitudes to tourism: Is a universal model possible? *Annals of Tourism Research*, 38(2), 460–480. <https://doi.org/10.1016/j.annals.2010.10.004>
- Varkey, D. A., Ainsworth, C. H., Pitcher, T. J., Goram, Y., & Sumaila, R. (2010). Illegal, unreported and unregulated fisheries catch in Raja Ampat Regency, Eastern Indonesia. *Marine Policy*, 34(2), 228–236. <https://doi.org/10.1016/j.marpol.2009.06.009>
- Weaver, D. B. (2011). *Sustainable tourism in protected areas: Guidelines for planning and management*. IUCN.

### Biography of Authors

**Dedi Armayadi**, School of Environmental Science, Universitas Indonesia, Central Jakarta, DKI Jakarta 10430, Indonesia.

- Email: [dedy.armayadi@ui.ac.id](mailto:dedy.armayadi@ui.ac.id)
- ORCID: N/A
- Web of Science ResearcherID: N/A
- Scopus Author ID: N/A
- Homepage: N/A

**Nadia Afifah**, School of Environmental Science, Universitas Indonesia, Central Jakarta, DKI Jakarta 10430, Indonesia.

- Email: [nadia.afifah@ui.ac.id](mailto:nadia.afifah@ui.ac.id)
- ORCID: N/A
- Web of Science ResearcherID: N/A
- Scopus Author ID: N/A
- Homepage: N/A

**Rizal Rifai**, School of Environmental Science, Universitas Indonesia, Central Jakarta, DKI Jakarta 10430, Indonesia.

- Email: [rizal.rifai@ui.ac.id](mailto:rizal.rifai@ui.ac.id)
- ORCID: 0000-0002-9362-591X
- Web of Science ResearcherID: N/A
- Scopus Author ID: N/A
- Homepage: N/A