



# Impact of managing Wakatobi National Park as a marine conservation area

Budiyanto, Irdam Riani, Rosmawati

Department of Fisheries Agribusiness, Faculty of Fisheries and Marine Sciences, Halu Oleo University, Kendari, Southeast Sulawesi. Indonesia. Corresponding author: Budiyanto, budiyanto@uho.ac.id

**Abstract.** The management of Wakatobi National Park (WNP) causes conflicts of interest, namely interests for conservation purposes and access to the use of marine resources. Determining an area as a conservation area aims to produce ecosystem services. Access to exploit marine resources is limited. This study aims to analyze the impact of Wakatobi National Park management on the ecological and social conditions around the area. The selection of study locations was carried out purposively, namely locations influenced by the Marine Conservation Area (MCA) and non-MCA locations. The data and information collected include: contributing parties, beneficiary parties, ecological impacts, social impacts, and conflicts that occur due to the management of conservation areas. Data and information collection was carried out through interviews and focus group discussions (FGD) using questionnaires. The collected data is tabulated and explained qualitatively. The results of the study show that the management of Wakatobi National Park has had a positive impact on marine ecology, but has had both negative and positive impacts on the social interactions of local residents who utilize marine resources. Negative impacts on social interactions of local residents are social costs of management, while positive impacts are social benefits.

**Key Words:** area management, benefits and costs of conservation, marine conservation.

**Introduction.** Most residents in coastal villages are very dependent on marine resources to meet their daily needs. This is due to the limited human, social, financial, physical, and natural capitals (Kusumanti et al 2021). The standard of living is, on average, low (Scales 2014; Jones et al 2016). The limited alternative sources for fulfilling living needs in coastal villages make it possible to continue using marine resources without effective law enforcement (Holmes 2007).

For residents in coastal villages, fishing activities play an important role in meeting daily needs. However, this activity is less reliable because catches are decreasing along with population growth (Vezina et al 2020). The decline in catches will trigger fishermen to expand their fishing areas. In addition, it can also encourage fishermen to use more destructive fishing methods and tools (Browne et al 2007). As a result, some marine biotas are becoming increasingly rare and threatened with extinction, while marine resource ecosystems are damaged.

Species threatened with extinction in their habitat require protective measures at various scales (Powles et al 2000; Arthington et al 2016). The most common policy and one that has long been considered important as a tool for maintaining habitat integrity and species diversity is the establishment of conservation areas (Powles et al 2000; Pullin et al 2013). However, the effectiveness of conservation area designation policies is still debated (Geldmann et al 2013). Limiting access to utilize resources in an area can have social and economic impacts on the surrounding population (Pullin et al 2013; Vezina et al 2020).

Indonesia has 50 national parks. One of them is the Wakatobi National Park (WNP), established in 2002. The area of the national park is 1.39 million ha, being the highest priority marine conservation area in Indonesia (Sopari et al 2014). About 97% of the area is sea, so Wakatobi National Park is known as a biodiversity hotspot for eastern

Indonesia's waters. In this area, there are at least 396 species of hard coral and 942 species of coral fish. Apart from the coral reef biota ecosystem, Wakatobi National Park is also a habitat for mega fauna species such as whales, dolphins and turtles (WWF 2019).

The consideration for establishing Wakatobi National Park as a marine conservation area is the diversity and beauty of the marine resources found in the area (Asmara et al 2013). Meanwhile, the aim is to protect, preserve and sustainably manage marine resources, including ecosystems, types and genetics of fish. Thus, the existence of Wakatobi National Park will have an impact on limiting access for residents in and around the area to utilize marine resources.

As is the case of coastal villages, the majority of residents in the Wakatobi National Park marine conservation area have a livelihood portfolio that utilizes marine resources (Central Statistics Agency 2022). Therefore, access to marine resources plays an important role in poverty alleviation (Ellis & Allison 2004). On the other hand, with the implementation of management of the Wakatobi National Park as a marine conservation area, this role has been reduced. Management of marine conservation areas limits the use of marine resources.

Berkes (2005) divides models/types of management of jointly owned resources in community-based management and that managed by the government. The management of Wakatobi National Park applies a mixture of these two management models. The question is what impact will this management have on conservation areas. This study aims to analyze the impact of Wakatobi National Park management on the ecological and social conditions around the area.

## **Material and Method**

***Time and location.*** The study was conducted from August to November 2023 in the Wakatobi National Park area, Indonesia. The study uses a with and without project approach, so that the sample selection of study locations is carried out purposively, with locations that are influenced by Marine Conservation Area (MCA) and non-MCA locations. As Wakatobi National Park area covers 4 large islands, namely Wangi-Wangi Island, Kaledupa, Tomia, and Binongko Island, the selection of study locations took into account the representation of these four large islands. The results of identifying study locations determined the number of study locations at 24 villages, consisting of 13 villages influenced by MCA and 11 villages that are not. The villages affected by the MCA include: Mola Utara, Kapota, Liya Mawi, Mola Bahari, Lulua, Samabahari, Waitii Barat, Patua II, Tonggano Barat, Kulati, Kampo-kampo, Lagongga, and Rukuwa. The villages as control locations are: Longa, Matahora, Buranga, Horuo, Tanomeha, Peropa, Darawa, Lamanggau, Wali, Makoro, and Waloindi.

***Source and type of data.*** The study collected data from community leaders who lived in the study location as sources. The selection of sources was carried out purposively. The size of the required sources was identified using a "power" analysis to ensure that the selection of sources is appropriate to adequate coverage of social and geographic groups in a location. The number of resource persons was set at 72 people. The type of data collected was qualitative data, including: parties who contribute and beneficiaries of conservation, ecological impacts, social impacts, and conflicts that occur due to the management of conservation areas.

***Data collection method.*** Data collection was carried out using the interview method assisted by a list of questions. Interviews were conducted face to face. Focus group discussions (FGD) were carried out to understand marine resource management and its impact on ecological and social conditions in villages affected by MCA and non-MCA villages.

***Data analysis.*** After the data was collected and analyzed by determining differences in conditions between MCA villages and non-MCA villages. Descriptive analysis was carried

out to determine the relationship between one variable or parameter and other variables (Watt 2007).

## Results

**Contributing party.** The management of the Wakatobi National Park marine conservation area will not be successful without support and contributions from various parties. Contributions include direct contributions (e.g., donations) as well as lost opportunities to exploit marine resources (e.g., access to exploit marine resources is limited). Based on the size of the contribution, marine resource user groups can be ranked as in Table 1.

Table 1  
The order of marine resource user groups based on the amount of contribution and type of contribution to the management of Wakatobi National Park

<i>USER GROUPS</i>	<i>TYPES OF CONTRIBUTIONS</i>
<i>In villages affected by the MCA</i>	
Shallow sea fishermen using environmentally friendly fishing gear	Monitor and supervise violations of regulations (use of non-environmentally friendly fishing gear); fishing areas and species caught are reduced
Sand and stone miner	Sand and stone mining areas are getting narrower, and income is decreasing
Travel/tourism entrepreneur	Increase employment opportunities and population income, thereby reducing opportunities for exploitation of marine resources; donations to surrounding villages; participate in monitoring regulatory violations
Fish, seaweed and pearl cultivators	Participate in monitoring and supervising violations of regulations related to the management of Wakatobi National Park
Sea transportation operators	Tax payment
<i>In villages non-MCA</i>	
Sand and stone miners	Sand and stone mining areas are getting narrower, and income is decreasing
Shallow sea fishermen who previously used non-environmentally friendly fishing gear have changed to using environmentally friendly fishing gear	Monitor and supervise violations of regulations (use of non-environmentally friendly fishing gear); fishing areas and species caught are reduced
Travel/tourism entrepreneur	Increase employment opportunities and population income, thereby reducing opportunities for exploitation of marine resources; donations to surrounding villages; participate in monitoring regulatory violations
Fish, seaweed and pearl cultivators	Participate in monitoring and supervising violations of regulations related to the management of Wakatobi National Park
Marine transportation entrepreneur	Tax payment

Based on the magnitude of their contribution to WNP management, the groups of marine resource users in the villages affected by MCA can be ranked: first, there are the shallow sea fishermen who use environmentally friendly fishing gear; second are sand and stone miners. In non-MCA villages, sand and stone miners are in first place based on contribution, while shallow sea fishermen are in second place. This difference is thought to be because in non-MCA villages relatively many residents make their living as sand and stone miners.

Apart from marine resource user groups, parties who have contributed to the management of WNP include the government (Wakatobi National Park Office), which has paid management costs, traditional institutions, which have monitored, supervised and provided sanctions for violations of regulations, non-governmental organization communities (for example WWF, TNC, and Wakatobi Fishermen's Community), which have provided training or assistance to fishing groups.

**Beneficiary party.** Wakatobi National Park functions as a protection for the life support system and protection of marine resource habitats and species. By saving on the exploitation of marine resources, there are parties who make sacrifices, but there are

also parties which gain benefits. Based on the magnitude of the benefits obtained, users of marine resources can be ranked as in Table 2.

Table 2

The order of marine resource user groups based on the amount of benefits obtained and the types of benefits from the management of Wakatobi National Park

<i>USER GROUPS</i>	<i>TYPES OF BENEFITS</i>
In villages affected by the MCA	
Shallow sea fishermen using environmentally friendly fishing gear	The existence of Wakatobi National Park ensures that the habitat of marine biota is maintained so that the reproduction of marine biota becomes faster. The existence of Wakatobi National Park reduces environmentally unfriendly fishing activities for marine biota, thus further increasing the availability of the population. This results in fishermen catching more and more.
Travel/tourism entrepreneurs	The existence of Wakatobi National Park ensures that the beauty and cleanliness of the marine environment is maintained, causing many tourists to visit Wakatobi National Park.
Fish, seaweed and pearl cultivators	The existence of Wakatobi National Park causes fishing using poison, anesthesia, and the like to be reduced, thereby reducing the risk of harvest failure in seaweed, fish and pearl cultivation activities.
In villages non-MCA	
Shallow sea fishermen	The existence of Wakatobi National Park ensures that the habitat of marine biota is maintained, so that the growth of marine biota is better. The existence of Wakatobi National Park also reduces environmentally unfriendly fishing activities for marine biota, thus further increasing the availability of the population. This results in fishermen catching more and more.
Fish, seaweed and pearl cultivators	The existence of Wakatobi National Park causes fishing using poison, anesthesia and the like to be reduced, thereby reducing the risk of harvest failure in seaweed, fish and pearl cultivation activities.
Travel/tourism entrepreneur	The existence of Wakatobi National Park ensures that the beauty and cleanliness of the marine environment is maintained, causing many tourists to visit Wakatobi National Park.

Table 2 shows that fishing activities with fishing gears that are not environmentally friendly will have a negative impact on various resources and parties. For ease of fishing and quick results, users of fishing gears that are not environmentally friendly do not realize that their actions can result in the damage of other parties. Users of explosives and poisons feel that they benefit because their actions can make their work easier and more effective. They do not realize that this action causes the death of marine biota (including cultivated seaweed) and the destruction of habitat. As a result, the availability of marine biota populations in the future will decrease, together with catches. The use of fishing gear that is not environmentally friendly has also damaged and reduced the beauty of marine resources, which will reduce the number of tourists visiting WNP, impacting tourism business income and job opportunities in the tourism sector.

Table 2 shows that there are differences in the order of groups of marine resource users who benefit from the management of WNP between villages influenced by MCA and non-MCA villages. In villages affected by the MCA, users of marine resources for tourism activities are in second place, and seaweed, fish and pearl cultivators are in third place on the list of marine resource users who benefit from the management of WNP. However, in non-MCA villages, the opposite is true, namely that users of marine resources for seaweed and fish cultivation activities are in second place, while users of marine resources for tourism activities are in third place. It is suspected that in villages affected by MCA, the number of users of marine resources for tourism activities is relatively greater than that of users of marine resources for seaweed and fish cultivation activities. On the other hand, in non-MCA villages, the number of marine resource users for seaweed and fish cultivation activities is relatively greater than the number of marine resource users for tourism activities.

**Ecological impact.** The purpose of establishing the WNP is as an effort to conserve marine resources. According to Law of the Republic of Indonesia Number 5 of 1990 concerning Conservation of Biological Natural Resources and Ecosystems, conservation is the management of biological natural resources whose use is carried out wisely to ensure the continuity of their supply, while maintaining and improving the quality of their diversity and value. Thus, the establishment of WNP will certainly have an impact on the ecological conditions in the area.

The ecological impact of managing the WNP as a conservation area in villages affected by the MCA is reduced use of environmentally unfriendly fishing gear, reduced cutting of mangrove trees, and reduced coral and sand mining. Thus, the marine environment (coral reefs, mangrove trees and seagrass beds) remains sustainable, so that the population of fish and other marine biota may increase in the long term. Another impact is that coastal erosion does not occur, and seaweed plants are protected from damage due to the minimal use of poisons in fishing. The use of poison in fishing, apart from killing fish and polluting the area, can also damage seaweed plants. Meanwhile, in non-MCA villages, the ecological impact of marine management in WNP is no different from the ecological impact in villages affected by MCA, namely that the marine environment remains clean and sustainable. The study data also shows that the people in the WNP area are actually aware and understand the benefits of marine resource conservation activities for environmental sustainability. However, because of their desire to obtain quick and great results, they carry out actions that damage or pollute the marine environment.

**Social impact.** Like other conservation activities, the establishment of WNP will have social impacts as a result of conservation interests being different from exploitation interests. These differences in interests will influence the perceptions and actions of community groups. The social impacts of marine management of WNP are presented in Table 3.

Table 3

Social impacts of marine management in the Wakatobi National Park

<i>Impacts</i>	<i>Description</i>
In villages affected by the MCA	
Positive	The emergence of public understanding on the importance of preserving the marine environment; fishermen's catches and income are increasing; the number of tourists visiting Wakatobi National Park is increasing.
Negative	The fishing area is increasingly limited; some protected marine biota cannot be harvested; the trigger for conflict at the beginning of the establishment of the Wakatobi National Park; sand and coral mining areas are increasingly limited, so that some sand miners have lost their jobs.
In villages non-MCA	
Positive	Increased catches and income of fishermen; increased harvest yields and income of seaweed farmers; there is a sense of security for seaweed cultivators due to the reduced use of poisons/anesthetics as fish catchers; the poison/anesthetic causes damage to plants; the frequency of conflicts between fishermen and the government is decreasing because the community is involved in determining the rules that apply in Wakatobi National Park; the number of tourists visiting Wakatobi National Park is increasing.
Negative	Fishing areas are increasingly limited, so that most shallow sea fishermen have to switch to the deep sea; the income of sand and coral miners is decreasing, because the mining area is increasingly limited.

The social impact of managing WNP both in MCA and non-MCA affected villages is similar (Table 3). However, there is a slight difference in the negative impacts, namely in non-MCA villages, where fishing areas are increasingly limited, some fishermen who usually fish in the shallow sea have to switch to the deep sea. This is because most fishermen in non-MCA villages usually catch fish in shallow seas, while fishermen in villages affected by MCA usually catch fish in deep seas.

**Social conflict around Wakatobi National Park.** Conflict is defined as a social process between two or more people (can also be a group), in which one party tries to eliminate

another party (Muspawi 2014). Conflict is motivated by differences in characteristics that individuals bring to an interaction. These differences include physical characteristics, intelligence, knowledge, customs, beliefs, and so on. With the inclusion of individual characteristics in social interactions, conflict is a normal situation in every society.

In relation to the management of WNP, where there are several interests, of course the potential for conflict will arise at any time. Several social conflicts occurred in the WNP area. Even though the frequency of conflict is relatively rare, namely one to two times per year, the impact of the conflicts can lead to anarchic acts. In the 24 villages as survey locations, 14 or 58.33% of social conflicts were related to marine resources during the last 12 months. If grouped based on the location of the incident, the occurrence of social conflict in villages influenced by the MCA is greater (61.54%) than in non-MCA villages (54.54%). Based on the type and parties involved, social conflicts that occur in the WNP area are presented in Table 4.

Table 4

Social conflict in the Wakatobi National Park management area

<i>Types of conflict</i>	<i>The parties involved in the conflict</i>
Social conflict related to enforcement of marine resource management regulations	Conflict between the community or residents who build settlements on the coastline and the government (Wakatobi National Park Office); conflict between fishermen who use the same fishing gear, namely FADs; conflict between sea sand miners and the government (Wakatobi National Park Office), where sand miners refuse regulations regarding the prohibition of sea sand mining; conflict between fishermen and the government (Wakatobi National Park Office), where fishermen reject regulations regarding restrictions on catching several protected species or marine biota; social conflict between fishermen who catch octopus using diving equipment and the government (Wakatobi National Park Office), where the activity of catching octopus by diving is considered to be damaging coral reefs; conflict between residents of Mola Bahari Village and residents of Liya Mawi Village, where the conflict was triggered by residents of Mola Bahari Village taking coral rocks in the sea around Liya Mawi Village. According to the people of Liya Mawi Village, taking coral is an act that violates the regulations, so the people of Liya Mawi Village have given sanctions in the form of confiscation of boats and equipment.
Social conflict related to marine resource governance	Conflict between fishermen who use trap fishing gear and fishermen who use circle net fishing gear, where circle net fishermen catch fish near the location where traps are installed; conflict between inter-island fish traders (fishermen who sell their catch outside the island) and the regional government, where inter-island fish traders refuse to pay fees for fish commodities to be sold outside the island on the grounds that fishermen from outside the island have freedom catching fish in its territory without being charged retribution; conflict between fishermen who catch fish in the shallow sea and fishermen who catch fish in the deep sea. The conflict was triggered by an abundance of catches from deep sea fishermen, causing fish price in the market to decline.
Social conflict related to interactions between users of marine resources	Conflict between seaweed cultivators and sand miners, where sea sand mining activities cause seaweed plants to become dirty and damaged; conflict between fishermen who use environmentally friendly fishing gear and fishermen who use non-environmentally friendly fishing gear; conflict between fishermen and firewood collectors or mangrove tree cutters; social conflict between seaweed cultivators and fishermen who use poison fishing gear, where the poison used to catch fish can damage seaweed plants; social conflict between seaweed cultivators and fishermen who pass by and break ropes or damage seaweed plants.

Table 4 shows that social conflict occurs because of the interests of different individuals and/or groups. Conflict occurs because of the behavior or actions of individuals and/or groups that are intentional or unintentional. The impact of conflict will become more widespread if the conflict involves groups in society. The study also shows that all types

of conflicts have the potential to reappear. This is because the conflict has not been resolved or has been resolved incompletely.

**Discussion.** Each establishment of a conservation area will create social benefits and costs (Springer 2009). The social costs of establishing a conservation area come from various parties, parties who contribute directly to the success of management and parties who are negatively impacted by the establishment of a conservation area. Meanwhile, the social benefits of conservation efforts can be enjoyed by local residents and the global community. In various cases, the benefits of conservation in the form of biodiversity and ecosystem services obtained often exceed the costs incurred (Neudert et al 2015).

Management of WNP as a MCA raises at least three social costs that must be borne by local residents. These social costs are related to restrictions of access to marine resources, namely restrictions on fishing areas and prohibitions on catching protected marine biota, restrictions on sand and coral mining, and prohibitions on harvesting mangrove trees. As a result of restrictions on fishing areas, fishermen have to move fishing areas, from shallow seas near the coast to deep seas far from residential areas. Restrictions on sand and coral mining have caused some residents to lose their jobs and people have difficulty obtaining sand and coral, even though sand and coral are the main materials for infrastructure development. The ban on harvesting mangrove trees makes it difficult for people to get firewood. In Brazil, the establishment of conservation areas covering 7.68% of the country's territory caused a decline in GDP of 0.05% (Azzoni & Isai 1994).

The social benefits obtained by local residents by establishing the WNP as a MCA increased fish catches and tourist visits, and reduced risks of crop failure for seaweed, fish and pearl cultivation. These social benefits show that negative impacts due to conservation can be offset by maintaining ecosystem services, thereby creating new alternative livelihoods (Pullin et al 2013). Previously, the majority of local residents' livelihood was obtained from fishing activities. However, with marine conservation efforts, some local residents have started to cultivate seaweed, fish and pearls, and to work in the tourism sector.

One of the main issues in marine resources and environmental policy is the recognition of fishing rights (Dyspriani 2011; Grip 2017). Fishing is a tradition for communities in most coastal countries, historically recognized in UNCLOS (Bernard 2012; Grip & Blomqvist 2020). The need for marine natural conservation first received attention at the United Nations Conference on Environment and Development in 1992. Therefore, restrictions on the use of marine resources in conservation areas often lead to conflict (Grip & Blomqvist 2020).

Differences in interests in marine resource conservation and fisheries management often trigger conflict (Laffoley et al 2019; Kearney et al 2012; Pita et al 2011). Conflicts usually occur due to a lack of dialogue between parties representing conservation interests and fisheries management interests. Therefore, to avoid conflict, collaboration is needed in the management of conservation areas and fisheries areas (Sopari et al 2014; Hilborn 2016; Grip & Blomqvist 2020) believes that the management of marine conservation areas must be legally separated from fisheries management, because the objectives of conservation management are different from the objectives of fisheries management.

Conservation goals can only be achieved through the implementation of appropriate management measures (Constable et al 2000). Additionally, the success of conservation efforts depends on creating conservation incentives for local communities that utilize marine resources (Neudert et al 2015). For this reason, the management of WNP as a conservation area must be able to reduce costs and increase social benefits for residents around the area. In some cases, the benefits of conservation are enjoyed by the majority of the global community, while local residents have to bear high opportunity costs (Hockley & Razafindralambo 2006; Barcott 2011).

**Conclusions.** The management of Wakatobi National Park has had a positive impact on marine ecology, but has had both negative and positive impacts on the social interactions

of local residents who utilize marine resources. Negative impacts on social interactions of local residents are social costs of management, while positive impacts are social benefits. Therefore, the success of conservation efforts depends on the costs and social benefits generated by conservation management.

**Acknowledgements.** We are grateful for WWF-Indonesia's collaboration with the Faculty of Fisheries and Marine Sciences, Halu Oleo University. We also express our deepest gratitude to the residents at the research location who were willing to provide the required data and information.

**Conflict of Interest.** The authors declare that there is no conflict of interest.

## References

- Arthington A. H., Dulvy N. K., Gladstone W., Winfield I. J., 2016 Fish conservation in freshwater and marine realms: status, threats and management. *Aquatic Conservation: Marine and Freshwater Ecosystems* 26(5):838-857.
- Asmara A., Dahlan M. A., Rani C., 2013 [Ecological status of the density of the coral predator *Acanthaster planci* in relation to the condition of coral reefs in Tomia Waters, Wakatobi National Park, Southeast Sulawesi]. *Bonorowo Wetlands* 3(1):1-11. [In Indonesian].
- Azzoni C. R., Isai J. Y., 1994 Estimating the costs of environmental protection in Brazil. *Ecological Economics* 11(2):127-133.
- Barcott B., 2011 The unfulfilled promise of the world's marine protected areas. Yale School of Forestry and Environmental Studies, Yale Environment, New Haven, 360 p.
- Berkes F., 2005 Commons theory for marine resource management in a complex world. *Senri Ethnological Studies* 67:13-31.
- Bernard L., 2012 The effect of historic fishing rights in maritime boundaries delimitation. Proceedings from the 2012 LOSIKIOST Conference on securing the ocean for the next generation, Centre for International Law, National University of Singapore.
- Browne N. B., Markham H., Fanning D., Weaver D., 2007 A proposed marine management strategy: Diego Suarez Bay. London, UK: Frontier-Madagascar.
- Constable A. J., de la Mare W. K., Agnew D. J., Everson I., Miller D., 2000 Managing fisheries to conserve the Antarctic marine ecosystem: Practical implementation of the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR). *ICES Journal of Marine Science* 57(3):778-791.
- Dyspriani P., 2011 Traditional fishing rights: Analysis of state practice. Division for Ocean Affairs and Law of the Sea Office of Legal Affairs, UN, 140 p.
- Ellis F., Allison E., 2004 Access to natural resources sub-programme livelihoods diversification and enterprise development sub-programme livelihood diversification and natural resource access Livelihood Support Programme (LSP) an inter-departmental programme for improving support. Livelihood Support Programme (LSP) Working Paper 9, 79 p.
- Geldmann J., Barnes M., Coad L., Craigie I. D., Hockings M., Burgess N. D., 2013 Effectiveness of terrestrial protected areas in reducing habitat loss and population declines. *Biological Conservation* 161:230-238.
- Grip K., 2017 International marine environmental governance: A review. *Ambio* 46(4):413-427.
- Grip K., Blomqvist S., 2020 Marine nature conservation and conflicts with fisheries. *Ambio* 49(7):1328-1340.
- Hilborn R., 2016 Policy: Marine biodiversity needs more than protection. *Nature* 535(7611):224-226.
- Hockley N. J., Razafindralambo R., 2006 A social cost-benefit analysis of conserving the Ranomafana-Andringitra-Pic d'Ivohibe corridor in Madagascar. Report to USAID, Madagascar, 60 p.
- Holmes G., 2007 Protection, politics and protest: understanding resistance to conservation. *Conservation and Society* 5(2):184-201.

- Jones D., Ryan C. M., Fisher J., 2016 Charcoal as a diversification strategy: The flexible role of charcoal production in the livelihoods of smallholders in central Mozambique. *Energy for Sustainable Development* 32:14–21.
- Kearney R., Buxton C. D., Farebrother G., 2012 Australia's no-take marine protected areas: Appropriate conservation or inappropriate management of fishing? *Marine Policy* 36(5):1064–1071.
- Kusumanti M., Ferse S., Glaser M., 2021 Sustainable livelihoods frameworks in investigating household assets in Jakarta Bay, Indonesia. *AAFL Bioflux* 14(1):204–217.
- Laffoley D., Baxter J. M., Day J. C., Wenzel L., Bueno P., Zischka K., 2019 Marine protected areas. In: An environmental evaluation. Sheppard C. (ed), *World Seas*, 21 p.
- Muspawi M., 2014 [Conflict management (effort to resolve conflict in an organization)]. *Jurnal Penelitian Universitas Jambi Seri Humaniora* 16(2):41-46. [In Indonesian].
- Neudert R., Goetter J. F., Andriamparany J. N., Rakotoarisoa M., 2015 Income diversification, wealth, education and well-being in rural south-western Madagascar: Results from the Mahafaly region. *Development Southern Africa* 32(6):758–784.
- Pita C., Pierce G. J., Theodossiou I., Macpherson K., 2011 An overview of commercial fishers' attitudes towards marine protected areas. *Hydrobiologia* 670:289–306.
- Powles H., Bradford M. J., Bradford R. G., Doubleday W. G., Innes S., Levings C. D. 2000 Assessing and protecting endangered marine species. *ICES Journal of Marine Science* 57(3):669-676.
- Pullin A. S., Bangpan M., Dalrymple S., Dickson K., Haddaway N. R., Healey J. R., Hauari H., Hockley N., Jones J. P. G., Knight T., Vigurs C., Oliver S., 2013 Human well-being impacts of terrestrial protected areas. *Environmental Evidence* 2(1):1-41.
- Scales I. R., 2014 Conservation and environmental management in Madagascar. Routledge, 398 p.
- Sopari H., Oka N. P., Salman D., 2014 [Collaborative planning model between the Wakatobi National Park Office and the Wakatobi Regency Government in the sustainable management of biological natural resources]. *Jurnal Sains & Teknologi* 14(2):189–198. [In Indonesian].
- Springer J., 2009 Addressing the social impacts of conservation: lessons from experience and future directions. *Conservation and Society* 7(1):26-29.
- Vezina B., Ranaivoson A., Razafimanahaka J., Andriafidison D., Andrianirina H., Ahamadi K., Rabearivony J., Gardner C., 2020 Understanding livelihoods for protected area management: Insights from Northern Madagascar. *Conservation and Society* 18(4):327–339.
- Watt D., 2007 On becoming a qualitative researcher: the value of reflexivity. *Qualitative Report* 12(1):82–101.
- \*\*\* Central Statistics Agency, 2022 [Sulawesi Tenggara Province in figures: 2022]. BPS-Statistic of Sulawesi Tenggara Province, 661 p. [In Indonesian].
- \*\*\* Government of Indonesia, 1990 [Law of the Republic of Indonesia number 5 of 1990 concerning Conservation of Biological Natural Resources and Ecosystems]. Ministry of State Secretary of the Republic of Indonesia, Jakarta, 28 p. [In Indonesian].
- \*\*\* WWF, 2019 [Social study and management of marine resources in the Wakatobi National Park area, Indonesia 2019]. World Wildlife Fund, 86 p. [In Indonesian].

Received: 12 August 2024. Accepted: 14 October 2024. Published online: 29 April 2025.

Authors:

Budyanto, Department of Fisheries Agribusiness, Faculty of Fisheries and Marine Sciences, Halu Oleo University, Jl. HEA Mokodompit 93231, Kendari, Southeast Sulawesi, Indonesia, e-mail: budyanto@uho.ac.id

Irdam Riani, Department of Fisheries Agribusiness, Faculty of Fisheries and Marine Sciences, Halu Oleo University, Jl. HEA Mokodompit 93231, Kendari, Southeast Sulawesi, Indonesia, e-mail: irdamg318@gmail.com

Rosmawati, Department of Fisheries Agribusiness, Faculty of Fisheries and Marine Sciences, Halu Oleo University, Jl. HEA Mokodompit 93231, Kendari, Southeast Sulawesi, Indonesia, e-mail:

rosmawatispi@uho.ac.id

This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

How to cite this article:

Budyanto, Riani I., Rosmawati, 2025 Impact of managing Wakatobi National Park as a marine conservation area. *AAFL Bioflux* 18(2):1046-1055.