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Community practices effects in the resources of marine sanctuaries in Ipil and Tungawan Zamboanga Sibugay

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Abstract

Philippines have been bestowed with abundance that extends in the coasts of its archipelago. However, the countrys' biodiversity is increasingly threatened by overexploitation and environmental degradation, despite ongoing efforts from the government and private sectors to address these challenges. Illegal fishing and encroachment in municipal waters, particularly within Marine Protected Areas (MPAs), continue to pose significant threats to marine resources. This study was conducted to assess the impact of coastal communities on the resources of two MPAs in Ipil and Tungawan, focusing on resource utilization, enforcement practices, and their implications for conservation efforts. A survey of 45 respondents from these coastal communities, alongside apprehension data from the Municipal Environment and Natural Resource Office (MENRO), revealed that activities such as shell harvesting, illegal fishing, and unsustainable tourism are contributing to the depletion of marine resources. Additionally, environmental degradation was observed in the form of coppice mangroves, coral bleaching, and damaged corals, indicating the ongoing decline of the ecosystems within these protected areas. These findings highlight the urgent need for a more effective community-based management plan that encourages sustainable resource use while also addressing the economic needs of local communities.

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Introduction

For centuries communities have lived in coastal zones (CZ), enjoying the ecosystem services these areas provide. Coastal zones have long been favored for their easy access to resources, particularly the plentiful supply of subsistence resources, as well as opportunities for recreational and cultural activities (Mehvar *et al.*, 2018).

Marine resources in the Philippines are under growing pressure due to overfishing, destructive fishing methods, habitat destruction, deteriorating water quality, and limited management capacity (Boquet and Boquet, 2017). These problems do not only affect the resources but also endanger the livelihood of the communities that depends on them. As majority of the Philippine population are being highly dependent on the country's marine products as their primary source of protein, degradation of the quality of these products could also mean endangering the health and well- being of the countrymen.

The declaration of the area as Marine Protected Areas (MPAs) are a key management strategy of the government to address these issues, yet most MPAs globally fail to meet their management objectives (Tupper *et al.*, 2015). Marine sanctuaries, recognized as effective tools for conservation and fisheries management, are gaining increasing promotion worldwide (Di Franco *et al.*, 2016). Moreover, the collective participation of the community and the effective management of the resources can depend on the support of the government in the Marine Protected Areas (Mahajan and Daw, 2016). Positive ecological trends in sanctuary areas have resulted from a blend of community support, management measures, and the enforcement of regulations (Mutanga *et al.*, 2015).

However, limited work has been undertaken to evaluate the conservation effectiveness of existing marine protected area (MPAs) despite widespread recognition of the Philippines as a global priority for marine conservation (Kamil *et al.*, 2017). Despite the conservation efforts, coastal and marine biodiversity is declining very rapidly due to increasing human-population pressure on coastlines and brings multiple human uses and threats to the coastal marine environment (Pawar, 2016). Illegal, unreported and unregulated fishing threatens fisheries management and marine biodiversity, worsening overfishing and unsustainable practices (Costantino *et al.*, 2022). Thus, community management and enforcement factors were related to increase or decrease of marine resources in sanctuary areas (Ban *et al.*, 2017).

Buluan Island Marine Sanctuary (Fig. 1) rests 2.63 km southwest of the mainland and is the westernmost barangay of the municipality of Ipil, Zamboanga Sibugay. Established in 2004 then passed as Municipal Fisheries thru Ordinance No. 09-214-2006, Buluan island in the Second largest locally declared Marine Sanctuary in the province of Zamboanga Sibugay. With a total of 163 hectares (83.9 hectares core zone and 79 hectares buffer zone), it is the only place in the municipal waters where soft and hard corals were still intact.

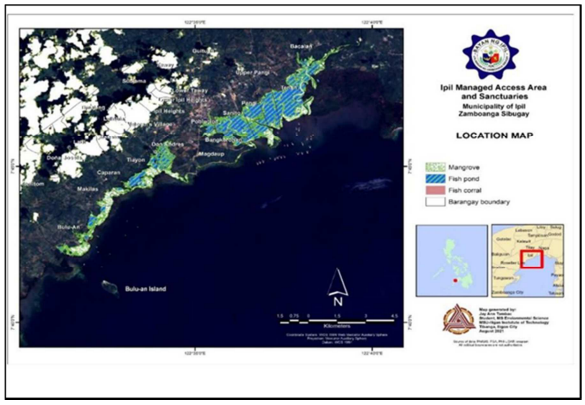

Fig. 1. Location map of Buluan Island Marine Sanctuary in Ipil, Zamboanga Sibugay (Tambac *et al.*, 2022).

Moreover, Bangaan Island Marine Sanctuary (Fig. 2) was established in 2004 through General Ordinance No. 30-04. This comprises 880 hectares of coral reef, seagrass beds, and mangrove (247 hectares buffer; 633 hectares core zone). Within its sanctuary lies the 17-hectare hilly forested area with unique rock formation and white sandy beaches ideal for eco-

tourism. Valuable resources on the island were commercially valuable fishes (Lapu-lapu, Mantis, Talakitok, and Maming), Corals (*Montipora, Acropora, Porites,* and *Fungia*), endangered species of whales, sea turtles, and manta rays were also observed, and rich algae of different species and seagrass beds. Bangaan Island is also the nesting site of marine turtles, Tabon birds, and other wildlife.

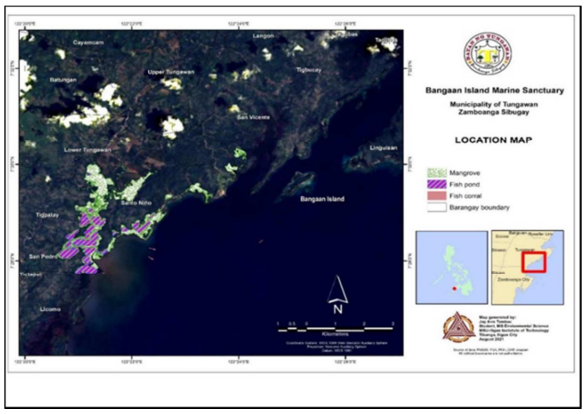

Fig. 2. Location map of Bangaan Island Marine Sanctuary in Ipil, Zamboanga Sibugay (Tambac *et al.*, 2022).

Since coastal communities were greatly dependent on the marine resources, unsustainable practices of resource utilization could lead to overexploitation and degradation of these resources. This action will not only affect the biodiversity but also, the whole community that depends on these resources could feel its consequences. With this, an assessment of coastal community practices on marine resource utilization has been conducted and to determine its effects on the resources in the marine sanctuaries of Ipil and Tungawan, Zamboanga Sibugay Province. This study specifically aims to compare the data of resource assessment in the marine sanctuaries of Ipil and Tungawan; identify the coastal communities resource utilization practices to mangrove, fish caught, corals and seagrasses in the marine sanctuary; and, determine the coastal communities most frequent violations.

Materials and Methods

Resource assessment

Present resource assessment of mangroves, seagrass, fisheries and corals were conducted and results were compared to the previous studies conducted in the area as stated in the Coastal Resource Management Plan of the Local Government Units. Also, published articles in resource assessment conducted in the area of study were used as a reference of previous and recent resource assessment of the marine sanctuaries.

Social assessment

Furthermore, this study uses a survey questionnaire and key informant interview to assess the resource utilization of the coastal communities residing adjacent to the marine sanctuaries. A total of 45 individuals participated in the survey, with 30 respondents from Tungawan and 15 from Ipil. Data o apprehensions were also collected from the LGUs to determine the illegal activities of the coastal communities in the coastal and marine resources.

Results and discussion

Resource assessment

There were six mangrove trees identified in Bangaan Island (*Avicennia* spp., *Lumnitzera* spp., *Rhizophora* spp., *Ceriops* spp., *and Sonneratia* spp.) and four mangrove trees species in Buluan Island (*Avicennia* spp., *Lumnitzera* spp., *Rhizophora* spp., and *Sonneratia* spp.). It was observed that coppice mangroves are present in the area, an indicator that these mangrove trees were once cut and then recovered over time. Factors that could be identified were either by anthropogenic (Rasquinha and Mishra, 2021) or as a result of natural calamities (Salmo, 2021).

Five species of seagrasses were observed along the vicinity of Bangaan Island Marine Sanctuary. These are: *Enhalus acoroides, Thalassia, hemprichii, Cymodocea serrulata, Cymodocea rotundata* and *Halophila ovalis*. Two of this species (*Enhalus acoroides and Thalassia, hemprichii*) were found in strips along the vicinity of Buluan Island Marine Sanctuary. The presence of these seagrass species could indicate a good quality of coastal water (Roca *et al.*, 2015). Additionally, the condition of seagrass can act as an ecological indicator to evaluate the health of nearby coral reef ecosystems (de los Santos *et al.*, 2020).

Previous assessment has been conducted on 2004 by ECOGOV in coordination with the Municipal Local Government Units of Tungawan, to assess marine resources in Bangaan Island Marine Sanctuary. This study was used by the LGU as a baseline for the formulation of Marine Sanctuary in Tungawan, Zamboanga Sibugay. Results of the previous study revealed coral reefs in the marine sanctuary of Tungawan on 2004 have "good" coral cover (53%). Registering 49.5% coral cover in barangay Tigbucay and 63.5% coral cover in barangay Linguisan. Fish abundance as assessed was 17,280 fish per hectare and seagrass cover was 15.96%-24.70%. For the Municipality of Ipil, previous assessment was based on the study of Valino *et al.* (2021), in the corals of Buluan Island Marine Sanctuary where it was revealed in his study that *Fungia* had the highest abundance values and maintained dominance in the three-sampling period even after experiencing a significant decline in August 2017. The second dominant taxa were *Porites* branching coral and followed by *Pavona,* which both experienced a decline in relative abundance in February 2017.

Results of present field observations conducted, found out that there were more corals found outside the vicinity of Bangaan Island Marine Sanctuary where people such as tourists and fishermen have an easy access to the area. With this, presence of crushed corals, installed fish traps and floating cottages were observed in the area.

Most commonly observed corals in both Marine Sanctuaries were table corals (*Acropora* spp.), brain corals (*Platygyra* spp.*, Favites* spp.*, Diploria* spp. *and Favia* spp.), galaxy corals (*Galaxea* spp.), disc corals (*Ctenactis* spp.), and Flowerpot coral (*Goniopora* spp.). Coral bleaching has been observed in both areas and based on Key Informant Interview in the head of office of Municipal Environment and Natural Resources, coral bleaching was first observed on the year 2016. According to the study conducted by Valino *et al.* (2021), coral cover and diversity in Buluan Island Marine Sanctuary showed no changes after bleaching event which might be because of the turbidity experienced in the area that have reduces the impact of intense irradiance in the reef thus, turbid resilient reefs would be identified and should be protected.

Resource utilization practices in Ipil

Out of the 15 respondents from the fisherfolk association of the municipality of Ipil majority of participants are Bisaya, and most rely on fishing as their primary livelihood. Most of the respondents have recognized the provisioning services of the mangrove forest and acknowledged its uses as a wildlife habitat. With this, respondents have not identified any practices that utilized mangrove products for personal purposes.

Fish caught are either sold fresh in the market or processed for consumption by the fishermen. All 15 respondents noted that illegal fishing activities, such as trawling, cyanide, and sodium fishing, could significantly impact fish resources. Despite this awareness, these illegal fishing practices continue to be observed in certain areas of Zamboanga Sibugay.

All respondents in the area recognized coral resources as vital marine organism habitats, emphasizing that coral collection should be strictly prohibited to protect these resources and improve fish catch abundance for local fishermen. Therefore respondents have not identified utilizing corals directly for personal use.

Respondents have perceived the importance of seagrasses as a major habitat and feeding ground for wildlife fauna. Seagrass meadows were utilized as a place for shell gleaning, and a seagrass leaves were used as insect repellent and as a fertilizer. However, most of the respondents don't know the factors that could harm the seagrass in the area. Respondents believed that seagrasses are fast growing species and were still abundant. Respondents explained that seagrass recuperating ability is fast thus, it does not need to be protected.

It was observed that most of the respondents in barangay Buluan, Ipil, Zamboanga Sibugay have recognized the ecological uses of the resources as how this benefits the marine ecosystem and indirectly, they will benefit from protecting these resources.

Resource utilization practices in Tungawan

Out of 30 respondents from the fisherfolk association of the municipality of Tungawan, majority of the respondents have utilized mangroves for construction of houses.

Fish caught sold by the respondents in the commercial market or thru middlemen. Most of the respondents processed first their fish caught either dry (*daing*) it or ferment (*alamang*) it so that it will be preserved to increase its market value. Based on the key informant interview, there is a decrease of fish resources as compared to the past 5 to 10 years. According to them, before, fishermen don't have to go far to fish but this time, they have to go to the farthest part of municipal water or to other municipality to have more fish catch.

In terms of coral resources, most of the respondents answers the use of corals as a marine organism's habitat and therefore have not collected nor used it for personal use. Respondents also have identified that illegal fishing method is the most common factor that could lead to the degradation of corals in the municipality of Tungawan. Although this study did not identify any respondents who practice illegal fishing methods, the majority observed that illegal fishing continues to be practiced by other fishermen in the municipal waters of Tungawan.

Seagrass were used mostly by the respondents of Tungawan as a feeding ground or fishes and other wildlife or serves as a wildlife habitat thus, seagrass is an ideal place for shell gleaning which was practiced by most of the women in the coastal communities of the municipality while their husbands were fishing. However, according also to the respondents, most of the practices that could deplete seagrass resources is fishing in seagrass meadows. This is a type of fishing method that were not prohibited in the area but were observed by the residents as destructive to the seagrass as some may entangled in mesh nets or may cling to boat propellers.

Since most of the residents depend their livelihood in fishing and others do not even have an alternative source of income, the very possibility of resource overexploitation in the marine resources will not only put the marine ecosystem in grave threat but also the coastal communities who have the direct contact and are dependent to these resources. This domino effect of resource degradation could also affect social communities from other areas for putting food security at risk. Though the most common response to the factors that affects fish resources is due to illegal fishing activities, there were respondents who answered that this is because of the increasing number of fishermen. With a limited resources and a limited technology, it is hard for them to compete to have more access to the resources. With this, financially able fishermen can have more access to resources and thus could catch more and bigger fishes as compared to fishermen who struggle financially. Also, capitalist and businessmen have been investing in fishing are most common in the province of Zamboanga Sibugay. This strategy is imposed by capitalist or financially abled individuals (financer) lend their money to fishermen which in return pay them with their fish caught. The money will serve as a starting capital for fishermen such as the purchase of necessary equipment used in fishing, and food for their family. As a payment, fishermen would sell the fish caught to the financer however, in a lower price as compared to the middlemen.

Apprehensions

Data on Apprehensions in this study were only based on the records provided by the Municipality of Ipil and Tungawan. Based on the data of apprehensions from the Local Government Unit of Ipil and Tungawan municipalities, the most common violation listed is the illegal fishing activities (Fig. 3).

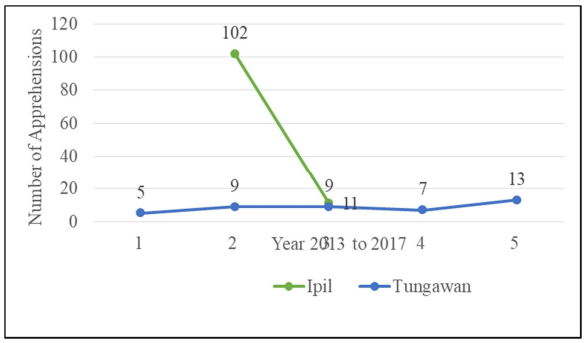

Fig. 3. Apprehensions of Ipil and Tungawan from year 2013 to 2017

Apprehensions recorded in the municipality of Ipil (2014-2015) are decreasing. The most common violation is the practice of illegal fishing activities such as trawl. Most of the apprehensions within this years violated the Unified Fishing Ordinance, under Article 9 which pertains to the fines and sanctions of operating unregistered fishing boats, fishing within the Marine Sanctuary, using of fine mesh nets, fishing within the municipal waters and fishing using active gears (prohibited equipment). On 2014, number of apprehensions in Ipil reached up to 102, the highest apprehensions recorded in two years. It is because this year is the start of strong law enforcement in the marine ecosystem of the municipality. Also, the implementation of the management plan has taken its effect during this time in conservation of the municipalities' locally declared marine protected areas and marine sanctuary. With this, the local government unit of Ipil has fully realized the values and potential of their coastal and marine resources especially the Buluan Island and hence devise some strategy that could protect and preserve it. One of the most common yet known to be effective method that Ipil municipality has done is law enforcement and this explains the highest apprehension records in the year 2014. One year later the number of apprehensions decreases since by this time, fishermen and coastal communities are fully aware on the consequences and they are now afraid to violate the laws implemented. Also, due to series of Information, Education and Communication (IEC) campaigns conducted by the LGUs, residents in the coastal community of Ipil have expanded their awareness and knowledge on the importance of each organism in the coastal and marine ecosystem. To prevent the same mistake to happen again, the local government have partnered with other government agencies such as TESDA and DTI to conduct some trainings and seminars in coastal communities to allow them to engage in another type of livelihood activities other than fishing. They also partnered with other non-government organizations and agencies such as RARE and XAES which also helps them in the management of the marine sanctuaries.

In Tungawan, the trend of apprehensions are increasing from 5 apprehensions in 2013 to 13 apprehensions in year 2017, (9 in 2014, 11 in 2015, and 7 in 2016). The most common apprehensions recorded is operation of fishing boats without permit which violates sec. 89 and 90 of RA 8550 (The Philippine Fisheries Code of 1998), GEN. ORD #30-05, SEC 26-27 for 5 consecutive years (2013-2017).

In year 2013, there are 7 apprehensions in the coastal areas of Tungawan, Zamboanga Sibugay. All of these violations pertains to fishermen operating fishing boats with no permit from the Local Government of Tungawan, no license, and no papers of vessels and fishing gears and thus, violated the Section 89 and 90 of RA 8550, General Ordinance #30-05, Section 26 and 27. In the year 2014 there were 9 violations recorded and most of this has violated the Section 89 and 90 of RA 8550, General Ordinance #30-05, Section 26 and 27 or fishing without pertinent documents (7). Two of the nine apprehensions are possession of dynamited fish of about 4-6 kilos. In the year 2015, there are also 9 apprehensions which all have violated the Section 89 and 90 of RA 8550, General Ordinance #30-05, Section 26 and 27 or operating without sufficient papers. For this year, two of the violator of the said law was encroachment of commercial fishing vessel using active gear thus also violated Municipal Ordinance number 30-04, Section 26 and 27. During the seize and capture operation conducted by bantay dagat task force of Tungawan, boat captain and all crew of the said vessel jump off the sea and abandoned their fishing boat.

In the year 2016, there are 17, and on 2017 there are 13 apprehensions in Tungawan, Zamboanga Sibugay. Fishing boats were suspended from fishing and owner or operator was penalized for operating without pertinent documents or registration thus, violated General Ordinance number 30-04, Section 26, for 2017.

The increasing number of apprehensions in the municipality of Tungawan has continued despite the local government unit efforts to strengthen law enforcement. Even at present, fishermen of Tungawan has continued to witness illegal fishing practices in the area.

According to the LGU and the fishermen, most of the illegal fishers came from other areas, most commonly from Zamboanga City since the municipality of Tungawan is the last municipality in Zamboanga Sibugay to the city of Zamboanga.

Conclusion

Results of this study have found out that communities in the coastal areas of Ipil and Tungawan has an impact to the marine resources in the marine sanctuary. For mangrove, data shows that there is an increase of mangrove cover in Buluan, Ipil, Zamboanga Sibugay for the past 5 years as compared to the data of Municipal Environment and Natural Resource Office. Also, Seagrasses were still present in the two marine sanctuaries which indicate the presence of wildlife fauna in the area but mostly observed in Bangaan Island Marine Sanctuary. Coral bleaching is present in the two marine sanctuaries. In Bangaan Island Marine Sanctuary, traces of illegal fishing activities were still visible in the area. There is an increase of identified corals in the area since last assessment has been conducted (2004).

Also, traces of human activities in the marine sanctuaries were visible such as presence of coppice mangroves and trail of crushed corals serves as a track for people who practiced shell gleaning. Apprehension logs also supports that the practice of illegal fishing method is still present in the areas which explains the crushed corals in the reef of the marine sanctuaries.

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