



From Bountiful Seawaters to Condition of Excessive Depletion of Marine Resources

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ABSTRACT.

From once bountiful seawaters to a condition of excessive marine resource depletion, this qualitative study sought to document the lived experiences and insights of fisher-respondents from six islands in Bohol. The participants, who have resided in the islands for at least 50–60 years, were purposively selected due to their extensive knowledge and long-term experience with local marine ecosystems. The study focused on three key areas: (1) the condition of coral reefs and reef fishes, (2) fish catches per fishing effort, and (3) the current issues and challenges related to marine resource conservation and management. All the twelve (100%) fisher-respondents reported that coral reefs in the six islands are now severely damaged, with only a few reef fishes observed in reef areas. Ten (83.33%) respondents further noted that fish catches have declined significantly, from more than 10 kilograms per fishing effort in the past to only 2–3 kilograms at present. Illegal fishing and other destructive practices were identified as major concerns, alongside pollution and improper waste disposal linked to poorly managed tourism activities. In response to these issues, it is recommended that local government units (LGUs) across the six islands strengthen their law enforcement mechanisms through adequate budget allocation and enhanced implementation of conservation programs. Additionally, greater community involvement is essential, with all sectors encouraged to actively participate in monitoring, awareness campaigns, and collaborative efforts to support both local and national initiatives for marine resource conservation and sustainable management.

Keywords: Bountiful, depletion, marine resources, fishers, law enforcement units, local government

INTRODUCTION

Management of marine resources remains a primary concern for maritime nations such as the Philippines. Article I of the 1987 Philippine Constitution defines the country's national territory to include not only its terrestrial, fluvial, and aerial domains, but also its territorial sea, seabed, subsoil, insular shelves, and other submarine areas. Furthermore, Article II, Section 16 mandates the State to protect and advance the people's right to a balanced and healthful ecology in accord with the rhythm and harmony of nature, thereby establishing environmental protection as a constitutional obligation.

Despite this strong legal and constitutional framework, illegal fishing and other destructive marine activities persist in many coastal and island communities. These ongoing challenges highlight gaps in enforcement, governance, and community compliance, underscoring the need for strengthened management strategies, effective monitoring, and sustained stakeholder engagement to ensure the long-term sustainability of the country's marine resources.

Illegal fishing encompasses a broad range of exploitative marine activities undertaken by both small-scale and commercial fishers in the high seas as well as in waters under national and local jurisdiction (Daliri et al., 2016; Pomeroy et al., 2009; Pomeroy et al., 2010). In the Philippine context, Republic Act No. 10654—An Act to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing, which amended Republic Act No. 8550 or the Philippine Fisheries Code of 1998—provides a strengthened legal framework to address this persistent problem. However, its effectiveness largely depends on strict and consistent implementation across all sectors.



The law is not merely punitive; it enhances monitoring, control, and surveillance mechanisms and promotes coordinated action among national and local government agencies, the private sector, and coastal communities. It underscores shared and reciprocal responsibilities in preventing and controlling illegal fishing within respective jurisdictions (Gomez, 2020; Acosta, 2019). In line with this, effective marine resource management requires local government units (LGUs) to actively collaborate with the national government in protecting and managing marine resources within their territorial waters, as mandated under Chapter 1, Section 2(a) of the Local Government Code of 1991.

The Provincial Government of Bohol has demonstrated its strong commitment to marine resource protection and environmental management through the enactment of the Bohol Environment Code of 1991. This landmark policy institutionalizes environmental governance at the local level and provides a comprehensive framework for the conservation, protection, and sustainable use of the province's natural resources, including its marine ecosystems.

The Code empowers local government units (LGUs)—particularly cities, municipalities, and barangays—to enact locally responsive and community-supported ordinances that advance environmental stewardship. It promotes shared responsibility among government agencies, private sector entities such as non-government organizations, religious and charitable institutions, and people's organizations. Through this collaborative and participatory approach, the province strengthens its collective capacity to conserve and manage Bohol's ecological and marine biodiversity systems effectively.

Serious and sustained action—supported by adequate funding and strong multi-sectoral collaboration—is crucial to effectively address illegal fishing, prevent the indiscriminate disposal of domestic, commercial, and industrial wastes, and respond to the accelerating impacts of climate change on marine ecosystems. These overlapping pressures contribute to the degradation of coastal habitats, declining fisheries productivity, compromised food security, and the erosion of livelihoods among fishing-dependent communities, particularly in climate-vulnerable regions such as Southeast Asia.

Scientific evidence further underscores the urgency of coordinated and evidence-based intervention. William W. L. Cheung et al. (2010) projected substantial climate-driven shifts in marine species distribution and reduced fishery catch potential in tropical waters (*Global Change Biology*). In addition, Daniel Pauly and Dirk Zeller (2016) revealed that global fisheries catches have been significantly underreported, reinforcing the need for stronger monitoring and enforcement mechanisms against illegal, unreported, and unregulated (IUU) fishing (*Nature Communications*).

Moreover, Elena Ojea et al. (2020) highlighted the importance of adaptive strategies among fishing communities facing climate-driven shifts in target species (*One Earth*). Their findings emphasize the roles of effective governance, institutional flexibility, and community engagement in strengthening resilience. Collectively, these studies advocate for an integrated management framework that combines strict law enforcement, environmental protection, and adaptive governance to ensure the long-term sustainability of marine ecosystems and coastal livelihoods.

In a nationwide open-access study, Ferdinand Panga et al. (2021) examined the environmental factors affecting reef benthic cover in the Philippines and found that coral reef conditions are influenced by both human activities and natural stressors (*Frontiers in Marine Science*). The study reported declining live coral cover in several areas, often associated with destructive fishing, coastal development, pollution, thermal stress, and storm disturbances. These findings highlight the cumulative impacts on Philippine reefs and underscore the need for strengthened management and conservation efforts to sustain reef ecosystems.

This study has been conducted in 6 islands of Bohol, Philippines (namely: Cabilao is., Sandingan is., Pangangan is., Mantatao is., Batasan is., and Jandayan is.). Researchers were interested to assess the present state of marine resources in the islands specially, to the condition of coral reefs and reef fishes, to include the fish catches of fisher per fishing effort, and the issues and problems met by the islanders in relation to the management of marine resources, wherein these islands the authors have a knowledge on the condition of marine resources way back 30 years ago, hence it has nice to understand if there were changes happen in the last 30 years.



It is both timely and significant to reassess the situation of marine resources of the six islands of Bohol in order to determine the present condition of coral reefs, reef fish communities, and fish catches of municipal fishers using gill nets and multiple handlines. In assessing the current state of coral reefs, reef fishes, catch per unit effort, and the management-related issues encountered by local communities, observations and knowledge from the past 30 years served as an important baseline. These conditions were determined with information gathered from twelve fisher-respondents across the islands, enabling the study to examine perceived and measurable changes in marine resources and governance challenges over the last three decades.

Objectives

The objective of this study was to determine the conditions of marine resources and the livelihood of the fishers in the islands about their observations on changes occurred in the last 30 years and at present such as the present condition of coral reefs and reef fishes in the island, the catch of fishers of per day fishing, and the issues and problems met by the islanders in relation to marine resources conservation and management.

METHODOLOGY

This study was conducted last June 2024 in six island communities of Bohol, Philippines: Cabilao Island, Sandingan Island, Pangangan Island, Mantatao Island, Batasan Island, and Jandayan Island. The participants, who have resided in the islands for at least 50–60 years, were purposively selected due to their extensive knowledge and long-term experience with local marine ecosystems.

The research aimed to assess the current status of marine resources in these areas, with particular focus on the condition of coral reefs and reef fish populations. It also examined fish catch per unit effort (CPUE) among local fishers and identified key issues and challenges faced by island residents in relation to marine resource management.

Reassessing the marine resources of the six islands of Bohol is both timely and significant, particularly in examining the current condition of coral reefs, reef fish communities, and the fish catches of municipal fishers using gill nets and multiple handlines. Comparing present observations with conditions documented three decades ago provides an opportunity to evaluate long-term ecological and fisheries-related changes. Such historical comparison strengthens the understanding of shifts in resource abundance, habitat quality, and fishing productivity over time.

Anchored in a phenomenological research strategy, this study draws on both descriptive and interpretive approaches as outlined by A. Oluka (2025). Consistent with this framework, the research emphasizes capturing the lived experiences, perceptions, and reflections of fishers regarding changes in marine resources across three decades. Historical observations served as a baseline for comparison with narratives gathered from twelve fisher respondents across the islands. Through this lens, the study not only documents ecological conditions but also interprets the meaning of change as experienced by local fishing communities in relation to marine resource management challenges.

RESULTS AND DISCUSSION

The participants vividly recounted their experiences of life in the seas surrounding the islands, describing a time when marine ecosystems were thriving and deeply intertwined with their daily existence. According to one participant:

“In the late 1980s, most—if not all—marine resources in Bohol were perceived to be in excellent condition. Coral reefs were vibrant and richly coloured, while reef fishes, shellfish, and crustaceans were abundant. For fisher families living in peaceful island and coastal communities, the sea was not only a source of livelihood but also a symbol of sustenance and well-being. Young blue swimming crabs could be easily caught by hand in shallow waters, and shellfish were readily gathered just beneath the sandy surface—clear signs of ecological richness and balance”



These recollections stand as powerful testimonies to the beauty and productivity of marine ecosystems before the onset of widespread environmental degradation. They reflect a period when natural resources were relatively undisturbed and capable of sustaining both biodiversity and community livelihoods. Additionally, another participant noted:

“During the 1990s, personal observations through several dives conducted across the same six islands further affirmed these accounts. Using simple traditional wooden goggles for snorkelling, the underwater landscape revealed an astonishing diversity of marine life. Schools of colourful reef fishes swam among structurally complex coral formations, feeding and seeking shelter within healthy reef habitats. Such experiences not only highlight the former ecological integrity of these marine environments but also provide an important historical benchmark against which present conditions can be meaningfully compared.”

Present Condition of Coral Reefs and Reef Fishes

The twelve (12) fisher-respondents from the six islands were asked to describe the current condition of coral reefs and reef fish populations compared to their state three decades ago. Across interviews, a consistent narrative emerged: participants perceived a significant decline in reef quality and fish abundance. They attributed this deterioration primarily to destructive fishing practices—particularly the use of dynamite, cyanide, and toxic plant extracts—as well as to natural disturbances, including the severe impacts of Super Typhoon Odette (Rai), which struck the region on December 16, 2021.

Respondents emphasized that the effects of blast fishing, even when practiced many years ago, continue to be evident today. Coral structures shattered by dynamite have struggled to recover, leaving fragmented reef habitats that no longer provide adequate shelter and breeding grounds for reef-associated species. According to the fishers, this long-term degradation has contributed to reduced fish catches and a noticeable decline in marine biodiversity, underscoring the enduring ecological consequences of destructive fishing practices. One respondent said:

“Our coral reefs in the islands were destroyed by illegal fishers who extensively used dynamite fishing. Dynamite fishing was very rampant 20–30 years ago in the islands. That was one of the main reasons our corals were broken and/or disintegrated. Coral rubble with fewer reef fishes can now be clearly observed in many reef areas.”

Research further confirms the long-term vulnerability of Philippine coral reefs. In a nationwide analysis, Ferdinand Panga et al. (2021) examined environmental factors influencing reef benthic cover across multiple sites in the Philippines (*Frontiers in Marine Science*). Their study found that coral reef conditions are strongly shaped by both anthropogenic pressures—such as destructive fishing, coastal development, and pollution—and environmental variables including temperature stress and storm disturbances. The authors emphasized that many reef areas exhibit reduced live coral cover and increased algal dominance, reflecting cumulative impacts over time. These findings reinforce earlier assessments that Philippine reefs have experienced sustained degradation and highlight the urgent need for strengthened local management, enforcement, and climate adaptive conservation strategies to prevent further decline. This condition is confirmed by the one of the participants stating:

“Sometimes in December 2023, I conducted my second dives along the cliff sides of three of the six islands. What I saw left me worried and disappointed, as I reflected on how the once rich and colourful coral reefs of the islands have now become heavily and severely depleted.”

Another human activity that has contributed to coral reef degradation is the use of poisons, such as cyanide and toxic plant extracts, in fishing practices. The fishers identified much of the present reef damage as a consequence of these illegal and destructive methods. One participant stated:

*“...the other reason was the poisoning of fish by using cyanide and toxic plants like Tobli tree (*Barringtonia asiatica*, and Lagtang vine (*Derris elliptica*) ...”*

However, Bohol was struck by Super Typhoon Odette on December 16, 2021, which also caused significant damage to natural resources, including coral reefs in the surrounding island seas.



From one of the participants,

“...and the natural calamities like the super typhoon named “Typhoon Odette” that hit in the entire province of Bohol last December 16, 2021 which obviously made a huge damaged of coral reefs in the 6 islands...”

These statements from the fisher-respondents corroborate the findings of Costello and Baker (2011) and Costello (2015), who reported that the depletion of marine resources is largely driven by overfishing, particularly through illegal fishing methods. Such practices endanger marine ecosystems and critical habitats of marine mammals, birds, reptiles, and fish, increasing their risk of population decline and possible extinction. Furthermore, overfishing, pollution, poorly managed tourism activities, and other anthropogenic and natural disturbances—when left uncontrolled—contribute to coral reef destruction, reduced species abundance, and declining reef biodiversity (Abelson, 2006).

Fish Catch of Fisher per Fishing Effort

A participant shared that thirty (30) years ago, fish could easily be caught even with bare hands and/or through traditional fishing methods such as hook-and-line or gill nets.

“I was an occasional fisher in the 1980s during my high school days. I used to accompany the owners of gill net fishing operations during weekends, public holidays, and long school vacation periods. I would wake up at 2:00 early in the morning then hop onto my assigned small fishing pump boat to help steer it to the open sea where the gill nets and fishing paraphernalia would be set up at the desired fishing spot at the exact time. We would temporarily drop our pump boat anchor and wait silently for the signal to set the gill nets into the seawater, which would usually take place at exactly 4:00 in the morning when the sun begins to rise. It takes at least an hour to ensure the gill nets are properly submerged in the seawater, after which we would wait for another hour before we retrieve said nets and to our great joy, catch at least 10 kgs of fish per gill net fishing. Those moments of seeing our catch are unforgettable to me, especially those times when our gill nets could bring in more than 10 kgs of fish per fishing effort.”

This indicates that fishing activities in the past were relatively easy and consistently productive. With each fishing effort, fishers could expect catches of 10 kilograms or more, reflecting the abundance of fish stocks during that period.

The fish caught in the past included a wide range of species and varieties. Fishers encountered diverse types of reef and pelagic fishes during their fishing activities. This diversity reflected the rich and healthy condition of marine ecosystems at that time. One of the participants reported:

“The common fish species caught through gill net fishing during those times included the gold saddle goatfish, whitespotted surgeonfish, hairtail fish, bigeye trevally, herring scad, gruntfish, Spanish mackerel, pugnose ponyfish, rabbitfish, yellow-lined seaperch, blue swimming crab, netted sweetlips, crevalle jack, ornate threadfin bream, moray eel, blue-spotted stingray, bluefin trevally, deep-bodied mojarra, common silver-biddy, smalltoothed ponyfish, blue-and-gold fusilier, lunar fusilier, greenback mullet, moonfish, sole, bar-tailed flathead, pickhandle barracuda, northern whiting, yellow-tipped threadfin bream, and diamond trevally.”

When the fishers were asked about the estimated kilograms of fish caught per fishing effort using gill nets and multiple handlines, a substantial decline was reported. Ten (83.33%) of the twelve fisher-respondents agreed that their catches had drastically decreased—from more than 10 kilograms per fishing effort in the past to only 2–3 kilograms at present. They also noted that there are times when the total catch amounts to less than one kilogram per fishing trip. One participant said:

“Most of the fish species we currently catch range only from 2–3 kilograms per fishing effort, regardless of the method used, compared to the past when we regularly caught 10 kilograms or more. The species commonly caught through gill net fishing include goldsaddle goatfish, surgeonfish, blue swimming crab, crevalle jack, pugnose ponyfish, bluefin trevally, blue-spotted stingray, smalltoothed ponyfish, moonfish, pickhandle barracuda, and rabbitfish.”



This observation was supported by another participant's experience, who noted that the reduction in fish catch has been extremely evident when compared to experiences from 20–30 years ago. Fishers also identified several species commonly caught using other fishing methods.

“The different species of fish caught using multiple handline fishing include snapper, yellow-tipped threadfin bream, grouper, netted sweetlips, yellow-lined seaperch, stingray, and eel. Catches from multiple handline fishing have also declined, and the fish caught are noticeably smaller in size compared to those caught 20 to 30 years ago.”

At present, although fish catches have declined, the market price somewhat offsets the reduction in volume, as two kilograms of fish valued at ₱200 per kilogram amount to ₱400 per day. If this daily income is multiplied by 24 fishing days per month, fishers may earn approximately ₱9,600 monthly or ₱115,200 annually. This estimated annual income appears higher than the ₱30,000 to ₱69,000 range reported by Bersaldo et al. (2022) for fishers in Malita and the Davao Gulf, suggesting that income levels in the six islands of Bohol may be comparatively better, though potentially even higher if reef ecosystems had not been degraded.

Issues and Problems met by the Islanders in Relation to Marine Resources Conservation and Management

Effective management of marine resources across the country remains a persistent challenge for both the public and officials at the local and national levels, particularly in the province of Bohol. Despite the presence of fisheries law enforcement units, some individuals continue to exploit marine resources through illegal and destructive practices for immediate survival, often disregarding the long-term consequences for ecosystem sustainability. Ten (83.33%) of the fisher-respondents from five of the six islands identified illegal fishing and destructive activities as the primary issue currently confronting their communities.

“Illegal fishing remains a major problem because some fishers continue to practice indiscriminate methods such as blast fishing using dynamite, poisoning with cyanide, and trawl fishing within municipal waters. These activities are highly destructive, as such fishing gears are prohibited in municipal waters, yet they persist despite their harmful impacts on marine resources. Examples include drive-in-net fishing, push-net fishing, and the use of triple nets, all of which contribute to the degradation of coral reefs and fish habitats.”

Another issue identified by the participants was pollution and improper waste disposal. Seven (58.33%) of the fisher-respondents from four of the six islands reported that pollution and the improper disposal of solid and domestic wastes are clearly evident in their communities, contributing to the degradation of coastal and marine environments.

“Most residents in the islands do not have proper drainage systems. Household wastewater from kitchens is often discharged directly into the shorelines, and many families practice burning non-biodegradable waste materials such as cellophane, Styrofoam, and similar items without considering the negative effects on the marine environment and its resources in the islands.”

At present, another human activity increasingly observed in Bohol is the growth of various tourism activities, which may also contribute to coral and reef degradation when not properly managed. Six (50.00%) of the fisher-respondents from three islands mentioned that unmanaged tourism has negatively affected marine resources. As one participant stated,

“One of the activities destroying marine resources, particularly corals, is unmanaged tourism. Some beachgoers do not respect live hard corals; for example, tourists walk freely over live corals during the lowest low tide.”

Despite the existence of ordinances aligned with national laws protecting marine life, weak law enforcement remains a continuing concern in the islands. Three (23.07%) fisher-respondents from three islands reported that ineffective implementation of environmental regulations is one of the key issues affecting marine resource conservation and management. A participant explained,



“Some commercial fishing vessels from neighbouring municipalities and provinces enter municipal waters to fish and compete with local fishers. Their activities sometimes violate local ordinances, and the enforcement of laws is not strictly observed, resulting in damage and destruction to marine life.”

The experiences and observations shared by fishers in the islands of Bohol are both vital and timely, as they provide valuable insights that can be used to raise awareness among residents and neighbouring island communities. These narratives should serve as a basis for reflection, dialogue, and collective planning toward more effective marine resource conservation and management. Immediate action is necessary, as delays may further compromise the sustainability of marine ecosystems that communities depend upon for food and livelihood.

Illegal fishing and other destructive activities continue to persist in the islands, and if not properly addressed, future generations may no longer witness the richness of marine life that previous generations once experienced. The continued disregard for marine resources risks accelerating ecological decline and fisheries depletion. This concern is supported by Afoakwah et al. (2018), Gillam et al. (2018), and Hilborn (2011), who reported that although illegal fishing takes various forms, its cumulative effects are profoundly destructive and contribute significantly to the depletion of fish stocks worldwide.

CONCLUSION AND RECOMMENDATIONS

The study concludes that significant changes have occurred in the condition of marine resources across the six islands of Bohol. Once characterized by abundant and productive seawaters, the marine environment now shows signs of considerable decline compared to its previous state. Coral reefs have been severely damaged, with only a few reef fishes observed in many reef areas, and fish catches have dropped from more than 10 kilograms per fishing effort in the past to only 2–3 kilograms at present. Persistent issues—such as the use of destructive fishing methods and toxic substances, improper waste disposal from tourism activities, and illegal fishing practices that violate existing ordinances and marine protection laws—continue to contribute to reef degradation and fisheries decline.

It is therefore recommended that local government units (LGUs) in the six islands of Bohol strengthen their law enforcement mechanisms by allocating adequate budgets for enforcement activities and conservation programs aimed at addressing coral reef degradation, illegal fishing, and poorly managed tourism. Greater community involvement is also essential; all sectors within the island communities should actively participate in monitoring efforts, public awareness campaigns, reporting mechanisms, and incentive-based conservation initiatives. Through stronger enforcement and inclusive community engagement, local and national governments can work collaboratively to enhance marine resource conservation and sustainable management.

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Informed Consent

This study was carried out with the informed consent of all participants. They were clearly informed about the study’s purpose, procedures, potential risks and benefits, and their right to withdraw at any time without penalty. Written consent was obtained from each participant prior to their involvement.

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The authors acknowledge the use of Chatgpt to organize thoughts, correct grammar and proper punctuation and enrich ideas. The prompts and outputs used were presented in the matrix below. While the authors acknowledge



the usage of AI, they maintain that they are the sole authors of this article and take full responsibility for the content therein, as outlined in COPE recommendations.

Prompts	Purpose
Improve the grammar, fix punctuation, and correct any writing errors in the paragraph below. Keep the meaning the same and make the writing clear and natural. Here is the paragraph:	Improve Grammar and Correct Punctuation
Rephrase the paragraph to improve clarity, coherence, and smooth flow of ideas:	Rephrase to Improve Clarity and Flow
Rewrite the paragraph with improved grammar, punctuation, and sentence structure. Enhance the clarity of ideas, improve transitions, and make the overall thought more logical and well-organized. Maintain the original meaning. Text:	Improve Grammar + Rephrase for Better Thought Structure

Conflict of Interest

The authors affirm that they have no financial, personal, or professional conflicts of interest that could have influenced the conduct or outcomes of this study.

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