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SUSTAINABLE FINANCING OF MARINE PROTECTED AREAS IN THE BANGSAMORO REGION

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ABSTRACT

The Philippines, an archipelago with over 7000 islands and a coastline of 33,900 km, is situated within the Coral Triangle, the world's most biologically diverse marine area and one among its regions is the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM), which was newly established pursuant to Republic Act No. 11054 of 2018, faces environmental challenges due to the pressure on production goals. Marine Protected Areas and emerging sustainable financing faces challenges such as insufficient funding, unpredictable revenue sources, and competing financial priorities of the region. These obstacles threaten the long-term viability of MPAs, hindering their effectiveness in achieving conservation goals and posing a threat to marine ecosystems. The ongoing decline in marine resource abundance and ecosystem degradation is a consequence of policies structured around unsustainable approaches to marine resource use. Sustainable financing, specifically in the context of natural resource management, is essential for overcoming funding challenges in conservation efforts. Establishing a network of MPAs is a strategic approach to conserve coastal and marine ecosystems, leveraging interconnectivity among organisms and safeguarding their habitats throughout various life stages. Studies underscore the positive impacts of networking MPAs in protecting marine life during critical life cycles. The success of MPAs in Bangsamoro relies on community involvement and aligning initiatives with Bangsamoro cultures and traditions. The research aims to address global challenges by exploring financial mechanisms crucial for sustaining marine ecosystems, emphasizing the urgency of addressing overfishing and promoting conservation.

I. INTRODUCTION

Bangsamoro region underwent severe declines in coral reef health due to poor land-use practices, rapid coastal development, overfishing and destructive fishing techniques, including the use of dynamite and cyanide. Marine protected areas (MPAs) are critical instruments of oceans conservation, yet their long-term viability hinges on sustainable financing. The concept of sustainable financing is mostly connected to the management of natural resources. One of the approaches in conserving and protecting the coastal and marine resources and its ecosystem is the establishment of Marine Protected Areas networks. There are many studies that testify the positive impact of networking marine protected areas considering its interconnectivity among some organisms such as marine fishes and invertebrates that use various habitats during their different life history, thus ensures the organisms to be protected during their life cycle.

In the context of Bangsamoro perspectives, the sustainable financing of marine protected areas (MPAs) represents not only a strategic approach to environmental conservation but also a moral imperative in governance. Despite the ecological importance of marine protected areas, the financial sustainability of MPAs remains a significant challenge. Funding is essential to support the on-going conservation efforts, effective management, and the realization of long-term benefits. This research work is rooted in several key consideration: (1) As a human activity, such as unsustainable fishing practices, habitat destruction and climate change continue to threaten marine environments. It is imperative to ensure the financial stability of MPAs, without adequate funding. These areas may be unable

to fulfill the intended ecological functions; (2) Under the Sustainable Development Goals, sustainable financing of MPAs is a growing global significance. With the international commitments, such as the Convention on Biological Diversity's Aichi Targets, emphasized the importance of MPAs expansion and effective management; and (3) There were past research paper indicating a variety of financing models and mechanisms worldwide and some of these have proven to be successful in maintaining the long-term sustainability of MPAs.

Marine protected areas (MPAs) play a critical role in conserving and safeguarding our oceans' biodiversity and ecosystems' health. However, the sustainable financing of MPAs has emerged as a significant challenge. Insufficient funding, unpredictable revenue source and competing financial priorities have sometimes jeopardized the long-term viability of these vital conservation areas. This problem hinders the effectiveness of MPAs in achieving their conservation goals and threatens the future of our marine ecosystems.

The continuing decline of marine resource abundance and the degradation of marine ecosystems result to a large extent from policies that are still structured around unsustainable approaches to marine resource use. Addressing this issue is imperative to ensure the continued preservation of our oceans and their invaluable resources for the present and future generations.

Conducting this research, it aims to filling the research gaps on sustainable financing for MPAs, and the result will probably offer a policy recommendation for reinforcing the financial resiliency in the region.

II. RELATED LITERATURES

According to the United Nations Food and Agriculture Organisation, 30% of global fishing stocks are overexploited or depleted with another 57% being fully exploited (FAO, 2012). This poor fisheries management has caused global fishing stocks to provide far less than if they were allowed to recover, and some studies suggest that in a business-as-usual scenario, 100% of commercial fishing stocks could collapse by 2048 (Worm et al., 2006).

The World Bank (2008) attempted to quantify the benefits of conserving marine ecosystems by calculating the cost of global overfishing, adding up to US$50 billion annually and totalling U$2 trillion over the past three decades. In addition, Balmford et al. (2002) estimated the total enterprise value of intact mangrove systems in Thailand to be 70% higher than those altered for shrimp farming, and the total enterprise value of sustainable fishing practices around a coral reef in the Philippines exceeded that of destructive fishing techniques by nearly 75%.

In the 2008 report 'The Sunken Billions', the total economic loss caused by the global decline in fish stocks is estimated to be approximately two trillion dollars for the last 3 decades. The loss of functions, goods and services marine ecosystems provide is a significant barrier to the achievement of the Millennium Development Goals to eradicate extreme poverty and hunger. The vulnerability of marine resource-dependent sectors of society to degradation of these resources, particularly in developing countries, requires policy responses that address the different factors contributing to this vulnerability.

The results showed clear signs of overexploitation (defined as fishing levels higher than the maximum sustainable yield, with decreasing yield at increasing fishing effort) in all management areas, particularly for small pelagic species. Over the last few decades, unsustainable use of marine resources has dramatically risen in Indonesia, and the degradation of marine ecosystems including coral reefs, seagrass meadows and mangroves pose major threats to the viability of coastal ecosystems from both land- and sea-based human activities.

MPAs can have many positive social and economic benefits, including increasing tourism, spill-over effects that benefit fisheries, acting as cultural heritage sites and increasing wellbeing of the general public and coastal communities. On top of this, regulatory uncertainty can play a role in weakening protection and MPAs bio-cultural benefits, by, for example, decreasing sea-users' and the public's understanding of the conservation measures and laws in place. This may lead to non-compliance with the measures, hindering the achievement of the conservation objectives. It may also decrease users and public's perceptions of the legitimacy of the law, leading to mistrust (Daniela N. Schmidt M. Pieraccini and L. Evans , 2022).

Adaptive governance is advocated as a key response to ecological, regulatory and societal uncertainty. In the context of marine governance, this can relate to networked and dynamic MPA design, inclusive and responsive decision-making and institutional clarity and flexibility. While protected areas have had some success in meeting conservation objectives, a recent Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Intergovernmental Panel on Climate Change (IPCC) report indicates that protected area designations to date have been insufficient to adequately address biodiversity loss or something like this. They argue that this is owing to limited protection, poor design and insufficient enforcement. The International Union for Conservation of Nature (IUCN) guidelines for ecological networks and corridors stress how networks of interconnected protected areas are vital to ensure ecological connectivity and the survival of species (Daniela N. Schmidt M. Pieraccini and L. Evans , 2022).

Bennett and Dearden (2014) state that in addition to having an enabling governance framework, the effectiveness of MPAs is largely determined by managers' abilities to recognise necessary governance, management and local development inputs, such as mechanisms promoting a fair distribution of MPA benefits amongst local people, without which MPAs either remain just 'paper' parks or are not sustainable on the long term.

Community involvement in the planning and implementation process of MPAs plays a critical role in their success (White et al., 1994; White et al., 2002). In the Philippines, the stewards of successful MPAs are often local resource stakeholders who have received substantial mentoring and assistance to become effective MPA managers (White 1988a; Bolido and White, 1997; Hermes, 1998). Their knowledge of the community and awareness of the power inequalities and different interests existing therein helps themrecognise possible sources of conflict, resolve differences and enable various groups to arrive at a common vision for the MPA.

The designation of Marine Protected Areas in the Philippines is categorized into two on the basis of governance, these are; 1) Community-based MPAs were those designated under the local or municipal level ordinances and governed by community organiza-

tion with or without assistance from local government units (LGUs) (White et.al 2006a) and 2) Nationally designated sites were those designated under the National Integrated Protected Areas System (NIPAS Act or Republic Act 7586 as amended by Enhaced National Integrated Protected Area System (ENIPAS) Act of 2018 or the Republic Act 11038., or Ramsar Convention or declared as World Heritage Sites under the United Nations Educational, Scientific and Cultural Organizations (UNESCO) legislation and government primarily by a national government agency (NGA).

In the Philippines, MPAs are established nationally through the National Integrated Protected Areas System (NIPAS) Act or through local (municipality or city) government planning and ordinance. The three jurisdictions holding the authority to establish and manage MPAs are the Department of Environment and Natural Resources (DENR), and the Department of Agriculture-Bureau of Fisheries and Aquatic Resources (DA-BFAR) or the local government units (White et al., 2006). Provincial governments are also important in helping sustain MPAs over time by helping municipalities and cities through technical assistance, training, policy guidance and funding. Both DA-BFAR and DENR have (sometimes overlapping) responsibilities for protecting marine environments (White et al., 2006). The DA-BFAR is mandated in the Fisheries Code of 1998 (RA 8550) to manage fishery and aquatic resources with the main consideration of achieving food security. Meanwhile, the DENR has authority over the development, exploration and utilisation of marine, freshwater and brackish water environments, as well as all aquatic resources over all nationally declared protected areas by virtue of the NIPAS Act of 1992. This law checks and manages national protected areas through a Protected Area Management Board with local government and stakeholder representatives, as explained in Philippine Coastal Management Guidebook 2: Legal and Jurisdictional Framework for Coastal Management (DENR et al., 2001)

As most individual MPAs will require some level of assistance to help make them become sustainable in their own right, their management bodies will need to be strengthened by partners who are involved with CRM and can assist with the implementation of an MPA network (White et al., 2006). These partners should work in coordination with other projects and stakeholders operating the area and consult with local governments and communities throughout the different stages of establishing and managing the MPA network.

III. METHODS

The researcher explores websites, research academic databases, articles, government reports, publications from the DENR, DA-BFAR, and other platforms dedicated to the management of Marine Protected Areas. Moreover, the researcher analyzes specific and related case studies of MPAs especially those well-funded. This case can provide valuable insights into the financing models that have been implemented successfully. Case studies may include information on funding sources, revenue generations, and financial sustainability.

IV. RESULTS AND DISCUSSION

Results of the study indicate that within the Bangsamoro Autonomous Region in Muslim Mindanao, there is a limited presence of locally-managed Marine Protected Areas (MPAs) despite the huge and gigantic marine, coastal and other aquatic resources in the region (See Table 1) and there has been lack of sufficient initiatives since the administration of the former Autonomous Region in Muslim Mindanao (ARMM) regarding the establishment of sustainable financing for these MPAs. The ARMM government has initiated the establishment and deployment of Coral Nursery Units (CNUs) in the seven (7) Local Government Units of Maguinanao, Sulu, Lanao del Sur, Basilan and Tawi-Tawi and this was the bureaus's (BFAR-ARMM) program for the continuous management of resources aside from the MPA through strengthening the LGUs ordinances in combating illegal fishing and resource management of our oceans. In addition, the ARMM government has allocated a substantial amount of funds as dole-outs or grant funds for fisherfolks with the aim of increasing their production. Over the years, the ARMM region has consistently ranked as the top producer in terms of catches. However, there is a growing concern among researchers that this funding approach may pose a future threat to the region's fish resources, questioning its sustainability and its adequacy in supporting the replenishment of marine, coastal, fisheries, and other aquatic resources. These efforts are observed to be somewhat piecemeal, indicating a fragmented approach.

It is important to note that financial support programs should consider sustainable fishing practices, limit overfishing, and encourage responsible resource management that would align production goals with conservation efforts to ensure both economic well-being and ecological sustainability in the long term. Nevertheless, this research acknowledges the relatively recent establishment of the region, considering that it was formed in 2018 through the enactment of Republic Act No. 11054, giving rise to the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM). The region boasts abundant biodiversity and natural resources, including 53,920.51 hectares of mangroves, 107,636.67 hectares of coral reefs, and 99,062.51 hectares of seagrasses, with 2,083.44 hectares designated as Marine Protected Areas and these resources may have a great impact on the BARMM's economy that grew by 7.7% outpacing the country's overall GDP of 6.0%.

The Ministry of Agriculture, Fisheries, and Agrarian Reform played a vital role, supporting agrarian reform services and enhancing agriculture and fishery productivity through flagship programs. In 2020, the ministry intensified efforts, focusing on priority commodities, and aligning accomplishments with the Bangsamoro Appropriations Act and nationally funded programs from 2019. Up to 2023, BARMM continued to excel in fisheries production, holding the top producing region in the Philippines. According to the latest Situation Report released by the Philippine Statistic Authority, BARMM garnered 31.4% of the country's total fisheries production in the second Quarter of 2023. The Ministry of Agriculture, Fisheries, and Agrarian Reform outlined a strategic vision focusing on increasing productivity, enhancing farm mechanization, promoting climate-resilient production systems, diversifying products, reducing post-

harvest losses, and conducting capability training, ultimately aiming for a food-secure and progressive Bangsamoro.

Table 1. Distribution and Location of Marine, Coastal and Aquatic Resources

PROVINCES AND CITIES/ MUNICI-PALITIES	MANGROVE (HAS)	Coral Reefs (Has)	MPAs (Has)	Sea grasses (Has)
BARMM	**53,920.51**	**107,636.7**	**2,083.44**	**99,062.51**
Basilan	**8458.079125**	**4731.291**	**64**	**4,597.88**
City of Lamitan	226.68	269.195	64	186.05
Lantawan	1,641.60	405.542	-	199.16
Maluso	1,133.69	291.451	-	189.64
Sumisip	619.68	252.776	-	155.58
Tipo-Tipo	28.54	134.721	-	79.54
Tuburan	239.63	782.772	-	300.16
Akbar	93.089125	75.393	-	126.45
Al-Barka	488.13	475.968	-	906.08
Hadji Mohammad Ajul	224.48	354.247	-	257.91
Ungkaya Pukan	62.2	179.477	-	207.34
Hadji Muhtamad	2,488.21	1160.762	-	257.91
Tabuan-Lasa	1,212.15	348.987	-	1,732.08
Lanao del Sur	**448.29**	**589.361**	**-**	**248.07**
Balabagan	63.94	140.067	-	62.041
Malabang	153.1	47.403	-	
Picong	100.17	393.67	-	104.581
Kapatagan	131.08	8.221	-	81.449
Sulu	**28,988.68**	**32,357.01**	**-**	**29,929.83**
Indanan	75.91	158.14	-	95.29
Jolo	-	2.19	-	16.83
Kalingalan Caluang	455.07	320.45	-	907.75
Luuk	830.94	215.33	-	229.92
Maimbung	163.02	131.93	-	241.31
Hadji Panglima Tahil	2058.85	650.20	-	1,300.55
Old Panamao	133.46	511.01	-	231.36
Pangutaran	11,483.73	17,272.58	-	11,234.48
Parang	95.36	1,095.63	-	375.38
Pata	720.02	1,453.87	-	1,445.63
Patikul	10.53	376.42	-	115.38
Siasi	875.32	2,211.13	-	4,913.85
Talipao	867.96	263.78	-	399.83
Tapul	2278.99	1,744.59	-	2,518.80
Tongkil	6672.17	2,603.31	-	2,644.82
Panglima Estino	398.28	323.91	-	577.28
Lugus	108.74	1,017.57	-	559.15
Pandami	1245.13	1,484.72	-	2,122.25
Omar	515.18	520.25	-	
Tawi-Tawi	**14,208.69**	**67,867.38**	**1,509.8**	**62,264.13**
Panglima Sugala	3,147.24	5,843.31	179.19	13,830.10
Bongao	1,201.74	1,718.89	127.65	1,040.98
Mapun	396.44	2,420.30		1,773.36
Simunul	104.78	2,585.65	53.09	2,143.52
Sitangkai	494.42	46,391.19	43.17	12,322.28
South Ubian	500.83	936.00		8,047.43
Tandubas	5,098.92	1,479.09		5,283.65
Turtle Islands	1.86	1,751.57		114.02
Languyan	2,730.68	2,061.34	87.42	1,721.35
Sapa-Sapa	425.50	2,680.04		8,817.37

Sibutu	106.28			7,170.06
Maguindanao del Norte	**1,816.77**	**2,091.62**	**509.64**	**2,022.60**
City of Cotabato	616.58			245.30
Datu Blah T. Sinsuat	310.56	538.62		420.48
Datu Odin Sinsuat	242.70	67.48		91.84
Matanog	65.43			
Parang	405.00	1329.91	509.64	1169.72
Sultan Kudarat	135.88			38.78
Sultan Mastura	40.62	155.62		56.47

Table 1 illustrates the vast potential of the BARMM. However, this wealth is increasingly susceptible to climate change and natural disasters, posing challenges to the agriculture and fishery sectors across the region. The impact of changing climate conditions on fish catch is felt not only in the provinces within BARMM but resonates across various regions. Within the extensive marine resources of BARMM, a notable finding from the research indicates that only Sitangkai and Sibutu in Tawi-Tawi were declared locally managed Marine Protected Areas. This declaration was a result of a comprehensive study conducted by Prof. Filemon G. Romero, focusing on the spawning aggregations of the Napoleon wrasse, locally known as Mameng. The results of the study were presented to local government units, validated with fisherfolks, and subsequently led to the joint adoption of Municipal Ordinance No. 3, Series of 2013, establishing Sitangkai and Sibutu as MPAs. These areas however recognized as reef complexes within the ecologically vital Coral Triangle, served as major habitats for the Napoleon wrasse or *Humphead wrasse* locally known as Mameng. This species, the largest living member of the Labridae family, is central to mariculture efforts and constitutes a substantial portion of the cultured species. Despite being a protogynous hermaphrodite, the *Humphead wrasse* faces challenges due to its slow growth, low productivity, and vulnerability to overfishing.

Mariculturists have capitalized on the *Humphead wrasse*, with considerable exports recorded. However, challenges arise from the species' listing in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and the existing legal frameworks, such as the Fisheries Code and Wildlife Protection and Conservation Act, which prohibit the fishing of threatened or endangered species. Despite legal restrictions, mariculture of the *Humphead wrasse* persists due to its economic significance. The lack of viable substitutes for livelihood intensifies the challenges, particularly concerning sustainable practices and the absence of hatchery technology. The reliance on wild catch for ranching or culturing further jeopardizes the species' sustainability.

Challenges

The initiatives of the BARMM region in providing technical and financial support to its fisher-folks were seen to be a piecemeal approach. The region has emphasized production over sustaining institutional capabilities and conserving marine and aquatic resources, and it is of course driven by food security and high poverty incidence. Due to the rich and vast resources, fishers-folks have engaged in marine culture (mariculture) practices of Napoleon or *Humphead wrasse*, and trade and market this species as a source of their livelihood. The challenge in sustainability was put at stake since the fish farmers depend on wild catch of the species to be ranched or cultured in their pens and cages. The high demand in the market especially in chinese restaurants have forced these fisherfolks to trade and market these species, although they knew these species have been banned as threatened species and continuously declining.

Other challenges identified in this research were the marketing and selling of fisheries due to limited market access. The absence of post-processing facilities for fisheries and aquaculture products in island provinces puts these regions at a disadvantage, compelling them to sell raw products. Moreover, there is an observable decline in human capital, with more farmers preferring alternative professions for their children, moving away from farming and fishing to escape poverty. Sustainability issue was also seen a great challenge for the Humhead wrasse due to the high demand for the *Humphead wrasse* in chinese restaurants, especially in China. The absence of hatchery operations and the potential underground activities to meet market demands necessitate collaborative efforts with local governments and fisherfolks to implement effective management interventions. The primary objective is to protect the spawning aggregations of the *Humphead wrasse*, aligning with the observed spawning behaviours of this species.

Conclusion

The BARMM grapples with the dual challenge of harnessing its rich resources for economic development while ensuring the sustainable management of vulnerable species, such as the *Humphead wrasse*. Collaborative efforts, supported by effective management strategies and interventions, are imperative to strike a balance between economic opportunities and ecological conservation.

The heavy reliance of coastal communities and fishing villages on fish stocks for income and food security means that overexploitation can threaten the welfare of coastal regions. Fish stocks also face depletion through illegal, unreported, and unregulated fishing (IUUF) by domestic and foreign vessels. Among the top seven species of fish harvested in the Philippines, six species experienced a total decline of 22 percent between 2010 and 2017.

By adopting a lesson learned from the best management practices of well-funded Marine Protected Areas and Sustainable Financing

Schemes towards policymaking, the BARMM can synchronize its efforts to curb illicit and unsustainable fishing practices. Working together throughout the levels of government and across sectors lends itself to efficient resource use and optimizes response capabilities. There are recommended areas of concern that need policy direction for the BARMM to effectively address issues at hand, including optimal MPA location and size, the most effective methods to harmonize and synergize all efforts towards sustainable financing. Overall, while improvements have been made, threats in the maritime domain persist.

Recommendations

To address the limited locally managed Marine Protected Areas (MPAs) in the BARMM region, a comprehensive approach is essential. This involves strengthening legal framework, promoting comprehensive education awareness, fostering community engagement, through collaboration among stakeholders, and implementing targeted conservation efforts in critical habitats such as mangroves, seagrasses, and coral reefs. The establishment and effective management of these MPAs will enhance ecological resilience, contributing significantly to the long-term sustainability of marine resources in the region. Key actions should include community-based initiatives, capacity building, and the development of sustainable financing mechanisms to support MPA conservation goals. Sustainability issues were seen as challenge when production continuous as pressure. The collaborative approach and effective management and conservation interventions is necessary.

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