

■ DATA SCIENCE FOR PUBLIC POLICY PROGRAM

MANAGEMENT AND POLICY RECOMMENDATIONS FOR THE IMPROVEMENT OF MPA MANAGEMENT IN MIAGAO, ILOILO, PHILIPPINES

Joshua M. Regalado¹

EXECUTIVE SUMMARY

Marine protected areas (MPAs) are widely used tools in managing coastal resources and regulating anthropogenic activity that may potentially negatively affect the resources. In 2015, the Miagao local government unit (LGU) established three MPAs as a response to declining fish catches in the nearshore fishing grounds. However, it is difficult to determine whether the MPAs have been effectively managed and are performing in line with the local government's resource management goals due to several gaps in important aspects of MPA management. It is important to identify and address these gaps to maximize the conservation of the coral reef resources and the economic benefits that the stakeholders can obtain. It is recommended that the MPA management body prioritize the establishment of a management plan for each MPA. The plan should include detailed financial plans, regular coral reef monitoring protocols, IEC activities, and other programs that can enhance the effectiveness of the MPA. It is also recommended that the socioeconomic benefits derived from MPAs be examined.

ESTABLISHMENT OF MARINE PROTECTED AREAS IN MIAGAO, ILOILO

Establishing a marine protected area (MPA) is a coastal management tool widely used in the Philippines to protect coral reefs from various stressors and overfishing. An MPA is defined as “the area of the sea established and set aside by law, administrative regulation, or any other effective means, in order to conserve and protect a part of or the entire enclosed environment, through the establishment of management guidelines” (White et al. 2014). They are classified based on governance levels as nationally managed MPAs (established through the Republic Act 7586 or National Integrated Protected Area System (NIPAS) Act of 1992) and locally managed MPAs (established through Republic Act No. 8550 or the Fisheries Code of 1998). At least 1,800 MPAs are established in the Philippines, most of which are locally managed (Muallil et al. 2019; Cabral et al. 2014).

¹ Assistant Professor IV, Fisheries Policy Laboratory
Institute of Fisheries Policy and Development Studies, College of Fisheries and Ocean Sciences
University of the Philippines Visayas, Miag-ao, Iloilo

The municipality of Miagao, in the province of Iloilo, is a coastal municipality located south of Panay Island. Fishing is one of the important livelihoods of locals especially those living in the coastal areas. Fishers have reported, however, that catches have been dwindling for past decades due to unregulated fishing and overfishing particularly in the nearshore areas.

To help address this decline in fishery resources, the local government of Miagao legislated the Municipal Marine Sanctuaries Ordinance of 2015 (Ordinance No. 2015-26). This ordinance established three pilot coral reef MPAs, described the composition and responsibilities of the members of each MPA's management board, and set guidelines on what is allowed and prohibited activities within the MPA. The three pilot MPAs were the Damilisan Marine Sanctuary (DMS), Lanutan Marine Sanctuary (LMS), and Gines-Calampitao Marine Sanctuary (GCMS).

The extent of the area covered by the MPAs was based on recommendations by Gubralson (2014) after a volunteer survey team examined the coastal habitats of Miagao in 2014. A baseline assessment of the coral diversity and abundance and a visual census of the coral reef fishes were conducted for the reefs in Barangays Lanutan, Gines, and Calampitao. These became the basis for the establishment of the Lanutan Marine Sanctuary (LMS) and Gines-Calampitao Marine Sanctuary (GCMS). The Damilisan Marine Sanctuary (DMS), however, was established without any baseline survey on its coral and reef fish abundance and diversity. It was not until 2019 that an initial survey of its coral and reef fish composition was conducted (Regalado et al. 2024). Activities supporting the MPAs were mostly led by the Municipal Agriculture Office. These activities are mainly focused on informing fisherfolks about the regulations in activities in the MPA and its vicinity.

GAPS IN MPA MANAGEMENT

The MPAs of Miagao have been established for almost a decade now. However, there are still many aspects of the management of these MPAs that can be improved. Without adequate information about the health of the coral reef and the management effectiveness of the MPA, it is difficult to determine whether MPAs are “performing” as it is intended to. It is therefore important that specific gaps in MPA management be identified and necessary steps for its improvement be implemented.

Based on the Management Focus Criteria listed in the MPA Management Effectiveness Assessment Tool (MEAT) of the Department of Environment and Natural Resources (DENR), many aspects of effective MPA management are still absent in the MPAs of Miagao. A study conducted by Legaspi (2022) using the MPA Management Effectiveness Assessment Tool (MEAT), which examined the management effectiveness of the DMS, found major gaps in effective MPA management. These include the lack of an existing MPA Management Plan; no consistent budget allocation, the lack of information, education, and communications plan and activities; limited infrastructure development, and the lack of activities led by the MPA management boards. Furthermore, after the baseline assessments conducted in 2014 in LMS and GCMS, and in 2019 in the DMS, there were no other coral reef and fish census surveys ever conducted in these MPAs, and the management effectiveness of these two MPAs was not assessed.

POLICY RECOMMENDATION

To improve the management effectiveness of the MPAs of Miagao, Iloilo we advocate the establishment of an MPA management plan for each MPA. As of this writing, there is no MPA management plan for all the three MPAs of Miagao. An MPA management plan should contain current information about the MPA and serve as a guide for managers on which activities should be conducted and prioritized for effective and sustained management of the MPA. Among others, the MPA management plan should include the following:

- Clear budget and financial plan for activities of the MPA. It is important to ensure that there is an annual budget allotted for supporting activities in managing the MPA. Most of the financial support coming from the LGU is focused on law enforcement and should also expand to activities aligned with the MPA Management Plan. The plan should allocate adequate amounts for regular coral reef monitoring, support for regular law enforcement patrolling, IEC activities, and incentives or support during regular meetings of the MPA management boards of each MPA.
- Regular monitoring of MPA Effectiveness. MPA effectiveness should be examined regularly to help inform managers which areas of ideal MPA management they can improve on. Ideally, the coral

reef areas and the environment within its vicinity are surveyed every year to allow monitoring of annual and interannual changes in key reef health indicators. Additionally, tools such as the MPA Effectiveness Assessment Tool can be used to assess management performance annually.

- Updated coral reef surveys. It should be prioritized that the MPAs be surveyed again to compare baseline information with recent information on coral and reef fish abundance and diversity. A regular monitoring plan should also be put in place to track the condition of the hard coral and the reef fish abundance and diversity as these are important indicators of various changes in the coral reef condition. Ideally, the coral reef areas and the environment within its vicinity are surveyed annually.
- Adopting participatory and recent survey methods. Recent coral reef survey methods described by Licuanan et al. (2019) and citizen science methods (Licuanan et al. 2020) were both adopted by the DENR and are recommended when conducting monitoring surveys on the reefs to enable the information to be compared to other studies in the Philippines. These methods use letter “grades” and are not “value-laden” compared to previous methodologies (e.g., assigning the status of coral reefs as “poor” or “fair”). When examining coral reef fish abundance and composition, methodologies that do not require highly technical skills and expertise and are participatory in nature can also be adopted. Examples are the methods described in MPA-FishMapp (MPA-FishMapp-USACFI). The MPA-FishMapp has integrated web-based tools to help analyze and visualize the data collected during surveys.
- Incorporate data-science methods in future studies. Examination of coral reefs and the changes while implementing an MPA requires a variety of data. Trends in coral reef abundance and reef fish composition may happen in long-term time scales (multiple years to decades) with various disturbances such as climate phenomena (El Niño, La Niña), typhoons, and anthropogenic activity all interacting making the study of changes in the reefs very complex. Participatory approaches and data-limited approaches have been the go-to solutions for examining coral reefs and MPAs due to the limited data most of the reefs and MPAs in the country have.

However, adapting data-science methodologies and approaches may be key when it comes to incorporating various data streams and analyzing them to see interacting factors that impact the health of coral reefs and the ecosystem services that locals benefit from. An alternative to manual coral reef fish survey is the FISH-I service (<https://tapitechtransfer.dost.gov.ph/technologies/it-development/fish-i>), which uses artificial intelligence to identify and quantify reef fishes. The local government may consider investing in these technologies or contracting the services of FISH-I to conduct reef fish assessments on the coral reefs. Additionally, visualizing and mapping the various coral reefs and coastal resources using Geographic Information Systems (GIS) can aid in the analysis of information regarding their status. GIS outputs can also be used to map and visualize threats and hazards that can affect the health of the coral reefs in the MPAs.

- Examine other aspects such as socioeconomic benefits from MPAs. It is important that the MPAs be also examined based on their effectiveness in providing socioeconomic benefits to the local community which directly utilize the coastal resources from fishing. It is recommended that the MPA managers use an assessment tool such as the Socio-Economic Assessment Tool (SEAT) (Rosales 2018).

CONCLUSION

This brief identified gaps in the management of MPAs in Miagao, Iloilo and provided recommendations in order to improve the management effectiveness of these MPAs. The management of MPAs should be data-driven and evidence-based based to ensure that the implementation of planned programs and activities is appropriate for the effective management of each MPA.

LINK TO ORIGINAL RESEARCH/ ANALYSIS

The contents of this policy brief were mainly based on the study “Initial Assessment of the Benthic Profile and Reef Fish Composition of the Damilisan Marine Sanctuary, Miagao, Iloilo, Philippines” (https://nfrdi.da.gov.ph/tpjf/vol31/research_article_regalado_et_al_31120230039) and unpublished undergraduate student theses from BS Fisheries students of the College of Fisheries and Ocean Sciences.

REFERENCES

- Cabral, Reniel B., and Rollan C. Geronimo. 2018. "How Important Are Coral Reefs to Food Security in the Philippines? Diving Deeper than National Aggregates and Averages." *Marine Policy* 91:136–41. <https://doi.org/10.1016/j.marpol.2018.02.007>.
- Cabral, Reniel B., Porfirio M. Aliño, Adrian Chester M. Balingit, Christian M. Alis, Hazel O. Arceo, Cleto L. Nañola, Rollan C. Geronimo, and MSN Partners. 2014. "The Philippine Marine Protected Area (MPA) Database." *Philippine Science Letters* 7 (2): 300–308.
- Department of Environment and Natural Resources, Department of Agriculture, and National CTI Coordinating Committee. National Coral Triangle Initiative. 2011. "Marine Protected Area Management Effectiveness Assessment Tool." Coral Triangle Initiative, February 2011. <https://www.coraltriangleinitiative.org/sites/default/files/resources/MEAT%20e-form.pdf>.
- Felasol, A. G. B. 2022. "Mapping of Marine Protected Areas (MPAs) and Selected Coastal Resources in Miagao, Iloilo." Undergraduate thesis, University of the Philippines Visayas.
- Fidler, Robert Y., Ralph G. Turingan, Alan T. White, and Moonyeen N. Alava. 2017. "Reef-Wide Beneficial Shifts in Fish Population Structure Following Establishment of Marine Protected Areas in Philippine coral reefs." *Marine Ecology Progress Series* 570:187–202. <https://doi.org/10.3354/meps12067>
- Gulbranson, J. 2014. "Summary Field Report: Miagao." Miagao Municipal Agriculture Office.
- Hilomen, V. V., C. L. Nañola Jr., and A. L. Dantis. 2000. "Status of Philippine Reef Fish Communities." In *Philippine Coral Reefs, Reef Fishes, and Associated Fisheries: Status and Recommendations to Improve Their Management*, edited by W. Y. Licuanan and E. D. Gomez. Global Coral Reef Monitoring Network.
- Legaspi, A. M. 2023. "Evaluation of the Conservation and Management Efforts of Damalisan Marine Sanctuary in Miagao, Iloilo Using the Marine Protected Area Management Effectiveness Assessment Tool." Undergraduate thesis, University of the Philippines Visayas.
- Licuanan, Wilfredo Y. 2020. "New Scales to Guide the Assessment of Hard Coral Cover and Diversity in the Philippines." *Philippine Journal of Fisheries* 27 (2): 121–26. Available from: <https://doi.org/10.31398/tjpf/27.2.2020-0008>.
- Licuanan, Wilfredo Y. Princess Zyrlyn Mordeno, and Marco V. Go. 2021. "C30—A Simple, Rapid, Scientifically Valid, and Low-Cost Method for Citizen-Scientists to Monitor Coral Reefs." *Regional Studies in Marine Science* 47 (101961). <https://doi.org/10.1016/j.rsma.2021.101961>.
- Licuanan, Wilfredo Y., R. Robles, and M. Reyes M. 2019. "Status and Recent Trends in Coral Reefs of the Philippines." *Marine Pollution Bulletin* 142:544–50. <https://doi.org/10.1016/j.marpolbul.2019.04.013>.
- Magdaong, Evangeline T., Masahiko Fujii, Hiroya Yamano, Wilfredo Y. Licuanan, Aileen Maypa, Wilfredo L. Campos, Angel C. Alcala, Alan T. White, Dean Apistar, and Rafael Martinez. 2014. "Long-Term Change in Coral Cover and the Effectiveness of Marine Protected Areas in the Philippines: A Meta-analysis." *Hydrobiologia* 733:5–17. <https://doi.org/10.1007/s10750-013-1720-5>.
- Maypa, Aileen P., Alan T. White, Elline Cañares, Raffy Martinez, Rose Liza Eisma-Osorio, Porfirio Aliño, and Dean Apistar. 2012. "Marine Protected Area Management Effectiveness: Progress and Lessons in the Philippines." *Coast Management* 40 (5): 510–24. <https://doi.org/10.1080/08920753.2012.709465>.
- Muallil, Richard N., Melchor R. Deocadez, Renmar Jun S. Martinez, Samuel S. Mamauag, Cleto L. Nañola Jr., and Porfirio M. Aliño. 2015. "Community Assemblages of Commercially Important Coral Reef Fishes Inside and Outside Marine Protected Areas in the Philippines." *Regional Studies in Marine Science* 1 (437): 47–54. <https://doi.org/10.1016/j.rsma.2015.03.004>.

- Muallil, RN, Melchor R. Deocadez, Renmar Jun S. Martinez, Samuel S. Mamauag, Cleto L. Nañaola Jr., and Porfirio M. Aliño. 2019. "Effectiveness of Small Locally-Managed Marine Protected Areas for Coral Reef Fisheries Management in the Philippines." *Ocean & Coastal Management* 179 (104831). <https://doi.org/10.1016/j.ocecoaman.2019.104831>.
- Nique, S. M. P. 2022. "Using Web-based IEC Tools to Promote the Marine Protected Areas of Miagao, Iloilo." Undergraduate thesis. University of the Philippines Visayas.
- Rosales, Rina Maria P. 2018. "SEAT: Measuring Socio-economic Benefits of Marine Protected Areas." *Marine Policy* 92:120–30. <https://doi.org/10.1016/j.marpol.2018.02.026>.
- Russ, Garry R. 2002. "Yet Another Review of Marine Reserves as Reef Fishery Management Tools. In *Coral Reef Fishes: Dynamics and Diversity in a Complex Ecosystem*, edited by Peter F. Sale. Academic Press.
- Uychiaoco, Andre J., Stuart J. Green, Margarita T. dela Cruz MT, Paulyn A. Gaite, Hazel O. Arceo, Porfirio M. Aliño, and Alan T. White. 2001. *Coral Reef Monitoring for Management*. University of the Philippines Marine Science Institute, United Nations Development Programme Global Environment Facility-Small Grants Program, Guiuan Development Foundation, Inc., Voluntary Service Overseas, University of the Philippines Center for Integrative and Development Studies, Coastal Resource Management Project, and Fisheries Resource Management Project.

THE UP CIDS POLICY BRIEF SERIES

The UP CIDS Policy Brief Series features short reports, analyses, and commentaries on issues of national significance and aims to provide researchbased inputs for public policy.

Policy briefs contain findings on issues that are aligned with the core agenda of the research programs under the University of the Philippines Center for Integrative and Development Studies (UP CIDS).

The views and opinions expressed in this policy brief are those of the author/s and neither reflect nor represent those of the University of the Philippines or the UP Center for Integrative and Development Studies. UP CIDS policy briefs cannot be reprinted without permission from the author/s and the Center.

CENTER FOR INTEGRATIVE AND DEVELOPMENT STUDIES

Established in 1985 by University of the Philippines (UP) President Edgardo J. Angara, the UP Center for Integrative and Development Studies (UP CIDS) is the policy research unit of the University that connects disciplines and scholars across the several units of the UP System. It is mandated to encourage collaborative and rigorous research addressing issues of national significance by supporting scholars and securing funding, enabling them to produce outputs and recommendations for public policy.

The UP CIDS currently has twelve research programs that are clustered under the areas of education and capacity building, development, and social, political, and cultural studies. It publishes policy briefs, monographs, webinar/conference/forum proceedings, and the Philippine Journal for Public Policy, all of which can be downloaded free from the UP CIDS website.

THE PROGRAM

The **Program on Data Science for Public Policy (DSPPP)** has three (3) objectives. First, it aims to build the capacity of the faculty members of the University of the Philippines (UP) in data science and apply this learned skill to public policy and governance. Second, it strives to engage a community of researchers within the University and encourage the pursuit of interdisciplinary, problem-oriented research through high-level quantitative analyses. Finally, it seeks to convene multidisciplinary teams of social scientists, humanists, and scientists to research issues in the public sector.

EDITORIAL BOARD

Rosalie Arcala Hall
EDITOR-IN-CHIEF

Honeylet L. Alerta
DEPUTY EDITOR-IN-CHIEF

PROGRAM EDITORS

■ EDUCATION AND CAPACITY BUILDING CLUSTER

Dina S. Ocampo
Lorina Y. Calingasan
EDUCATION RESEARCH PROGRAM

Fernando dIC. Paragas
PROGRAM ON HIGHER EDUCATION
RESEARCH AND POLICY REFORM

Romylyn Metila
Marlene Ferido
ASSESSMENT, CURRICULUM, AND
TECHNOLOGY RESEARCH PROGRAM

Ebinezer R. Florano
PROGRAM ON DATA SCIENCE FOR
PUBLIC POLICY

■ DEVELOPMENT CLUSTER

Annette O. Balaoing-Pelkmans
PROGRAM ON ESCAPING THE
MIDDLE-INCOME TRAP: CHAINS FOR
CHANGE

Antoinette R. Raquiza
Monica Santos
POLITICAL ECONOMY PROGRAM

Eduardo C. Tadem
Ma. Simeona M. Martinez
PROGRAM ON
ALTERNATIVE DEVELOPMENT

Leonila F. Dans
Iris Thiele Isip-Tan
PROGRAM ON HEALTH
SYSTEMS DEVELOPMENT

■ SOCIAL, POLITICAL, AND CULTURAL STUDIES CLUSTER

Rogelio Alicor L. Panao
PROGRAM ON SOCIAL AND
POLITICAL CHANGE

Darwin J. Absari
ISLAMIC STUDIES PROGRAM

Herman Joseph S. Kraft
Francis Rico C. Domingo
STRATEGIC STUDIES PROGRAM

Marie Aubrey J. Villaceran
Frances Antoinette C. Cruz
DECOLONIAL STUDIES PROGRAM

■ NEW PROGRAMS

Maria Angeles O. Catelo
FOOD SECURITY PROGRAM

Weena S. Gera
URBAN STUDIES PROGRAM

Benjamin M. Vallejo, Jr.
CONSERVATION AND BIODIVERSITY

Rosalie B. Arcala Hall
LOCAL AND REGIONAL STUDIES
NETWORK

EDITORIAL STAFF

Jheimeel P. Valencia
COPYEDITOR

Alexa Samatha R. Hernandez
EDITORIAL ASSISTANT

Jessie Feniquito
Mikaela Anna Cheska D. Orlino
LAYOUT ARTISTS

Get your policy papers published. Download open-access articles.

The *Philippine Journal of Public Policy: Interdisciplinary Development Perspectives* (PJPP), the annual peer-reviewed journal of the UP Center for Integrative and Development Studies (UP CIDS), welcomes submissions in the form of full-length policy-oriented manuscripts, book reviews, essays, and commentaries. The PJPP provides a multidisciplinary forum for examining contemporary social, cultural, economic, and political issues in the Philippines and elsewhere. Submissions are welcome year-around.

For more information, visit cids.up.edu.ph. All issues/articles of the PJPP can be downloaded for free.

Get news and the latest publications.

Join our mailing list: bit.ly/signup_cids to get our publications delivered straight to your inbox! Also, you'll receive news of upcoming webinars and other updates.

We need your feedback.

Have our publications been useful? Tell us what you think: bit.ly/dearcids.



UNIVERSITY OF THE PHILIPPINES CENTER FOR INTEGRATIVE AND DEVELOPMENT STUDIES

Lower Ground Floor, Ang Bahay ng Alumni, Magsaysay Avenue
University of the Philippines Diliman, Quezon City 1101



cids.up.edu.ph

Telephone (02) 8981-8500 loc. 4266 to 4268
(02) 8426-0955

Email cids@up.edu.ph
cidspublications@up.edu.ph

Website cids.up.edu.ph