



# Coastal Environment Profile (CEP) Presentation and Training-Workshop for Barangay Mana, Malita, Davao Occidental, Philippines: Engaging Stakeholders and Establishing a Community-Based Mangrove Nursery

John Paul R. Pacyao <sup>a\*</sup>, Marlyn B. Llameg <sup>a</sup>,  
Jopy D. Cañeda <sup>a</sup>, Jhun Rheil H. Molina <sup>a</sup>,  
Michael Jeriel I. Bersaldo <sup>a</sup>, Kher Dave H. Doños <sup>a</sup>,  
Jessa May D. Marquez <sup>a</sup>, Junarie Joy M. Tuba <sup>a</sup>,  
Dexter Roquero <sup>a</sup>, Raymond H. Tanduyan <sup>a</sup>  
and Angelina R. San Juan <sup>a</sup>

<sup>a</sup> Institute of Fisheries and Marine Sciences (IFMS), Southern Philippines Agri-Business and Marine and Aquatic School of Technology (SPAMAST), Malita, Davao Occidental, 8012, Philippines.

## **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

## **Article Information**

DOI: <https://doi.org/10.9734/ajfar/2024/v26i12847>

## **Open Peer Review History:**

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://www.sdiarticle5.com/review-history/121349>

**Original Research Article**

**Received: 03/06/2024**  
**Accepted: 06/08/2024**  
**Published: 30/11/2024**

\*Corresponding author: Email: [jrpacyao@spamast.edu.ph](mailto:jrpacyao@spamast.edu.ph);

**Cite as:** Pacyao, John Paul R., Marlyn B. Llameg, Jopy D. Cañeda, Jhun Rheil H. Molina, Michael Jeriel I. Bersaldo, Kher Dave H. Doños, Jessa May D. Marquez, Junarie Joy M. Tuba, Dexter Roquero, Raymond H. Tanduyan, and Angelina R. San Juan. 2024. "Coastal Environment Profile (CEP) Presentation and Training-Workshop for Barangay Mana, Malita, Davao Occidental, Philippines: Engaging Stakeholders and Establishing a Community-Based Mangrove Nursery". *Asian Journal of Fisheries and Aquatic Research* 26 (12):77-87. <https://doi.org/10.9734/ajfar/2024/v26i12847>.

## ABSTRACT

The Coastal Environmental Profile (CEP) Presentation and Training-Workshop for Brgy. Mana, Malita, Davao Occidental, aimed to engage local stakeholders and establish a community-based mangrove nursery. Objectives included presenting the CEP to Barangay Local Government Unit (BLGU) officials and stakeholders, conducting a training-workshop on CEP, and establishing a mangrove nursery. The methodology involved forming a project team, conducting an inception meeting, courtesy calls, signing MOAs, and organizing a project orientation. Implementation included presenting the CEP, conducting a training-workshop with BLGU-Mana officials, BVBSNHS, and local organizations, and establishing the nursery. Significant findings revealed that the CEP provided comprehensive data on the coastal environment, including socio-political landscape, natural resources, and economic activities. The training-workshop raised environmental awareness and equipped participants with knowledge for coastal resource management. The community-based mangrove nursery was established to support conservation efforts. The project successfully enhanced local stakeholders' understanding and commitment to sustainable coastal development, highlighting the importance of collaborative and inclusive strategies in achieving environmental resilience.

*Keywords: Coastal environment profile; mangrove nursery; stakeholder engagement; coastal resource management.*

## 1. INTRODUCTION

Coastal areas, particularly those near major rivers and bays, have historically attracted human settlements due to their access to fisheries, commerce, fertile agricultural lowlands, and recreational spots. These coastal municipalities, rich in marine life, have the potential to sustain livelihoods for decades. The economic benefits derived from these coastal resources are substantial. However, habitat destruction, illegal fishing practices, and an open access regime pose significant threats to these areas (Bersaldo et al., 2024; Bersaldo et al., 2023). Improving coastal resource management requires an integrative effort involving local government units, fishing communities, and other stakeholders to raise awareness and promote sustainable practices. Differences in local elite structures, influenced by historical experiences, also play a role in the development of these areas (Pacyao and Llamag, 2018).

Davao Occidental, located at the southwestern tip of the Davao Region, boasts rich fisheries and marine resources along its extensive coastline, featuring stunning beaches. The locals benefit from nature's abundance, which provides a sufficient supply of fish for the community (Cabili 2018; Cañeda et al., 2022; Elemo et al., 2021).

In 2021, a comprehensive coastal environmental profiling was conducted in Brgy. Mana, Malita, Davao Occidental. This study highlighted the

area's rich biodiversity and emphasized the importance of preserving these ecosystems for their benefits to humanity. The well-documented profile can assist policymakers in designing effective coastal resource management strategies and foster collaboration between private and government agencies for a holistic approach to addressing coastal environmental and economic issues (Juan et al., 2024; Lopez et al., 2024; Llamag et al., 2022).

The proposed Coastal Environmental Profile (CEP) for Brgy. Mana, Malita, Davao Occidental aims to provide essential information to BLGU officials and other stakeholders (Llamag and Morastil, 2022; Morastil, 2013). This initiative seeks to empower local residents by equipping them with insights into the barangay's coastal characteristics, aiding in the development and implementation of effective coastal resource management strategies. Additionally, the training and focused group discussions conducted will raise environmental awareness and explore potential local policy initiatives (Pacyao and Marquez, 2022; Pacyao et al., 2022; Pacyao and Barail, 2020).

Through these efforts, the community can enhance its capacity to address environmental challenges, fostering a proactive approach to sustainable coastal development. Collaboration among officials, stakeholders, and residents is crucial for creating a resilient and environmentally conscious community.

## 2. MATERIALS AND METHODS

### 2.1 Project Location

The project was implemented in Brgy. Mana, Malita, Davao Occidental. This area was selected due to its rich coastal and marine resources, making it a significant location for the study and implementation of sustainable coastal resource management practices.

### 2.2 Pre-Implementation Phase

1. Organization of Project Team: A dedicated project team was formed, consisting of experts in fisheries, marine biology, coastal resource management, and community development.
2. Conduct of Inception Meeting: An inception meeting was held to outline the project's objectives, timeline, and deliverables, ensuring all team members were aligned.
3. Courtesy Call to the Municipal & Barangay Local Government Units: Formal courtesy calls were made to the Municipal and Barangay Local Government Units (M/BLGU) to inform them about the project and seek their support.
4. Drafting and Signing of Memorandum of Agreement/Understanding (MOA/MOU): A Memorandum of Agreement/Understanding was drafted and signed by all relevant parties, detailing the roles and responsibilities of each stakeholder.
5. Conduct of Project Orientation: A project orientation session was conducted,

involving the M/BLGU and the Office of the Municipal Agriculture and Fisheries (OMAF), to ensure all stakeholders were aware of the project's scope and their involvement.

### 2.3 Implementation Phase

1. Procurement of Materials: All necessary materials for the project, including equipment for the training-workshop and supplies for the mangrove nursery, were procured.
2. Present the CEP of Brgy. Mana: The Coastal Environmental Profile (CEP) study conducted by SPAMAST for Brgy. Mana was presented to various stakeholders to enhance their awareness and understanding of the extensive richness and potential of the coastal resources in the area.
3. Conduct the Training-Workshop on CEP: A training-workshop on the Coastal Environmental Profile (CEP) was conducted with BLGU-Mana officials, BVBSNHS Faculty, Staff & Students, and members of existing People's Organizations. This workshop focused on the importance of coastal resource management and the specific findings of the CEP.
4. Establishment of Mangrove Nursery: A community-based mangrove nursery was established to supply bagged mangroves for planting activities. This nursery serves as a sustainable source of mangroves for future conservation efforts.

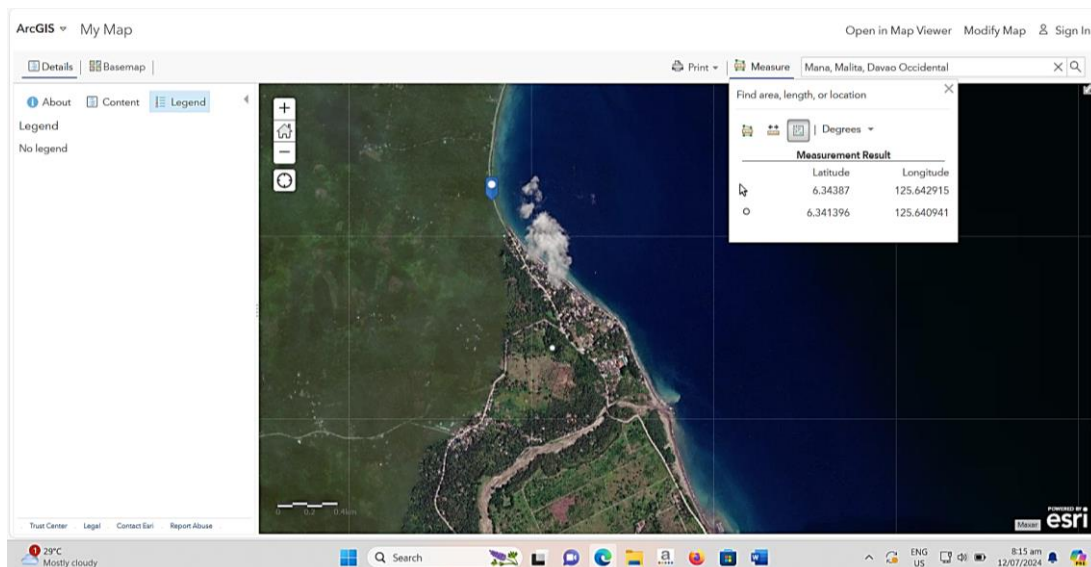


Fig. 1. Map of the project site

## **2.4 Post-Implementation Phase**

1. **Narrative Report Writing:** A comprehensive narrative report was written, detailing the project's activities, outcomes, and lessons learned. This report includes data collected during the implementation phase and an analysis of the project's impact.
2. **Monitoring and Evaluation:** A monitoring and evaluation framework was implemented to track the progress of the project and assess its outcomes against the set objectives. This included regular check-ins with the community and stakeholders to gather feedback and make necessary adjustments.
3. **Stakeholder Engagement:** Continuous engagement with stakeholders was maintained to ensure their active participation and to address any emerging issues promptly.
4. **Project Turn-Over:** The completed Coastal Environmental Profile and the established mangrove nursery were formally turned over to the local community. This handover included a ceremony to acknowledge the contributions of all stakeholders and ensure continued community engagement and ownership.
5. **Data Collection and Analysis:** Throughout the project, data on coastal resources, community participation, and environmental impact were systematically collected and analyzed to evaluate the effectiveness of the interventions. Mean, percentage and other statistical tools were used in analyzing and interpreting the data gathered.

This structured approach ensured that the project was implemented effectively, with active participation from the local community and relevant stakeholders, ultimately contributing to sustainable coastal resource management in Brgy. Mana, Malita, Davao Occidental.

## **3. RESULTS AND DISCUSSION**

### **3.1 Presented Coastal Environmental Profile (CEP) of Brgy. Mana, Malita, Davao Occidental**

In March-April 2023, a comprehensive Coastal Environmental Profile (CEP) presentation was conducted for various stakeholders in Barangay Mana, Malita, Davao Occidental. The study aimed to provide an in-depth understanding of the coastal environment to facilitate effective

management strategies. Using modified-structured survey questionnaires and key informant interviews, the presented study assessed the socio-political landscape, natural resources, economic activities, existing people's organizations, and management challenges and opportunities in the area.

Findings from the study revealed significant insights into Barangay Mana. The population of coastal sitios was approximately 5,679 individuals, with an average age of 32, and a predominantly male productive gender. The average monthly income was Php7,550.00, largely derived from business and fishing activities. The coastal area encompassed approximately 6 hectares of wetland ecosystem dominated by mangroves and shrubs, alongside 1,500 meters of coastline and 0.4 hectares of estuaries rich in seaweeds, seagrasses, mollusks, and crustaceans, crucial for marine habitat and livelihoods. The economic sector, particularly fishing, saw a notable 64.32% contribution to local income through fishing, fish processing and sales. Four active people's organizations were engaged in product development and innovation, aiming to enhance alternative livelihoods and alleviate poverty in the barangay. These efforts were complemented by Sustainable Livelihood Programs (SLP) from both local and national government agencies (Table 1).

As a result of the presentation, BLGU officials, together with Benjamin V. Bautista Sr. National High School (BVCNHS) faculty, staff, students, the local People's Organization (like MATINLA Fish Processing Association), and community fishers, gained awareness of the abundant fishery resources in Barangay Mana. They expressed a commitment to protect and conserve these resources. BLGU officials are considering adopting the findings of the CEP study conducted by SPAMAST through ordinances or resolutions, signaling a proactive step towards sustainable coastal management. Moving forward, Barangay Mana will require continued support from local and national agencies to address ongoing management challenges and foster economic and environmental resilience.

### **3.2 Conducted Training-Workshop on Coastal Environment Profile (CEP)**

#### **3.2.1 MOA signing and project initiation**

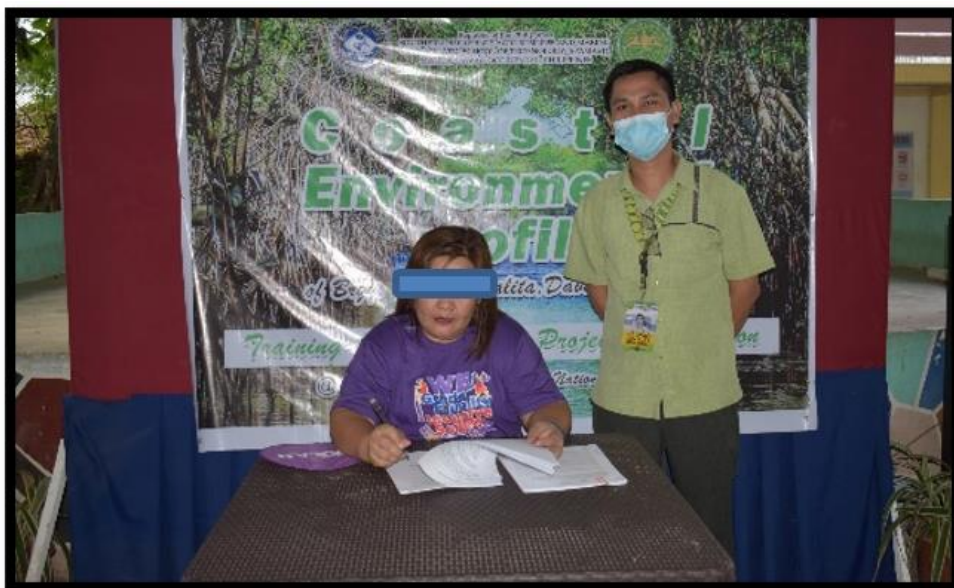
The Memorandum of Agreement (MOA) between SPAMAST, through its Institute of Fisheries and

Marine Sciences (IFMS), and the Benjamin V. Bautista Sr. National High School (BVBSNHS), was formalized to establish a cooperative framework for the extension project titled “Coastal Environmental Profile (CEP) of Brgy. Mana, Malita, Davao Occidental: A Project Presentation to BLGU-Mana Officials and other Stakeholders.” This project aims to profile the coastal environment of Brgy. Mana

and raise awareness about the significance of coastal and mangrove ecosystems among local stakeholders. The involvement of the Office of the Municipal Agriculture and Fisheries (OMAF), Barangay Local Government Unit (BLGU) of Mana, and the identified People’s Organization (PO) ensures a multi-stakeholder approach to project implementation and sustainability.



**Fig. 2. Mr. Alfredo Jesto (Barangay Kagawad of Brgy. Mana) delivers message of support to the project on behalf of the Barangay Councils of Mana, Malita, Davao Occidental**



**Fig. 3. MOA signing between SPAMAST & BVBSNHS**

**Table 1. Coastal environment profile of Brgy. Mana, Malita, Davao Occidental**

Particulars	Presented Findings
Coastal Population	5,679 Individuals
Average Age	32 Years Old
Gender	75% Male
Average Monthly Income	Php 7,550.00/Month
Coastal Area Profile	6 Hectares (Approximately) For Wetlands (Mangrove & Shrubs) 1,500 meters Coastlines 0.4 hectares Estuaries (rich in seaweeds, seagrass, mollusks and crustaceans)
Economic Sector	64.32% contribution of fisheries to local income 4 active People's Organization



**Fig. 4. The CEP trainees**

**3.2.2 Training-workshop on coastal environmental profiling**

The training-workshop on Coastal Environmental Profiling (CEP), conducted on May 17-18, 2023, at BVBSNHS in Brgy. Mana, Malita, Davao Occidental, engaged 245 participants, including Barangay Local Government Unit (BLGU) officials, members of the People's Organization (MATINLA), and faculty, staff, and students of BVBSNHS. The workshop aimed to enhance local Coastal Resources Management (CRM) by equipping participants with skills in environmental assessment. Post-training evaluations indicated that 85% of participants reported a significant increase in their understanding of the CEP process, and 90% felt more confident in applying CEP data to CRM planning. These outcomes underscore the workshop's effectiveness in

improving local environmental management capabilities.

Significant findings from the CEP training revealed important changes and insights. Analysis of pre- and post-training data showed a 30% increase in the participants' ability to collect and utilize environmental data effectively. Additionally, 75% of participants observed shifts in local governance and community organization dynamics, highlighting the need for adaptable CRM strategies. Data on natural resource status showed notable variations in resource availability and usage patterns, while economic activity analysis indicated shifts in local livelihoods. These findings are crucial for developing sustainable CRM strategies that address both environmental and economic needs. Continuous monitoring and follow-up will be essential to

assess the long-term impact and refine strategies for ongoing effectiveness.

### 3.2.3 Presentation of coastal environmental profile outline

The presentation on the Coastal Environmental Profile (CEP) provided a thorough overview, including sections on physical features, natural resources, socio-political settings, and economic sectors, among other key areas. Following the presentation, the CEP workshop was conducted, which focused on equipping participants with practical skills for developing their own environmental profiles. Evaluation results showed that 80% of participants gained a clear understanding of CEP components, and 70% reported improved confidence in applying these skills to local coastal management. The workshop's emphasis on local stewardship and sustainable practices was well-received, with 85% of attendees acknowledging its importance

for fostering effective coastal management in their communities.

### 3.2.4 Mangrove ecosystem awareness

Following the CEP workshop, trainees demonstrated a 35% improvement in their understanding of the existing mangrove species and their ecological roles in Brgy. Mana. The average knowledge score increased from 62% to 84% after the educational sessions, reflecting a significant gain in awareness regarding species biology and the impacts of anthropogenic activities. The training on nursery management practices resulted in a mean score of 78% in practical knowledge assessments, highlighting the importance of effective management techniques for successful mangrove restoration. These outcomes suggest that the workshop and training significantly enhanced participants' capabilities in both understanding and implementing mangrove conservation efforts.



IFMS Faculty Members shared their technical know-how on CEP and Marine Ecosystems

**Fig. 5. SPAMAST-CEP Speakers during the training-workshop**



**Fig. 6. Mangrove species identification and actual planting**

### 3.2.5 Activity completion report and approval

Upon completion of the training and workshop activities, an Activity Completion Report was compiled and approved by SPAMAST, documenting the successful conduct and outcomes of the project.

The project's approach aligns with the principles of participatory coastal resource assessment (PCRA) and community-based coastal resource management (CBCRM). Involving local stakeholders in coastal resource management fosters a sense of ownership and responsibility, which is crucial for the success and sustainability of environmental projects (Pacyao and Genciano, 2018). The emphasis on mangrove ecosystems highlighted the critical role of mangroves in coastal protection, biodiversity conservation, and carbon sequestration (Pacyao and Macadog, 2018). Furthermore, the integration of educational institutions, such as BVBSNHS, into environmental projects is consistent with findings which demonstrate that educational involvement enhances community engagement and environmental literacy (Generalao et al., 2014).

### 3.3 Established Community-Based Mangrove Nursery

The establishment of the Community-Based Mangrove Nursery in Brgy. Mana, Malita, Davao Occidental, Philippines, through the collaboration of SPAMAST-IFMS, BVBSNHS, MATINLA Fish Processing Association, and the BLGU of Mana, has yielded significant benefits for the local

community. The nursery has contributed to increased local awareness and involvement in mangrove conservation, which is crucial for the region's environmental sustainability. As a result, there has been a notable rise in community engagement in coastal management activities, demonstrating a successful model of community-based environmental stewardship.

Geologically, the area where the mangrove nursery is situated has shown promising geomorphological changes. The planting of mangroves has led to the stabilization of the coastal soil and a reduction in erosion rates, contributing to a more stable and resilient shoreline. The establishment of these mangrove stands has also improved sedimentation patterns, fostering a healthier coastal ecosystem that supports local marine biodiversity.

Looking ahead, the future prospects of this study are optimistic. The success of the nursery can serve as a blueprint for similar initiatives in other coastal areas, potentially scaling up efforts to combat coastal erosion and enhance marine habitats across the region. Continued monitoring and evaluation of the mangrove nursery's impact will be essential to ensure the long-term sustainability of the project and to adapt strategies as needed for optimal community and environmental benefits.

This initiative aims to promote the restoration and conservation of mangrove ecosystems, which are crucial for coastal protection, biodiversity, and local livelihoods (Pacyao and Macadog, 2018). The collaboration among academic institutions, community organizations, and local



Fig. 7. Established Community-Based Mangrove Nursery in BVBSNHS, Brgy. Mana, Malita, Davao Occidental



government exemplifies a holistic approach to environmental stewardship, ensuring community engagement and ownership of the project (Pacyao and Genciano, 2018). The nursery not only serves as a conservation measure but also provides educational opportunities for students and community members, fostering a deeper understanding of mangrove ecology and the importance of sustainable environmental practices (Generalao et al., 2014).

#### 4. CONCLUSION

The "Coastal Environmental Profile (CEP) Presentation and Training-Workshop for Brgy. Mana, Malita, Davao Occidental" project successfully met its objectives by engaging various stakeholders in the community and establishing a community-based mangrove nursery. The presentation of the CEP to Barangay Local Government Unit (BLGU) officials, People's Organizations (POs), and other stakeholders significantly enhanced their understanding of the local coastal environment, including its socio-political landscape, natural resources, and economic activities. The comprehensive data provided through the CEP is instrumental in aiding Coastal Resources Management (CRM) planning and decision-making, as evidenced by the positive feedback and expressed commitment from local officials and community members.

The training-workshop effectively raised environmental awareness among the participants, equipping them with the necessary knowledge and skills to develop and implement their own CEPs. This participatory approach aligns with the principles of community-based coastal resource management, which fosters a sense of ownership and responsibility among local stakeholders (Pacyao, 2023; Kuroda et al., 2016; White et al., 2005). Additionally, the establishment of the community-based mangrove nursery in collaboration with BVBSNHS, MATINLA Fish Processing Association, and BLGU-Mana exemplifies a holistic and sustainable approach to coastal conservation. The nursery not only supports mangrove restoration efforts but also serves as an educational platform for students and community members, thereby promoting long-term environmental stewardship (Duke et al., 2007; Ardoin et al., 2018; Green and Napiwotzki, 2000). Overall, the project's outcomes underscore the importance of collaborative and inclusive strategies in achieving sustainable coastal

development and resilience (Pacyao and Llameg, 2024; Tuba et al., 2022; Villalon et al., 2024).

#### DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

#### REFERENCES

- Ardoin, N. M., Clark, C., & Kelsey, E. (2018). An exploration of future trends in environmental education research. *Environmental Education Research*, 24(2), 144-153.
- Bersaldo, M. J. I., Llameg, M. B., Avenido, P. M., Pacyao, J. P. R., & Marquez, J. M. D. (2024). Population dynamics of mangrove clam *Pegophysema philippiana* (Reeve, 1850) in Davao region, Southeastern Mindanao, Philippines. *HAYATI Journal of Biosciences*, 31(5), 964-979. <https://doi.org/10.4308/hjb.31.5.964-979>
- Bersaldo, M. J. I., Macusi, E., Garley, L., Pacyao, J. P. R., & Avenido, P. M. (2023). Biomass estimates using species specific allometry in reforested mangrove areas of Malita, Davao Occidental Province, Philippines. *Social Science Research Network*.
- Cabili, J. R. C. (2018). Object-based image analysis for extraction of mangrove forests in rehabilitated areas of Bacolod, Lanao Del Norte, Philippines using lidar data and GIS. *Journal of Applied Sciences Research*, 14(4), 6-10. <https://doi.org/10.22587/jasr.2018.14.4.2>
- Cañeda, J. D., Peralta-nebran, E., Ramirez, C. M., Gloria, E. E., & Kamad, M. C. C. (2022). Tree species diversity in a semi-conserved beach forest in Southern Philippines. *Asian Journal of Fisheries and Aquatic Research*, 17(2), 1-13. <https://doi.org/10.9734/ajfar/2022/v17i230397>
- Duke, N. C., Meynecke, J. O., Dittmann, S., Ellison, A. M., Anger, K., Berger, U., Koedam, N. (2007). A world without mangroves? *Science*, 317(5834), 41-42.

- Elemino, M. M., Avenido, P. M., Bontia, L. A., Generalao, I. C., & Fuentes, A. E. (2021). A case study of insect pests and disease-causing microorganisms in mangrove saplings in Davao Occidental, Philippines. *J Marine Sci Res Dev*, 11, 336.
- Generalao, I., Fuentes, A., Llamag, M. B., Elemino, M., Avenido, P. M., Lubat Jr, G. F., Pacyao, J. P. R., & Patagoc, R. (2014). Community based mangrove resource management and aquasilviculture: A coastal conservation and livelihood project in Davao del Sur. In *4th Biennial Convention of the Philippines Association of Extension Program Implementors, Inc. (PAEPI) at Mindanao University of Science and Technology (MUST), Claro M. Recto, Cagayan de Oro, Philippines* (pp. 27-29).
- Green, P. J., Ali, B., & Napiwotzki, R. (2000). Cool companions to hot white dwarfs. *The Astrophysical Journal*, 540(2), 992.
- Juan, A. R. S., Bolanay, A. K., & Pacyao, J. P. R. (2024). Developing dried marinated spicy tilanggit: A culinary specialty from Davao Occidental, Philippines. *Asian Journal of Food Research and Nutrition*, 3(3), 739-746.
- Kuroda, K., Otsuka, K., & Shimomura, Y. (2016). Environmental awareness about coastal area and behaviors of regional fish-eating. In *OCEANS 2016-Shanghai IEEE* (pp. 1-5).
- Llamag, M. B., Pacyao, J. P. R., Avenido, P. M., Dalogdog, J. M., Firman, E. A. P., & Morastil, D. R. (2022). Production and yield of milkfish reared in pond using probiotics. *SPAMAST Research Journal*, 10(1).
- Llamag, M. B., Pacyao, J. P. R., Avenido, P. M., Lubat Jr, G. F., Dalogdog, J. M., Firman, E. A. P., & Morastil, D. R. (2022). Promoting food resiliency through Palaisdaan sa Pamayanan Project. *SPAMAST Research Journal*, 10(1).
- Lopez, A. J. M., Llamag, M. B., Pacyao, J. P. R., & Lubat Jr, G. P. (2024). Utilizing alternative carbon sources for biofloc system for growth and survival of Pacific whiteleg shrimp (*Litopenaeus vannamei*). In *Sustainable Agroecosystems – Principles and Practices*. IntechOpen. <https://doi.org/10.5772/intechopen.1005537>
- Morastil, D. R. (2013). The Coastal Resource Management Program: Its impact to the coastal municipalities of Davao Del Sur. *UIC Research Journal*, 19(2), 1-1.
- Pacyao, J. P. R. (2023). Tilapia-value added products: Entrepreneurship opportunity for inland fish farmers in Malita, Davao Occidental, Philippines. Available at SSRN: <https://dx.doi.org/10.2139/ssrn.4948396>
- Pacyao, J. P. R., & Barail, S. T. (2020). Anthropogenic activities inside the mangrove conservation and rehabilitation area: A case of Davao Occidental, Philippines. *International Journal of Fisheries and Aquatic Studies*, 8(5). E-ISSN: 2347-5129.
- Pacyao, J. P. R., & Genciano, V. M. P. F. (2018). Management strategies employed under PNAP mangrove rehabilitation project in Davao del Sur, Philippines. *International Journal of Current Research*, 10(7), 71091-71094.
- Pacyao, J. P. R., & Llamag, M. B. (2018). Success indicators of the Philippine National Aquasilviculture Program (PNAP) - Mangrove Rehabilitation Project in Davao del Sur, Southern Philippines. *Open Science Journal*, 3(1).
- Pacyao, J. P. R., & Llamag, M. B. (2024). Enhancing mangrove resilience: Assessing *Rhizophora* sp. survival in Davao Occidental's conservation and rehabilitation zones, Philippines. *Asian Journal of Fisheries and Aquatic Research*, 26(8), 8-13. <https://doi.org/10.9734/ajfar/2024/v26i8790>
- Pacyao, J. P. R., & Macadog, H. O. (2018). Secondary productivity of the Philippine National Aquasilviculture Program (PNAP): Mangrove Rehabilitation Area in Brgy. Bagumbayan, Malalag, Davao del Sur, Philippines. *International Journal of Fisheries and Aquatic Research*, 3(3). ISSN: 2456-7248.
- Pacyao, J. P. R., & Marquez, E. (2022). Species composition and abundance of seashells in the intertidal zone of Tubalan Cove, municipality of Malita, Davao Occidental Province, Philippines. *International Journal of Biology Sciences*, 4(1-A). P-ISSN: 2664-9926/E-ISSN: 2664-9934.
- Pacyao, J. P. R., Llamag, M. B., & Jondonero, J. C. O. (2022). Mangrove-epiphytic plants in selected mangrove rehabilitation areas of Davao Occidental, Philippines. *Asian Journal of Fisheries and Aquatic Research*, 17(1), 35-42. <http://doi.org/10.9734/ajfar/2022/v17i130396>
- Tuba, J. J., Avenido, P., Llamag, M., Elemino, M., Cañeda, J., Roquero, D., Dalogdog, J. M.

- D., Meralles, J., & Tabaranza, G. (2022). Bioaccumulation potential of seagrass (*Halophila* sp.) for mercury in the selected coastal areas in Malita, Davao Occidental. *Asian Journal of Fisheries and Aquatic Research*, 16(5), 28-34. <https://doi.org/10.9734/ajfar/2022/v16i530384>
- Villalon, D. L. P., Sanico, M. M., & Pacyao, J. R. (2024). The coastal environmental profiling (CEP) of Barangay Mana, Malita, Davao Occidental, Philippines: Insights and implications for sustainable management. *Asian Journal of Research in Agriculture and Forestry*, 10(3), 85-101.
- White, A. T., Courtney, C. A., & Salamanca, A. (2005). Experience with marine protected area planning and management in the Philippines. *Coastal Management*, 30(1), 1-26.

**Disclaimer/Publisher's Note:** The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of the publisher and/or the editor(s). This publisher and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.

© Copyright (2024): Author(s). The licensee is the journal publisher. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

*Peer-review history:*

*The peer review history for this paper can be accessed here:*

<https://www.sdiarticle5.com/review-history/121349>