

Proposal Title	Mapping the Way Forward: Enhancing Efficiency in Agriculture, Fishery, and Natural Resources in Oriental Mindoro
Proponent/Project Leader	Macario B. Masagca, Jr.
Project Duration	Nine (9) months
Project Start Date	April 1, 2024
Project End Date	December 31, 2024
Implementing Agency Address	Mindoro State University-Main Campus Alcate, Victoria, Oriental Mindoro
Sustainable Development Goals Addressed	SDG 14: Life Below Water, SDG 15: Life on Land, SDG 12: Responsible Consumption and Production, SDG 6: Clean Water and Sanitation, SDG 11: Sustainable Cities and Communities, SDG 13: Climate Action
Total Budget	Php 3,135,350.00

INTRODUCTION

Oriental Mindoro is a tropical island in the Philippines that is part of the MIMAROPA provinces, which include Occidental Mindoro, Marinduque, Romblon, and Palawan. It is considered an idyllic place due to its natural beauty and tropical climate. It is the seventh-largest island near Manila, the capital city of the Philippines. In May 2020, the population of Oriental Mindoro was estimated to be 908,339, with a population density of 214 individuals per square kilometer across a total land area of 4,238.38 square kilometers.

Oriental Mindoro is renowned for its essential agricultural commodities, which include rice, banana, calamansi, livestock, poultry, and fishery goods. The primary commercial partners consist of the neighboring CALABARZON provinces (Cavite, Laguna, Batangas, Rizal, and Quezon) and Metro Manila, which serves as the central hub of economic activity in the country (Department of Trade and Industry, n.d.).

To maintain the tag as a food basket, the province has allocated 60% of goods for the One Town, One Product (OTOP) initiative focusing on food processing. This choice is based on the abundance of raw materials, suitable manufacturing regions, and the availability of local labor. The Department of Trade and Industry has identified certain processed foods, including virgin coconut oil, banana chips, processed fish and meat, pastillas, buko pie, calamansi, dried mango, and dalandan juice.

The province's productivity has seen fluctuations in recent years. Based on the 2021 PSA-MIMAROPA data (Philippine Statistics Authority Provincial Statistics Office, 2021), its palay production decreased by 9.33% from April to June of that year. Accordingly, that year's overall output volume was estimated to be 112,042.00 metric tons only, which is lower than the 123,576.06 metric tons reported in the corresponding quarter of 2020. The production of irrigated palay decreased by 10.69 percent, while the production of rainfed palay increased by 3.71 percent. Additional evidence of the fluctuating agricultural output in the province is linked to several aspects, such as the province's calamansi and coconut production, which are affected by pests and diseases, and climate-related problems, according to farmers.

Oriental Mindoro is primarily dependent on agriculture, particularly rice and corn. In 2020, its Provincial Agriculture Office recorded a total rice production of 549,516.12 metric tons. This equals 5,954,556 bags of milled rice, with a total value of PhP 13,100,023,200

during that period. The rice was produced from 114,710.80 hectares of rice fields, equivalent to an average rice yield of 4.8 metric tons per hectare (MT/ha). Rice is a common agricultural crop in all the municipalities and the lone city of the province, serving as proof of being tagged as the rice granary of the region.

The province grows two types of corn: white, which is a suitable rice substitute, and yellow, which is used in livestock and poultry feeds and manufacturing. From 1,370.05 hectares of maize crop, the province produced 5,551.69 MT in 2019, averaging 4.05 MT per hectare. The province produced 5,922.73 MT of corn from 1,406.83 hectares in 2020, averaging 4.21 MT per hectare. In 2020, yellow corn was planted on 1,429.77 hectares and harvested on 1,166.90 hectares, yielding 5,284.52 MT and 4.53 MT/ha. White corn is just 23.75% of yellow corn's 339.62 hectares, with 263.93 hectares harvested, 731.11 MT produced, and 2.77 MT/ha yield.

Cassava is also one of the promising crops of Oriental Mindoro, according to the Provincial Agriculture Office. This is due to its importance as an alternative crop, particularly in upland communities, and its potential for value addition. It is well suited, especially in the upland, serving as an alternative livelihood for the highlanders of Bulalacao with marketing support from some farmers' associations such as the FARMVILLE Association in Roxas, Oriental Mindoro.

Aside from rice and cord, calamansi is the priority commodity of Oriental Mindoro and has been added to the Philippine Rural Development Project commodities with enterprise development interventions. Calamansi production totaled 60.10 thousand metric tons from July to September 2021. It rose 8.3 percent from 55.47 thousand metric tons in the same period in 2020. MIMAROPA Region produced more than half of the country's total calamansi production (59.0 percent), with 35.48 thousand metric tons. This was followed by CALABARZON (9.7 percent) and Central Luzon (5.3 percent) (Philippine Statistics Authority, 2021). Oriental Mindoro contributed much to the calamansi production of MIMAROPA, comprising 99% of regional output or 41% of the national production. As of 2019, 2,577 calamansi farmers in the province and nine calamansi processors are making ready-to-drink calamansi juice or concentrate.

Aside from calamansi, coconut was included in the Philippine Rural Development Project commodities. It received enterprise development interventions from various support agencies. The province has an average coconut cultivation area of 32,568.80 hectares, with an average production of 75,210.54 metric tons. The province has 32,370 coconut farmers and three virgin coconut oil refineries. Based on the 2017 data, Oriental Mindoro ranks third among the MIMAROPA provinces in terms of coconut production with husk, following Palawan and Romblon. According to the Philippine Statistics Authority, Oriental Mindoro could produce 71,130.06 metric tons of coconuts with husk in the same year. This accounted for a portion of the region's overall coconut production, which totaled 772,478.55 metric tons.

The province enjoys the region's leading spot for banana production, contributing 60% of the overall regional output. The province has an average banana plantation area of 13,989.58 hectares, with an average production of 71,514.93 metric tons. This output represents 60% of the total regional production. Between 2015 and 2019, the province had 12,654 banana producers and nine banana chip processors.

Seaweed farms reportedly exist in six barangays in Bulalacao. One hundred thirty-eight (138) seaweed farmers are now active in the area, employing 878 hectares of coastal waters combined. Seaweed holds a significant position among the crucial aquaculture commodities in the Philippines. During January to June, commonly regarded as the prime season for seaweed farming, growers typically experience a favorable yield. *Eucheuma cottonii* is the most popular and commercially cultivated species due to its rapid growth and high market value. Seaweed is exported in two forms: raw or processed. The processed forms include fresh or dried seaweeds, such as carrageenan and kelp powder. Agar, alginates (sodium alginate), and carrageenan are the primary substances obtained from seaweed. Carrageenan is a naturally occurring gum utilized as an additive, binder, and emulsifier in various industries such as food, pharmaceutical, beverage, and cosmetics.

Based on 2020 PSA data, Oriental Mindoro is second to Palawan in the overall value of cattle output, 53.8% and 16.4%, respectively. The same provinces hold the same spot in the overall value of poultry production, which is 50.9% and 17.3%, respectively.

Oriental Mindoro's location, bordered by the Verde Island Passage, provides rich aquatic resources, including diverse fish and marine species. The waters surrounding the province are considered some of the most biodiverse in the world, contributing to its potential for fishing and eco-tourism. The fishing industry in the province is vital for local and coastal communities, providing food and livelihoods.

The province's forests have many endemic and rare flora and fauna. These forest resources are crucial for ecosystem services, including water regulation, carbon sequestration, and biodiversity habitat. The remaining forests are critical in sustaining the ecological balance and supporting indigenous communities and rural livelihoods dependent on forest resources, particularly the Mangyans.

OBJECTIVES

The main objective of this project is to develop a comprehensive map of the agricultural, fishery, and natural resources of Oriental Mindoro with policy recommendations that will contribute to the sustainable, efficient, and equitable management of these resources.

Specifically, it aims to:

1. Assess the state and distribution of agricultural lands in the province to understand land use patterns, crop and animal diversity, including farming practices.
2. Identify critical habitats for aquatic species, particularly endangered or commercially essential ones, to inform conservation efforts and sustainable fishing practices.
3. Analyze the impacts of human activities on agricultural and aquatic ecosystems, such as pollution, overfishing, and infrastructure development, to develop guidelines for mitigating adverse effects.
4. Map the distribution and status of non-timber forest products with economic value to develop measures to protect them from being overharvested and design cultural and propagation approaches to preserve them.
5. Identify and prioritize areas for conservation and restoration based on biodiversity significance, ecosystem services, and vulnerability to human-induced pressures.
6. Map the province's agriculture-fishery and non-timber industry, including resources and potentials, and analyze market trends and demand patterns for agricultural products in Oriental Mindoro, domestically and internationally, through market and value chain analysis.
7. Identify opportunities to strengthen value chains, reduce post-harvest losses, and improve smallholder farmers and fisherfolk market access.
8. Design and develop mobile-based applications and websites that will aid the use of the data gathered through this research work for academic, research, and public use.

9. Provide at least four (4) relevant research and publications that will aid the policymaking process for developing the agriculture-fishery sector and protecting the province's vulnerable resources.

METHODOLOGY

Understanding how agriculture, fisheries, and natural resources change over time and making maps of their locations are essential for government long-term management and conservation programs. As stated below, comprehensive and effective mapping will be done in several ways, particularly using cutting-edge technologies. This project will employ the use of the following advanced tools and methods:

1. Remote sensing and satellite imagery
 - to map and monitor natural resources and land use in large areas.
 - identify the difference between different land cover types, such as farmland, forests, and bodies of water, which provides useful information about the size and state of resources.
 - to make maps of different types of crops and land use changes over time. It can also find places hit by droughts, floods, or pests.
 - for fisheries, it will help find good fishing spots, map aquatic areas, and monitor changes in coastal areas.
2. Geographic Information Systems (GIS)
 - to collect, organize, and look at data about places and spaces to combine different types of data, like maps, satellite images, and statistical data, so it's possible to look at natural resources, land use trends, and environmental factors spatially.
3. Global Positioning System (GPS)
 - to get precise information about where things are, which is important for maps and ground truthing. GPS data can make resource maps and lists more accurate when mixed with GIS and remote sensing.
4. Drone Technology (UAVs)
 - to take high-resolution pictures in real time and help get to places that are hard to access.
 - to make accurate maps of forest areas, farm locations, and changes in land use or land cover related to natural resources.
5. Participatory Mapping
 - local communities will participate in the participatory mapping process, combining their traditional knowledge with new mapping tools. This method effectively obtains detailed information about land use, natural resources, and cultural practices.
 - historical mapping
 - participatory mapping methods improve community involvement and reinforce local governance systems.
6. Surveys
 - the typical method using specialized survey questionnaires.

7. Use of computer software

- For mobile applications and website development.

8. Statistical software such as SPSS, Fishery Statistical Tools, and others

- For analysis of complex data from surveys and actual field activities.

EXPECTED OUTPUTS

The results are expected to provide information for academe and research, policymaking, direct conservation initiatives, improve the security of food and aquatic resources, and contribute to achieving sustainable development objectives on a provincial scale.

The specific expected outputs of this project are presented in the succeeding matrix:

Research Assistants 1 and 2 (Agri-Crops)	Research Assistant 3 (Animals / Poultry)	Research Assistant 4 (Fishery)	Research Assistant 5 (Non-timber Forest Products)	Computer Programmer (IT)
2 Research papers for presentation / publication	1 Research paper for presentation / publication	1 Research paper for presentation / publication	1 Research paper for presentation / publication	2-3 mobile applications developed and uploaded to Google Play Store
				2-3 web-based information hubs developed (accessible)
Proponent/Project Leader				
1 Book 5 Policy Papers/Briefs				

EXPECTED BENEFICIARIES

Agriculture, fishery, and natural resource mapping have several applications and benefits. It can assist many stakeholders. In this project, the expected beneficiaries are the following: (1) government agencies, (2) researchers and academia, (3) farmers and fisherfolks, (4) private sector and businesses, (5) non-government Organizations (NGOs), (6) international organizations, and (7) civil society including indigenous communities.

Government Agencies (Local, Municipal and Provincial)

These agencies utilize mapping data to formulate policies, manage resources, and plan development projects. For instance, they can recognize areas appropriate for extending agriculture production, ascertain locations where fishing is viable, and oversee the administration of protected zones. They refer to mapping data to observe land-use alterations, areas with high biodiversity, and locations vulnerable to environmental deterioration. This facilitates the implementation of environmental regulations and the promotion of conservation initiatives.

Researchers and Academia

Mapping data is valuable for researchers in agriculture, fisheries, and environmental science as it allows them to study land use patterns, ecosystem dynamics, and the effects of human activities on natural resources. Academic institutions integrate mapping into their curriculum to educate students about spatial analysis, resource management, and environmental conservation.

Farmers and Fisherfolks

Mapping information can assist small-scale farmers and fishermen make well-informed choices on crop selection, fishing areas, and land management strategies. Implementing this approach can increase efficiency, maximize resource utilization, and reduce the negative impacts of climate change and natural disasters. Access to mapping data empowers farmers to engage in agricultural extension programs and use such data for any financial claims or services, such as crop insurance and credit facilities.

Private Sector and Businesses

Agribusinesses, fishery enterprises, and natural resource extraction industries employ mapping data to determine suitable locations, manage their supply chains, and analyze market conditions. It guides or facilitates investment decisions, enhances operational efficiency, and guarantees adherence to environmental regulations. Mapping data also enables the advancement of precision agriculture technology, such as crop monitoring systems that utilize satellite pictures and machinery directed by GPS (in some other countries). These technologies improve production and resource efficiency.

Non-Government Organizations (NGOs)

Conservation organizations and community-based groups use mapping data to determine key areas for habitat restoration, establish marine protected areas, and carry out sustainable livelihood projects. This promotes the preservation of biodiversity, the rehabilitation of ecosystems, and the empowerment of communities. NGOs addressing food security, poverty reduction, and climate resilience include mapping data into their projects. This allows them to specifically target their interventions, track their initiatives' development, and assess their programs' impact on the local communities.

International Organizations

Some local and national governments receive support from international organizations and development partners through various technical assistance and funds to facilitate the collection and analysis of mapping data. Their objective is to advocate for using geospatial technology to facilitate sustainable development planning, mitigate disaster risks, and enhance capacity building. Mapping data is utilized in global projects like the United Nations Sustainable Development Goals (SDGs) to monitor advancements towards food security, biodiversity protection, and climate action.

Civil Society, including Indigenous Communities

Civil society organizations promote transparent and inclusive land use planning processes, employing mapping data to empower marginalized communities, safeguard land rights, and contest unsustainable development practices. Mapping is also crucial for indigenous communities since it allows them to record traditional land use practices, assert their territorial rights, and negotiate with government authorities and extractive businesses that may affect them.



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BAGONG PILIPINAS

TIMELINE OF ACTIVITIES

Major Activities	2024											
	April	May	June	Jul	Aug	Sep	Oct	Nov				
1. Project Setup <i>Defining project scope / Resource allocation</i>												
2. Stakeholder Engagement <i>Identifying and engaging stakeholders / Initial stakeholder meetings</i>												
3. Preliminary Research <i>Literature review / Existing data analysis</i>												
4. Methodology Design <i>Selecting mapping methods (Remote Sensing, GIS, etc.) / Designing data collection protocols</i>												
5. Training and Workshops <i>Team training on chosen methodologies / Stakeholder workshops for participatory mapping</i>												
6. Fieldwork Preparation <i>Logistics and scheduling / Equipment preparation</i>												
7. Data Collection <i>Conducting fieldwork / Participatory mapping sessions / Remote sensing data acquisition</i>												
8. Data Processing <i>Processing field data / Analyzing remote sensing imagery</i>												
9. Mapping <i>Creating preliminary maps / GIS analysis and layer creation</i>												
10. Final Mapping and Analysis <i>Refining maps based on analysis / Final GIS layer compilation</i>												
11. Writing and Documentation <i>Drafting project reports / Creating documentation for GIS layers and methodologies</i>												
12. Dissemination and Stakeholder Feedback <i>Presenting findings to stakeholders / Collecting feedback / Final report adjustments</i>												

BUDGET PROPOSAL

ITEMS	No/Unit	Monthly	Annual
Professional Services			
Research Assistant (SG 8)	5	Php 19,744.00	Php 888,480.00
Computer Programmer (SG 11)	1	27,000.00	243,000.00
Project Assistant (SG 1)	1	13,000.00	117,000.00
TOTAL PS			1,248,480.00
MOOE			
Automated Weather Station (Upgrading of Existing AWS in the Main Campus)	1		300,000.00
Webhosting and Google Play Console Registration			80,000.00
ICT Equipment			42,930.00
Office Supplies			40,000.00
Travel (Data Gathering and Related Travels)			750,940.00
Trainings and Seminars			150,000.00
Publication			200,000.00
Communication and Internet			36,000.00
LGU's, Farmers & Fisherfolks Forum			200,000.00
Printing (Tarps) of IEC Materials	20		12,000.00
Laptop	1		45,000.00
Ink Tank System Printer	1		30,000.00
TOTAL MOOE			1,886,870.00
GRAND TOTAL			Php 3,135,350.00

Prepared by:

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Project Leader / Director for Research and Development

Approved:

CHRISTIAN ANTHONY C. AGUTAYA, PhD
OIC - Office of the University President

APPENDIX

Appendices

AWS and Webhosting

Automated Weather Station (Upgrading of Existing AWS in the Main Campus) - The facility was awarded to MinSU through the SARAI Project. This is a source of weather data for research and other agricultural research of proximal barangays	1		Php 300,000.00
Webhosting and Google Play Console Registration - Includes uploading of 3 mobile applications to Google Play Store for Android and IOS - 3 Accessible Websites			80,000.00
Subtotal			Php 380,000.00

Travel (Data Gathering and Related Travels)

Related Travels	No. of Trips	Amount
Coordination Meetings		
per diem @Php 198 TEV/day for trips within 50 kilometers (8 Project Team Members and driver)	15	Php 26,730.00
per diem @Php 440 TEV/day for trips beyond 50 kilometers (8 Project Team Members, and driver)	20	79,200.00
Conduct		
per diem @Php 198 TEV/day for trips within 50 kilometers (8 Project Team Members, and driver)	35	62,370.00
per diem @Php 2,200 TEV/day for trips beyond 50 kilometers (8 Project Team Members and driver)	26	514,800.00
Fare (8 Project Team Members for the conduct of the project within 50 kilometers)	32	67,840.00
SUBTOTAL		Php 750,940.00

Printing (Tarps)

	No. of Pcs.		Amount
Printing (Tarps) of IEC Materials - <i>Data and Reports Dissemination</i> - 3x4 feet @ Php 50/sq. ft. = Php 600 - Outdoor quality	20		Php 12,000.00

