Global foundations for reducing nutrient enrichment and oxygen depletion from land based pollution, in support of the

Global Nutrient Cycle

State of the Coasts Report
Province of Bataan, Philippines

Prepared by: Provincial Government of Bataan, PEMSEA

Component D: Doc: D1-3

Partners:

September 2017

About the GEF-Global Nutrient Cycle Project

Project objective: to provide the foundations (including partnerships, information, tools and policy mechanisms) for governments and other stakeholders to initiate comprehensive, effective and sustained programmes addressing nutrient over-enrichment and oxygen depletion from land based pollution of coastal waters in Large Marine Ecosystems.

Core project outcomes and outputs:

- the development and application of quantitative modeling approaches: to estimate and map present day contributions of different watershed based nutrient sources to coastal nutrient loading and their effects; to indicate when nutrient over-enrichment problem areas are likely to occur; and to estimate the magnitude of expected effects of further nutrient loading on coastal systems under a range of scenarios
- the systematic analysis of available scientific, technological and policy options for managing nutrient over-enrichment impacts in the coastal zone from key nutrient source sectors such as agriculture, wastewater and aquaculture, and their bringing together an overall Policy Tool Box
- the application of the modeling analysis to assess the likely impact and overall cost effectiveness of the various policy options etc brought together in the Tool Box, so that resource managers have a means to determine which investments and decisions they can better make in addressing root causes of coastal over-enrichment through nutrient reduction strategies
- the application of this approach in the Manila Bay watershed with a view to helping deliver the key tangible outcome of the project – the development of stakeholder owned, cost-effective and policy relevant nutrient reduction strategies (containing relevant stress reduction and environmental quality indicators), which can be mainstreamed into broader planning
- a fully established global partnership on nutrient management to provide a necessary stimulus and framework for the effective development, replication, up-scaling and sharing of these key outcomes.

Project partners:

- Chilika Development Authority
- Energy Centre of the Netherlands
- Global Environment Technology Foundation
- Government of India - Lake Chilika Development Authority
- Government of the Netherlands
- Government of the Philippines
- Government of the United States
- Intergovernmental Oceanographic Commission of UNESCO
- International Nitrogen Initiative
- Laguna Lake Development Authority
- Partnerships in Environmental Management for the Seas of East Asia
- Scientific Committee on Problems of the Environment
- University of Maryland
- University of the Philippines
- University of Utrecht
- Washington State University
- World Resources Institute

Implementing Agency: United Nations Environment Programme
Executing Agency: UNEP- Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities (GPA)

STATE OF THE COASTS

of Bataan Province

The Provincial Government of
Bataan, Philippines

Be One with
1Bataan
The Only Place for Everything Bataan

gef

UN environment
United Nations
Environment Programme

GPA

PEMSEA

Bataan Coastal Care
Foundation, Inc.

State of the Coasts of Bataan Province

The Provincial Government of Bataan, Philippines

Be One with 1Bataan
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GPA Global Programme of Action for the Protection of the Marine Environment from Land-based Activities

PEMSEA

Bataan Coastal Care Foundation, Inc.

State of the Coasts of Bataan Province

September 2017

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PEMSEA is an international organization based in Manila, Philippines, specialized in sustainable development at the coastal areas through the implementation of integrated coastal management (ICM).

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Republic of the Philippines
Province of Bataan

Office of the Governor

Message

We welcome the publication of the State of the Coasts of Bataan. As we continue to strive towards our vision of having the lowest poverty incidence resulting from quality growth attaining the highest human development index in the Philippines.

The State of the Coasts reflects the real time situation in our coastal areas and the condition of our coastal resources. The publication covers the implementation of Integrated Coastal Management (ICM) program in Bataan. It highlights the significance of the program in the development of the province into a highly eco-industrial and investment center. The ICM program guides us in crafting plans for future development. It changed our perspective towards a more balanced approach between development and environmental protection. However, the SOC brings out the need for a better plan of action and the importance of development and management plans in all facets of our services. It calls out for more vigilance among us public servants and the participation of the community in every campaign as we aspire for excellent public service towards better quality of life for all.

The launching of the SOC of Bataan will be instrumental in understanding what programs would well fit in achieving economic development while giving due consideration to sustainable use of our coastal and marine resources. This would also serve as a guide in measuring our accomplishments and addressing current issues and concerns.

I laud all stakeholders in this project. I enjoin you to work much more in the conservation of our coastal and marine resources. Let us not leave any stone unturned and make this province a haven for economic development and environmental protection.

ALBERT S. GARCIA
Governor

Global Programme of Action for the Protection of the Marine Environment from Land-based Activities
United Nations Environment Programme

Message

On behalf of the Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities and the United Nations Environment Programme, we welcome the publication of the 'State of the Coasts of Bataan Province', a culmination of an engaging participatory process with a view to enhancing sustainable development and coastal resource conservation. The Global Programme of Action is indeed happy to have been associated with the efforts of the Provincial Government of Bataan and Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) that has placed land-based marine pollution and its impacts at the center of coastal conservation and developmental issues.

The Global Programme of Action is the only global intergovernmental mechanism directly addressing the connectivity between terrestrial, freshwater, coastal and marine ecosystems, and has supported countries across the globe in combatting marine pollution through the conduct of specific assessments, implementation of investments, development of policy, building capacity and raising awareness. As the world's population continues to grow, the issues of pollution of the marine environment and damages to ecosystems and the services they provide, are expected to escalate if corrective concrete actions are not taken. However, innovative solutions are being developed across many levels to address land-based pollution and there has been emerging leadership to address the issue from private sector to governments to community-based organizations.

With commitment to the Sustainable Development Goals, preservation of the integrity of coastal resources through the lens of pollution abatement will mean a close nexus in meeting targets under Goal 6 on maintaining the quality of freshwater, and under Goal 14 on reducing marine pollution. The commitment has been amplified in the outcome of the United Nations Conference to Support the Implementation of Sustainable Development Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development, and the 'Our Ocean, Our Future: Call for Action', where countries have pledged *"to accelerate actions to prevent and significantly reduce marine pollution of all kinds, particularly from land-based activities,…."*.

The Global Programme of Action will continue to play a role in assisting countries in meeting their commitments under the Sustainable Development Goals in relation to land-based pollution. One of these avenues has been under the Global Environment Facility-funded Global Nutrient Cycle (GEF-GNC) Project that has assisted the formulation of this State of Coasts Report of Bataan Province. Over the past five years, the GEF-GNC Project has contributed to providing knowledge foundations, tools and policy mechanisms to help governments and other stakeholders in initiating comprehensive, effective and sustained programmes to address nutrient over-enrichment and oxygen depletion from land-based pollution of coastal waters.

The Global Programme of Action encourages the Provincial Government of Bataan, other national authorities and partners to showcase their experiences to the world, and we, at the United Nations Environment Programme stand ready to support in any future endeavors.

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HABIB N. EL-HABR, PhD
Coordinator, Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities
United Nations Environment Programme

PEMSEA

Partnerships in Environmental Management for the Seas of East Asia

Message

On behalf of PEMSEA, I wish to congratulate the Provincial Government of Bataan and its partners for the publication of the State of the Coasts Report of Bataan Province. The report is one of the most important outputs of the ICM program since it consolidates the achievements of the province in ICM implementation over the past 16 years involving a range of stakeholders, including national agencies, the municipal and city governments, nongovernmental organizations, the academe and the private sector. It also highlights areas that need improvement and offers recommendations on appropriate management interventions, thus providing important inputs to the planning processes of the province and municipal and city governments.

As can be gleaned from the SOC report, Bataan has made significant progress in improving the ICM governance mechanism through the establishment and operationalization of the Bataan Sustainable Development Coordinating Council, enactment of ICM enabling-legislations, policy development and goal setting, in capacity strengthening and financing the ICM program. On the other hand, Bataan should focus on strengthening the implementation of management programs related to habitat and biodiversity conservation, water use, fisheries and sustainable livelihood and pollution reduction and waste management in coordination with the relevant sectors and agencies. It is hoped that the succeeding SOC reports will be able to show positive trends resulting from the implementation of sector-specific management programs.

The Bataan ICM program is unique having benefited from the support of the private sector, the Bataan Coastal Care Foundation, Inc., and other partners for the past 16 years. PEMSEA is pleased to be part of this partnership ever since the inception of the Bataan ICM program in 2000. PEMSEA will continue supporting the ICM program, which can serve as a platform for achieving Bataan's vision of having the highest human development index in the Philippines by reducing poverty through quality growth.

Congratulations!

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STEPHEN ADRIAN ROSS
Executive Director
PEMSEA

Department of Environment and Natural Resources - Provincial Environment and Natural Resources Office

Message

I would like to congratulate the Province of Bataan for the publication of the State of the Coasts. This vital manuscript establishes the baseline valuation of the socioeconomic and ecological conditions, as well as the governance mechanisms that the peninsula has employed for the sustainable development of its coastline and marine environment. This will facilitate the proper evaluation of the ICM program implementation and the drawing up of strategies and management plans.

The steps the province has made in managing its coastal and marine areas are remarkable. The institutional and legal mechanisms, including the allocation of budget and staff have made ICM in the province feasible. The partnership between the Provincial Government, BCCFI, PEMSEA, and other sectors is likewise noteworthy. However, even with the 15 years of ICM implementation in the province, Bataan has more to offer in conserving the peninsula's natural resources.

As highlighted in this report, the province needs to give more and specific attention to management issues including man-made and natural hazard management, habitat protection, water resources management, air pollution, and industrial and hazardous waste. We at the PENRO support all efforts to address these pressing concerns. As partners, we look forward to closely working hand in hand with the provincial government and all stakeholders in the successful implementation of the ICM program in Bataan.

RAYMOND A. RIVERA
Officer-in-Charge, Provincial Environment and Natural Resources Office, DENR-Bataan

Provincial Government - Environment and Natural Resources Office

Message

I salute all stakeholders on this endeavor to establish a mechanism for the implementation of the Bataan Integrated Coastal Management Program (BICMP).

For the past 16 years, Bataan was in the forefront of ICM program implementation. The publication of the State of the Coasts of Bataan Province (SOC) is an ideal tool for revisiting the strategies of the province in addressing environmental concerns particularly the coastal and marine resources. The province may have directed many interventions in our coastal zones, though the SOC points us to the lapses, weakness, and areas for improvement. It serves as an effective tool in the determination and prioritization of concerns that need immediate action. As the province embarks on an intense campaign to conserve our natural resources, we rely on this information for the establishment of benchmarks and performance targets for the integrated coastal management program. The indicators provide us guidance towards good governance and ecological management.

With strong commitment, we support the nation in adopting and implementing ICM as a strategy to ensure sustainable development of the country and the province's coastal resources.

VICTOR B. UBALDO, MNSA
Head, Provincial Government - Environment
and Natural Resources Office/
PMO Director, Bataan ICM Program

Bataan Coastal Care Foundation, Inc.

Message

The Bataan Integrated Coastal Management Program (BICMP) has been at the forefront of efforts to strike a harmonious balance between economic development in the province and environmental protection. As a major stakeholder in Bataan, we in the business community are helping concretize this vision through tangible actions and achievable goals.

With the Bataan Coastal Care Foundation, Inc. (BCCFI), we are synergizing our individual endeavors into collaborative initiatives to support the BICMP and make a collective and lasting impact. Doing so requires the proper management tools. Together with the Provincial Government, we have crafted the *Bataan Sustainable Development Strategy* and the *Coastal Land and Sea Use Zoning Plan*, translating the Bataeños' common aspirations into a road map to effectively manage their coastal and marine resources.

The State of the Coasts Report complements this by providing a clear snapshot of the province's resources, the conditions these are in, and the initiatives being undertaken and need to be taken to preserve, manage, and sustain them. This provides a comprehensive reference for us to understand how best to further Bataan's development agenda. For the BCCFI members, this means aligning our CSR programs and our business operations, and sharing critical resources to support the recommendations in the SOC report.

We thank the Provincial Government of Bataan under the leadership of Governor Albert S. Garcia for giving BCCFI the opportunity to be part of the SOC report and be its partner in the development of the province. We are also grateful to PEMSEA for their untiring work to see this report completed and published. The BCCFI stands ready to do our share in sustaining the future of Bataan.

CHARMAINE V. CANILLAS
President, Bataan Coastal Care Foundation, Inc./
Assistant Vice President for Corporate Affairs, Petron Corporation/
General Manager, Petron Foundation, Inc.

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List of Abbreviations and Acronyms

AOP	–	Annual operational plan
AVP	–	Audio-Video Production
BCCFI	–	Bataan Coastal Care Foundation Inc.
BFAR	–	Bureau of Fisheries and Aquatic Resources
BICMP	–	Bataan Integrated Coastal Management Program
BNP	–	Bataan Natural Park
BPAFTF	–	Bataan Provincial Anti-Illegal Fishing Task Force
BPSU	–	Bataan Peninsula State University
BSDCC	–	Bataan Sustainable Development Coordinating Council
BSDS	–	Bataan Sustainable Development Strategy
CLSUZP	–	Coastal Land and Sea Use Zoning Plan
CLUZP	–	Coastal Land Use Zoning Plan
CMVR	–	Compliance Monitoring and Validation Report
CRM	–	Coastal Resource Management
CRMP	–	Coastal Resource Management Plan
CSO	–	Civil Society Organization
CSR	–	Corporate Social Responsibility
CTI-CFF	–	Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security
DENR	–	Department of Environment and Natural Resources
DO	–	Dissolved Oxygen
DRRM	–	Disaster Risk Reduction and Management
ECC	–	Environmental Compliance Certificate
EIS	–	Environmental Impact Statement
EMB	–	Environmental Management Bureau
EBFM	–	Ecosystem-based Fisheries Management
EMP	–	Environmental Management Plan
EUF	–	Environmental User Fee
FAB	–	Freeport Area of Bataan
FARMC	–	Fisheries and Aquatic Resources Management Council
GEF	–	Global Environment Facility
GIS	–	Geographic Information System
ICM	–	Integrated Coastal Management
IEC	–	Information, Education and Communication
IMO	–	International Maritime Organization
LGU	–	Local Government Unit
LWUA	–	Local Water Utilities Administration
MAAP	–	Maritime Academy of Asia and Pacific
MBEMP	–	Manila Bay Environmental Management Project
MGB	–	Mines and Geosciences Bureau
MMT	–	Multipartite Monitoring Team
MOA	–	Memorandum of Agreement
MPP-EAS	–	Marine Pollution Prevention and Management in the East Asian Seas (or the GEF/UNDP/IMO Regional Programme for the Prevention and Management of Marine Pollution in the East Asian Seas)
MPA	–	Marine Protected Area
MPDO	–	Municipal Planning and Development Office
MRF	–	Materials Recovery Facility
NAMRIA	–	National Mapping and Resource Information Authority
NGO	–	Nongovernmental Organization
NCR	–	National Capital Region
NPCC	–	National Price Coordinating Council
NSWMC	–	National Solid Waste Management Commission

ODA	–	Official Development Assistance
OPA	–	Office of the Provincial Agriculturist
OPT Plus	–	Operation Timbang Plus
PCC	–	Project Coordinating Committee
PCRA	–	Participatory Coastal Resource Assessment
PDC	–	Provincial Development Council
PDPFP	–	Provincial Development and Physical Framework Plan
PDRRMC	–	Provincial Disaster Risk Reduction and Management Council
PDRRMO	–	Provincial Disaster Risk Reduction and Management Office
PDRRMP	–	Provincial Disaster Risk Reduction and Management Plan
PEMSEA	–	Partnerships in Environmental Management for the Seas of East Asia
PENRO	–	Provincial Environment and Natural Resources Office
PHO	–	Provincial Health Office
PG-ENRO	–	Provincial Government - Environment and Natural Resources Office
PGB	–	Provincial Government of Bataan
PMO	–	Project Management Office
PNLC	–	PEMSEA Network of Learning Centers
PNLG	–	PEMSEA Network of Local Governments for Sustainable Coastal Development
PO	–	People's Organization
PPDO	–	Provincial Planning and Development Office
PPP	–	Public-Private Partnership
PRRM	–	Philippine Rural Reconstruction Movement
SMR	–	Self-monitoring Report
SP	–	Sangguniang Panlalawigan (Provincial Council)
STP	–	Septage Treatment Plant
SWMP	–	Solid Waste Management Plan
TNA	–	Training Needs Assessment
TSP	–	Total Suspended Particles
TSS	–	Total Suspended Solids
UNDP	–	United Nations Development Programme
UNOPS	–	United Nations Office for Project Services
SGP	–	Small Grants Programme
VO	–	Volunteer Organization
VOC	–	Volatile Organic Carbon

Olive Ridley Sea Turtle

Acknowledgements

The State of the Coasts baseline report for Bataan Province was initiated by the Provincial Government of Bataan under the leadership of Governor Albert S. Garcia through the BICMP-Project Management Office in collaboration with the Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) and the Bataan Coastal Care Foundation, Inc. (BCCFI) with assistance from the following government agencies and stakeholders:

- City of Balanga
- Municipality of Abucay
- Municipality of Bagac
- Municipality of Dinalupihan
- Municipality of Hermosa
- Municipality of Limay
- Municipality of Mariveles
- Municipality of Morong
- Municipality of Orani
- Municipality of Orion
- Municipality of Pilar
- Municipality of Samal

The Provincial Environment and Natural Resources Office-Department of Environment and Natural Resources Office (PENRO-DENR); and the Municipal Planning and Development Office/Environment and Natural Resources Offices.

The late Rep. Enrique T. Garcia Jr., who was then governor (2004-2013) when ICM was implemented in the province, for providing the lasting inspiration.

The final output benefited from the technical guidance and insights from the PEMSEA Resource Facility, namely:

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The staff of the Project Management Office of the Bataan ICM Program under the ICM Division of PG-ENRO is comprised of the following:

Ms. Karen June A. Balbuena, Technical Assistant; Ms. Rodora Cuaresma, Supervising Environmental Management Specialist; Mr. Roland James G. Enriquez, Environmental Management Specialist; Ms. Eleanor S. Tabing, Community Affairs Officer, and Ms. Sherilyn F. Valdecanas, Environmental Management Specialist II.

The development and publication of this report was supported by the United Nations Environment Programme (UNEP)/Global Environment Facility (GEF) Project “Global Foundations for Reducing Nutrient Enrichment and Oxygen Depletion from Land-based Pollution in Support of Global Nutrient Cycle”.

Turtle Cove, Morong, Bataan

Introduction

What is Integrated Coastal Management?

Integrated Coastal Management (ICM) is a natural resource and environmental management framework which employs an integrative, holistic approach and an interactive planning process in addressing the complex management issues in the coastal area. The ultimate purpose of ICM is to increase the efficiency and effectiveness of coastal governance in terms of its ability to achieve the sustainable use of coastal resources and of the services generated by the ecosystems in the coastal areas. It aims to do this by protecting the functional integrity of these natural resource systems while allowing economic development to proceed. Through integrated planning, ICM aims to address conflicts arising from multiple uses of limited space and resources (Chua, 2006).

What is a State of the Coasts Report?

The State of the Coasts (SOC) is a reporting system developed primarily to assess the progress and impacts of ICM implementation by local governments. Specifically, it aims to:

a. Define the scope of issues addressed in ICM;

b. Delineate the governance mechanisms and implementing arrangements that have been put in place;

c. Assess the extent and effectiveness of ICM program implementation;

d. Identify trends or changes in the social, economic and environmental status of the area;

e. Determine the driving force for change;

f. Assess the implications of the trends; and

g. Promote adaptive management in ICM program implementation in response to changing conditions.

Who is the SOC target audience?

The State of the Coasts report is intended for:

a. Chief Executives of local governments;

b. ICM managers;

c. ICM practitioners; and

d. Coastal communities and other stakeholders.

What are the main elements of the SOC Report?

The SOC report contains the following:

a. An Executive Summary featuring a fact sheet of the area, and a summary of key findings, implications and recommendations;

b. A description of the relevance of various indicators of governance and sustainable development aspects of ICM programs based on a common framework for sustainable coastal development;

c. The results and analysis of each indicator, including the implications of changing conditions and recommendations for mitigating measures, as agreed to by concerned stakeholders; and

d. A description of the SOC methodology and process, the framework for sustainable coastal development, and the accomplished SOC reporting templates.

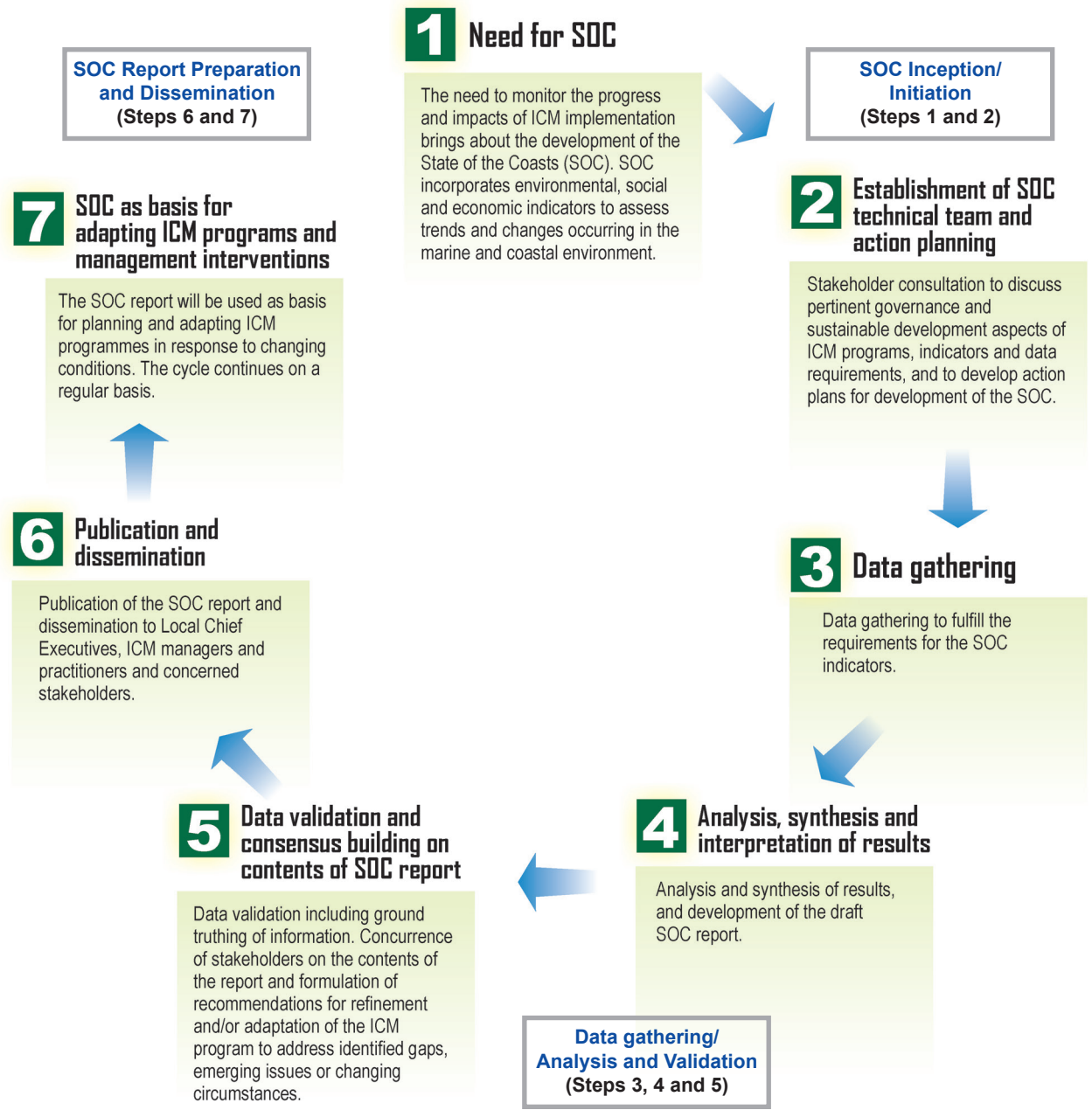
Reference

Chua, T.E. 2006. *The Dynamics of Integrated Coastal Management: Practical Applications in the Sustainable Coastal Development in East Asia*. 468 p. Global Environment Facility/United Nations Development Programme/International Maritime Organization Regional Programme on Building Partnerships in Environmental Management for the Seas of East Asia (PEMSEA), Quezon City, Philippines.

Development of the State of the Coasts Report for Bataan Province

The development of Bataan State of the Coasts Report adopted PEMSEA's General Steps in the Development of State of the Coasts Report (summarized in the figure below) with the following three major steps:

1. SOC inception or initiation of SOC implementation.
2. Data gathering, analysis and validation and validation
3. Report preparation and dissemination.



Core Indicators for SOC Reporting for Bataan Province

Category	SOC Code	Indicator	Trend * (2000–2015)
Governance			
Policy, strategies and plans	001	Coastal profile and environmental risk assessment	
	002	Coastal strategy and action plans	
	003	Local government development plan, including coastal and marine areas	
Institutional arrangements	004	Coordinating mechanism	
	005	Participation of stakeholders in the coordinating mechanism	
Legislation	006	ICM enabling legislation	
	007	Administration and monitoring of compliance to legislation	
	008	Environmental cases filed/resolved	
Information and public awareness	009	Public education and awareness	
	010	Stakeholder participation and mobilization	
Capacity development	011	Availability/accessibility	
	012	Human resource capacity	
Financing mechanisms	013	Budget for ICM	
	014	Sustainable financing mechanisms	
Sustainable Development Aspects			
Natural and man-made hazard prevention and management	015	Level of preparedness for disasters	
	016	Degree of vulnerability to disasters	
	017	Social and economic losses due to disasters	

Category	SOC Code	Indicator	Trend * (2000–2015)
Sustainable Development Aspects			
Habitat protection, restoration and management	018	Habitat management plan and implementation	
	019	Areal extent of habitats	
	020	Protected areas for coastal habitats and heritage	
	021	Reclamation and conversion	
Water use and supply management	022	Water conservation and management	
	023	Access to improved water source	
	024	Incidences/deaths due to waterborne diseases	
Food security and livelihood management	025	Fishery management plan and implementation	
	026	Fisheries Production	
	027	Malnutrition rate	
	028	Poverty, education and employment	
	029	Livelihood programs	
Pollution reduction and waste management	030	Management plans	
	031	Water quality	
	032	Air quality	
	033	Sanitation and domestic sewerage	
	034	Municipal solid waste	
	035	Industrial, agricultural and hazardous wastes	

*** Legend:**  Improving  Deteriorating  Baseline data only or data not conclusive — No data

Ambon-Ambon Falls, Bagac, Bataan

Executive Summary

The State of the Coasts of Bataan Province was established as a mechanism to assess the progress and impacts of the integrated coastal management (ICM) program implementation in the peninsula. Site visits were conducted to coastal municipalities and villages for verification of information. Contents of the report were evaluated and validated by government agencies, the academe, and the private sector. The report was reviewed and concurred to by the stakeholders during the final State of the Coasts (SOC) workshop held on December 7, 2016.

The report compiles available data and information on governance and sustainable development aspects of marine and coastal resources, and reflects the current status of the province's coastal environment as summarized in the table of Core Indicators for SOC Reporting for Bataan Province. Coverage years of the report is 2000-2015.

Governance of Marine and Coastal Resources in the Province of Bataan

Policies, Strategies and Plans

The province developed and adopted the Bataan Sustainable Development Strategy (BSDS), which serves as the long-term framework for the sustainable development of the coastal areas in Bataan. The development of the strategy has been achieved through multisector participation. The BSDS outlines broad action programs ranging from participatory information, education and communication (IEC) projects, mitigation of environmental damages, protection and rehabilitation of critical habitats and rational development pursuits, including poverty alleviation in coastal communities. The implementation plan for the BSDS is instrumental in realizing the action programs laid out in the strategy. As such, all programs that aim to conserve and protect the coastal resources and environment are harmonized under the BSDS framework.

As part of the implementation of the BSDS, the province developed and adopted the Bataan Coastal Land and Sea Use Zoning Plan (CLSUZP), which serves as a spatial planning tool to resolve issues and multiple use conflicts in the coastal and marine areas of the province. It complements the existing comprehensive land use plan of the province. It also serves as the 'mother plan' that provides guidance for the municipal local government units (LGUs) in developing their respective zoning plans. At the municipal and city levels, Abucay and Balanga have developed and adopted their CLSUZPs.

The BSDS and the CLSUZP have been mainstreamed into the Provincial Development Plan and municipal comprehensive land use plans and fully operational with implementing mechanisms in place. The adoption of these plans is instrumental in ensuring their implementation and thus, maintaining a balance between economic development and environmental protection in the province.

Institutional Arrangements/Mechanisms

The Project Coordinating Committee (PCC), a multisectoral, interagency coordinating mechanism that provides policy guidance to the ICM program, was established. The PCC facilitated the participation of concerned stakeholders in the ICM program, including appropriate national agencies and LGUs, industry, private sector, education and research institutions, nongovernmental organizations (NGOs) and local community groups during the regular assemblies, such as the PCC meetings and forums.

In 2015, the PCC was institutionalized into a more permanent and dynamic Bataan Sustainable Development Coordinating Council (BSDCC), which acts as the governing body that is mandated to set policies and guidelines for the ICM program in general and in the implementation of the BSDS in particular, including the management and protection of the coastal area and its resources. The recommendation of linking the BSDCC to the Provincial Development Council (PDC), a legislated body, will further ensure its institutionalization and sustainability. The inclusion of the Bataan Coastal Care Foundation Inc. (BCCFI), a private sector group which provides technical and financial support to the ICM program, in the BSDCC ensures participation of the private sector in ICM implementation.

The Project Management Office (PMO), established in April 2000, handles the day-to-day operations of the ICM program. It acts as a secretariat to the PCC and later on, to the BSDCC, and manages, coordinates, collects and integrates relevant data program/projects to different stakeholders.

Legislation and Enforcement of Laws

Legislation creating the coordinating mechanism and coordinating office has been enacted at the provincial

level through Executive Order AD 05, Series of 2005. The province and municipalities have enacted several ordinances on coastal zoning, regulation of fisheries activities, aquaculture, pollution reduction and waste management. The implementation of these laws needs to be strengthened accordingly.

With RA 8550 or the Fisheries Code of the Philippines as their basis, all coastal city/municipalities of the province have issued fishing ordinances to govern their coastal and municipal waters. The city/municipalities also established task forces to implement the policies and regulation stated in the fishing ordinances. To support enforcement, the province created the anti-illegal fishing and anti-illegal cutting task forces to complement the task forces formed at the municipalities and city. The PNP, BFAR, DENR and other provincial government agencies entered into a Memorandum of Agreement (MOA) for the creation of a task force to enforce and implement laws and ordinances for the fishery sector. This scheme effectively reduced illegal fishing in the province. The establishment of a regular and systematic recording and monitoring mechanism to consolidate the results of enforcement activities is necessary. The information would be useful in refining future enforcement measures.

Information and Public Awareness

Information, education and communication (IEC) campaigns and programs remain an effective tool in fostering greater public support for the ICM program in Bataan. Annual ecological awareness activities such as coastal cleanups, mangrove planting and *pawikan* (marine turtle) and bird festivals are likewise seen as vehicles to promote environmental governance from the provincial down to the barangay level.

Information sharing and public awareness was facilitated by the PMO and PG-ENRO through forum and discussion with the students from different colleges and universities in Bataan wherein environmental issues and concerns were discussed to keep them informed and aware of the situation. As part of the National Service Training Program, the students impart information to the communities and participate in the coastal and other environment-related programs of the province.

Regular meetings with the stakeholders through the PCC meetings and other forums on relevant features of the ICM program also include information campaigns/activities on the importance of the environment. Symposia and forums were conducted regularly. Audio-visual presentations (AVPs) and brochures were distributed periodically. IEC mechanisms are being reviewed and enhanced to boost public information and participation in the implementation of the ICM program. A communication/IEC plan is needed to harmonize the various IEC efforts being implemented and targeting all the major stakeholders in Bataan. The effectiveness of the IEC activities also needs to be evaluated to refine future IEC campaigns.

Capacity Development

Access to training is recognized as important to equip the PMO staff and stakeholders involved in the program with tools, methodologies and new knowledge to allow them to perform their tasks efficiently. Training opportunities on ICM are available for Bataan environmental practitioners and managers. These are often offered by partners and through participation in various events such as the East Asian Seas Congress and hosting of study tours. With years of exposure to ICM and environmental concerns, staff members gained the competence to coordinate coastal management programs with LGUs and the community. The trainings they received enabled them to cope with the requisites of ICM implementation. The province is urged to conduct a training needs assessment (TNA) and involve various partners such as the national agencies (DENR, DA-BFAR), private sector (BCCFI) and local universities in reviewing, consolidating past training efforts and identifying strategies for strengthening local capacity. Given the long experience of Bataan in ICM implementation, the establishment of an ICM training center can also be explored.

Financing Mechanism

Good collaboration in funding the ICM program between the provincial/municipal governments and the private sector as partners, such as the BCCFI, contributes to the program realization significantly. Aside from fund sharing for the BICMP, each member of the BCCFI allocates fund for other projects as part of their continuing support to the program.

Financial support from other institutions such as PEMSEA, the national government agencies such as DENR and BFAR, and the GEF UNDP Small Grants Programme also contributed in facilitating ICM implementation. Securing additional sources of funding and innovative financing such as environmental user fees and resource use fees, including Official Development Assistance (ODAs) and funding outfits of the national government such as the People's Survival Fund (PSF) is necessary to cover the ICM-related activities for the entire province.

Sustainable Development Aspects of the Marine and Coastal Management in the Province of Bataan

Natural and Man-made Hazard Management

Surrounded by Manila Bay and the West Philippine Sea, Bataan is vulnerable to oil/chemical spills. With the Philippine Coast Guard as lead, the province has developed an oil spill contingency plan. In addition to this, the province has conducted oil spill preparedness and response awareness seminars and workshops. These activities enhanced the stakeholders' knowledge on oil spill and response measures in cases of marine vessel accidents.

Given the range of natural and man-made hazards faced by Bataan, the provincial government created the Provincial Disaster Risk Reduction and Management Office (PDRRMO) to spearhead all disaster-related activities and policy formulation. The office leads the preparation and implementation of the PDRRM Plan (PDRRMP). The PDRRM Council (PDRRMC), organized under Republic Act No. 10121, serves as the main coordinating mechanism at the provincial level for disaster mitigation, preparedness, response, and rehabilitation efforts among government and private entities. The same council serves as the coordinator of sub-provincial DRRM Councils (municipal and city). Given the vulnerability of the province to rain-induced flooding, rising sea levels, cyclones and other hazards, the PDRRM mechanism of the province helps in minimizing human casualties and economic losses. Strengthening the PDRRMO at all levels will enhance its capability to reduce risks during disasters.

Furthermore, an assessment of potential effects of climate change and adaptation mechanisms must be given utmost consideration in the crafting of future response and contingency plans.

Habitat Protection, Restoration and Management

Bataan is hosting critical habitats such as mangroves, seagrasses, coral reefs and mountain forests. These critical habitats are facing continuing threats from human activities and economic development activities. Despite the lack of a comprehensive habitat protection and management plan, various activities have been implemented to ensure that the critical habitats are protected. These include mangrove rehabilitation and establishment of mangrove nurseries, establishment of a coral nursery and deployment of artificial reefs, establishment of a bird watching site in Barangay Tortugas in Balanga City and marine turtle conservation in Morong. These activities, however, are still limited in scale and coverage.

The development of a comprehensive habitat protection, conservation and management plan that can serve as a framework for the municipal plans will facilitate identification of priority areas where human and financial resources are required and where alignment of various efforts can be made. The efforts of the province in protected area (PA) management need to be expanded to cover additional critical areas with the engagement of various partners such as DENR, BFAR, NGOs, the private sector and the concerned municipalities and barangays in the preparation of MPA management plans, their subsequent implementation and assessment of management effectiveness. Incorporating regular assessment and monitoring of the condition and status of coastal habitats into the habitat protection and management plan will aid in the subsequent refinement of the management plan. Moreover, the implementation of the Coastal Land and Sea Use Zoning Plan (CLSUZP) is necessary to ensure that the zones designated for protection and conservation are followed. In this way, the critical habitats and vulnerable areas will not be degraded through reclamation and conversion, or indirectly through other land-based activities.

Water Use and Supply Management

Water resources management in the province is fragmented primarily due to the absence of an institutional mechanism for water resources development and management from the national government to the provincial and local government levels. Groundwater extraction is currently regulated by a national government office that has no local operating units. On the other hand, surface water management is dispensed by the Department of Environment and Natural Resources (DENR) for watersheds and by the Department of Public Works and Highways (DPWH) for rivers.

Given the development direction of the province, it is imperative that a water resource conservation and management plan be developed for the long-term management of the water resources. Identification of all existing and potential sources of water supply including surface water and groundwater is important to determine current use and demand. The water resource conservation and management plan will safeguard the access to quality and health-friendly water resources. In addition to this, the purchase and use of water quality testing instruments would be highly beneficial for the management and maintenance of safe and improved water supply.

In general, domestic water supply in the province is stable. All municipalities and the city are served by local water districts that operate as government corporations. Others are being provided by numerous artisans and deep wells.

The abundant supply of water can be attributed to the continuous effort of protecting and rehabilitating the watershed areas of the province. Furthermore, there is a proposal for the province to enter into an agreement with the National Water Resources Board for authority to issue and cancel permits for the utilization of surface water. The monitoring of groundwater extraction would ensure that groundwater is not exploited. The province must collaborate with the municipalities in the development of a strategic plan for water resources management.

Incidences of waterborne diseases have declined continuously through the efforts of government agencies to provide clean and safe water for their constituents. Reported incidences of waterborne diseases are minimal and if present may be attributed to poor hygiene, food mishandling and exposure to the environment.

Food Security and Livelihood Management

The provincial government earmarks funds for the protection and rehabilitation of its municipal waters, mainly for fisheries. The funds are used for the implementation of numerous programs for sustainable job creation, livelihood opportunities and sustenance of the community. The funds are also utilized for the improvement of fishing areas, such as construction and deployment of several modules of concrete artificial reefs for the fish sanctuaries, planting of mangroves to improve the breeding grounds of other fisheries resources, patrolling and monitoring of municipal water to eradicate illegal fishing activities.

Fisheries production including municipal fishing and aquaculture is on the rising trend. However, commercial fisheries production reached near zero due to strong enforcement. The increase in fisheries production helped sustain coastal communities' subsistence and livelihoods. The province has one of the least poverty incidences in Region III and in the country as a whole. This may be attributed to the economic progress the province has been gaining over the last decade. Educational opportunities are ample and literacy rate is high with over 95 percent literacy.

To sustain the fishery resources of the province, the development of a fisheries management plan is necessary to complement the CRM plans and to harmonize the policies and legislations of the province on fisheries development. Coordination between the province and municipalities including BFAR and law enforcement agencies ensures coordinated enforcement of fisheries ordinances. Capacity building of the members of MFARMCs and BFARMCs is also important to ensure that they can efficiently perform their roles as fish wardens and

environment officers. There is also a need to improve the collection of fisheries data such as size and composition of fish catch, including types of fishing gears and fishing effort to facilitate the crafting of appropriate fisheries policies and the updating of the fisheries management plan.

Pollution Reduction and Waste Management

Geared towards industrialization and development, Bataan has to address pollution and waste disposal. City/ municipalities in Bataan have formulated local solid waste management plans (SWMPs). Pending the establishment of a sanitary landfill in the province, the Provincial Solid Waste Management Board has adopted a proposal to enter into a contract with Metro Clark Development Corporation (MCDC) for waste disposal. Materials recovery facilities (MRFs) were established at the city/municipal levels. Massive IEC campaigns were conducted to encourage households to segregate garbage and practice the 3Rs (reduce, reuse and recycle). Strict prohibition and penalization of direct dumping/disposal of liquid and solid wastes into rivers, waterways and other bodies of water are enforced throughout the province. Coastal, river and community cleanups are conducted regularly.

Water monitoring stations were frequently monitored to assess the quality of water within Manila Bay. Data show that the water quality of the province is maintained within the government standard. Industries' compliance of environmental standards was periodically assessed. Although the sewage and septage facility is currently not available, industries maintain sewage and septage facilities in compliance with the government regulation. Water treatment facilities are likewise under consideration given the growing population and environmental concerns.

The province is maintaining a relatively good air quality except for some congested areas in the city. Air quality monitoring is conducted by DENR in few areas of the province on a quarterly basis. Therefore, establishing a province-operated air monitoring stations is likewise under consideration. The establishment of these facilities will enhance the province's environmental campaign.

While pollution reduction and waste management initiatives are in place, there remain gaps that need to be addressed. These include adoption and implementation of the SWMPs of the eight (8) LGUs and completion, adoption and implementation of the SWMP of the province; upgrading of the MRFs to perform their intended function of processing and materials recovery, and exploring the utilization of privately-owned and operated septage treatment plants (STPs) to cater to more residential and commercial establishments. There is also a need to establish an environmental monitoring program to complement the existing monitoring programs of DENR and the industries/private sector.

Mangroves at Alangan, Limay, Bataan

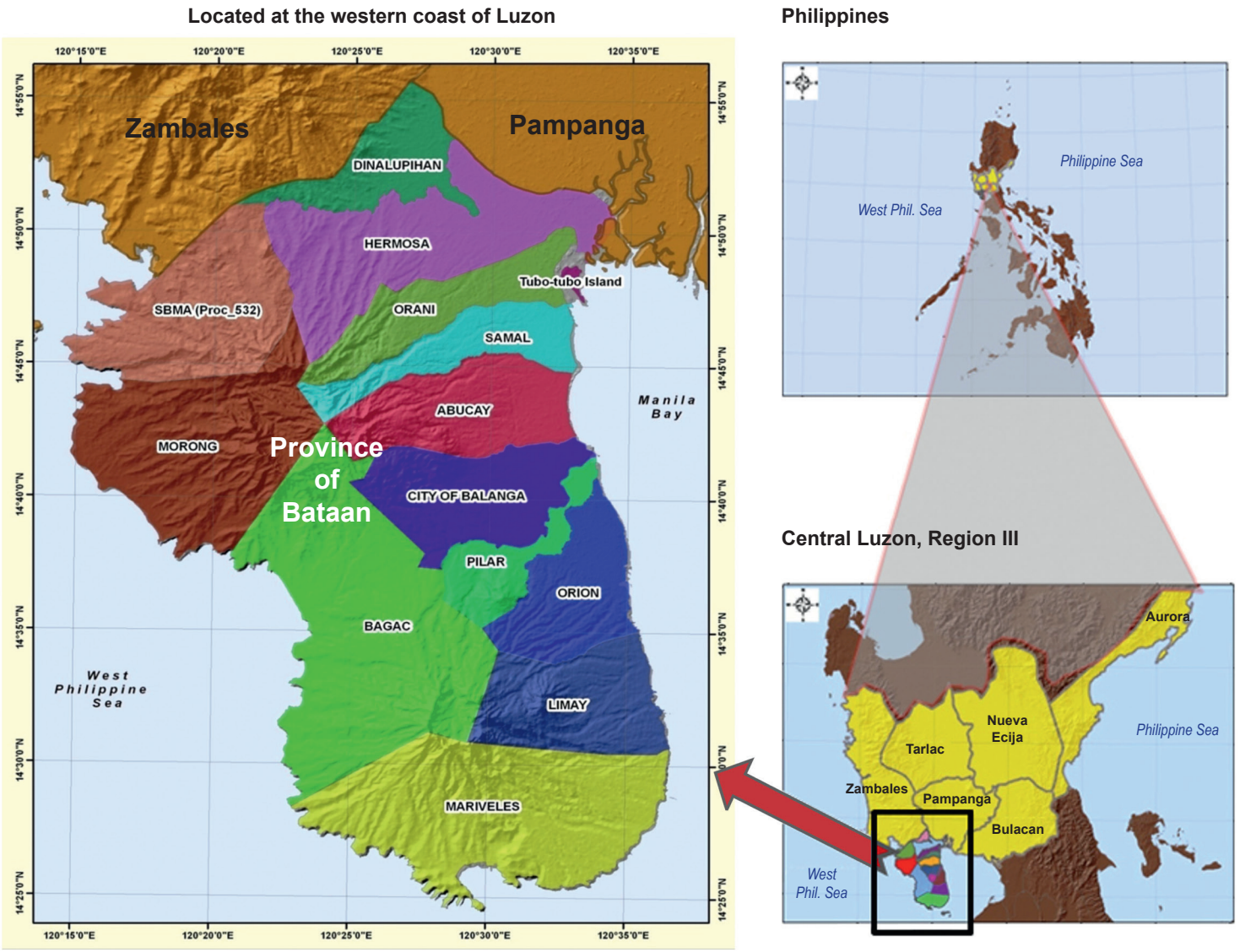
Bataan Province

The Province of Bataan enjoys a reputation as the bastion of heroism and gallantry during World War II, having been the last military stronghold that defied a vastly superior invading force.

Geographically, Bataan is a peninsula bounded in the north by the Provinces of Zambales and Pampanga, in the east by Manila Bay and in the west by the West Philippine Sea. Bataan has a land area of 137,296 ha and 188.663 km of coastline. Eleven (11) municipalities and one (1) city comprise the province. Among its component LGUs, only Dinalupihan is landlocked and connects the neighboring provinces of Zambales and Pampanga.

The province juts out of the mouth of Manila Bay, the gateway to the Philippines' political, social and economic center. Bataan serves as the industrial heartland of Central Luzon because of the presence of

Figure 1. Location map of Bataan Province.



Source: Provincial Planning and Development Office.

anchor industries in four (4) economic zones and two (2) freeport zones within the province. It is likewise considered as a prime business hub that serves as a major transshipment point for the Central Luzon region. Bataan also boasts of an active commercial and industrial fishery, plus a robust agriculture and aquaculture industry. Beach resorts and a natural park, along with various historical markers provide the setting for a healthy investment environment for tourism.

Bataan offers a lot of potential considering the productivity of its resources, from the watersheds down to its coastal areas. The coastline along the Manila Bay is characterized by muddy tidal flats that support seafood production, such as mussels, capiz, mudcrabs, and prawns, among others. There are considerable areas covered by mangrove forests, along with seaweed and seagrass ecosystems, which offer opportunities for ecotourism and socioeconomic development.

Table 1. Key facts about Bataan Province.

Category of Information	Data/Information
Geographic, demographic, socioeconomic	
Land area (km^2)	1,373 km^2
Coastline (km)	188.66 km
Major river systems (names)	Talisay River, Almacen River
Watershed areas (km^2 per river basin)	• Abo-abo River: 317.04 km^2 • Batalan River: 194.08 km^2 • Lamao River: 133.85 km^2 • Saysayin River: 119.99 km^2 • Aglaloma River: 107.18 km^2 • Mamala River: 96.65 km^2
Total number of coastal cities/municipalities	10 coastal municipalities 1 coastal city
Population (2015 census)	760,650
Population growth rate (2015 census)	1.94%
Male/Female ratio (2015 census)	102.2 (males for every 100 females)
Average annual household income (2012 FIES)	PhP 281,058
Sectoral employment (percentage of total employment; latest census) Agriculture/fisheries Industry Services	 • Agriculture, fishery and forestry: 28% (2015) • Industry: 16.5% (2015) • Services: 55.5% (2015)

Indicators

What are indicators?

Indicators are quantitative/qualitative statements or measured/observed parameters that can be used to describe existing situations and to measure changes or trends overtime (Duda, 2002). Indicators are developed as tools to make monitoring and evaluation processes operational. To become powerful ICM management tools, indicators must demonstrate the measure of effectiveness of a project, program or policy. They become effective tools when they are used to reflect changes in the coastal and marine environments, trends in socioeconomic pressures and conditions in coastal areas and corresponding links among anthropogenic activities and ecological health. Finally, when used to evaluate ICM program performance, indicators offer feedback on action plans and provide parameters for subsequent actions that may prove useful in justifying further investments in ICM (Chua, 2006).

What are the indicators for the State of the Coasts?

Indicators for the State of the Coasts were determined based on PEMSEA's Framework for Sustainable Development of Coastal Areas thru ICM (Annex 1) to indicate current status, management responses, targets and impacts of management actions in each of the governance elements (policy strategies and plans; institutional arrangements; legislation; information and public awareness; capacity development; and financing mechanisms) and the five sustainable development aspects (natural and man-made hazard prevention and management; habitat protection, restoration and management, water use and supply management, food security and livelihood management; and pollution reduction and waste management) The indicators were chosen based on the following criteria: (a) simple and meaningful; (b) easy applicability in the region; and (c) complementary to the indicators identified in relevant international instruments, including the Sustainable Development Goals (SDGs), the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA), and relevant international conventions such as Convention on Biological Diversity and UN Framework Convention on Climate Change.

Annual Bird Count

What are the core indicators for SOC included in this report?

From a total of 160 indicators based on the Framework for Sustainable Development of Coastal Areas through ICM, a set of 35 core indicators were identified for the development of the initial SOC report. These 35 core indicators are considered to be a basic set of indicators for evaluating changes that have occurred in the Province over time as a consequence of ICM implementation. As the SOC becomes operational, more indicators will be considered in the succeeding SOC reports (PEMSEA, 2011).

How are the indicators presented in this report?

Each of the indicators is presented in the following format:

a. Category, which identifies the particular governance element or sustainable development aspect in the Framework for Sustainable Development of Coastal Areas

b. Name of the indicator

c. Description of the indicator

d. Rationale for using the indicator in the SOC

e. Data requirements

f. Results which describe the current status, management actions and impacts of management interventions in the area relating to the particular indicator

g. Implications of results and recommendations to respond to changing conditions

Sea Turtle Nesting Cycle

References

Chua, T.E. 2006. *The Dynamics of Integrated Coastal Management: Practical Applications in the Sustainable Coastal Development in East Asia*. 468 p. Global Environment Facility/United Nations Development Programme/International Maritime Organization Regional Programme on Building Partnerships in Environmental Management for the Seas of East Asia (PEMSEA), Quezon City, Philippines.

Duda, A. 2002. *Monitoring and Evaluation Indicators for GEF International Waters Projects*. Monitoring and Evaluation Working Paper 10. Global Environment Facility. Washington, DC, USA.

PEMSEA. 2011. *Guidebook on the State of the Coasts Reporting for Local Governments Implementing Integrated Coastal Management in the East Asian Seas Region*. Partnerships in Environmental Management for the Seas of East Asia (PEMSEA), Quezon City, Philippines.

Policy, Strategies and Plans

001 Coastal profile and environmental risk assessment

Description

This indicator measures the percentage of the coastline that has undergone environmental risk assessment, coastal profiling or similar science-based evaluation in order to identify priority issues/threats to sustainable development of coastal and marine resources.

Rationale

Effective coastal management relies on planning that takes into account strategic and scientific assessment of the area, including social, cultural, political, economic, environmental, and policy issues, and the identification of policy concerns for coastal managers and policy makers. This strategic assessment should be the basis for developing strategies and action plans for coastal management.

Data Requirements

- Total length of coastline
- Coastal environmental profile/environmental risk assessment/other similar assessments
- Length of coastline covered by environmental assessment

Results

The total length of coastline of the Province of Bataan is approximately 188.66 km, spanning ten (10) coastal municipalities and one (1) coastal city (**Table 2**). The delineation of the municipal water boundaries of the ten coastal municipalities and one coastal city includes the entire geographical territory of Bataan covering the Manila Bay coastline and the Bataan-West Philippine Sea coastline.

Table 2. Length of coastline of the coastal municipalities in Bataan.

Municipality	Length of Coastline (km)
Abucay	4.702
Balanga City	3.182
Orion	11.345
Pilar	5.419
Samal	5.549
Bagac	29.254
Limay	10.091
Mariveles	60.303
Morong	35.121
Orani	23.697
Total	188.663

The immediate watersheds of Bataan drain into the Manila Bay through the headwaters of rivers that start from the mountainous and hilly areas of Mt. Natib and Mt. Mariveles. Other smaller hill and mountain ranges form a ridge and divide the Bataan peninsula into two, with one half of the province draining into the bay and the other half into the West Philippine Sea extending up to Cochinos Point in Mariveles.

The Manila Bay Initial Risk Assessment (IRA) and Refined Risk Assessment (RRA), which were undertaken in 2001 and 2004 respectively by an interagency, multidisciplinary technical working group (TWG) created by PEMSEA and DENR, included the Province of Bataan. The assessment provided insights on the environmental condition of the Manila Bay and the surrounding provinces, the priority environmental concerns, gaps and uncertainties, and recommendations for areas and concerns that require immediate management interventions. Results of the RRA provided a clear evidence of decline for fisheries, shellfisheries and mangroves. It also highlighted the urgent need for decisive steps to reduce the levels of fecal coliform in the bay, which have also contaminated shellfish. Among the heavy metals, mercury and lead in fish and shellfish were recommended to be monitored, considering their relative toxicity.

The result of the Coastal Resources Field Validation/ Assessment, conducted by NAMRIA in 2014, on the other hand, validated the extinction of seagrasses in the coastal areas adjoining the Manila Bay. Areas where seagrasses thrived are no longer favorable for seagrass growth. Soil erosion and sedimentation coupled with high concentration of toxins in the surrounding water affected the survival of these species. Seagrasses, however, still thrive in Bagac and Morong with an estimated cover of 76.96 percent. Coral reefs are found in Morong and Bagac with an estimated cover of 32.70 percent.

At the municipal level, the 2005 Ecological Profile of the Municipality of Orion provided the baseline information for the five development sectors, including social, economic, environmental management, infrastructure and utilities, and the institutional and administration sectors.

Bird Watching at Balanga City Wetland and Nature Park

Implications and Recommendations

The province has benefited from studies undertaken under the Manila Bay Environmental Management Project (MBEMP), particularly the IRA and RRA. The result of the assessments provided guidance to the province in identifying appropriate strategies and actions that were considered in the development of the Bataan Coastal Strategy (BCS) in 2002 and subsequently the Bataan Sustainable Development Strategy (BSDS) in 2006.

The collaboration with NAMRIA likewise provided additional information on the status of the coastal resources and the need to develop a more comprehensive and responsive management plan for the coastal and marine resources.

It is recommended that the province continue to take into account the results of assessments on the coastal habitats and ecosystems of Bataan to ensure that the strategies and actions in the coastal strategy and implementation plan remain relevant. It is also recommended that assessment on the impacts of climate change should be considered in light of recent studies on the vulnerability of the Manila Bay coastline to sea level rise.

References

Coastal Resource Assessment, Municipality of Bagac.
Coastal Resource Assessment, Municipality of Morong.
Fisheries Resource Management Plan, Municipality of Mariveles.
Municipal Planning and Development Office (MPDO) of Orion. 2003. Ecological Profile of Orion.
NAMRIA. Coastal Resources Mapping/Validation 2015.
NAMRIA. References on technical descriptions of the Municipal LGUs' coastlines.
Participatory Coastal Resource Assessment, City of Balanga.
Participatory Coastal Resource Assessment, Municipality of Morong.
Participatory Coastal Resource Assessment, Municipality of Samal.
PEMSEA and MBEMP-TWG IRA (Partnerships in Environmental Management for the Seas of East Asia and Manila Bay Environmental Management Project Technical Working Group for the Initial Risk Assessment. 2001. Manila Bay Initial Risk Assessment.
PEMSEA and MBEMP-TWG RRA (Partnerships in Environmental Management for the Seas of East Asia and Manila Bay Environmental Management Project Technical Working Group for the Refined Risk Assessment). 2004. Manila Bay Refined Risk Assessment.

002 Coastal strategy and action plans

Description

This indicator measures the scope, coverage and objectives of coastal management, as delineated in coastal strategies and action plans. This indicator further looks into the specific roles and responsibilities for different stakeholders, proposed interventions to address existing or potential threats to sustainable development, including economic, biophysical and social aspects with specified targets and timeframes. Finally, the indicator determines the government's commitment to implement the coastal strategy or action plan through its adoption at the provincial/city/municipal level.

Rationale

A coastal strategy is a critical component of ICM, providing a framework for integrated planning and management. It not only serves as a platform for policy reform that promotes good governance, but facilitates interagency consultation, multisector cooperation and stakeholder participation. A coastal strategy identifies conflicts arising from multiple use of limited marine and coastal resources, establishes approaches and actions for protecting or enhancing environmental quality and biodiversity, while facilitating environment-friendly economic development and environmental investment opportunities. The strategy will not be useful if it is not adopted and translated into on-the-ground actions. Action plans define: (a) the steps that are required in order to execute the strategies; (b) the milestones or indicators that can be used to measure progress and changes; (c) the timeframe for the actions; (d) the roles of the various stakeholders; and (e) the measures for monitoring the implementation of the strategy.

Data Requirements

- Coastal strategy and action plans
- Management boundary (geographic) of the plan
- Scope of management plans
- Multisectoral participation mechanisms
- Local government commitments to implementation
- Monitoring and evaluation program

Results

The Bataan Coastal Strategy (BCS) was developed in 2002 in line with the broader management framework of the Manila Bay Coastal Strategy. The BCS was adopted in 2002 through SP Resolution No. 68, 2002 entitled "Adopting the Bataan Coastal Strategy as Primary Coastal Resources Management Framework for the Province of Bataan." The coastal strategy embodies the vision and mission of the people of Bataan in charting a course for the long-term preservation of Bataan's rich endowments. It is an optimistic statement by and for the people of Bataan to whom the province's natural resources, particularly the coastal environment, provide a source of livelihood, transportation, recreation, a sense of beauty, culture and history. Commitment to implement the BCS was made possible through the Bataan Declaration on

Environmental Protection (2002), which declared the support of the provincial government, the League of Municipalities of Bataan, the private sector, government agencies and offices as well as NGOs and other CSOs in pursuing sustainable development in the province through ICM.

The BCS was updated in 2006 into the Bataan Sustainable Development Strategy (BSDS) to address emerging environmental concerns (e.g., climate change and sea level rise), the broader scope of the ICM program and the development direction of the province. The strategy covers related aspects ranging from biophysical to socioeconomic, natural and man-made hazards, natural and cultural heritage, water supply, food security and livelihood, and pollution reduction concerns. The development of BCS and BSDS was characterized by multisectoral participation (**Figure 2**).

The BSDS covers activities or processes that have short-, medium- and long-term impacts on the coastal and marine environment of the province.

Figure 2. Schematic presentation of the consultation process for the development of the Bataan Sustainable Development Strategy.

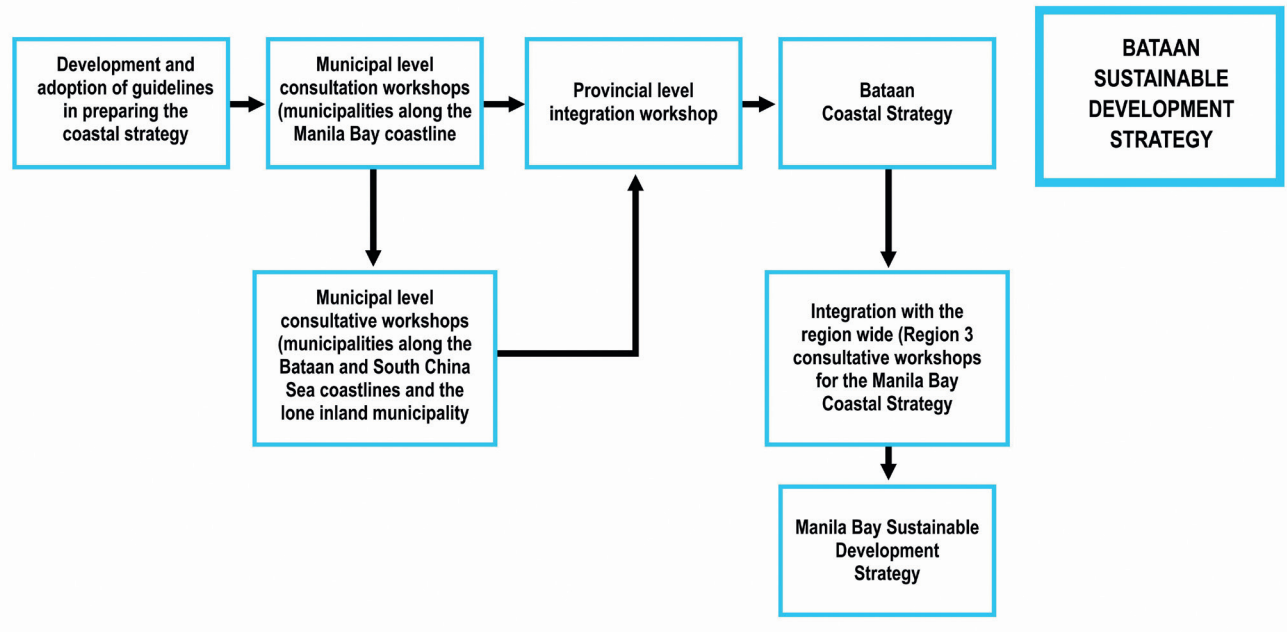
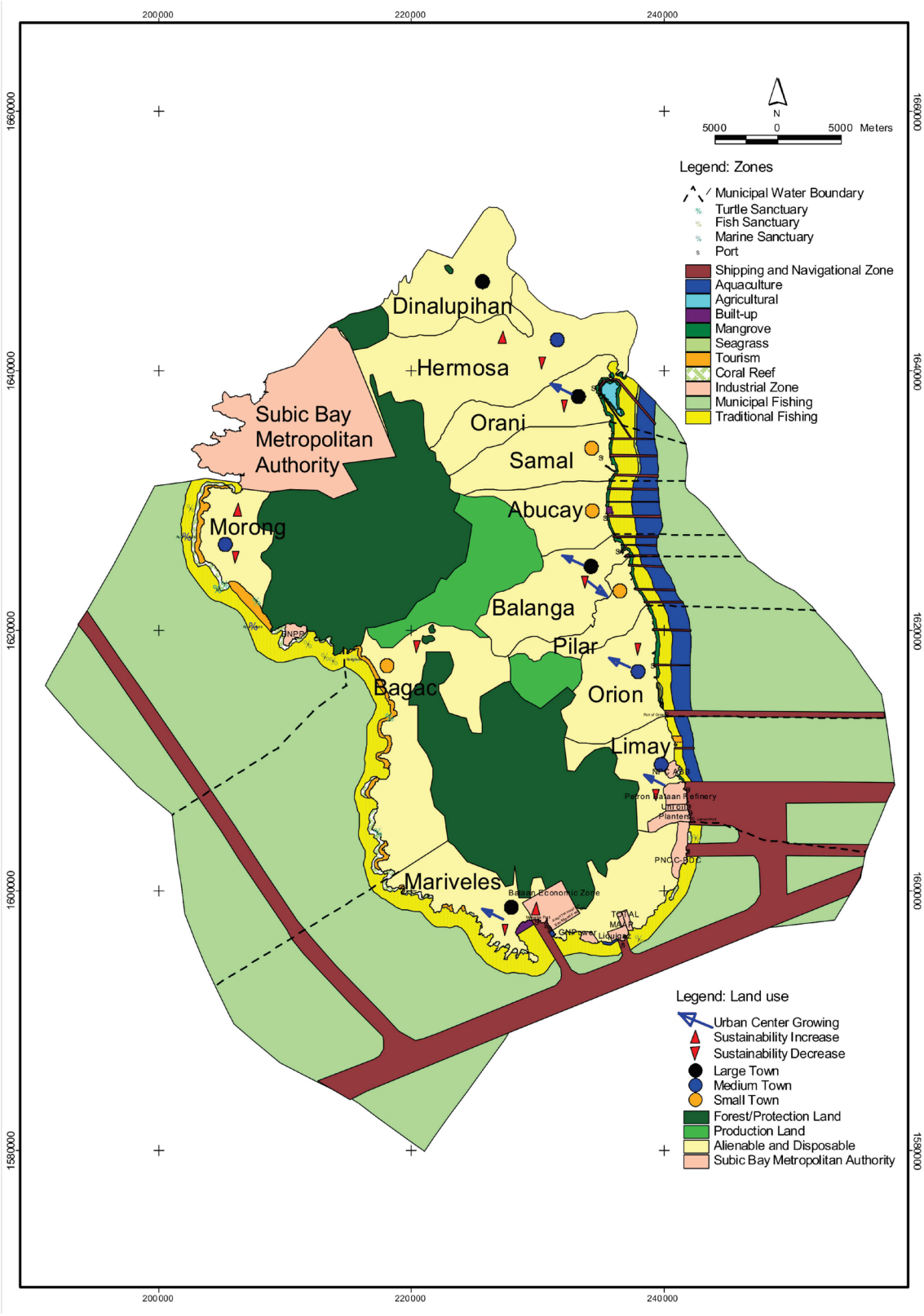
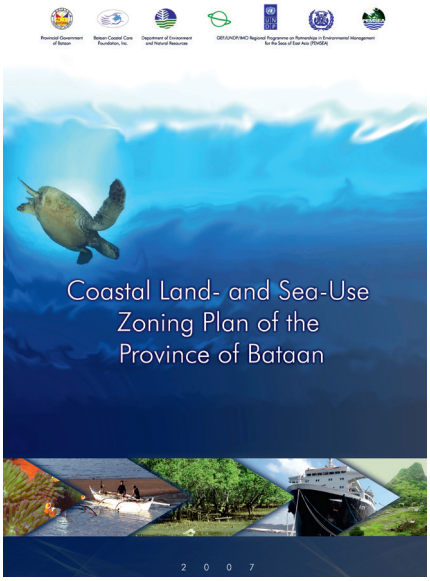


Figure 3. Bataan integrated coastal land and sea use zoning plan.



Source: Bataan Coastal Land and Sea-Use Zoning Plan 2006.



The BSDS Implementation Plan for the period 2014-2020 included action programs and activities that address the most immediate and priority concerns identified in the prioritization process with clear, measurable targets and responsible sector/agency/institution.

As part of the implementation of the BSDS, the province developed the Bataan Coastal Land and Sea Use Zoning Plan (CLSUZP), which was adopted in 2006 through SP Resolution No. 155 (**Figure 3**). The Bataan CLSUZP serves as a spatial planning tool to resolve issues and multiple use conflicts in the coastal and marine areas of the province. It complemented the existing comprehensive land use plan of the province. It also served as the 'mother plan' that provided guidance for the municipal LGUs in developing their respective zoning plans. At the municipal and city levels, Abucay and Balanga have developed and adopted their CLSUZPs through Resolution No. 70-009 and Executive Order No. 17, S. 2010, respectively.

Through the State of the Coasts reporting, which was initiated in the province in 2012, the province aims to monitor the progress of the implementation of the BSDS and the progress and impacts of the ICM program as a whole.

Implications and Recommendations

The BCS and BSDS serve as the long-term framework for the sustainable development of the coastal areas in Bataan. The development of the strategy has been achieved through multisector participation. The common vision, thus, expresses the shared aspiration of the people in collectively achieving sustainable development. The implementation plan for the BSDS is instrumental in realizing the action programs laid out in the strategy. As such, all programs that aim to conserve and protect the coastal resources and environment are harmonized under the BSDS framework.

It is recommended that the province conduct regular and comprehensive monitoring on the implementation of various programs to determine their contributions to the short-, medium- and long-term targets of the province and municipalities. The results of the monitoring can also guide the province in crafting appropriate mechanisms and measures to ensure that the programs remain effective. It is likewise necessary to review and update the strategy to meet new challenges in the implementation and sustainability of the ICM program.

References

Bataan Coastal Strategy. 2001
Bataan Coastal Care Foundation Inc. (BCCCFI). 2006. Bataan Sustainable Development Strategy.
BCCFI. n.d. Implementation Plan for Bataan Sustainable Development Strategy.
BCCFI and Province of Bataan. 2006. Coastal Land and Sea Use Zoning Plan of the Province of Bataan.
City of Balanga. 2012. Comprehensive Land and Water-Use Plan 2012-2020.
Municipality of Abucay. 2009. Abucay Integrated Land and Water-Use Zoning Scheme and Development Plan 2009-2019.

003 Local government development plan, including coastal and marine areas

Description

This indicator reviews the local government units that have integrated coastal management issues and sustainable development of coastal and marine resources into their multi-year development plans.

Rationale

To determine an understanding of their commitment to coastal management, the development plans of local government units can be evaluated to ascertain whether the sustainable use of coasts and near the coastal areas and the associated resources have been recognized for their value and the role they play in the development process. The integration of ICM into the development plans of local government units reflects a local commitment to ensure the protection and development of coastal and marine areas in the broader context of the coastal development strategy/ Strategic Environmental Management Plan, through a more integrated economic, social and environment policy and planning approach.

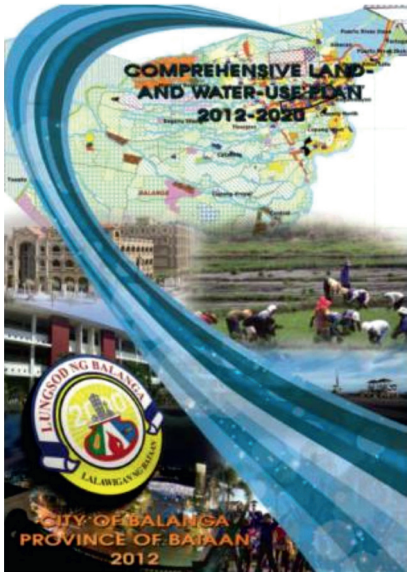
Data Requirements

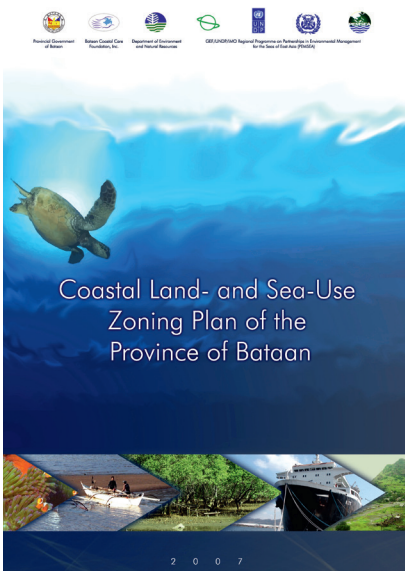
- Local development plans

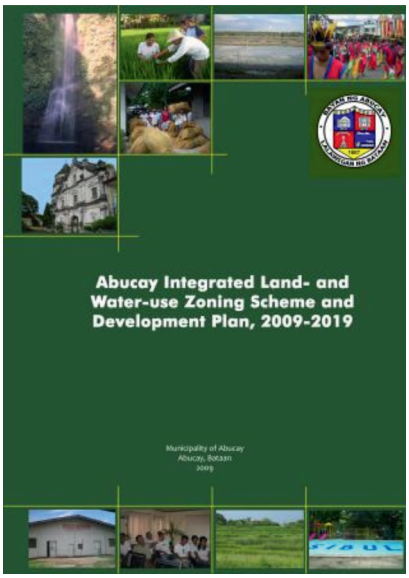
Results

The Bataan Integrated Coastal Management Program is integrated into the Provincial Development and Physical Framework Plan (PDPFP) 2013-2020 (PPDO, 2012). The PDPFP provides the policies and directions for land development and utilization up to the shoreline area. However, it does not include provisions and guidelines for the management of the municipal waters.

The development of the Coastal Land and Sea Use Zoning Plan (CLSUZP) is one of the major achievements of the Bataan ICM program. The CLSUZP aimed to delineate the zones and uses of the coastal land and waters and then integrate and harmonize these with the PDPFP. The Bataan CLSUZP complements the existing comprehensive land use plans of the province and the municipalities. In Balanga City, the Comprehensive Land and Water Use Plan (2012-2020), which integrated the management of land and water, has not been undertaken in the past. The integration captured the importance of various ecosystems (forest, upland, lowland, and coastal and marine) and the interactions of socioeconomic activities that have potential impacts to the ecosystems, health and the quality of life of the people. Similarly, the approach employed in the development of the Integrated Land and Water Use Plan of the Municipality of Abucay (2009-2019) involved the integration of land and water as one planning unit. It also puts into consideration all ecosystems in the watersheds and coastal areas.







Implications and Recommendations

The BSDS and the CLSUZP have been mainstreamed into the Provincial Development Plan and the municipal comprehensive land use plans, with implementing mechanisms in place. Several municipal governments of Bataan have likewise developed their respective CLSUZPs that are attuned to the local setting. The adoption of these plans is instrumental in ensuring their implementation and thus, maintaining a balance between economic development and environmental protection in the province.

To ensure the successful development of the province into an economically prosperous and environmentally-sound zone, all municipalities should develop and adopt their respective development plans and CLSUZPs in line with the provincial plan. These plans must be implemented with utmost urgency in order to cope with the demands of a growing population and conserve the natural resources of the peninsula.

References

BCCFI and Province of Bataan. 2006. Coastal Land and Sea Use Zoning Plan of the Province of Bataan.
City of Balanga. Comprehensive Land and Water Use Plan.
Municipality of Abucay. Integrated Land and Water Use Plan.
Programme Management Office (PMO), PPDO, Province of Bataan. The Bataan ICM Program – A Comprehensive Report.
Provincial Planning and Development Office (PPDO). 2012. Provincial Development and Physical Framework Plan (PDPFP) 2013-2020.

Institutional arrangements

004 Coordinating mechanism

Description

This indicator considers the presence of a functional interagency and multisectoral coordinating mechanism that oversees the development and implementation of the ICM program. The indicator further looks into the institutionalization of a local office with adequate administrative resources – staff, budget and equipment – to oversee, guide and coordinate the implementation of coastal strategies and action plans.

Rationale

A fully functional coordinating body consisting of the government agencies, nongovernment agencies, the private sector, civil society and other stakeholders, as appropriate, is a key component of ICM programs. The purpose of the coordinating mechanism is to harmonize any overlapping responsibilities of line agencies and other stakeholder interests, as well as to integrate policy and management interventions.

Moreover, the availability and allocation of adequate administrative resources for ICM is an expression of the capacity of the ICM management team to administer, coordinate and implement activities over time. In the implementation of ICM, there is a need for a local office to serve as a clearing house, central coordinating agency and focal point for multisectoral activities.

Data Requirements

- Coordinating mechanism established and legal basis
- Organizational structure of the coordinating mechanism
- Coordinating office established and legal basis
- Organizational structure of the coordinating office
- Staff and budget allocation of the coordinating office

Results

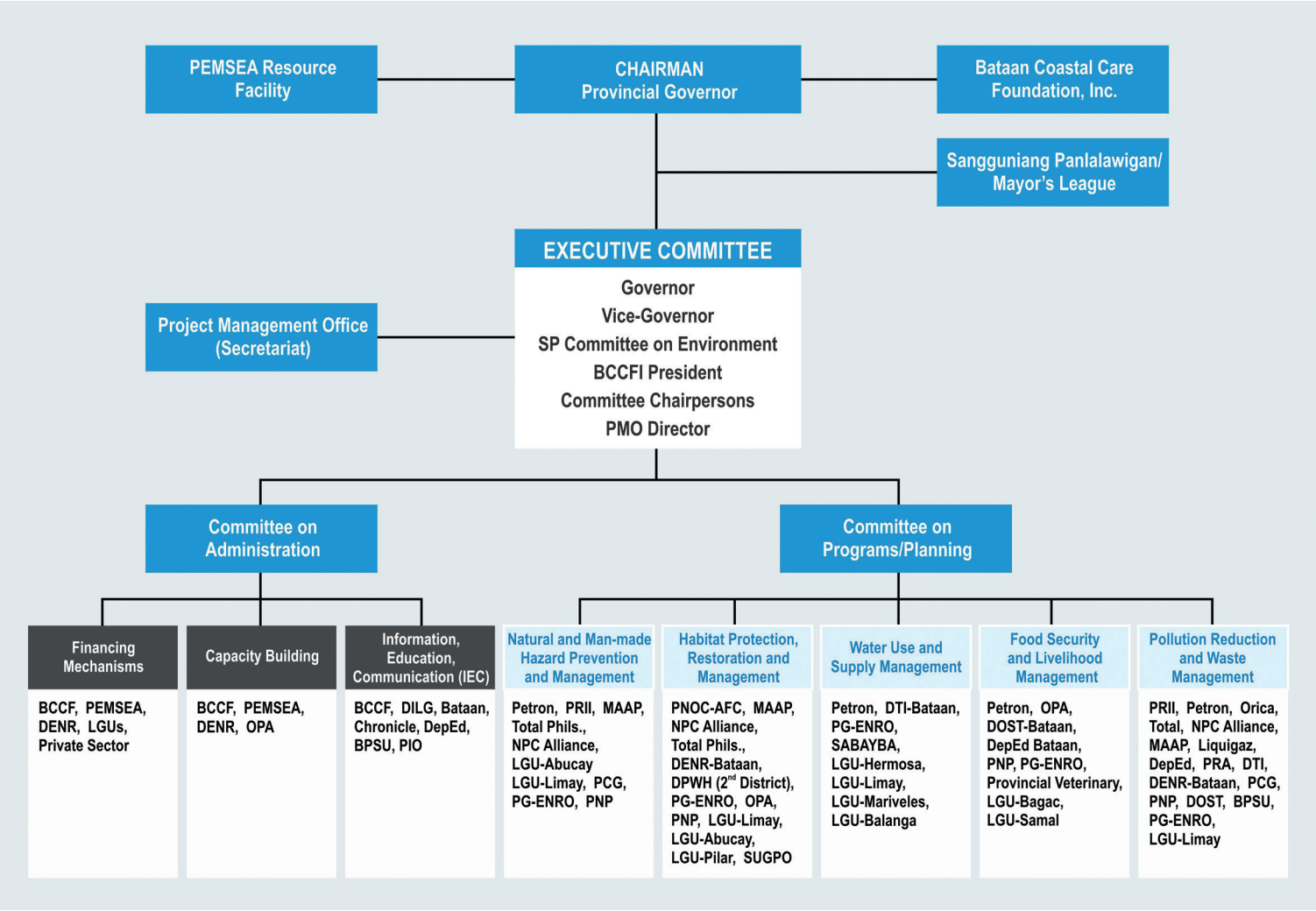
A Memorandum of Agreement (MOA) between the Provincial Government of Bataan, the Bataan business community represented by the Bataan Coastal Care Foundation, Inc. (BCCFI) and GEF/UNDP/IMO Regional Programme on Marine Pollution Prevention and Management for the Seas of East Asia (MPP-EAS) was signed in February 2000 establishing the Bataan Integrated Coastal Management Program (BICMP). Bataan became the first parallel site of PEMSEA in the Philippines —– a province having its own ICM program which is purely funded by the provincial government in partnership with the private sector and fully supported by other stakeholder organizations. The MOA was renewed in 2005 with GEF/UNDP/UNOPS PEMSEA and subsequently every three years thereafter.

The tripartite MOA strengthened collaboration on the development and implementation of the ICM program in Bataan. Among the agreed tasks included the establishment of the Project Coordinating Committee (PCC), a multisectoral, interagency coordinating mechanism that provides policy guidance to the ICM program. It also facilitated the participation of concerned stakeholders in the ICM program, including appropriate national agencies and LGUs, industry, private sector, education and research institutions, NGOs and local community groups.

The provincial government established the Project Management Office (PMO) as secretariat of the PCC and BICMP. The office was originally organized under the direct supervision of the provincial governor in 2000.

MOA Signing between Bataan, PEMSEA and BCCFI

Figure 4. Organizational chart of the Bataan Sustainable Development Coordinating Council.



However, to maximize technical support to the ICM program, it was placed under the supervision of the Provincial Planning and Development Office in 2005. As a result, ICM was integrated in the province's annual work and financial plan.

In 2015, the PCC was institutionalized into a more permanent and dynamic Bataan Sustainable Development Coordinating Council (BSDCC) through Executive Order No.18, Series of 2015, and acts as the governing body that is mandated to set policies and guidelines for the ICM program, in general, and in the implementation of the BSDS, in particular, including the management and protection of the coastal area and its resources (**Figure 4**).

BSDCC Meeting, September 2008

BSDCC Meeting, 2015

Implications and Recommendations

The institutionalization of the PCC into the BSDCC ensures efficient coordination as regard coastal and marine management in the province. The support from BCCFI, PEMSEA and other partners is instrumental in the institutionalization of ICM and strengthening program implementation.

It should be noted that coordination of ICM work requires well-trained technical staff. The province has limited number of PMO staff and there is a need for their continuing capacity development. In the same manner, there is a need for the members of the BSDCC to have a basic understanding of ICM and its benefits. It is also recommended that the BSDCC shall be attached to the Provincial Development Council (PDC), a legislated body, to ensure its institutionalization and sustainability. The BSDCC can be a sub-committee of the PDC where the PG-ENRO and the PMO will serve as secretariat. The structure of the BSDCC will be reviewed, including the mechanism for incorporating it into the PDC.

References

Bataan Sustainable Development Coordinating Council, Organizational Structure
Executive Order No. AD 05, Series 2005
Executive Order No.18, Series of 2015
Memorandum of Agreement for the Establishment of BICMP
Project Coordinating Committee, Organizational Structure

005 Participation of stakeholders in the coordinating mechanism

Description

This indicator reports the pertinent sectors (government, nongovernment, private, civil society, academe) that are represented in the coordinating mechanism for the ICM program and are part of the integrated decisionmaking process. It further reflects the commitment of government agencies and other stakeholders to implement, comply with and enforce ICM plans and activities. It also suggests the reality of the execution and performance of ICM initiatives, as well as the degree of acceptance on the part of users subject to the plan.

Rationale

Stakeholder participation is the key to coastal management. The ICM coordinating mechanism provides stakeholders (government and nongovernment) with access to decisionmaking process. The concerned sectors include those that exploit and use the natural resources for profit, communities that traditionally use natural resources for their food and livelihood, and the public sectors (local and central) that govern and manage the resources.

Likewise, in order to achieve the targets of sustainable use and development of the oceans and coasts, the commitment of national agencies, local governments and concerned government stakeholders is essential. Thus, their respective programs, projects and activities should be aligned with the action plans, programs and policies identified in the coastal management plans.

Data Requirements

- Representation of stakeholders in the coordinating mechanism
- Staff and budget allocation of agencies in the coordinating mechanism

Results

The Bataan ICM program is built upon a partnership arrangement. Since the establishment of the Project Coordinating Committee (PCC) in 2000, various stakeholders have been participating in the PCC meetings and various activities of the ICM program. Regular meetings of the PCC have been organized by the PMO. The Bataan Coastal Care Foundation, Inc. (BCCFI) is a key player in coordinating the ICM activities among the private sector. The BCCFI was headed by the Petron Foundation with more than 20 member-companies operating in the province.

In 2015, the PCC evolved into the Bataan Sustainable Development Coordinating Council (BSDCC), the structure of which was revised to allow for more representation of additional sectors that were not included in the previous arrangement.

Aside from BCCFI, many stakeholders participated in the PCC and BSDCC (**Table 3**), including national agencies, the academe, local organizations, NGOs and POs.

BCCFI Fellowship Meeting, December 2009

Orientation on ICM and Blue Economy for BCCFI, October 2015

Table 3. Stakeholders that participated in the PCC and BSDCC meetings.

Bataan Coastal Care Foundation, Inc.
DENR-PENRO
PEMSEA
Provincial Government of Bataan
Department of Interior and Local Government
Philippine National Police
Department of Science and Technology
Philippine Ports Authority
Department of Education-Bataan
Bataan Peninsula State University
Department of Public Works and Highways
Department of Trade and Industry
People's organizations (Sugpo, Sabayba)
Philippine Coast Guard
Municipal Mayors
Media

Implications and Recommendations

Stakeholder participation was promoted through the PCC and BSDCC. PMO is making sure that the voices of various stakeholders on the implementation of the ICM program and the BSDS are heard and are reflected in the decisions of the BSDCC. As the BCCFI is a collective representation of the business sector of the province, it is one of the major unique attributes of the ICM program in Bataan.

It is recommended that the province continue promoting and facilitating the involvement and participation of various stakeholders from the national agencies, academe, private sector, NGOs, POs and other sectors. It is also important to ensure that regular meetings of the BSDCC be organized to ensure regular review of the progress in implementation and that necessary policy direction is provided.

References

Bataan ICM Program. Project Brief.
BCCFI. 2006. Bataan Sustainable Development Strategy.

Legislation

006 ICM enabling legislation

Description

This indicator describes the existence and adequacy of legislation enabling the implementation of ICM interventions.

Rationale

The existence, adequacy and effectiveness of legislation are important in order to determine if the goals and objectives of coastal management are supported by a clear and enforceable legal basis. Legislation defines what is required, permitted and prohibited in the coastal and marine area. Awareness and understanding of coastal management legislation promotes compliance and therefore achievement of coastal management goals and objectives.

Data Requirements

- Legislation/local ordinances regarding the ICM institutional mechanism and management activities, including:
- Coastal use zoning;
- Fisheries, mining and other extraction activities;
- Pollution-related activities;
- Building structures in the coastal environment, including aquaculture structures; and
- Access to rules and regulations

Results

Bataan Province has been active in issuing local ordinances since 2000 to support the implementation of the various activities of the ICM program (**Table 4**). Ten municipal governments of the province likewise enacted ordinances to support the Bataan ICM Program. The list of municipal ordinances is provided in **Annex 2**.

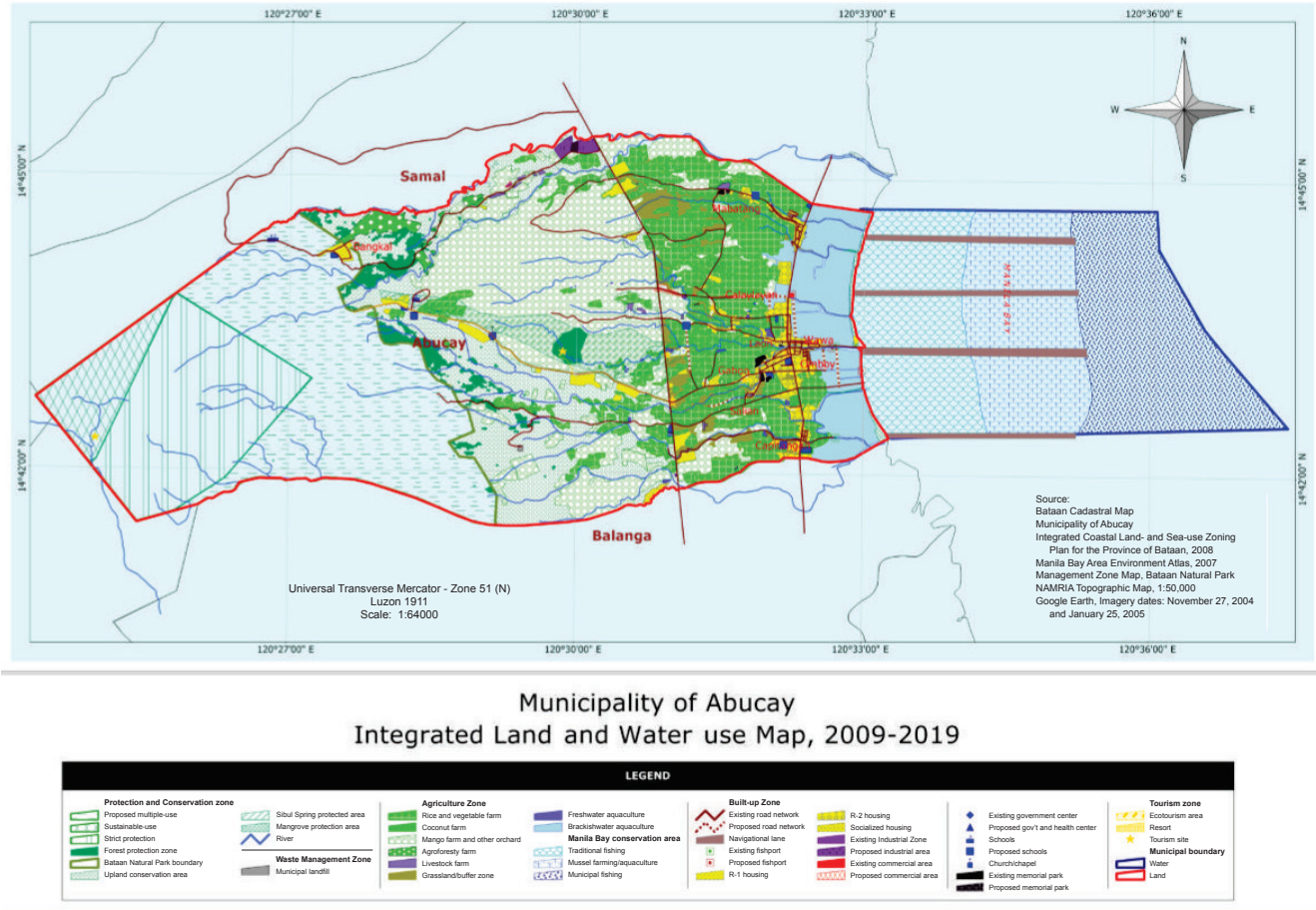
One of the most important ordinances issued is the adoption of the Coastal Land and Sea Use Zoning Plan through SP Resolution No.155 in 2006, which provided the legal basis for the local governments of Abucay and Balanga to issue similar ordinances to develop and support land and sea use planning.

The Abucay Integrated Land and Water Use Zoning Scheme and Development Plan for 2009-2019 was adopted by the municipal council through Resolution No. 70-2009 which spells out the integrated approaches

Table 4. ICM-relevant legislations in Bataan Province.

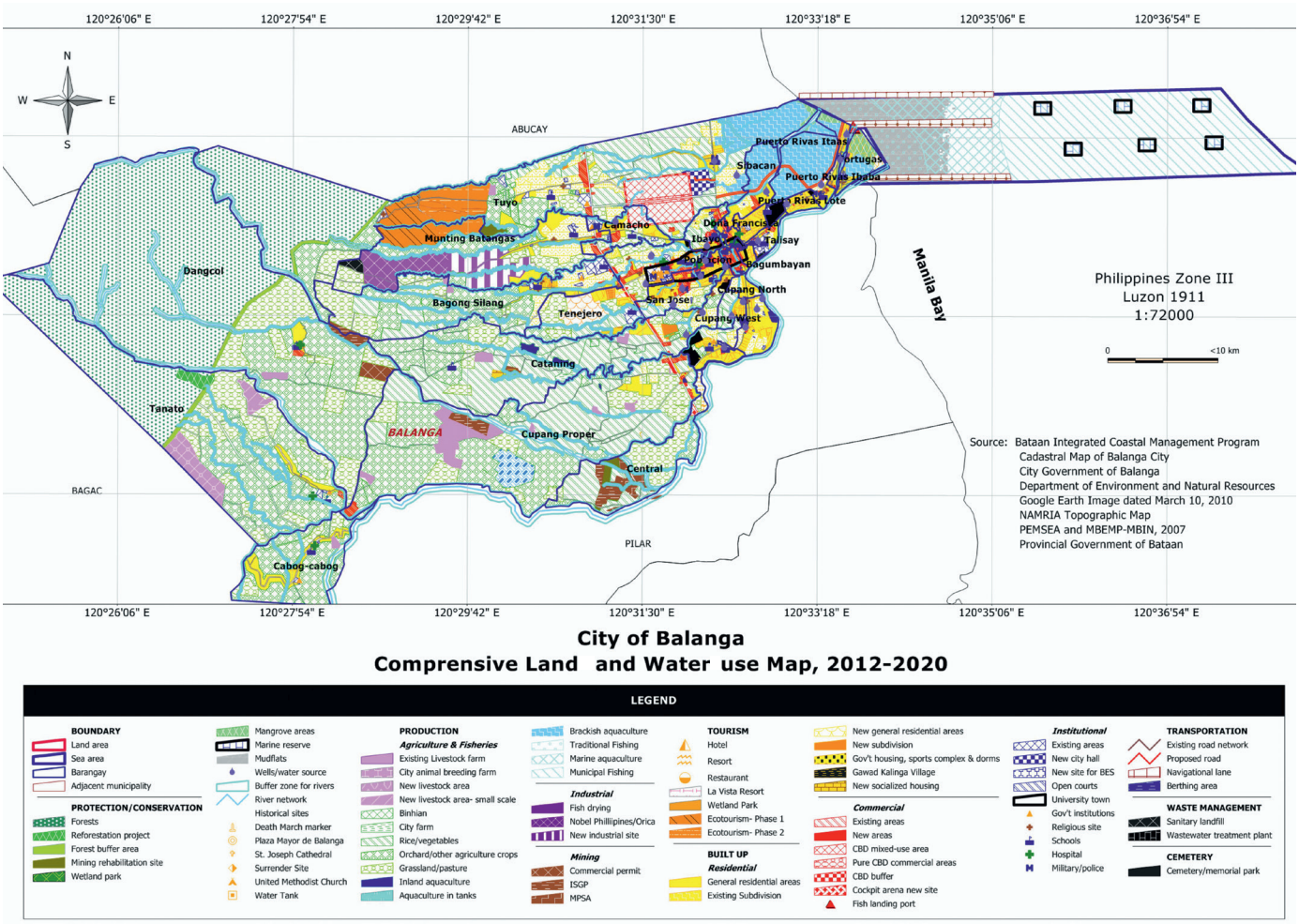
Ordinance/ Resolution No.	Year	Title
Resolution No. 59	2000	Authorizing the Provincial Government of Bataan to enter into an MOA with the IMO for the promotion and collaboration for the development and implementation of ICM parallel site in the Province of Bataan
Resolution No. 59	2004	Creating the Bataan Coastal and Marine Resources Management Division (BCMRMD) under the Provincial Governor
Resolution No. 95	2006	Resolution giving authority to the Provincial Governor to sign the Draft Charter of the PEMSEA Network of Local Governments for Sustainable Coastal Development (PNLG)
Resolution No. 68	2002	Adopting the Bataan Coastal Strategy as Primary Coastal Resources Management Framework for the Province of Bataan
Provincial Ordinance No. C-5	2001	An Ordinance establishing the Provincial Solid Waste Management Board for the Province of Bataan
Executive Order No. AD 05	2005	Establishing the Technical Working Group (TWG) for the Coastal Use Zoning Plan
Executive Order No. AD 06	2005	Institutionalizing the Bataan Integrated Coastal Management Program and establishing the Project Management Office (PMO) within the Provincial Planning and Development Office (PPDO)
SP Resolution No. 155	2006	Adopting the Coastal Land and Sea Use Zoning Plan in the Province of Bataan

Figure 5. Integrated land and water use map of Abucay.



Source: Municipal Planning Office, Abucay.

Figure 6. Comprehensive land and water use map of the City of Balanga.



Source: City Planning and Development Office, Balanga City.

to development to ensure that habitats are sustainably managed while meeting the needs of the community (**Figure 5**).

The Comprehensive Land and Water Use Plan of the City of Balanga on the other hand was adopted by the city through Executive Order No.17, Series of 2010, which considered the need to update the 2000 CLUZP to address and achieve the current development needs and goals (**Figure 6**). Consistent with the vision of the city to become a center of quality learning (University Town 2020), trade and ecotourism have been promoted. The zoning plan provided a comprehensive framework for economic development balanced with environmental conservation.

Implications and Recommendations

A sufficient number of ordinances have been issued in the Province of Bataan to support ICM implementation. These ordinances are a clear demonstration of the strong support of the provincial and municipal governments for the ICM program. One of the most significant policy developments relating to ICM is the development and adoption of the provincial CLSUZP, which provided the framework for the preparation of Abucay and Balanga zoning plans. However, despite the existence of these plans, use conflicts along the municipal waters still occur, which lead to more land conversion and reclamation in critical areas and overfishing, coupled with illegal and destructive fishing.

It is imperative that the province continue formulating legal measures to ensure that the objectives of the ICM program are achieved through proper and efficient program implementation. The codification of the coastal resources and fishery management plans based on the local CLSUZPs will ensure proper utilization of coastal and marine resources in accordance with the framework laid out in the zoning plan.

References

Basic Fishery Ordinances of Municipalities in Bataan.
Bataan ICM Program. List of Relevant Environmental Legislations.

Legislation

007 Administration and monitoring of compliance to legislation

Description

This indicator reports the various types and frequency of inspections conducted in the area to determine compliance with coastal policies and legislation. It further looks into the effectiveness of enforcement of legislations.

Rationale

The available capacity within government to enforce laws and ensure compliance with coastal policy and regulations is paramount to successful implementation of ICM programs.

The effective management of illegal and uncontrolled activities taking place along the coast and in coastal waters is an important step in addressing and minimizing unsustainable practices.

Data Requirements

- Types of environmental compliance monitoring/ inspection (i.e., market inspections for fishery violations; aquaculture; manufacturing; coastal polluting and coastal tourism establishments, ports and water transportation)
- Frequency of environmental compliance monitoring/ inspection including coastal patrols

Results

The fishery and forestry sectors are two of the most important industries in the province, necessitating the enforcement of laws addressing illegal activities occurring along the coastal areas.

A Memorandum of Agreement was signed between key agencies and sectors in the province requiring the establishment of a task force to oversee the stricter implementation of laws and ordinances. The Bataan Provincial Anti-illegal Fishing Task Force (BPAFTF), which is tasked mainly to campaign against illegal fishing was established on February 20, 2008 (**Figure 7**). The establishment of the task force facilitated the expansion of the patrol capacity of the city and municipalities of the province. The BPAFTF is operating along the coast of the whole province in coordination with the Fisheries and Aquatic Resources Management Councils (FARMCs) and local police authorities of the city/municipalities which have

jurisdiction over the municipal waters. The BPAFTF is now devolved to the municipal LGUs.

The province has embarked on a wide range of programs against illegal fishing. The anti-illegal fishing campaign also involved extending legal support to volunteers, procurement of patrol boats and other equipment to enhance capacity of task forces, members and utilization of new technologies, such as mobile phones. For instance, the Text-a-Crime program empowered the communities to participate in the monitoring, prevention and reporting of crimes, particularly illegal fishing and other environmental crimes.

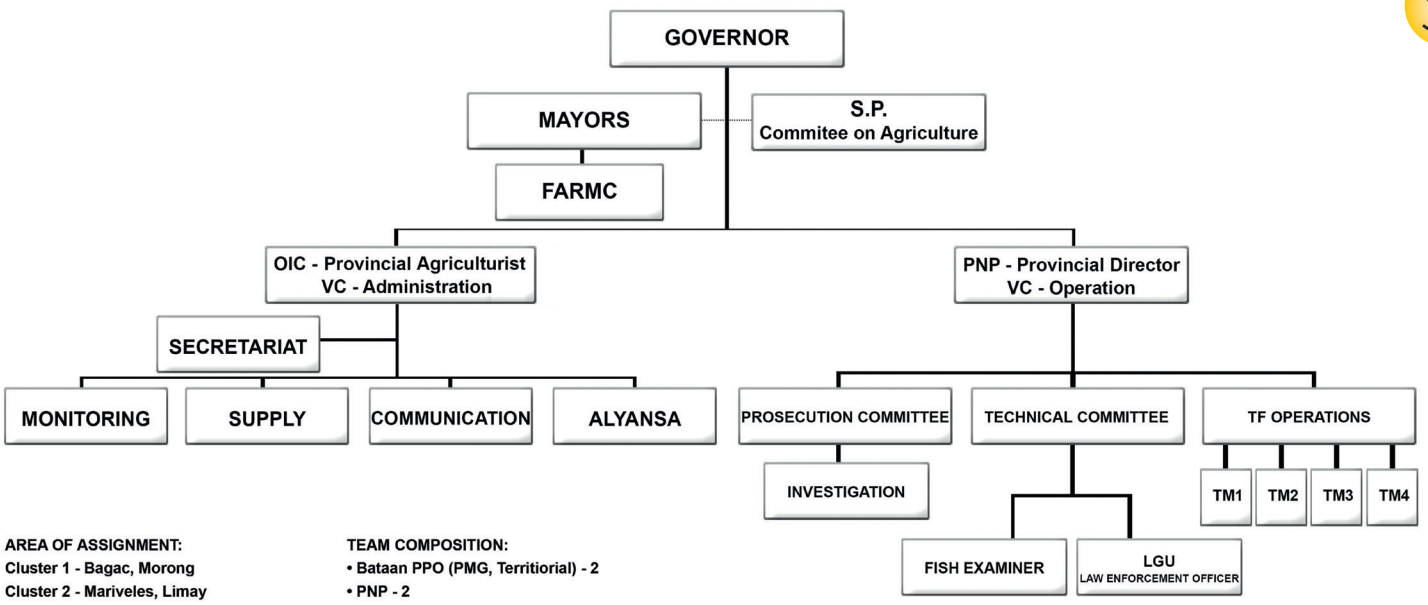
As partner of the provincial government in curbing illegal fishing activities, the task force has mobilized hundreds of volunteers from the coastal municipalities. At least one boat per municipality was utilized for the campaign.

The task force patrolled the waters round-the-clock to ensure close monitoring and enforcement. Operational costs were shared by the provincial and municipal governments while other incidental expenses were augmented by the province.

To complement the anti-illegal fishing campaign being conducted by the task force, the provincial government has utilized a helicopter for air surveillance. Equipped with a surveillance camera and other equipment, the chopper has become an effective tool in strict enforcement of fishery and other environmental measures in the province.

The province has also utilized helicopters for aerial seeding and to document violations related to natural resources extraction in the forest areas in support of the *Bantay Gubat* (Forest Patrol) Program.

Figure 7. Organizational chart of the Bataan Provincial Anti-illegal Fishing Task Force.



AREA OF ASSIGNMENT:
Cluster 1 - Bagac, Morong
Cluster 2 - Mariveles, Limay
Cluster 3 - Orion, Pilar, Balanga
Cluster 4 - Abucay, Samal, Orani, Hermosa

TEAM COMPOSITION:
- Bataan PPO (PMG, Territorial) - 2
- PNP - 2
- Bantay Dagat - 2
- Fish Examiner - 1
- Alyansa - 1

Illegal fishing vessel: Danish sail or buli-buli *apprehended off the coast of Mariveles*

Active sea patrol: Provincial Anti-illegal Fishing Task Force

Banca *(boat) for anti-illegal fishing task force*

Provincial Government-owned Chopper for air surveillance/patrol

Implications and Recommendations

Bataan has been actively monitoring illegal fishing activities in its coastal waters. Active campaign for forest protection is also being implemented. These efforts are reinforced with the use of surveillance helicopter and engagement of volunteers. Private sector support on these endeavors has also been very encouraging.

To sustain this collaboration, the province must conduct regular consultations and intensive information campaigns particularly in coastal communities. Illegal fishing activities will be curbed more effectively by institutionalizing the anti-illegal fishing task force (BPAFTF) into a permanent enforcement unit with regular funding. Moreover, there should be close monitoring of Environmental Compliance Certificates (ECCs) by industries operating in the province to ensure that they are complying with established standards.

References

Office of the Provincial Agriculturist - BFAR
PENRO-Bataan

Legislation

008 Environmental cases filed/resolved

Description

This indicator reports the total number of cases filed and resolved, and the total value of fines issued for non-compliance of relevant coastal legislations.

Rationale

Effective enforcement of environmental legislation taking place in the marine and coastal areas can be reflected by the number of cases filed, resolved and fines collected resulting thereof. The strict enforcement of relevant legislation is an important step in addressing and minimizing unsustainable practices in the coastal areas.

Data Requirements

- Total number of reported complaints
- Total number of violations where violators were arrested
- Total number of violations penalized
- Total value of fines collected for non-compliance with relevant legislations

Results

Enforcement of laws and regulation on fishery and logging industries are active in Bataan. With the assistance of *Bantay Dagat* (Sea Patrol) and *Bantay Gubat* (Forest Patrol), the province was able to bring some violation cases to court. **Table 5** shows the illegal fishing cases which were brought to court for resolution. Most illegal fishing cases were convicted in court particularly those that were engaged in illegal fishing activities such as use of explosives, noxious or poisonous substances, use of fine mesh nets and use of active fishing gears in the municipal waters. **Table 6** shows the number of violations recorded from 2005 to 2010 where a declining trend in the number of cases is evident.

Table 5. Illegal fishing cases filed in court (January-August 2005).

Date of Violation	Type of Violation	Status in Court
March 4, 2005	Violation of Sec. 89 in relation to Sec.4 (21)	Convicted
April 2, 2005	Violation of Sec. 89 in relation to Sec.4 (21)	Convicted
May 20, 2005	Violation of Sec. 89 of RA 8550	Convicted
May 20, 2005	Violation of Sec. 88 Par 3 of RA 8550	Convicted
	Violation of Sec. 88 Par 4 of RA 8550	Convicted
May 29, 2005	Violation of Sec. 88 of RA 8550	Convicted
July 11, 2005	Violation of Sec. 89 and 90 of RA 8550	Convicted
July 14, 2005	Violation of Sec. 88 Par 4	Convicted
July 15, 2005	Violation of Sec. 86 of RA 8550	Convicted
July 15, 2005	Violation of Sec. 86 of RA 8550	Convicted
July 25, 2005	Violation of Sec. 86 and 90 of RA 8550	Convicted
August 2, 2005	Violation of Sec. 88 Par of RA 8550	Convicted

Table 6. Number of violations from 2005-2010.

VIOLATIONS (Rep. Act 8550)	2005	2006	2007	2008	2009	2010
Sec. 88: Dynamite Fishing	47	56	56	41	17	10
Sec. 89 and 90: Use of Active Gear/Fine Mesh Net	181	72	158	163	131	27
Sec. 94: Conversion of Mangrove	7	_	_	4		
Illegal Trading of Petroleum	_	5	_	_		
Sec. 93: Use of Superlight	_	_	33	_		
Sec. 86: Unauthorized Fishing	_	_	_	9		
Sec. 98: Capture of Sabalo						1
TOTAL	**235**	**133**	**247**	**217**	**148**	**38**

Source: OPA/BFAR

Apprehended: Violation of Republic Act 8550 (use of fine mesh)

As Bataan has abundant forest resources, illegal cutting activities have been reported. Illegally cut forest resources are usually manufactured into lumber, charcoal and *banca* (wooden boat). **Figure 8** shows the number of confiscated forest products in 2006 that were illegally cut. Vehicles carrying illegally sourced forest products have also been confiscated during enforcement activities. **Figure 9** shows the Municipality of Bagac having the highest number of illegally transported forest products.

Figure 8. Number of confiscated forest products in 2006.

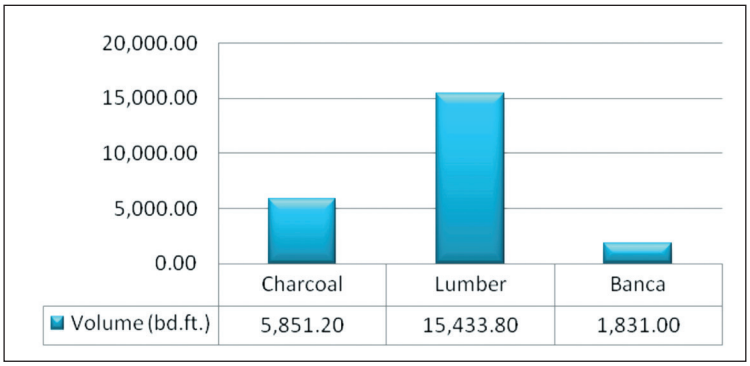
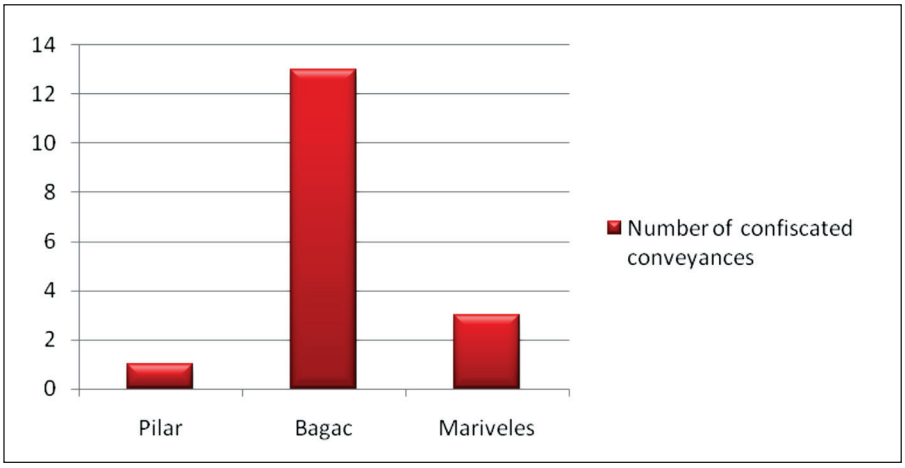


Figure 9. Number of confiscated vehicles carrying illegally transported forest products in 2010.



Implications and Recommendations

Illegal fishing and illegal cutting of forest resources are the most serious environmental violations in Bataan. Although some violations were filed in court, there is a need to establish a more systematic means of monitoring and enforcing environmental laws.

It is therefore recommended that Bataan establish a regular and systematic recording and monitoring mechanism to consolidate the results of enforcement activities. The information would be useful in refining future enforcement measures. An enforcement network along with a secretariat to be assumed by the PG-ENRO would facilitate better coordination between the local government and national agencies, particularly those responsible for enforcement and litigation.

Development of additional livelihood programs and job creation for the coastal communities are anticipated to encourage the community to give up illegal fishing and illegal cutting activities.

References

PENRO Bataan
BFAR Bataan

Information and Public Awareness

009 Public education and awareness

Description

This indicator reports on communication plans, staff and budget allocations, and public awareness programs initiated by various sectors, and the different communication channels used to promote public awareness.

Rationale

The development and implementation of a well-conceived communication plan promotes increased awareness and education of the general public regarding the value and benefits of coastal and marine resources, the issues affecting the environment, and the need for coastal management to protect and conserve these resources.

Data Requirements

- Communication plan
- Budget and staff allocation for implementation of communication plan
- Local government's facilities for public access to information
- Local awareness programs
- Frequency of community participation activities
- Number of participants in community participation activities

Results

Information, education and communications (IEC) campaigns are among the major activities of the ICM program since 2000. The IEC campaigns, which included the use of both traditional media (print and broadcast) and non-traditional forms (pro-active seminar workshops, focus group discussions, on-site monitoring of activities, etc.), targeted key stakeholders in Bataan.

The Bataan ICM Program traces its roots to an environmental awareness activity in celebration of the International Coastal Cleanup Day in September 1999. Led by Petron Corporation, in partnership with the provincial government, the activity involved hundreds of volunteers who trooped to the shores of the industrial town of Limay to undertake a beach cleanup dubbed

Kontra Kalat sa Dagat, or Movement Against Sea Littering. This set the stage for the eventual establishment of the Bataan ICM Program, with the coastal cleanup becoming an annual short-term environmental activity, along with mangrove planting. The province continues to partner with POs, the academe, environmental groups, and the private sector in instilling awareness in the community about the importance of citizens' participation in the success of environmental protection.

With thousands of volunteers from within and outside the province, these regular activities have become effective tools for promoting awareness and participation in the environmental programs of the province and municipalities.

Environmental awareness activity for children

Coastal assessment, December 2012

A five-minute video was also produced to provide an entertaining yet informative medium about the program. This was regularly shown in local cable channels, as well as in national TV (PTV 4 and IBC 13). In coordination with the Department of Education (Bataan Schools Division), copies of the video were distributed to schools to be shown to students at certain times during the school year. Other copies were provided to the Mt. Samat Ferry Express, an inter-island ferry navigating between Bataan and Manila, for showing onboard. Local and national print and broadcast media were tapped to publicize interventions and perspectives on Bataan ICM efforts and the development/ strengthening of partnerships in environmental resources management.

In 2009, BCCFI produced a video documentary entitled, "Frontiers of the Future," in support of Bataan's hosting of the 2009 PEMSEA Network of Local Governments for Sustainable Coastal Development (PNLG) Forum. The video showcased Bataan's ICM journey, which was nearing ten years, to a global audience. Subsequently, the audio-video production (AVP) became a standard IEC material which was regularly shown to the general public and stakeholder groups participating in the Bataan ICM program.

Coastal Cleanup Day 2012

***Ibong Dayo* Philippine Bird Festival.** For the past ten years, the Bataan Provincial Government and the City Government of Balanga have jointly organized the *Ibong Dayo* (Migratory Bird) Philippine Bird Festival at the Balanga City Wetland Park. The event served as a venue for raising awareness on the importance of wetlands as feeding and resting sites for migratory birds where the numbers have been observed to be increasing significantly between the months of August and February each year. Together with the Wild Bird Club of the Philippines, the city conducted forums and other activities to raise the level of community awareness on the protection and importance of wetlands and the fact that Bataan is part of the route of migratory birds from Europe and mainland Asia. Balanga has declared their city a Bird-friendly Zone.

***Pawikan* Festival.** The province through the Bataan Provincial Tourism Office and the Municipality of Morong, holds the *Pawikan* (Sea Turtle) Festival every year from November to February to raise awareness on the importance of marine turtles. With the beaches of Morong and Bagac serving as nesting sites of sea turtles, which included hawksbill, olive ridley, and green turtle, the province is intensifying its efforts to protect these endangered species.

Implications and Recommendations

Several public education and awareness activities on ICM and environmental management have been regularly organized in the province. Through these activities, awareness has been enhanced. What is needed is an IEC plan that will harmonize various IEC efforts being implemented in the province and targeting all the major stakeholders in Bataan.

It is recommended that periodic survey and evaluation be conducted on the impacts of the IEC activities, particularly to determine whether there is perception change among the members of the communities concerning, for instance, biodiversity conservation and habitat protection. In this way, the effectiveness of the IEC campaign can be measured and the results will provide inputs to the refinement of future IEC campaigns.

References

BICMP. Accomplishment Report.
City Tourism Office. Accomplishment Report.
Provincial Tourism Office. Accomplishment Report.

010 Stakeholder participation and mobilization

Description

This indicator reports the number of nongovernmental organizations, civil society groups and other stakeholder organizations who are contributors to sustainable development of the coastal and marine areas.

Rationale

The active involvement of stakeholders reflects their understanding on the value of implementing coastal management and mobilizing activities related to it.

Data Requirements

- Nongovernmental organizations, civil society groups and other stakeholder organizations with environment-related programs and activities
- Types of environment-related programs and activities
- Number of members

Results

Bataan Province is promoting the active participation of various stakeholders in ICM implementation. The BCCFI through the leadership of Petron Foundation has engaged various stakeholders in ICM activities. **Table 7** shows the list of organizations that were involved in tree and mangrove planting and coastal cleanups from 2005-2015.

Mangrove planting, Balut, Orion, Bataan 2014

Table 7. Stakeholders' groups involved in the ICM program of Bataan.

Stakeholder group/organization	Estimated number of Participants	Environmental Program/Activity
Jollibee Foundation	470	Tree-planting, mangrove planting
Bataan Peninsula State University	6,523	Tree-planting, mangrove planting, coastal cleanup
Petron Foundation	227	Tree-planting/reforestation
SALBA	180	Tree-planting, mangrove propagation/planting
Lions Club, Balanga	35	Tree-planting
Rotary Club	34	Tree-planting, mangrove planting, coastal cleanup
SUGPO	115	Artificial reef, mangrove Planting, coastal cleanup
SABAYBA	35	Mangrove nursery, mangrove planting, coastal cleanup
Maritime Academy for Asia and the Pacific (MAAP)	265	Artificial reef, mangrove planting, coastal cleanup
Rotary Club of Cosmopolitan, Cubao	25	Mangrove planting, aquasilvi culture (crab culture)
Philippine Army	608	Tree-planting, mangrove planting, coastal cleanup
Philippine Coast Guard	45	Tree-planting, mangrove planting, coastal cleanup
Philippine Ports Authority	40	Tree-planting, mangrove planting, coastal cleanup
Department of Trade and Industry	10	Mangrove planting, coastal cleanup
Department of Science and Technology	5	Tree-planting, mangrove planting, coastal cleanup
Department of Education	1,010	Tree-planting, mangrove planting, coastal cleanup
Bataan Coastal Care Foundation	227	Tree-planting, mangrove planting, coastal cleanup

Tree planting

Implications and Recommendations

The stakeholders in Bataan have been actively participating and supporting the environmental advocacies of the province, which indicate broad-based support for the ICM program. However, the activities so far are limited to a few programs, such as mangrove planting and coastal cleanups. Since there are other issues and concerns, such as natural and man-made hazard management, that need to be addressed under the ICM program, it is recommended that the province expand the current programs where broader stakeholder participation and understanding are required.

The provincial government must also take advantage of the volunteerism that has been instilled through the years by providing a venue for capacity building through orientations, regular consultations and information sharing that would encourage more public participation in environmental protection.

References

BICMP. Accomplish Report 2015
SUGPO Files

Capacity Development

011 Availability/accessibility

Description

This indicator reports access to facilities and training programs, staff and budget allocation, and technical resources available for coastal management. It also measures the extent to which local personnel can impart their knowledge and experiences in coastal management as well as the presence of universities, research institutions and local experts in the area.

Rationale

Building local capacity to plan and manage their own resources is essential in ICM programs. Similarly, access to facilities and training programs, and budget allocation are essential in building local capacity. Local capacity is also enhanced by the availability of institutions such as universities, research institutions and local experts which can be tapped in implementing coastal management activities, and training and education programs. Local personnel with the appropriate skills must be able to impart their knowledge and experiences in coastal management to other coastal and natural resource managers.

Data Requirements

- Access to facilities and training programs
- Staff and budget allocation for capacity development
- List of experts
- Universities and research institutions in the area with related courses/research activities
- Local capacity to conduct trainings

Results

Bataan Province has limited access to training facilities and programs. The province has relied solely on PEMSEA's training program on ICM and specialized training on IIMS, SOC and CUZ, with few others on an ad hoc basis. The number of local experts who can provide technical support to the program is also limited. The Bataan Peninsula State University (BPSU) is the main institution in the area that offers coastal management and environment-related courses. BPSU also conducts environment-related research activities.

Participants to the refresher course for Fishery Law Enforcement, September 2-3, 2009

Bataan has participated in the East Asian Seas Congress in 2009 in Manila, Philippines, in 2012 in Changwon City, RO Korea, and in 2015 in Danang, Vietnam.

Implications and Recommendations

The success of the ICM program can be affected by the limited number of technical staff, limited training opportunities and few available resource experts. Although training opportunities are offered by PEMSEA and other partners, including DENR and DA-BFAR, and through participation in various events such as the East Asian Seas Congress and hosting of study tours, access to training is important to equip the staff and stakeholders involved in the program with tools, methodologies and new knowledge to allow them to perform their tasks efficiently.

It is recommended that the province conduct a training needs assessment (TNA) and involve various partners such as the national agencies (DENR, DA-BFAR), private sector (BCCFI) and local universities in reviewing and consolidating past training efforts and identifying strategies for strengthening local capacity. It would be beneficial for BPSU to consider becoming part of a network of universities, such as the PEMSEA Network of Learning Centers (PNLC) where faculty and staff who will become part of the ICM Core Team can be trained on ICM and supporting tools and methodologies. Other academic institutions such as the Maritime Academy for Asia and the Pacific and other colleges/schools of higher learning in Bataan can also be tapped for specific training depending on their areas of expertise.

Given the long experience of Bataan in ICM implementation, the establishment of an ICM training center can also be explored.

Reference

BICMP Accomplishment Report

Capacity Development

012 Human resource capacity

Description

This indicator measures local capacity in implementing coastal management in terms of human resources.

Rationale

The knowledge and skills of local personnel are essential for effective implementation of coastal management.

Data Requirements

- Number of people trained in ICM
- Number of skilled personnel working in ICM programs
- Number of graduates in ICM-related courses
- Number of required ICM trained people

Results

Since the establishment of the Bataan ICM program in 2002, coordination for the program was carried out by the Project Management Office (PMO) comprising of four (4) full-time staff and some support personnel. The PMO staff have received various ICM-related trainings from various organizations. On average, at least two trainings a year have been organized for various aspects of coastal management. Detailed information on the trainings attended can be found in **Annex 3**.

The participation of Bataan to the East Asian Seas (EAS) Congress in 2003, 2006, 2009, 2012 and 2015 has been beneficial in the sense that the congress has provided Bataan a venue for sharing and learning from the experiences of other ICM sites in the East Asian seas region. During the EAS Congress 2009, the province shared its experiences in the development and implementation of the CLSUZP. Likewise, BCCFI, the private sector partner in ICM implementation, shared the experiences of the province in addressing climate change through public-private partnership (PPP) and led the session on corporate social responsibility (CSR) for the sustainable development of coastal and marine areas.

Bataan hosted and jointly organized the 8th PNLG (PEMSEA Network of Local Governments for Sustainable Coastal Development) Forum with PEMSEA, the PNLG Secretariat and Bataan Coastal Care Foundation, Inc. on 21-22 November 2009.

Study tours also provided an equally important opportunity for ICM capacity building. The province shared its experiences and lessons learned in ICM program implementation to other LGUs, academe and non-government institutions from the Philippines and other countries. For example, in December 2012, the province hosted the study tour of local government leaders from the countries comprising the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security Local Government Network (CTI-CFF LGN) which included Indonesia, Papua New Guinea, Philippines, Solomon Islands and Timor-Leste.

With years of exposure to ICM and environmental concerns, staff members gained the competence to coordinate coastal management programs with LGUs and the community. The trainings they received enabled them to cope with the requisites of ICM implementation.

Implications and Recommendations

The four PMO staff may be insufficient considering the range of coastal management-related activities to be implemented. However, since other support personnel from PG-ENRO can be mobilized to provide support, implementation of various activities of the ICM program has been well-coordinated. Given the development direction of the province, enhancing the technical capacity of staff is necessary to enable them to respond to the demands and challenges brought about by industrialization and increasing population pressure.

It is recommended that training opportunities, including scholarships and special training programs, should be provided to the staff. Opportunities for graduates from environment-related courses from the local universities should also be provided to increase the number of staff and personnel that are exposed to ICM.

Reference

BICMP-PMO. List of Trainings.

Financing Mechanisms

013 Budget for ICM

Description

This indicator reports the financial requirements for coastal management and the government allocation including investments for environmental infrastructure. It also looks into the financial sources for coastal management, such as loans, and grants from financing institutions and donors.

Rationale

The activities for coastal management have specific budgetary requirements and thus need financial allocation for their implementation.

Data Requirements

- Total budget identified for coastal management
- Total budget allocated by LGU
- Total expenditure for coastal management
- Grants and loans from external sources
- Investments in environmental infrastructure

Results

The Bataan ICM Program is a partnership arrangement between the Provincial Government of Bataan and the Bataan Coastal Care Foundation, Inc. (BCCFI). The provincial government provides funds for manpower and maintenance of the office. The BCCFI on the other hand finances the implementation of priority projects at the provincial and municipal/community levels. Other sources of funding come from allocations from the municipal LGUs, national government agencies (DENR, BFAR), PEMSEA, GEF UNDP Small Grants Programme (SGP), among others.

The PMO prepares the work and financial plan which contains the budgetary requirements for specific activities. It also shows where the provincial government, BCCFI, LGU or local counterpart, and other financing institutions/donor agencies can contribute. **Table 8** shows the budget allocation from the provincial government and BCCFI for the ICM program from 2008-2012.

Table 8. Financial allocation for coastal management in Bataan (in PhP).

Year	Provincial Government*	BCCFI	Total	Expenditures
2008	1,410,000	1,539,323	2,949,323	861,777
2009	2,080,000	2,213,000	4,413,000	1,408,815
2010	1,500,000	776,000	2,276,000	636,970
2011	2,660,000	1,170,127	3,830,127	648,984
2012	2,385,000	1,693,877	4,078,877	675,164

*records for expenditures not available.

Source: PMO/Provincial Planning and Development Office.

Implications and Recommendations

Total budget available for ICM program implementation ranges from PhP 2 million to PhP 5 million. BCCFI provides about half of the total budget, which is a significant contribution to the ICM program. Since the available funds are not enough to cover the ICM-related activities for the entire province, it is recommended that the province secure other sources of funds by exploring innovative financing mechanisms such as environmental user fees and resource use fees, including ODAs and funding outfits of the national government such as the People's Survival Fund.

It is also recommended that the PMO establish a system for financial management such as tracking of budget allocation, expenditures, and contributions to the ICM program. Moreover, the municipal governments are urged to allocate additional funds for ICM implementation in their respective localities.

Reference

BICMP. Accomplishment Report.

014 Sustainable financing mechanisms

Description

This indicator takes account of the institutionalization of measures and means to support environmental conservation and environmental infrastructure improvements. Economic and market-based instruments, such as public-private partnerships, environmental user fees, user pay schemes, and corporate social responsibility (CSR) programs are among the tools being considered. The indicator also considers policies and programs put in place to enhance the climate for public and private sector financing of coastal management activities and for constructing and operating environmental infrastructure.

Rationale

Financial support for coastal management implementation may come from different sources. The sustainability of ICM programs is dependent on how revenue sources are developed and managed.

Transparency in all financial transactions is necessary to avoid suspicion from stakeholders. Apart from regular allocation from the government, various financing options must be explored to sustain financial inputs for coastal management activities and environmental infrastructure and service.

Data Requirements

- Corporate social responsibility (CSR)
- Private sector financing (e.g. PPP)
- Environment user fees
- Percentage of environmental user fees allocated to environmental projects
- Private sector investments for environmental infrastructure
- Standard procurement process in place (e.g. defined ceiling for bidding, canvassing and shopping)
- Provincial/city/municipality authorized to engaged in public-private partnership

Results

The Province of Bataan is seeking various funding opportunities to support ICM program implementation. As an example of PPP for ICM implementation, BCCFI provides counterpart funding for the implementation of various activities of the ICM Program. BCCFI's contribution has facilitated the strengthening of the management and technical capacities of the PMO, LGUs and NGOs that benefited from the partnership; increased awareness and promoted interactive community participation in coastal resources management. Petron Corporation, one of the more active members of BCCFI, received the Environment and Sustainable Development Special Award at the Second MAP CSR Leadership Challenge of the Management Association of the Philippines in March 2012 in recognition of their contribution to the ICM program of Bataan.

Table 9. Environmental activities spearheaded by the private sector in Bataan.

Organization	Activity
Philippine Resins Industries, Inc.	Mangrove planting Turtle conservation Water management Waste management Emission testing
PNOC-Alternative Fuels Corp.	Fishery Reserve Project (49 ha) Annual tree-planting activity Marine turtle conservation Park-wide coastal cleanup Quarterly ambient air monitoring Quarterly water monitoring
Maritime Academy of Asia and the Pacific (MAAP)	Artificial reef *Oplan Linis Marina* (marina cleanup) Tree planting Coastal cleanup
Orica Philippines	Annual tree planting Waste segregation Installation of domestic wastewater treatment plant Recycling
Petron and San Miguel Corporation	Tree planting and reforestation in Duale, Limay Coastal cleanup
Total and Liquigas	Establishment of artificial reef in Alas-asin, Mariveles

Table 9 illustrates some of the private sector's activities on environmental awareness with their own funding as part of their CSR programs.

So far, there is no user fee system established in Bataan. Although there are national parks in the province, no direct benefits have been derived from the national parks. It is necessary for the province to develop provincial parks as eco-tourism destinations and incorporate an environmental user fee (EUF) scheme.

Implications and Recommendations

The sustainability of the ICM program depends on the province's effort to explore sources of financing, and managing the funds in a transparent and efficient manner. The partnership established between the province and the private sector group has been considered one of the major highlights of the Bataan ICM program. The institutionalization of this arrangement is made possible through the Bataan Sustainable Development Coordinating Council (BSDCC) where BCCFI is serving as a member of the Executive Committee as well as the Committee on Administration.

It is recommended that the province continue to explore other opportunities for financing, particularly for environmental infrastructures such as wastewater treatment facilities and solid waste separation and recycling facilities. It is also recommended that a team of inter-department technical staff with the leadership of the PG-ENRO be established and trained to prepare project proposals for funding.

A profile of projects and activities under the ICM program can be prepared and made available to companies/ industrial locators to solicit their support and expand the area of cooperation and partnership with the local government.

Reference

BICMP. Accomplishment Report.

Natural and Man-made Hazard Prevention and Management

015 Level of preparedness for disasters

Description

This indicator measures the availability of disaster preparedness and management plans, capable people, equipment, budget and operations to anticipate, reduce, respond to, and recover from various hazards/disasters.

Rationale

Local communities and disaster management personnel must be prepared to respond to various hazards, if the number of deaths and property losses due to natural and man-made hazards are to be minimized. Moreover, proper preparation and mitigation measures can reduce the frequency of man-made hazards and severity of disasters.

Data Requirements

- Availability of natural/man-made disaster/environmental emergency response plan
- Scope of natural/man-made disaster/environmental emergency response plan (e.g. floods, earthquakes, oil spill, etc.)
- Identification of mitigation strategies
- Institutional mechanism for the implementation of the emergency response plan
- Number of trained and non-trained personnel allocated
- Early warning system in place
- Availability of adequate equipment
- Budget allocation for natural/man-made disasters

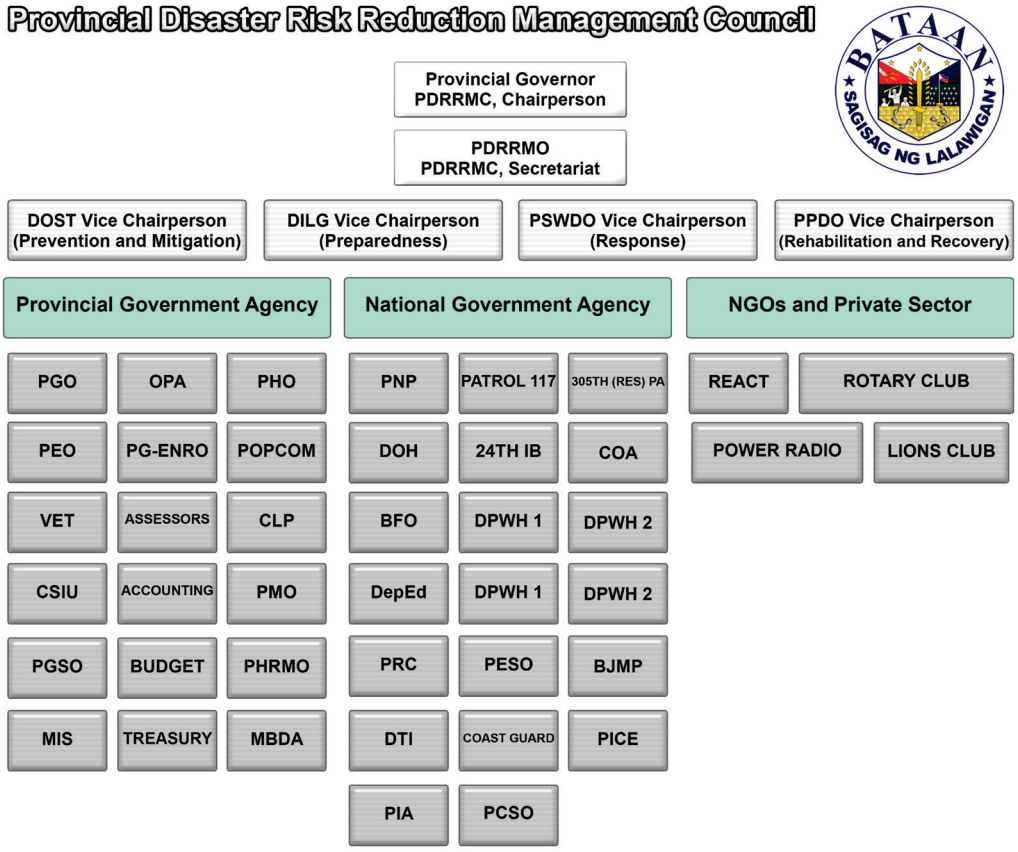
Results

To mitigate the impact of disasters and calamities, the province developed the Provincial Disaster Risk Reduction and Management Plan (PDRRMP 2014-2019) in compliance with the requirements of RA 10121 (Disaster Risk Reduction and Management Act). The plan covers four (4) thematic areas: (1) Prevention and Mitigation; (2) Preparedness; (3) Response; and (4) Rehabilitation and Recovery. It is the vision of the province to avoid hazards and mitigate their potential impacts by reducing vulnerabilities and exposure and enhancing capacities of communities.

The Provincial Disaster Risk Reduction and Management Council (PDRRMC) through the Provincial Disaster Risk Reduction and Management Office (PDRRMO) operates Bataan Rescue 117, which includes call trackers, dispatchers, emergency medical service and firefighters (**Figure 10**). It also operates 24/7 to provide rescue service during accidents and emergencies, and supports disaster management activities such as training and IEC campaigns. During disasters, the PDRRMO plays a vital role in coordinating responses and undertaking rescue activities.

Based on historical events, the City of Balanga has experienced bad to worse case of flooding. As a consequence, the city embarked on the preparation of a contingency plan to respond to flooding incidences. The contingency plan was prepared under the framework of the provincial government's disaster management program, which provides guidance to various entities such as government agencies, departments, private sector, NGOs, CSOs and volunteer organizations, including local communities.

Figure 10. Organizational chart of the PDRRMC.



The Bataan Oil Spill Contingency Plan was formulated to guide local government agencies, industries, communities and other stakeholders in the province to respond to and mitigate the effects of oil spills. The PDRRMO is tasked to implement the plan.

The Maritime Academy of Asia and Pacific (MAAP), on the other hand, developed the MAAP Disaster Risk Reduction and Management Plan (MAAP-DRRMP) which aims to reduce or avoid potential losses from hazards, assure prompt and appropriate assistance to victims of disasters, and deliver rapid and effective recovery.

Flooding is addressed through the flood control and drainage projects, such as construction of open canals, dikes and sea walls, desilting of river channels and clogged drainage, reforestation of mangrove and forest areas, implementing anti-illegal logging programs, as well as acquisition of rescue equipment and conduct of simulation trainings for water search and rescue. Evacuation and relief centers have been established at the different municipalities and city; the emergency response teams were organized and trained as well.

Implications and Recommendations

As a disaster-prone province, Bataan has developed the PDRRMP and established the PDRRMC/PDRRMO in accordance with RA 10121. In order to respond to impending disasters which may be aggravated by climate change, enhancing the capacity of staff responsible for disaster response and mitigation (e.g., handling industrial disasters) is necessary and should be properly equipped.

It is recommended that the province, municipalities and city continue to implement the PDRRMP and MDRRMPs, respectively, and ensure that these plans are reviewed and updated regularly. Mechanisms in handling waterborne diseases (e.g., elephantiasis, dengue, zika) common in flooded areas may be included in the program.

References

Maritime Academy of Asia and Pacific (MAAP). MAAP Disaster Risk Reduction and Management Plan.
Provincial Government of Bataan. Provincial Risk Reduction and Management Plan 2014-2019 (PDRRMP 2014-2019).

016 Degree of vulnerability to disasters

Description

This indicator measures the degree to which populations are at risk at exposure to natural and man-made hazards, i.e., populations living within various multihazard zones.

Rationale

The greater the degree of potential exposure to natural and man-made hazards, the more the government and local communities should be prepared and must put in place mitigation measures for disasters. Identification of the levels of threats from various hazards can also help focus preparations on the most relevant types of threats.

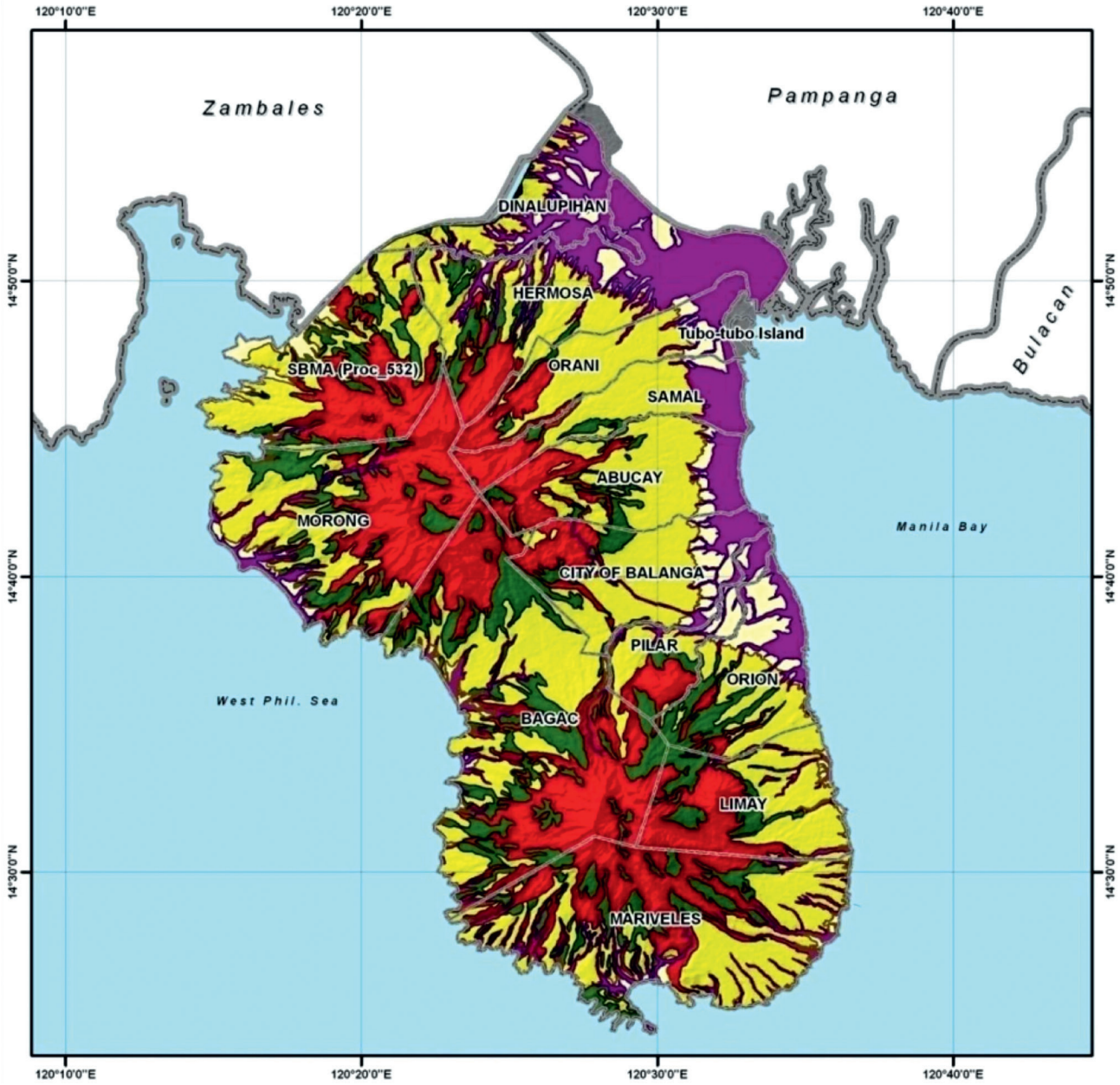
Data Requirements

- Availability of multihazard (landslides, storms, floods, etc.) map
- Number of people located in hazard-prone areas
- Number of people who relocated or moved away from hazard-prone areas

Results

The assessment and geo-mapping of flood hazards and rain-induced landslides for the Province of Bataan was undertaken by the Mines and Geosciences Bureau (MGB) of the DENR (**Figure 11**). The flood-prone municipalities and city in the province were determined based on risk assessment and mapping of flood-susceptible areas. Based on the results of the assessment which were released by MGB in 2008, flooding in some municipalities of the province is aggravated by anthropogenic factors. These included clogged drainage canals; structurally controlled flooding such as elevated roads and highways; irrigation canals and excessive release of water from dams and water impoundments; artificial damming along waterways (irrigation system and natural river/creek channels) that blocked the flow of the channels, causing these to overflow.

Figure 11. Rain-induced landslide and flood hazard map of Bataan.



High susceptibility to landslide

Areas with high landslide susceptibility rating have active/recent landslides and tension cracks that would directly affect the community. Those with steep slopes and drainages that are prone to landslide damming are also highly susceptible to landslides.

Moderate susceptibility to landslide

Areas with moderate landslide susceptibility rating have inactive/old landslides and tension cracks which are located away from the community. These areas usually have moderate slopes.

Low susceptibility to landslide

Areas with low to gentle slopes and lacking tension cracks have low landslide susceptibility rating.

High susceptibility to flooding

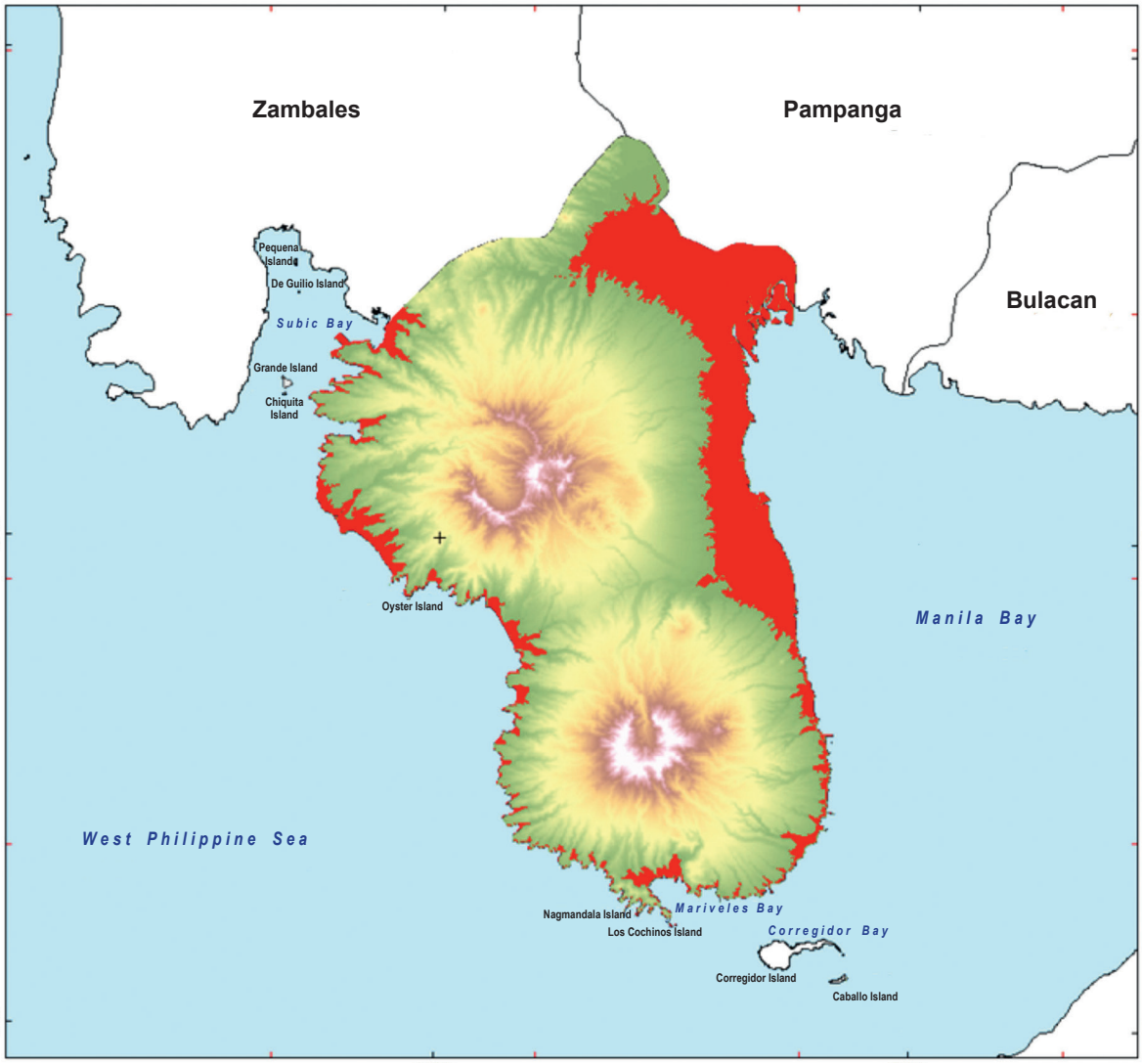
Areas with greater than 1 meter flood height. These areas are usually flooded for several hours during heavy rains; include landforms of topographic lows such as active river channels, abandoned river channels and areas along river banks; also prone to flashfloods.

Low to moderate susceptibility to flooding

Areas with less than 1.0 meter flood height. These are usually inundated during prolonged and extensive heavy rainfall or extreme weather condition

Source: Disaster Risk Vulnerability Assessment Report 2013.

Figure 12. Map showing the low-lying areas of Bataan (0-12 M Elevation in red color).



Source: National Mapping and Resource Information Authority.

With the purpose of segregating hazards to localize in terms of provincial, municipal and barangay exposure and impact, MGB's assessment map was further analyzed using GIS software to extract detailed information and estimated effects to the province (**Figure 12**). In terms of flood hazard susceptibility, generated data after GIS processing turned out that 219 *barangays* (villages) out of 237 *barangays* in 11 municipalities and 1 city are highly susceptible to flooding/ flashfloods. Settlements are found in the highly susceptible areas in Mariveles, Dinalupihan, Orani and City of Balanga. Every time there is an unusually large volume of rainfall in these areas, agricultural areas and houses are submerged in floods resulting in damaged properties and even occasional loss of lives. A computed area of 9,617 ha is projected to be affected by flood onslaught, with an average of 7 percent flood exposure in every municipality/city.

A total of 177 *barangays* on the other hand fell under the category of low to moderate flood susceptibility based on the processed map using GIS software. Estimates of 6,476 ha are seen to be affected in this category with 4.7 percent exposure average. Based on the past years' occurrence, flooding was annually experienced in the municipalities of Dinalupihan, Hermosa, Orani and Samal. These are generally the low-lying coastal municipalities of the province except the landlocked municipality of Dinalupihan. In anticipation of flood and landslide risks in the province, evacuation centers have been designated in each of the flood and landslide-prone *barangays*. **Table 10** shows the proportion of Bataan's population which is exposed to various forms of hazards.

Table 10. Summary of population of Bataan exposed to various hazards.

Municipalities/ City	Total Population	High Susceptibility to Flooding	High Susceptibility to RIL	Storm Surge Prone Areas	Moderate Earthquake Induced Landslide
Abucay	37,719	4,567	8,276	1,054	0
Bagac	25,568	942	9,747	0	336
City of Balanga	87,920	11,788	14,883	1,204	0
Dinalupihan	97,275	45,633	1,329	0	296
Hermosa	56,997	22,774	5,795	3,378	462
Limay	57,207	1,879	20,669	481	2,145
Mariveles	112,707	9,585	34,502	717	13,038
Morong	26,171	1,587	10,883	0	0
Orani	61,099	9,616	13,294	5,209	0
Orion	51,454	8,976	4,567	2,429	0
Pilar	39,787	7,671	9,985	737	0
Samal	33,578	8,107	6,612	2,206	0
TOTAL	687,482				

Implications and Recommendations

Bataan Province is highly vulnerable to flooding and landslides. Most of the coastal *barangays* are under the threat of flooding during heavy rains. The multihazard maps that have been developed and the identification of disaster-prone areas are very useful in crafting timely and appropriate response measures to avoid or mitigate the risks, including the proper designation of evacuation centers.

It is recommended that the province further improve its response capacity to disasters, including raising awareness among the population in highly vulnerable barangays. Redirecting development to higher grounds and the construction of aquifers, rainwater reservoirs, artificial lakes, and storm plans must likewise be considered.

Reference

Provincial Government of Bataan. Provincial Risk Reduction and Management Plan 2014-2019 (PDRRMP 2014-2019).

017 Social and economic losses due to disasters

Description

This indicator measures the population affected, deaths and economic losses due to each type of disaster (including the severity of the cause of disaster). It is a measure that integrates: (a) the level and location of hazards vis-à-vis populations; and (b) the level of preparedness and response mechanisms that result in the frequency and severity of actual disasters.

Rationale

Disasters set back development and especially impacts those least developed. The number of deaths, people and property affected are what hazard prevention and management ultimately aims to reduce.

Data Requirements

- Frequency of disaster incidents by type
- Number of people severely affected by natural/man-made disaster incidents
- Number of people that have died due to natural/man-made disaster incidents
- Total amount of economic losses due to natural/man-made disaster incidents

Results

From 2011-2014, the province was exposed to a total of eight (8) weather disturbances consisting of monsoons, low pressure areas, tropical depressions and typhoons (**Table 11**). In 2011, a total of 51,195 families or 233,576 individuals who were severely affected by Typhoon Pedring were evacuated. The total cost of damages is PhP 260.4 million (US$ 6.012 million). From 2011-2014, the province was exposed to a total of 8 weather disturbances consisting of monsoons, low pressure areas, tropical depressions and typhoons (**Table 10**). In 2011, a total of 51,195 families or 233, 576 individuals that were severely affected by typhoon Pedring were evacuated. The total cost of damages is PhP 260,396,000.00. The costs of damages to agriculture are as follows: rice (PhP 216,490,000), corn (PhP 26,000.00), high value commercial crops (HVCC) (PhP 12,194,000.00) and livestock (PhP 1,462,000).

Table 12 shows that for the period 1948-2009, a total of 64 tropical cyclones affected the Province of Bataan, comprising 14 tropical depressions (TD), 20 tropical storms (TS) and 30 typhoons (TY) with an average of 1 tropical cyclone per year.

Table 11. Number of persons affected by the major typhoons from 2011–2014.

Name of Disaster/ Event	Description	Affected Population	Value of Damages to Housing	Value of Damages to Agriculture
"Dodong" June 9–11, 2011	Tropical Depression	1 city and 6 municipalities	No reported damage on casualties or damages	
"Egay" June 19–21, 2011	Tropical Depression	1 municipality	No reported damage on casualties or damages	
"Falcon" June 24–24, 2011	Tropical Storm	8 Mun., 95 Barangays, 40,865 families, 190,834 persons; Evacuated 180 families and 925 persons	Totally damaged: 5 houses; Partially damaged: 12 houses; Total cost of damages: PhP 36,372,000	Breakdown: Cost of damages on agriculture: Rice (PhP 15,592,000.00), Livestock (PhP 264,000), Fisheries (PhP 2,880,000.00)
"Pedring" September 24–28, 2011	Tropical Storm	5 Mun., 175 Barangays, 51,195 families, 233,576 persons; Evacuated 375 families and 1,875 persons	Totally damaged 1,248 houses, partially damaged 12 houses 1,715 houses; Total cost of damages PhP 260,396,000.00	Breakdown: Cost of damages on agriculture: Rice (PhP 216,490,000.00), Corn (PhP 26,000.00), HVCC (PhP 12,194,000), Livestock (PhP 1,462,000)
"Quiel" September 29 – October 2, 2011	Tropical Storm	No data recorded		
"Glenda" July 13–17, 2014	Tropical Storm	12 Mun., 149 Barangays, 38,741 families,182,641 persons; Evacuated 4,516 families & 18,566 persons	Totally damaged 742 houses, partially damaged 4,371 houses; Total 5,113	Breakdown:Cost of damages on: agriculture: Rice (PhP 24,515,445), Corn (PhP 4,394,000), Livestock (PhP 509,600)
"Jose" August 2–7,2014	Typhoon	2 Mun., 2 Barangays, 2,620 families, 8,916 persons		
"Ruby" December 4–10, 2014	Typhoon	3 Mun., 11 Barangays, 551 families, 1,899 persons; Evacuated 329 families and 1,343 persons		

Source: Office of Civil Defense/PDRRMO

Table 12. Number of tropical cyclones that crossed the province's 50-km boundary.

Province	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	TD	TS	TY	STY
Abra	1	0	0	2	4	8	22	21	19	18	11	4	**110**	19	36	55	
Agusan del Norte	2	3	3	3	3	1	1	1	1	2	13	9	**42**	15	12	15	
Agusan del Sur	3	1	3	3	2	0	0	0	1	0	9	9	**31**	13	10	8	
Aklan	2	2	2	2	1	8	2	2	1	4	15	15	**56**	10	23	23	
Albay	5	0	1	2	7	5	11	2	10	18	16	12	**89**	17	28	42	1
Antique	3	2	5	5	2	6	2	3	1	6	26	21	**82**	14	30	38	
Apayao	1	0	0	1	1	0	9	17	10	12	6	1	**58**	10	16	32	
Aurora	1	0	0	1	7	16	24	11	17	29	23	4	**133**	30	42	60	1
Basilan	0	0	0	0	0	0	0	0	0	0	0	0	**0**				
Bataan	**0**	**0**	**0**	**1**	**3**	**6**	**10**	**4**	**11**	**19**	**8**	**2**	**64**	**14**	**20**	**30**	
Batanes	0	0	0	2	8	10	17	15	18	4	5	1	**80**	16	16	48	
Batangas	1	0	0	2	5	6	8	4	8	17	11	5	**67**	11	21	33	1
Benguet	0	0	0	1	9	8	18	10	11	16	14	3	**90**	18	25	46	1
Biliran	3	2	0	7	4	8	4	3	1	4	17	13	**66**	10	24	32	
Bohol	4	3	6	3	2	2	1	1	1	4	18	10	**55**	13	18	24	1
Bukidnon	1	0	2	1	0	0	0	0	0	1	2	1	**8**	4	3	1	
Bulacan	0	0	0	0	4	8	9	4	11	23	16	2	**77**	17	23	37	

Source: Draft manual for mainstreaming DDR/CCA in Provincial Development and Physical Framework Plans, NEDA).

Due to the enormous number of shipping activities in Manila Bay, the possibility of oil spills is high (**Table 13**). Based on the records of the Philippine Coast Guard (PCG), the largest oil spill incidence in Manila Bay happened in Mariveles, Bataan, in 1999 when MT Mary Anne spilled a total volume of 747,991 liters of oil. From February 1998 to December 2004, of the 18 oil spill incidences in Manila Bay, 50 percent occurred in the Bataan area. In addition, operational and accidental oil spills can also be attributed to the 6,715 units of motorized *banca*/fishing boats operating at the municipal waters of Bataan. Other sources of sea-based pollution included ships that may flush out and dump solid and liquid wastes, and septage and dredge materials from industrial, commercial and domestic activities.

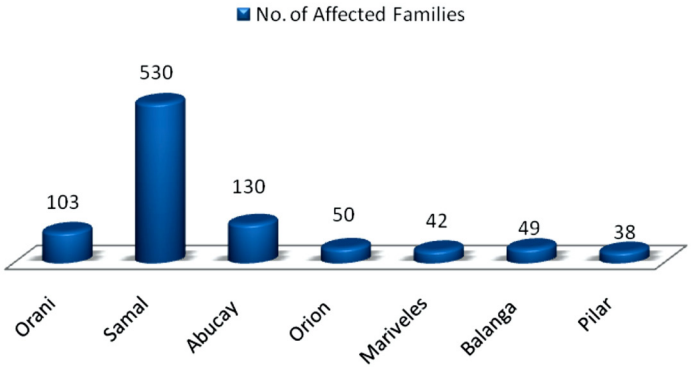
Red tide episodes have also been experienced in the province and had affected the livelihood of mussel and oyster farmers, and fishers in the coastal municipalities. In 2011, the livelihood of 942 families was affected by the red tide occurrence (**Figure 13**).

Participants to the Oil Spill Preparedness and Response Seminar 2011

Table 13. Incidences of oil spill in Manila Bay.

Date	Spiller	Volume in liters (L)	Location
31 March 1998	PBRC Limay, Bataan	600	Limay, Bataan
17 May 1998	Hema Shipping	30	Limay, Bataan
02 May 1998	M/T Ocean Pride	30	Limay, Bataan
09 February 1998	M/T Bocaue	40,000	Limay, Bataan
19 March 1999	M/T Sea Brothers	420,000	SH (South Harbor), Manila
23 July 1999	M/T Mary Anne	747,991	Mariveles, Bataan
4 January 2000	M/T Christian Albert	400	SH (South Harbor), Manila
25 May 2000	Baseco Shipyard		Engineer Island, Manila
21 July 2001	MV Superferry	210	NH (North Harbor), Manila
25 August 2001	MT Sea Mark	300	Limay, Bataan
22 November 2001	MV Princess of New Unity	100	NH (North Harbor), Manila
26 August 2002	MV Pulilan	100	Limay, Bataan
8 August 2002	MT Deborrah Dos	200	Limay, Bataan
10 February 2003	MV New Vigor	500	Limay, Bataan
7 June 2003	Superferry 5	150	NH (North Harbor), Manila
5 July 2003	Tacoma SVC Port	840	NH (North Harbor), Manila
29 January 2004	MV Piya Bhum	200	MICT, Manila
15 February 2004	MV Hanjin Kwangyang	50	MICT, Manila
	Total	1,211,701	
	Total Volume in Bataan	789,751	
	Total Volume in Manila	421,950	
	Total Numbers of Spills in Bataan	9	
	Total Numbers of Spills in Manila	9	

Figure 13. Red tide occurrence in 2011.



Implications and Recommendations

Every year, Bataan experiences human and economic losses due to disasters, most especially from typhoons. The province needs to step up measures for reducing or eliminating potential losses brought about by natural and man-made hazards and disasters. This will require greater preparedness and a better warning system to reduce vulnerability and exposure to disasters. Policy reform, consolidating data and information on disaster incidences and their impacts, and reviewing the plans and programs of the local government to reduce the impacts of disasters on people, property and infrastructure are required. This includes an early warning mechanism, early preemptive evacuation (Zero Response), institutionalization of trainings at the municipal level, and capacitation of the Barangay Disaster Risk Reduction and Management Office.

Reference

Provincial Government of Bataan. Provincial Risk Reduction and Management Plan 2014-2019 (PDRRMP 2014-2019).

Habitat protection, restoration and management

018 Habitat management plan and implementation

Description

This indicator measures the availability of plans, people and budget to manage coastal habitats and heritage.

Rationale

Coastal habitats served as critical life-support systems for a multitude of aquatic living resources. The quality of these habitats must be maintained and improved to sustain their benefits. Local governments need to identify specific strategies and action plans for habitats and the means to implement these action plans indicate the degree to which habitats will be effectively managed.

Data Requirements

- Availability of habitat management plan
- Staff and budget allocation for habitat management

Results

Despite the lack of a comprehensive habitat management plan, various activities have been implemented to ensure that critical habitats such as mangroves, coral reefs and seagrasses are protected. These included mangrove rehabilitation and establishment of mangrove nurseries, establishment of coral nursery and deployment of artificial reefs, establishment of a bird-watching site in Barangay Tortugas in Balanga City and marine turtle conservation in Morong.

Mangroves along the Bataan coastline.

Selected municipal governments have developed their coastal resources management (CRM) plans which usually focus on habitat protection and fisheries management programs. The municipalities of Bagac and Morong have drafted three-year CRM plans for 2013-2016 with BFAR's guidance and technical assistance. The CRM plans consolidated baseline information on the coastal resources, fishery resources and socioeconomic conditions of the sites. The plans also outlined the legal framework for the development and implementation of plans and proposed programs and activities to address the pressing issues and concerns identified during the consultation process. Furthermore, the CRM plans provided guidance to the local governments and other partners, including the national government agencies, POs and the coastal barangays for the proper planning of the coastal and marine areas of the concerned municipalities.

Implications and Recommendations

Although the province is implementing programs for habitat conservation and management, the activities are limited in scale and coverage, which can be attributed to the lack of a comprehensive habitat management plan.

In line with the BSDS, it is recommended that the province develop a comprehensive habitat protection, conservation and management plan that can serve as a framework for the municipal plans. Through the plan, the province can determine the priority areas where human and financial resources are required and where alignment of various efforts can be made.

Streamlining the mangrove management plan that DENR is preparing for the province into the habitat management plan must also be undertaken, including the various initiatives of the department in watershed management and mangrove assessment, among others.

References

Bataan Provincial Government. Bataan Sustainable Development Strategy.
Coastal Resource Management Plans of Bagac and Morong
Philippine MPA Database

019 Areal extent of habitats

Description

This indicator measures the area of various natural habitats (coral reefs, seagrass beds, mangrove forests, beaches, forests, urban green areas).

Rationale

Natural habitats and associated species help sustain products and services that support and benefit human activities. The extent and condition of various habitats also indicate the populations of associated species.

Data Requirements

- Total area (km^2) of coastal habitats (coral reef, seagrass, mangrove, natural beach, forest (excluding mangroves), and urban "green" area)

Results

Coastal habitats in the province include mangroves, seagrasses and coral reefs. Participatory Coastal Resource Assessments (PCRAs) were conducted for the three major habitats in the municipalities of Bagac and Morong in 2014 (**Table 14**). Coral reefs can be found in all the coastal *barangays* of the two municipalities with coral conditions ranging from poor to fair. Seagrass beds also abound in the littoral zones near the beaches in both municipalities. Seagrass species can also be found in the municipalities of Samal, Abucay, Balanga City, Mariveles, Bagac and Morong. However, most of the seagrass beds are degraded due to pollution from land-based activities. Mangroves are present in both municipalities, however, they occur in patches or in few numbers along river mouths and the rocky tidal flats.

Mangrove cover of the Province in 2005 was estimated at 121.08 ha by the DENR Provincial Environment and Natural Resources Office (PENRO) Bataan. Thirty-nine (39) ha are being maintained and protected by DENR in collaboration with various POs in Bataan. Ground-truthing results in 2015 revealed that there has been an increase in the province's mangrove cover by 34.87 ha, bringing the total cover from 121.08 ha to 155.95 ha (**Table 15**).

The most common species of marine turtles (*pawikan*) that nest in the shores of Bagac and Morong are olive ridley (*Lepidochelys olivacea*), a precious natural heritage that had only been rediscovered in Bataan in recent years. Other species are the green and hawksbill turtles.

Table 14. Results of Participatory Coastal Resource Assessment (PCRA) conducted in Bagac and Morong (2014).

Municipality	Coral reef (ha)	Seagrass (ha)	Mangrove (species)
Bagac	274.2	28.6	3 species
Morong	2.36	44.7	4 species

Source: Municipalities of Bagac and Morong, 2014.

Table 15. Baseline ground-truthing of mangrove areas.

Municipality/City	2005 Total Area per Municipality/City (ha)	2015 Total Area per Municipality/City (ha) after the mangrove ground-truthing
Orani	42.28	41.22
Samal	8.17	13.33
Abucay	17.38	29.89
City of Balanga	24.53	26.07
Limay	0.9	1.57
Pilar	14.03	17.49
Orion	13.79	26.38
Total	121.08	155.95

Source: DENR, 2015.

Mangrove Ground-truthing as conducted in 2015 by DENR, Bataan

Rafflesia Panchoana, Bataan Natural Park

Olive Ridley, West Philippine Sea

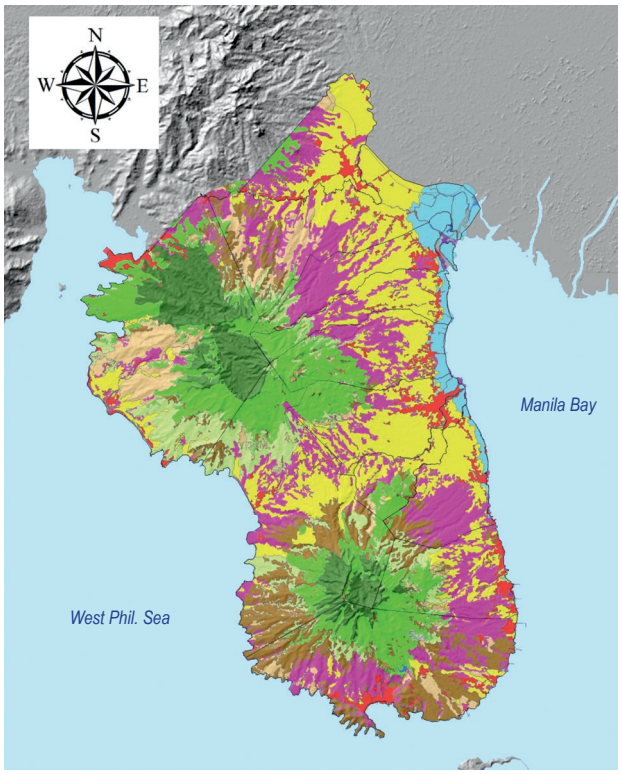
Mountain Rose, Melastoma spp., Bataan Natural Park

Fire Orchid, Renanthera spp., Bataan Natural Park

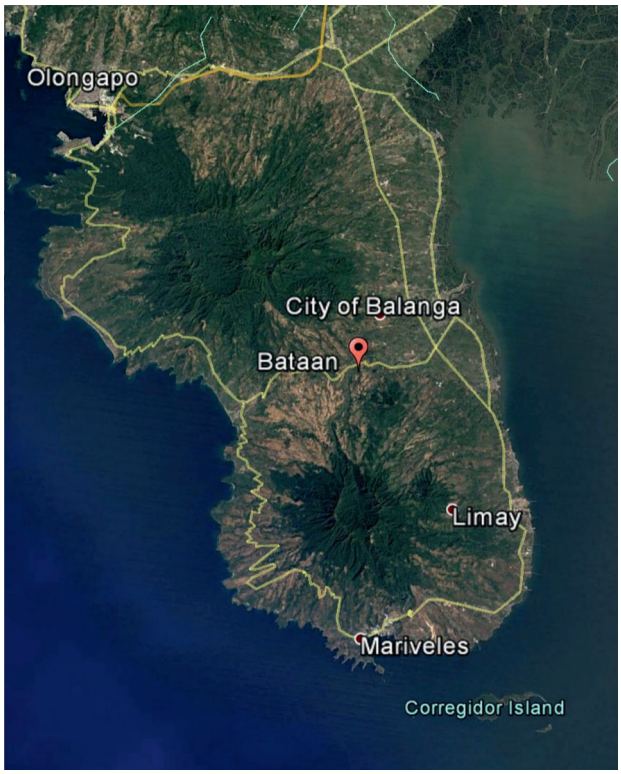
Forest resources abound at the Bataan Natural Park (BNP) where the remaining vestiges of old growth forests in the Zambales Geographic Zone can be found. Its importance as a protected area is underscored by the fact that its forests harbor some endemic species, such as the mountain rose (*Melastoma spp.*), fire orchid (*Renanthera spp.)*, among others. Different areas of BNP are continuously being threatened by rapid urbanization and industrialization occurring in various parts of the province. The Bataan Natural Park Management Plan seeks to address the issue on land conversion to industrial or residential use. The degradation of the forest at a fast rate, though small in scale, endangers the flora and fauna that it supports (**Figure 14**).

Proclamation No. 273, dated April 2000, declared the Roosevelt Natural Park (RNP) as the Roosevelt Protected Landscape (RPL) under the National Integrated Protected Area System (NIPAS). The protected landscape is within the territorial jurisdiction of the Municipalities of Dinalupihan and Hermosa, and covers a total land area of 786.4 ha.

Figure 14. Changes in forest cover between 2010 and 2015.



Forest cover in 2010



Forest cover in 2015

Source: Dept. of Environment and Natural Resources, Bataan.

Implications and Recommendations

Bataan hosts important habitats such as mangroves, seagrasses, coral reefs and mountain forests. These critical habitats are facing continuing threats from human activities and economic development activities. Mangroves have been degraded significantly over the last decade. Recent mangrove rehabilitation efforts, however, are reversing the trend.

It is recommended that the province incorporate regular assessment and monitoring of the condition and status of coastal habitats into the habitat management plan. It is also important to engage partners such as DENR, BFAR and other NGOs that have the necessary technical expertise and knowledge in conducting habitat assessments and analyzing the results. Consolidating the results of the assessments and other data and information on habitats into a database would be helpful in updating the management plan and in fine-tuning the monitoring program. Capacity building of local staff to conduct basic monitoring activities is also necessary.

Reference

State of the Mangrove Summit: Northwestern Luzon Proceedings

020 Protected areas for coastal habitats and heritage

Description

This indicator measures the area of coastal habitats and heritage effectively protected from degradation, as well as the extent of rehabilitation.

Rationale

The protection of coastal habitats and heritage reflects the commitment of local governments to prevent habitat loss and degradation. The protection of these habitats helps sustain the environmental, social and economic benefits derived from them.

Data Requirements

- Number and area of terrestrial, marine and coastal heritage areas protected by law
- Management effectiveness rating of terrestrial, marine and coastal heritage protected areas
- Natural areas rehabilitated (km^2)

Results

The province and municipalities have enacted ordinances to protect the critical habitats and species. There are six (6) marine protected areas (MPAs) in Bataan which were established between 1994–2012 (**Table 16**). Kent Fish Sanctuary in Orion with an area of 25 ha was established through Municipal Ordinance No. 94-020-008 on March 4, 1994. The PNOC/PDC Fishery Reserve Area was established through Municipal Fisheries Ordinance No. 14 in October 2001 and covers an area of 49.925 ha. The establishment and maintenance of the fishery reserve is a joint effort of the locators in the area, namely, Philippine Resins Industries, Inc., Bataan Polyethylene Corporation, Petrocorp and the PNOC.

For the protection of the three (3) marine turtle species that are found in Bataan (i.e., the olive ridley, green turtle and hawksbill), the Marine Turtle Conservation Center located in Barangay Nagbalayong, Morong, was established by Bantay Pawikan Inc. (Marine Turtle Watch Group), a PO established by the Philippine Rural Reconstruction Movement (PRRM). The center is co-managed by PRRM with the support of the Municipal Government of Morong, the provincial government, BCCFI, DENR-PAWB and GEF UNDP Small Grants Programme.

The City of Balanga enacted City Resolution No. 34, Series of 2011, declaring Barangay Tortugas as a critical habitat. Under this resolution, the mangrove areas and their adjacent areas are protected from extraction and activities that may damage the ecosystem. In addition, City Resolution No. 101, Series of 2010, designated Balanga City as a bird-friendly zone. Migratory birds flock to the mangrove areas of Orani, Samal, Abucay, Balanga City, Pilar and Orion during the months of September to March. Other forest and sea birds

Table 16. Marine protected areas (MPAs) of Bataan.

Municipality	MPA Type	Year Established	Area (ha)
Abucay Fish Sanctuary	Sanctuary		500
Bagac Marine Protected Area	Sanctuary	2012	
Limay Fish Sanctuary	Sanctuary	2005	7.5
PNOC Fishery Reserve Area	Reserve	2001	25
Marine Turtle Conservation Center (Pawikan Conservation Center)	Sanctuary	2001	
Orion Kent Fish Sanctuary	Sanctuary	1994	25

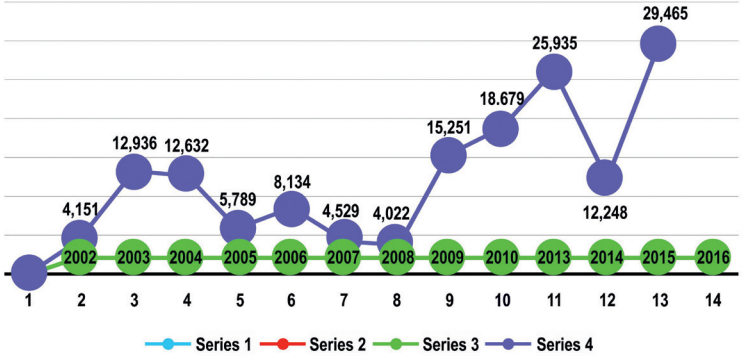
Source: Philippine MPA Database

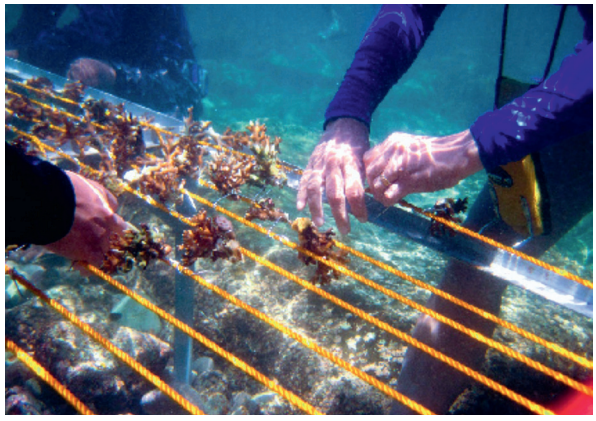
use the mangrove and mudflat areas as feeding grounds. In Balanga City, an increase in the number of water birds was recorded through the Annual Asian Water Bird Census, which is a joint undertaking of the DENR and the Wild Bird Club of the Philippines (**Figure 15**).

Coral reef nursery units were established in Barangay Sisiman in Mariveles, with support from PENRO Bataan. The site was selected due to minimal anthropogenic disturbances and proximity to the identified collection site of corals. A coral reef nursery was also established in Saysain, Bagac.

Figure 15. Annual waterfowl census in Balanga, Bataan.

Source: DENR, 2015.





Coral seeding in Sisiman, Mariveles

Implications and Recommendations

The efforts of the province in protected area (PA) management need to be expanded to cover additional critical areas, with the engagement of various partners such as DENR, BFAR, NGOs, the private sector and the concerned municipalities and barangays. Assistance can also be sought in the preparation of MPA management plans, their subsequent implementation and assessment of management effectiveness.

It is also recommended that a management plan be developed for the Balanga City Wetland and Nature Park, which occupies about 11 ha of the estuarine and coastal area of Barangay Tortugas. The annual bird festival organized by the City Tourism Office brings thousands of local and foreign bird enthusiasts. The lack of a management plan may degrade the mangrove forest which serves as roosting site for the migratory birds.

Reference

BICMP. Accomplishment Report.

021 Reclamation and conversion

Description

This indicator measures the area of coastal habitat that has been converted for other uses (e.g., mangrove to fishpond). This also includes the extent of reclamation in the coastal areas.

Rationale

The costs (limited access for some sectors, stability and safety of those using structures built on reclaimed land, destruction of mangrove nursery grounds of marine life, loss of fisheries fry gathering grounds, erosion, etc.), benefits (ports that would benefit society, etc.) and the sectors that would be affected should be considered before reclamation or land conversion is authorized.

Data Requirements

- Total length of coastline and area reclaimed
- Total coastal area converted to other uses (e.g., mangrove to fishpond)

Results

There are no recent records and reports on land reclamation and conversion in the province. Existing records show that limited conversion occurred in the early 1970s and 1980s, where private lands are converted into fishponds and some mangrove areas into built-up areas.

Since the inception of the ICM program in the province, no reclamation and conversion along the coastal zones have occurred. The only development recorded in the coastal area is the construction of a 120 m-long breakwater in the Port of Orion, which is designed to protect the entire length of the port. The Port of Orion has an estimated area of 499,764.80 m^2 (49.976 ha) with an initial built-up area of 3 ha. The structure and facilities included the berthing areas for roll on-roll off (RORO) vessels and multipurpose wharf for fast-craft vessels.

Implications and Recommendations

Despite the fact that no reclamation or conversion occurred in Bataan from 2000-2015, the provincial and municipal governments should closely monitor the coastal areas and legislate, as necessary, against reclamation and conversion of important habitats such as mangroves, mudflats and tidal flat areas. Relocation of informal settlers occupying the waterways must also be addressed. The need to strictly implement the CLSUZP is necessary to ensure that the zones designated for protection and conservation are followed. In this way, the critical habitats and vulnerable areas will not be deliberately exploited directly through reclamation and conversion, or indirectly through land-based activities.

Reference

GEF/UNDP/IMO Regional Programme on Building Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) and the Manila Bay Environmental Management Project (MBEMP) of the Department of Environment and Natural Resources (DENR), Republic of the Philippines. 2007. Manila Bay Environmental Atlas. (first edition).

Water use and supply management

022 Water conservation and management

Description

This indicator measures the demand of the population for freshwater and accounts the intensity of freshwater management efforts through availability of water management and conservation plans, strategies adopted, and staff and budget allocated.

Rationale

Freshwater is essential for life and effective management for its sustainable use is of utmost importance for a healthy community.

Data Requirements

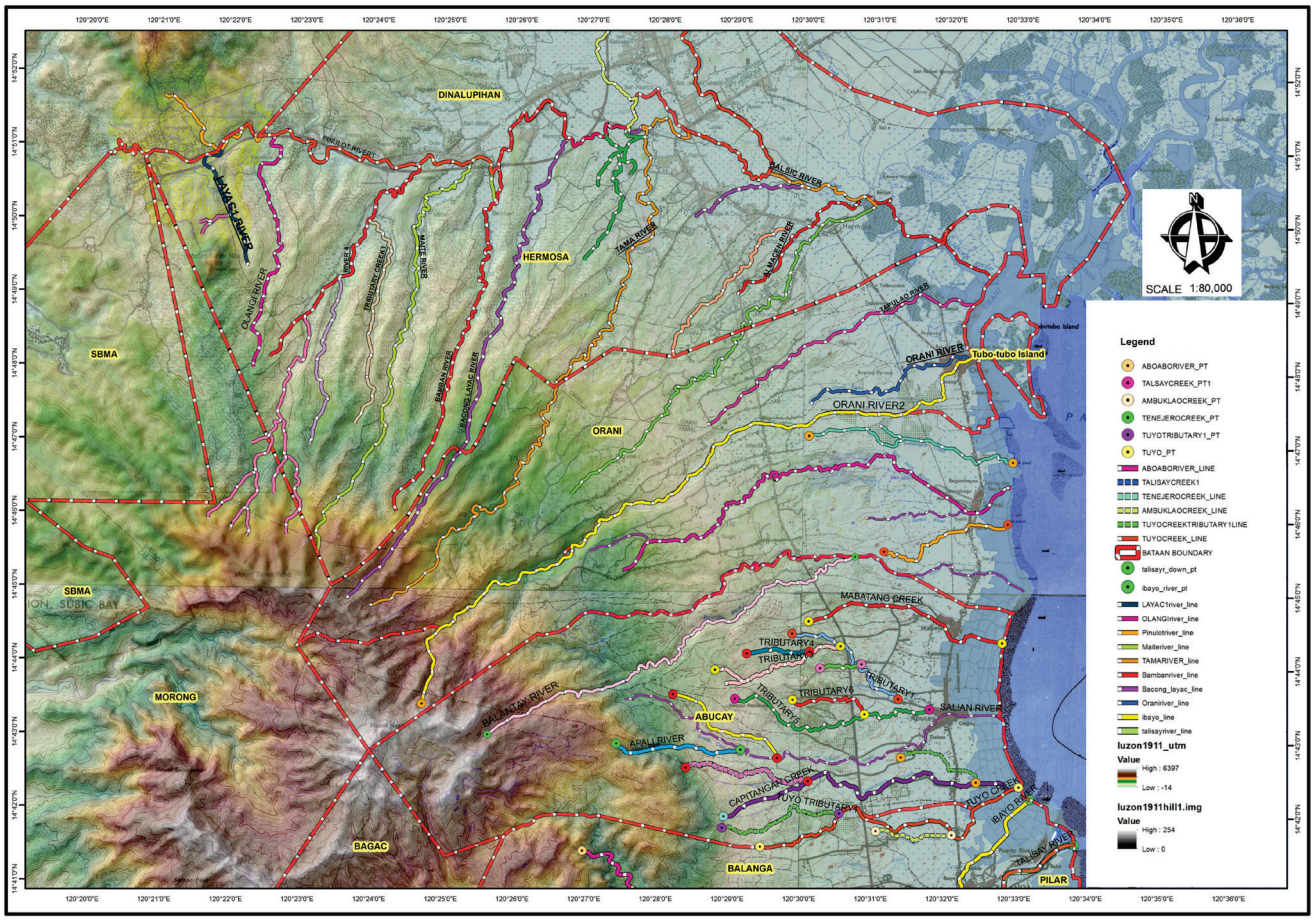
- Availability of water management and conservation plan
- Mitigation and adaptation strategies identified
- Water use per capita
- Staff and budget for water management

Results

Bataan has abundant water resources in the form of rivers, streams, creeks, waterfalls and springs. There are more than 100 rivers in the province radiating from the northern and southern mountain groups (**Figure 16**). These rivers are important not only for irrigation but also for navigation and fishing. Talisay and Almacen Rivers are the two major rivers in Bataan. Talisay is one of the major river systems that drains into Manila Bay. Its headwater is located in the Mariveles mountain group extending up to Pilar and Balanga City. The headwater of Almacen River on the other hand is located in the Natib mountains extending down to Hermosa and exits through the Orani Channel to Manila Bay.

As part of the implementation of the "Operational Plan for the Manila Bay Coastal Strategy", an area-based management plan has been developed for Talisay River which addresses four major concerns related to governance and partnerships, pollution and habitat protection and conservation.

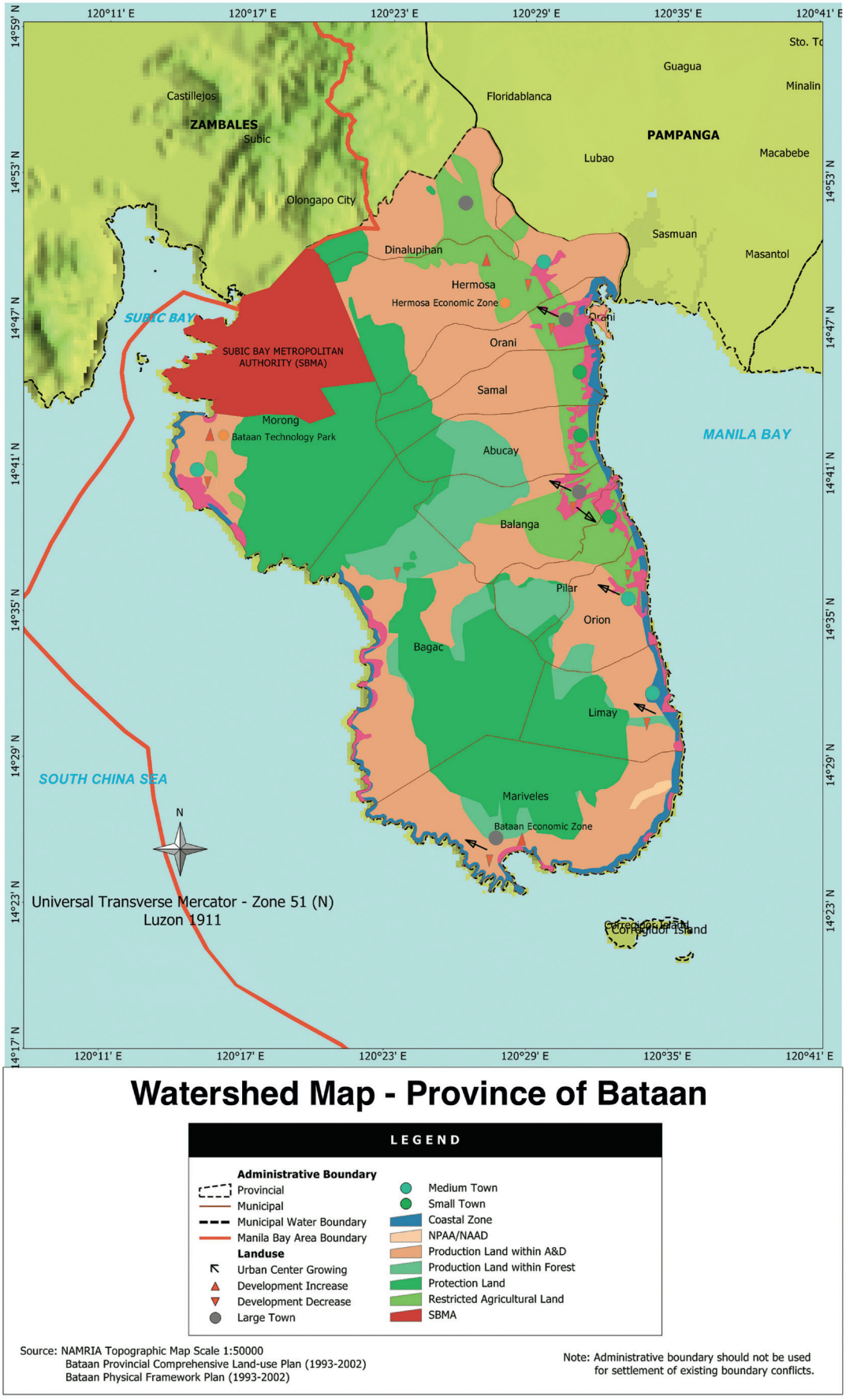
Figure 16. Major river systems in Bataan.



The province currently has no water conservation and management plan. The province, however, provides full support to Executive Order (EO) No. 26 concerning the implementation of the National Greening Program as a government-priority program to reduce poverty, promote food security, environmental stability, and biodiversity conservation to enhance climate change mitigation and adaptation. The following are some of the management programs being implemented at the provincial level under the NGP:

- Watershed characterization;
- Mariveles watershed (reforestation and retrofitting of existing dam);
- Mt. Natib/Bataan National Park (reforestation);
- Construction of small water impounding structure (SWIS);
- Establishment/enhancement of agro-forestry farms;
- Reforestation scheme (50 ha/municipality) at Pilar, Morong, Bagac, Balanga City, Dinalupihan and Hermosa; and
- Agro-forestry Scheme (50 ha/municipality) at Mariveles, Limay, Orion, Samal, Orani and Abucay.

Figure 17. Watershed map of Bataan.



Source: BCCFI and Province of Bataan. 2006. Land use map of Bataan.

The whole province can be considered a catchment area. There are three big watershed groups in Bataan: (1) the Subic Watershed from Morong to half of Bagac; (2) the Mt. Natib Watershed from Dinalupihan down to Balanga, and (3) the Mariveles Watershed from Mariveles to Limay, Orion, Pilar and half of Bagac. Smaller watershed areas comprise these three watershed groups (**Figure 17**). The province's water supply comes from these freshwater sources. Groundwater reserve is extensive, which is extracted through numerous deep wells and free-flowing areas in all municipalities.

Implications and Recommendations

Bataan Province has abundant water resources. Given the development direction of the province, it is imperative that a water conservation and management plan be developed for the long-term management of the water resources. As the water supply of the province is dependent on these freshwater sources and extensive groundwater reserve, the optimal and effective implementation of the existing watershed conservation programs should be carried out.

Also, to maintain its abundant water resources, it is recommended that the province enter into an agreement with the National Water Regulatory Board (NWRB) to allow the province to issue and cancel permits for water supply/surface water resources, and allocate sub-authority to the municipal level (leveling of authority). It is likewise an advantage to monitor and regulate groundwater extraction in the province.

References

BCCFI and Province of Bataan. 2006. Coastal Land and Sea Use Zoning Plan of the Province of Bataan.
Project Management Office, Bataan (ICM) Program. 2006. The Bataan Sustainable Development Strategy.
Provincial Planning and Development Office (PPDO). 2012. Provincial Development and Physical Framework Plan (PDPFP) 2013-2020.

023 Access to improved water source

Description

This indicator estimates the households with access to an improved water source, the amount delivered and the amount paid by households for water supply.

Rationale

Freshwater resources, whether scarce or abundant, may not necessarily be accessible or equitably accessible. Difficulty of access including high prices disproportionately burdens those with less resources, especially more vulnerable individuals and households within communities.

Data Requirements

- Households with access to using improved water sources
- Volume produced from piped water sources
- Water pricing per cubic meter

Results

One of the major sources of water supply in the province is the groundwater, extracted through deep wells and free-flowing areas in the municipalities. Private wells are extensively used in rural areas for domestic purposes. Another source of water is the city and municipal water districts that were established through Presidential Decree No. 198 (P.D. 198), also known as the Provincial Water Utilities Act of 1973. The districts take charge of water supply distribution through piped systems with individual household connections (**Table 17**). It is run by a five-member Board of Directors through a general manager and, like the Local Water Utilities Administration (LWUA), it is classified as a government-owned and controlled corporation (GOCC). In the province of Bataan, there are nine (9) water districts that operate in the city of Balanga and the different municipalities, except in Abucay, Pilar and Samal (**Figure 18**). Water rates range from PhP 130 to PhP 165 (US$ 2.6 TO US$ 3.3) or an average of PhP 146/m^3 (US$ 2.92/m^3) for residential use.

Table 17. Number of households connected to the water district (2015).

Water District Locations	No. of Connections (households)
Bagac	2,410
Balanga	10,598
Dinalupihan	13,636
Hermosa	5,297
Limay	9,084
Mariveles	17,524
Morong	1,550
Orani	10,754
Orion	5,300

Source: PHO, 2016.

Figure 18. Water district locations in Bataan (2015).

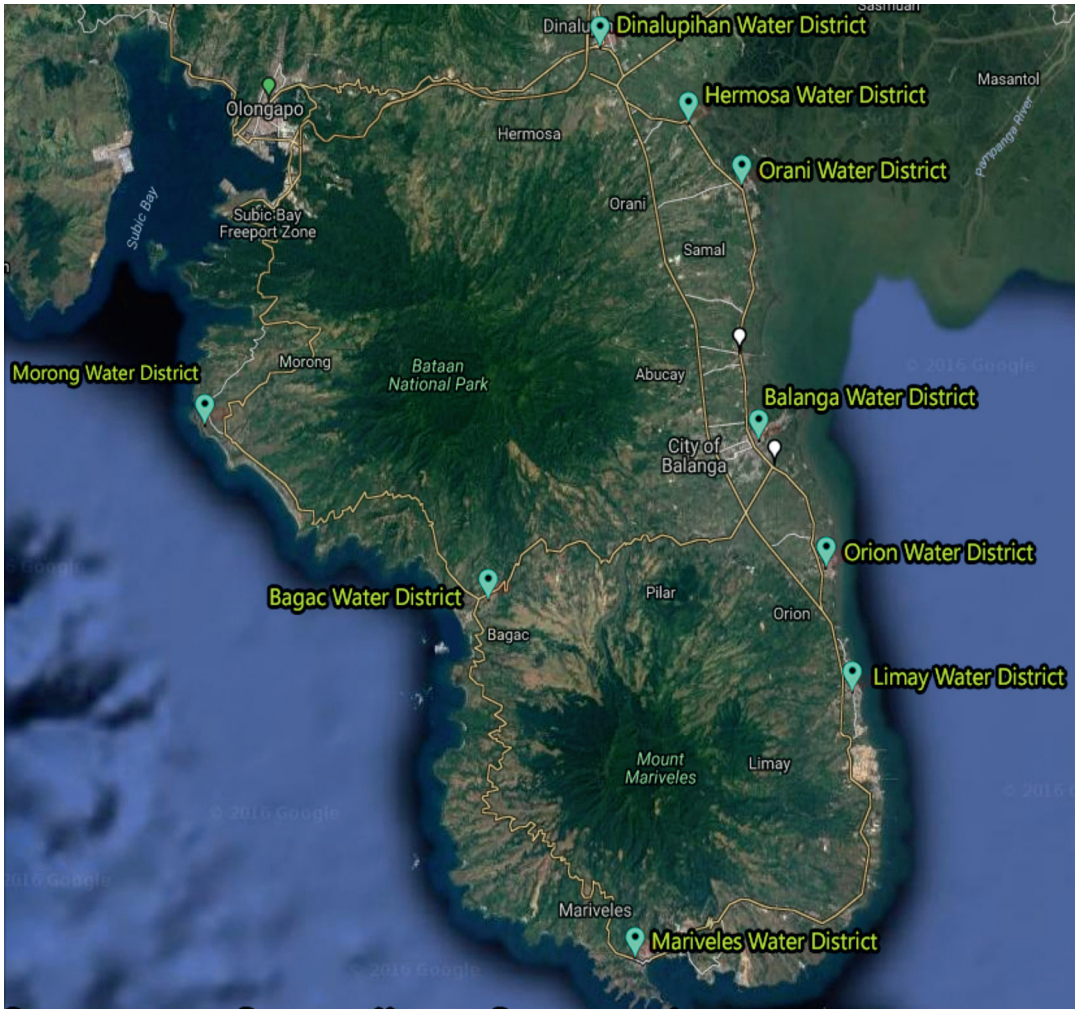


Table 18. Domestic water supply sources (2015).

Area	Level I	Level II	Level III
Rural	Point sources/stand-alone water points • Handpumps • Artesian wells • Rainwater collectors		
Urban		Piped water with a communal water point • Borewell • Spring system • Communal faucet	Piped water supply with a private water point • Individual household connections • System/facilities served by LWUA • Based on a daily water demand of more than 100 liters per person

Table 19. Access to improved water source (2015).

Municipality/ City	No. of Households	Households with access to improved/safe water supply		Safe Sources						Doubtful Water Supply Sources
				Level I		Level II		Level III		
		No.	%	No.	%	No.	%	No.	%	
Abucay	6,962	6,820	97.7	3,087	45.7	3,645	53	88	1.3	142
Bagac	4,615	4,239	91.9	420	9.9	0	0	3,819	90.1	379
Dinalupihan	18,798	18,798	100	4,745	25.2	829	4.41	13,224	70.4	0
Hermosa	10,556	10,556	100	460	4.4	0	0	10,096	95.7	0
Limay	10,783	12,532	116.2	3,717	29.7	0	0	8,815	70.3	0
Mariveles	22,159	22,065	99.6	2,928	13.3	855	3.87	18,282	82.9	94
Morong	4,941	3,933	79.6	2,483	63.1	98	2.49	1,352	34.4	1,008
Orani	11,146	11,159	100.1	1,038	9.3	0	0	10,121	90.7	0
Orion	9,269	9,109	98.3	4,750	52.2	0	0	4,359	47.9	297
Pilar	7,509	7,489	99.3	4,055	54.15	0	0	3,434	45.9	0
Samal	6,324	5,952	94.12	4,150	69.72	0	0	1,802	30.3	372
Balanga City	16,652	15,336	92.1	1,347	8.78	229	1.49	13,760	89.72	44
Bataan	129,714	127,988	98.67	33,180	25.92	5,656	4.42	89,152	69.66	2,336

Source: PHO, 2016.

While the aforementioned city and municipalities have their respective water districts recognized by the LWUA, the Municipality of Pilar has its own water supply system that operates in different barangays. Other sources of water are springs, which are relatively cheap to develop and incur no cost for extraction. However, this source is seasonal and is heavily affected by climate change. Some distant or isolated barangays source their water supply from springs especially during the wet months.

Table 18 shows where the domestic water supplies are generally sourced from. The urban population is being served with a combination of Level I, II, III schemes. In 2010, about 96.47 percent of the population had access to safe water supply (PPDO, 2012.). **Table 19** shows the accessibility of households to safe water supply at various levels in 2016. The Level I water facilities served 33,180 households (25.92%). Level II served 5,656 households (4.42%). Level III served 89,152 (69.66%).

Implications and Recommendations

As of 2015, although only 25.9 percent of the households have access to groundwater sources, majority of the population are connected to pipe systems with individual household connections. Data from the Provincial Health Office (PHO) shows that 98.7 percent of the households already have access to improved water supply, while water supply sources for a total number of 2,336 households remain unclear.

Nonetheless, the province should target the provision of safe and clean water to a hundred percent of the population. Identification of all existing and potential sources of water supply including surface water and groundwater is important to determine current use and demand. A water resource management plan will safeguard the access to quality and health-friendly water resources. In addition to this, the purchase and use of water quality testing instruments would be highly beneficial for the management and maintenance of safe and improved water supply.

References

Food and Agriculture Organization of the United Nations. 2012. “Philippines”.
Local Water Utilities Administration. Water Districts.
Province of Bataan, Provincial Health Office (PHO). 2016. Existing Water Supply Sources.
Provincial Planning and Development Office (PPDO). 2012. Provincial Development and Physical Framework Plan (PDPFP) 2013-2020.

024 Incidences/deaths due to waterborne diseases

Description

This indicator measures the number of reported cases and number of deaths due to diarrhea and other waterborne diseases.

Rationale

While other factors (such as food handling practices, etc.) may affect these figures, the prevalence of diarrhea and waterborne diseases also indicate the level of sanitation services and the cleanliness of freshwater supplies and of bodies of water for recreation.

Data Requirements

- Number of incidences of illness/infections and deaths due to waterborne diseases (e.g diarrhea; typhoid fever; cholera; amoebiasis; schistosomiasis; giardiasis; etc.)

Results

Table 20 shows the number of incidences of waterborne diseases in the province recorded by the Provincial Health Office (PHO) from 2010 to 2015. These diseases included diarrhea, amoebiasis, infectious gastroenteritis and colitis, unspecified contact dermatitis, non-infective gastroenteritis and colitis, typhoid and paratyphoid fevers. In 2014, there was a significant increase in the incidence of diarrhea despite it being the only waterborne disease reported to have occurred. The data from PHO are indicative of the inconsistency in the occurrence of these waterborne diseases for the period covered. Thus, it maybe surmised that the causes of the waterborne diseases are not from the supply itself but maybe from independent events/isolate incidents. Diseases can be caused by poor hygiene, food mishandling, and exposure to environment.

Table 20. Incidence of waterborne diseases.

Waterborne Diseases	Number of Cases					
	2010	2011	2012	2013	2014	2015
Diarrhea	1,806	6,057			5,465	
Amoebiasis	50		207	216		295
Infectious gastroenteritis and colitis, unspecified	612		1,448	1,315		
Non-infective gastroenteritis and colitis	225		4,522			
Unspecified contact dermatitis				718		
Typhoid and paratyphoid fevers						3
Unspecified intestinal parasitism			1,281			122

Source: Provincial Health Office, 2016.

Implications and Recommendations

The recorded incidences of waterborne diseases in the province showed no clear trends from 2010 to 2015. However, the PDPFP 2013-2020 (PPDO, 2012) identified the frequent occurrence of the waterborne diseases specifically diarrhea as one of the leading causes of morbidity. In order to significantly reduce, if not eliminate these diseases, the provincial government should intensify its public education and awareness campaign, and establish additional health facilities. Monitoring of water utilities and food establishments, particularly street food vending, must be conducted on a regular basis. The enforcement of local laws on garbage handling and disposal, and pollution control should be strengthened. Similarly, the province should encourage the public to regularly submit water samples for testing, since the PHO has laboratory facilities for physical, clinical and bacteriological analysis of drinking and surface water.

References

Philippines Field Health Service Information System (FHSIS) Morbidity Report (2010-2015), Province of Bataan, Provincial Health Office.

Provincial Planning and Development Office (PPDO). 2012. Provincial Development and Physical Framework Plan (PDPFP) 2013-2020.

Food security and livelihood management

025 Fishery management plan and implementation

Description

This indicator estimates the extent of fisheries management efforts through availability of fisheries management plans, staff and budget allocated.

Rationale

Fish is a direct product of the coastal zone, providing both food and livelihood to coastal dwellers, and to consumers far from the coast. Fisheries management is a challenging and necessary aspect of managing marine and coastal resources in order to ensure the sustainability of this valuable natural asset. A management strategy, supported by adequate resources and equipment, are markers of local government towards managing this resource.

Data Requirements

- Fisheries Management Plan
- Staff and budget allocation for fishery management

Results

The Office of the Provincial Agriculturist (OPA), in cooperation with the Provincial Government - Environment and Natural Resources Office (PG-ENRO), oversees the management of the fishery resources of the province. The Fisheries Division of the OPA, in particular, focuses on fish production, aquaculture and livelihood development. The PG-ENRO assists the OPA through conservation and protection of habitats and marine resources. At the municipal level, the Municipal Agriculturist Office is responsible for fishery management.

All the coastal municipalities and city have crafted their coastal resource and management plans, which included action programs on fisheries management and development. **Figure 19** shows the various fisheries management-related activities in the municipalities/city of Bataan.

As required by the Fisheries Code (RA 8550), municipal and *barangay* fisheries and aquatic resources and management councils (MFARMCs/BFARMCs) were created to institutionalize the role of local fisherfolks and resource users in community-based planning and implementation of policies and programs for the management, conservation, development and protection of fisheries and aquatic resources of the municipal waters. The MFARMCs/BFARMCs provide policy inputs in the implementation of the CRM plans.

Figure 19. Fisheries management-related activities in the municipalities/city of Bataan.

Source: OPA/BFAR.

Fishery assistance programs of the province included distribution of tilapia fingerlings for small-scale fishpond owners and distribution of fish nets, lights, and small boats to marginalized fishers. These programs aim to support the livelihoods of residents in the coastal communities.

Implications and Recommendations

To sustain the fishery resources of the province, the development of a fisheries management plan is necessary to complement the CRM plans and to harmonize the policies and legislations of the province on fisheries development. Coordination between the province and municipalities, including BFAR and law enforcement agencies, ensures enforcement of fisheries ordinances. Capacity building of the members of MFARMCs/BFARMCs is also important to ensure that they can efficiently perform their roles as fish wardens and environment officers.

References

BICMP. Accomplishment Report.
Office of the Provincial Agriculturist, Fishery Division.

026 Fisheries Production

Description

This indicator measures the trend in fisheries production and tries to estimate whether fisheries stocks are sustainable (using changes in catch composition and/or the frequencies of various sizes per species).

Rationale

The increasing fish catch would mean either greater dependence of the population to fisheries' resources or improved condition of resources.

Data Requirements

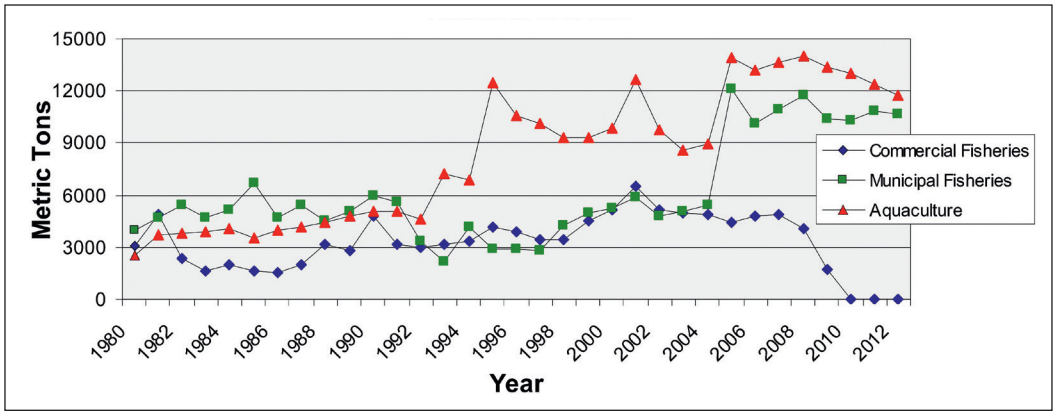
- Municipal (small-scale), commercial (large-scale) and aquaculture fishery production
- Size and composition of fish catch

Results

Being a peninsula, marine products are naturally abundant in all coastal municipalities and city in Bataan. The province had been leading among the provinces of Region 3 (Central Luzon) in municipal fisheries production until 2008 with total fish catch of 11,767 mt. **Figure 20** shows that municipal fisheries and aquaculture production are increasing since the 1980s, while commercial fisheries significantly dropped to near zero in 2011 and 2012. This can be attributed to the coordinated enforcement against commercial fishing around the coastal waters of Bataan using a helicopter and *Bantay Dagat* monitoring and surveillance.

Fish catch in the municipal waters comprise of croaker, mackerel, whiting, terapon, mullet, Hawaiian ladyfish, threadfin bream, fusilier, anchovy, yellow stripe sead, ponyfish, sardines, trevally, yellowfin tuna, sardinella, Spanish mackerel, barracuda, bullet tuna, beltfish, mackerel sead, short mackerel, eel, ray, gizzard shad, catfish, spotted seat, surgeonfish, grouper, mojarra, four finger threadfin, climbing perch, oxeye scad, snapper, pomfret, goldlined spinefoot, shrimps, squid, mantis shrimp, and mud crab, among others.

Figure 20. Annual fisheries production in Bataan.



For aquaculture, the province is third in production among the provinces in Region 3. The municipalities of Orani, Hermosa, Pilar, Samal and Abucay produce crabs, shrimps, tiger prawns, tilapia and milkfish both for local consumption and shipment to other provinces, including the National Capital Region. Other produce include giant freshwater prawns, clams, capiz *(placuna)* and mussels. At present, these are potential areas for aquaculture but no expansion has been undertaken.

BFAR boats for fisheries surveillance and technical assistance

Implications and Recommendations

The increasing municipal fishery and aquaculture production from 2008-2012 indicates increased availability of fish protein sources. The decline in commercial fishing is attributed to the vigilance of the community against illegal fishing. The province's campaign against commercial fishing in Manila Bay and the regular patrolling conducted by the anti-illegal fishing task force have limited commercial fishing activities in the province.

There is a need to improve the collection of fisheries data, such as size and composition of fish catch, including types of fishing gears and fishing effort, to facilitate the crafting of appropriate fisheries policies and development of the fisheries management plan. It is also recommended that the province promote sustainable fisheries by implementing an ecosystem approach to fisheries management (EAFM).

Reference

OPA, Fishery Division.

027 Malnutrition rate

Description

This indicator measures the proportion of the population with access to sufficient daily dietary requirements.

Rationale

Nutrition status is an indicator that integrates availability and equitability of access to food and livelihood. While other factors (such as agriculture and trade) may affect these figures, nutrition status is also affected by the availability of seafood.

Data Requirements

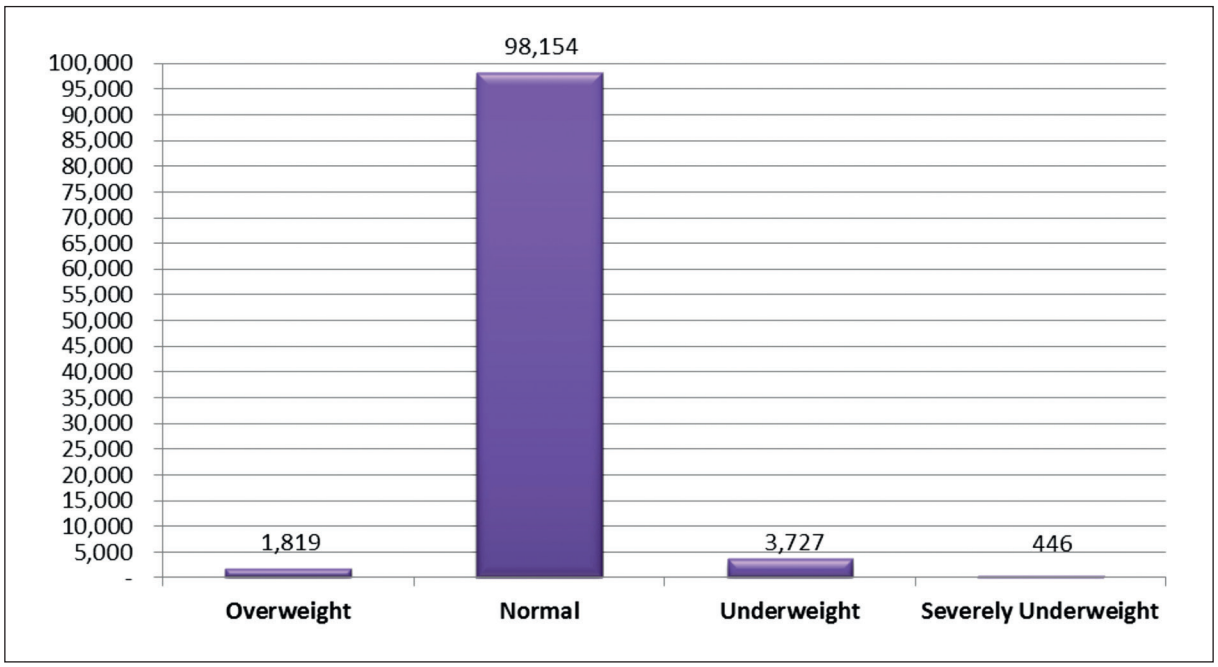
- Number of undernourished males (all ages)
- Number of undernourished females (all ages)
- Number of undernourished males (less than 5 years old)
- Number of undernourished females (less than 5 years old)

Results

In 2015, Operation Timbang Plus (OPT Plus), the annual weighing and height measurement of all preschoolers 0 to 71 months or below 6 years old in a community, was conducted to identify and locate malnourished children. There were 104,146 preschoolers weighed out of 123,537. The degree of malnutrition of the weighed preschoolers are classified into four categories: overweight, normal, underweight and severely underweight. Majority of the weighed preschoolers have normal nutritional status (i.e., 94.25% or 98,154 out of 104,146) (**Figure 21**), which is higher than the recorded rate in 2011 (i.e., 93.07%). Preschoolers with underweight nutritional status is 3.58 percent, which is lower than the recorded rate in 2011 (i.e., 4.5%).

Figure 21 also shows that the weighed preschoolers who are considered severely underweight is about 0.43 percent (446 children) with extreme nutritional deficiency, although the change is minimal compared to the recorded rate of 0.98 percent in 2011.

Figure 21. Nutritional status of OPT weighed preschoolers in 2015.



Implications and Recommendations

Though malnutrition persists in the province, the general public is nourished. The 94.25 percent of preschoolers with normal weight (against 3.58 percent underweight) indicates that government services are adequate. It has to be noted that the government has neither direct control of every individual's diet (whether balanced or not), nor the monitoring over every household's food preparation.

Since malnutrition is a product of insufficient, excessive or imbalanced consumption of nutrients, it is suggested that the province conduct aggressive nutrition campaigns. IEC campaigns may be intensified through health centers, schools, lectures, AVPs, and other media. Likewise, it is recommended that the province evaluate and improve its local nutrition program in areas where malnutrition exists, in order to provide adequate nutrition to children in need.

Reference

Provincial Health Office (PHO). 2011. Annual Operational Plan 2011.

028 Poverty, education and employment

Description

This indicator estimates the degree of poverty, employment and the potential for employment.

Rationale

The degree of poverty reflects an area's degree of social development. Productive employment is a foundational element needed to provide households with goods and services in their struggle against poverty, while education is a key to productive employment

Data Requirements

- Poverty threshold
- Poverty incidence
- Income per capita (male/female)
- Total employment (male/female)
- Education; proportion of population (male/female; primary/ secondary/tertiary)
- Budget allocation for livelihood programs

Results

Poverty incidence in the province from 1991 to 2015 was lower compared to regional and national figures (**Table 21**). Bataan is also included in the cluster of provinces with the least poverty incidence during the first half of 2015. Annual per capita poverty threshold in Philippine Peso shows an increasing trend, while poverty incidence among families shows declining trend with only 1.6 percent in 2015, which is a significantly lower number than the national average of 16.5 percent. The magnitude of poor families also shows declining trend from 8,358 in 2006 to 2,751 in 2015.

Table 21. Annual per capita poverty threshold, incidence and magnitude in Bataan and Region III (1991-2015).

Annual Per Capita Poverty Threshold and Poverty Incidence, by Region and Province: 1991, 2006, 2009, 2012 and 2015										
Region/ Province	Annual Per Capita Poverty Threshold (in PhP)					Poverty Incidence among Families (%)				
						Estimates (%)				
	1991 a/	2006	2009	2012	2015	1991 a/	2006	2009	2012	2015
Philippines	5,949	13,357	16,871	18,935	21,753	29.7	21.0	20.5	19.7	16.5
Region III	6,635	14,422	18,188	20,071	23,200	18.1	10.3	10.7	10.1	8.9
Aurora c/		11,883	14,979	18,446	20,458		25.1	14.7	27.1	22.1
Bataan b/		13,862	17,643	19,383	24,770		6.2	5.9	4.5	1.6
Bulacan b/		14,857	18,434	19,910	21,989		4.9	4.6	5.4	3.3
Nueva Ecija		14,221	18,732	20,847	23,403		21.6	24.9	19.6	18.6
Pampanga b/		14,221	17,399	19,163	22,474		2.0	4.9	5.4	3.0
Tarlac		13,958	17,559	18,810	23,008		14.1	13.7	13.5	14.7
Zambales b/		14,580	18,448	21,885	26,473		18.6	11.9	12.1	12.3

Annual Per Capita Poverty Incidence and Magnitude of Poor Families by Region and Province: 1991, 2006, 2009, 2012 and 2015										
Region/ Province	Poverty Incidence among Families (%)					Magnitude of Poor Families				
	Coefficient of Variation					Estimate				
	1991 a/	2006	2009	2012	2015	1991 a/	2006	2009	2012	2015
Philippines	1.9	2.0	2.1	2.2	3.7	3,554,878	3,809,283	4,036,915	4,214,921	3,746,513
Region III	7.5	7.8	7.5	8.5	12.6	221,205	206,568	232,928	240,079	223,684
Aurora c/		40.2	39.8	37.0	-		10,211	6,445	12,789	12,793
Bataan b/		22.5	22.2	37.3	66.7		8,359	8,688	7,116	2,751
Bulacan b/		15.5	14.0	22.4	25.4		27,997	29,371	38,103	24,359
Nueva Ecija		10.5	9.0	11.2	13.3		85,958	107,224	91,168	105,793
Pampanga b/		27.7	20.2	21.8	31.8		8,823	23,297	28,483	15,434
Tarlac		17.1	16.4	14.5	16.5		35,823	37,538	40,174	44,266
Zambales b/		21.1	17.3	28.4	24.2		29,397	20,365	22,246	18,228

Source: Provincial Development and Physical Framework Plan 2016.

Table 22. Public and private elementary schools and enrollees (2011–2015).

School Year	Public Elementary		Private Elementary		Total	
	No. of Schools	Enrollees	No. of Schools	Enrollees	No. of Schools	Enrollees
2015 – 2016	185	93,978	61	8,147	246	102,125
2014 – 2015	185	94,952	64	7,881	249	102,833
2013 – 2014	185	93,444	60	8,034	245	101,478
2012 – 2013	186	92,171	60	7,556	246	99,727
2011 – 2012	185	91,115	53	7,746	238	98,861

Source: Provincial Health Office, 2016.

Formal education in the province is provided by public and private schools in all levels starting from pre-elementary up to post-graduate level. In SY 2015-2016, there were 185 public schools offering elementary education in the province (**Table 22**), with a total of 93,978 enrollees. From SY 2011-2012 up to SY 2014-2015, the trend of enrolment in elementary schools, both public and private, showed a steady increase. In SY 2015-2016, lower enrolment was recorded for public schools compared to previous years, while private elementary schools had a slightly higher enrolment (8,147 enrollees) for the same school year. Although there was a fluctuating trend in the five-year period of the annual enrolment, specially for private elementary schools, overall, a 5.2 percent increase was registered from SY 2011-2012 up to SY 2015-2016.

There are three universities in the province. These include Polytechnic University of the Philippines, Bataan Peninsula State University with campuses in Dinalupihan, Orani, Abucay, Bagac and Balanga City, and the Philippine Women's University. Other learning institutions include AMA Computer Learning Center, Asia-Pacific of Advance Studies, Bataan Heroes College, Eastwood Professional College of Science and Technology, Micro City Computer College, St. Joseph College and Tomas del Rosario College are all based in Balanga City. Limay Polytechnic College is located in the Municipality of Limay. La Salle is based in Bagac, and Collegio de San Juan De Letran and Kalayaan College are based in Abucay.

Scholarships were made available in line with the province's goal of becoming a haven of learning. Thousands of students benefited from this opportunity. More classrooms were constructed and more teachers were hired to accommodate more students. These efforts yielded 98 percent literacy rate for the province. However, it may be noted that in SY 2014-2015 completion rate among secondary school students declined to as low as 79.72 percent for both sexes; 75.21 percent for males, and 84.69 percent for female. Dropouts were attributed to financial limitations to support transportation and school allowances. School dropouts have minimal chance of getting fair employment and could later contribute to higher poverty incidence in the future. The province is urged to extend assistance to indigent high school students.

For 2010-2015, literacy rate in the province is high at 98 percent while functionality rate is 86 percent. This is attributed to the provincial government's campaign for quality education. Through scholarship programs, more

Table 23. Employment status from 2002–2008 in Bataan.

Type	2002	2003–2006	2008
Employment Rate	83.9	84.9	91.7
Unemployment rate	16.1	12.6	8.3
Underemployment rate	12.6	7.0	13.5

Source: Philippine Statistic Authority.

students were able to avail themselves of higher education. Technological training courses were also made available in partnership with TESDA and sponsor industries. Net enrolment rate (participation rate) in the elementary level decreased by 2.6 percent during 2010-2011 having 79.61 percent rate (note: net enrolment is the ratio between the enrollments in the school age range to the total population of that range). In the secondary level, it decreased by 0.84 percent with 51.98 percent in 2010.

Table 23 shows the employment trend in the province which has been increasing over the years. The encouraging trend in employment status demonstrate that Bataan's economy is steadily progressing.

Implications and Recommendations

The Province of Bataan is one of the provinces with the least poverty incidence in the country, notably in 2006, 2009, 2012 and 2015. At 1.6 percent poverty incidence, it is lower than the national level at 16.5 percent and the regional level at 8.9 percent. The development of industrial states and growth of commercial centers in Bataan have contributed to the rise of industrial and service employment. Although the number of people employed and the number of establishments and other economic activities fluctuate, poverty incidence in the province remains low.

The entry of major industries, commercial establishments and real estate development in the province has boosted employment opportunities. As more establishments open their businesses in the province, more jobs are made available for the constituency. It is recommended that the province promote a business-friendly atmosphere to attract more investors.

It is also recommended that the province promote job creation related to environmental protection and conservation, for example, through ecotourism development in protected landscapes and seascapes within the province.

References

Bataan Profile 2002-2008.
DepEd, Bataan.
Provincial Health Office.
PPDO, 2012.

029 Livelihood programs

Description

This indicator measures the availability of programs, people, and budget to help enhance coastal livelihoods. It also looks into the sectors benefited and the impacts of these livelihood programs.

Rationale

Livelihood programs help optimize productivity of coastal areas and help households maximize their potential for income.

Data Requirements

- Existing livelihood programs
- Staff and budget allocation for livelihood programs
- Accessibility and budgets
- Sectors covered
- Impacts of livelihood programs

Results

Although limited in scope, the initiatives of various organizations in sponsoring livelihood training programs have created opportunities in the province. A notable achievement was the implementation of a livelihood program initiated in 2003 through BCCFI. Nine (9) POs from the coastal villages of Abucay, Orion and Limay were chosen as recipients of community-based livelihood training on mussel farming and aquaculture, with a total fund of PhP 300,000. **Table 24** shows the organizations that participated in the livelihood programs and their activities.

Table 24. Organizations that participated in the alternative livelihood programs in Bataan.

Organization	Alternative Livelihood Training Program
Philippine Resins Industries, Inc. (PRII)	Mussel production/pastry making
PRII/MAAP	Fish processing
Philippine National Oil Company-Alternative Fuels Corporation (PNOC-AFC)	Rag making
Maritime Academy of Asia and Pacific (MAAP)	Multipurpose cooperative
PRII	Installation of fish aggregating device
Bataan School of Fisheries	Mangrove nursery and crab fattening
Department of Environment and Natural Resources (DENR)	Cocomat weaving

2014 Livelihood training program: Shellcraft industry/kapis (Capiz) culture, Municipality of Samal

Implications and Recommendations

Alternative livelihood programs being implemented in the province are very limited. It is recommended that the province conduct a stocktaking of livelihood programs that have been completed to determine the good practices and lessons learned that can help in designing a holistic livelihood program for the province.

Reference

BCCFI. 2003. Annual Report to Membership.

Pollution reduction and waste management

030 Management plans

Description

This indicator accounts the presence of specific policies, plans and programs for pollution reduction and waste management. It further looks into the commitment of local government to implement the plans through allocation of human and financial resources.

Rationale

Specific strategies and action plans are essential to address issues on pollution and waste management. These action plans must be implemented through the commitment of facilities and equipment, as well as financial and human resources.

Data Requirements

- Availability of pollution management plans and their scope (water, air, land)
- Monitoring programs
- Budget for pollution and waste management
- Staff allocation for pollution and waste management
- Adequacy of equipment/facilities

Results

The formulation and adoption of pollution management plans in the Province of Bataan is guided by existing national laws. As such, there are two kinds of pollution management plans available: (a) the ten-year solid waste management plans (SWMPs), prepared and implemented by the LGUs as mandated by RA 9003 or the Ecological Solid Waste Management Act of 2000; and (2) the environmental management plans (EMPs), prepared and implemented by industries as mandated by Presidential Decree No. 1586, establishing the Philippine Environmental Impact Statement System.

The SWMPs outline the different strategies to be implemented by the LGUs on solid waste management (SWM) within their jurisdiction, including waste reduction, collection, diversion and materials recovery, IEC, and final disposal. At present, four LGUs have their SWMPs approved by the National Solid Waste Management Commission

Table 25. Ten-year solid waste management plans (SWMPs) of the municipalities/city of Bataan.

LGU	SWMP Planning Period	Status of SWMP
Abucay	2015 – 2024	Draft
Bagac	2014 – 2024	Draft
City of Balanga	2016 – 2025	Approved by NSWMC
Dinalupihan	2015 – 2024	Approved by NSWMC
Hermosa	2015 – 2024	Draft
Limay	2014 – 2024	Conditionally Approved by NSWMC
Mariveles	2016 – 2025	Approved by NSWMC
Morong	2015 – 2025	Draft
Orani	2014 – 2023	Draft
Orion	2016 – 2025	Draft
Pilar	2015 – 2024	Approved by NSWMC
Samal	2015 – 2024	Draft

Source: PG-ENRO SWM Report, 2016.

(NSWMC); one LGU has a conditionally approved SWMP; and seven LGUs have drafted their SWMPs (**Table 25**). Based on the city and municipal SWMPs, the province is currently drafting the provincial SWMP. The provincial SWMP contains the SWM strategies and programs to be implemented at the provincial level, including the province's general program of support to the implementation of SWM initiatives of the component city and municipalities of Bataan.

The EMP is part of the Environmental Impact Statement (EIS) submitted by a project proponent (e.g., industrial and commercial firms) to the DENR-EMB that details the prevention, mitigation, compensation, contingency and monitoring measures to minimize the negative impacts and risks of a proposed project or undertaking. This includes management measures for air and water pollution, solid wastes, and hazardous wastes.

Based on their EMPs, environment monitoring programs have been established by the industries operating in Bataan, through a multipartite monitoring team (MMT). In addition to the proponent/industry, members of the MMT include representatives from the DENR-EMB Region III; provincial and local DENR offices; provincial, city/municipal and barangay governments; and NGOs/POs. The MMT monitors various air and water quality parameters, which are determined by DENR-EMB based on the nature of operations (i.e., types of pollutants produced).

Pollution reduction and waste management facilities in the Province of Bataan include materials recovery facilities (MRFs) and residual containment areas (RCAs) for non-hazardous solid wastes; septage treatment plants (STPs) for septage/wastewater; and biogas digesters for methane and wastewater of poultry and piggery farms.

At present, 10 out of 12 LGUs in the province have existing central MRFs and composting facilities; the municipalities of Pilar and Orion do not have a central MRF. However, most of the existing city/municipal MRFs function only as segregation areas and storage of segregated solid wastes due to lack of equipment and manpower to perform processing/materials recovery. Some *barangays* also have their own MRFs and/or composting facilities, except in Abucay, Hermosa, Orani, Orion, and Samal, where the collected wastes from the barangays are brought to the municipal MRFs.

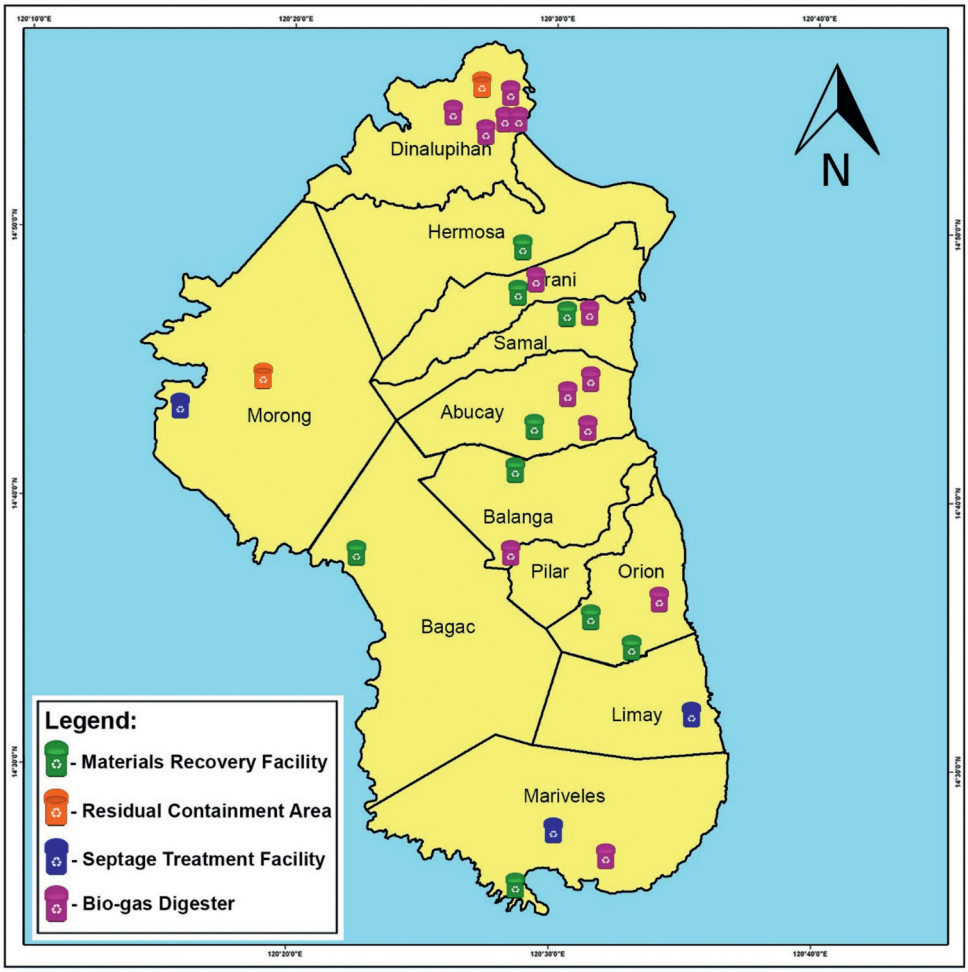
All component LGUs with open dumpsites (except in Pilar, which does not have any disposal facility) have also complied with the directive of DENR-EMB for dumpsite safe closure and rehabilitation. In lieu of closure and rehabilitation of these disposal facilities, the city and municipalities in the Province of Bataan have established residual containment areas (RCAs) for storage and eventual processing/recycling of residual wastes.

Existing STPs in the province are in the Freeport Area of Bataan (FAB) in Mariveles; Anvaya Cove in Morong; and Petron Bataan Refinery in Limay. Unlike SWM facilities, STPs are privately owned and operated, and as such, cater only to the said industry's septage and wastewater discharges. FAB, however, occasionally accepts septage from residential and commercial establishments outside its premises.

Similarly, biogas digesters (fixed dome type) are constructed and operated by private poultry and piggery farms, in compliance with Provincial Ordinance No. 03, S. 2014 (Ordinance Regulating the Operation of Livestock and Poultry Raising). To date, 19 farms in Bataan have constructed biogas digesters; 14 of which are operational.

The provincial and city/municipal governments' resource commitment to pollution reduction and waste management is currently focused on solid waste management. **Figure 22** shows the location map of waste and SWM facilities in the province. **Table 26** on the other hand, shows the staff and budget for solid waste management in the municipalities/city of the province.

Figure 22. Location map of waste/pollution management facilities in Bataan.



Source: PG-ENRO SWM Report, 2016.

Table 26. Staff and budget allocation for solid waste management in the municipalities/city of Bataan.

LGU	Staff Allocation	Budget Allocation (PhP)
Bataan Province	8	2016: PhP 713,045
Abucay	20	ND
Bagac	11	2014: PhP 3,296,000
City of Balanga	92 (including river cleaner and wetland park cleaner)	2015: PhP 29,553,039
Dinalupihan	28	2014: PhP 5,000,000
Hermosa	10	2014: PhP 1,000,000
Limay	204	2013: PhP 615,803
Mariveles	81	2015: PhP 85,456,600
Morong	12	2014: PhP 722,534
Orani	44	2014: PhP 7,058,602
Orion	31	2014: PhP 6,086,224
Pilar	11	2013: PhP 1,196,485
Samal	19	2014: PhP 2,500,000

Source: Provincial 10-Year Solid Waste Management Plan, 2016.

Implications and Recommendations

While pollution reduction and waste management initiatives are in place in the province, there remain gaps that need to be addressed. These include adoption and implementation of the SWMPs of eight (8) LGUs and completion, adoption and implementation of the SWMP of the whole province; upgrading of the MRFs to perform their intended function of processing and materials recovery, and exploring the utilization of privately owned and operated STPs to cater to more residential and commercial establishments.

It is also recommended that the province establish an environmental monitoring program to complement the existing monitoring programs of DENR and the industries/private sector.

References

City of Balanga, Bataan. Ten-year Solid Waste Management Plan of the City of Balanga 2016-2025.
Compliance Monitoring and Verification Reports of Industrial Locators.
Municipality of Abucay, Bataan. Ten-year Ecological Solid Waste Management Plan 2015-2024.
Municipality of Bagac, Bataan. Ten-year Ecological Solid Waste Management Plan 2014-2024.
Municipality of Hermosa, Bataan. Ten-year Solid Waste Management Plan.
Municipality of Limay, Bataan. Ten-year Solid Waste Management Plan (2014-2024).
Municipality of Morong, Bataan. Ten-year Solid Waste Management Plan.
Municipality of Orani, Bataan. Ten-year Municipal Solid Waste Management Plan.
Municipality of Orion, Bataan. Ten-year Solid Waste Management Plan (2016-2025).
Municipality of Pilar, Bataan. Ten-year Solid Waste Management Plan.
Municipality of Samal, Bataan. Ecological Solid Waste Management Plan 2015-2024.
Revised Procedural Manual for DENR Administrative Order No. 30 Series of 2003 (DAO 03-30).

031 Water quality

Description

This indicator measures the level to which coastal waters and river waters that discharge into the coastal area are within the water quality standards prescribed for the specific water use (e.g., drinking, swimming, boating, fishing, aquaculture, etc.).

Rationale

Criteria and standards for water quality are based on scientific information related to water use and potential risks to human health (e.g., transmit waterborne diseases), productivity (decrease fisheries productivity) and/or the ecosystem health (e.g., destruction and degradation of habitats). Different parameters provide indications of ecosystem health and potential threats to water use.

Data Requirements

Priority parameters

- Changes (temporal/spatial) in water transparency (secchi depth/total suspended solids) (marine/river/beach)
- Changes (temporal/spatial) in dissolved oxygen (DO) concentrations (marine/river/beach)
- Changes (temporal/spatial) in total/fecal coliform counts (marine/river/beach)

Secondary parameters

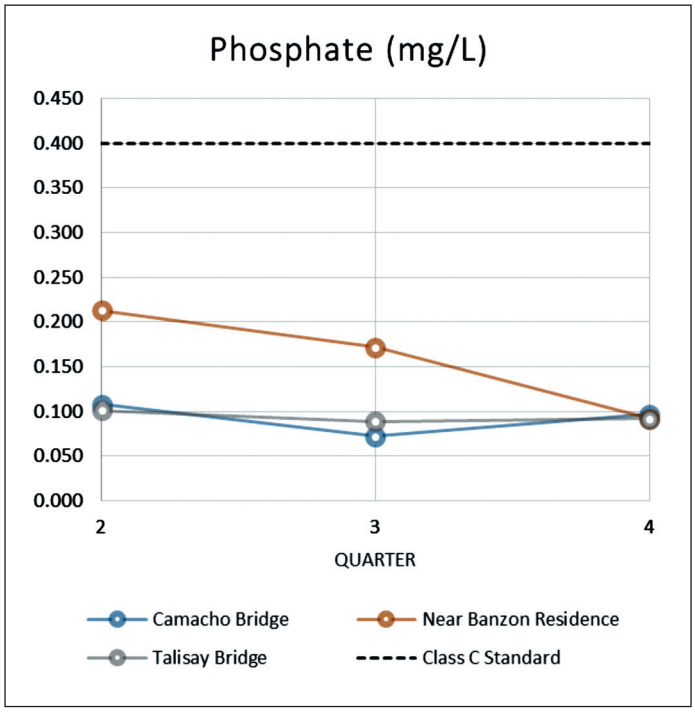
- Changes (temporal/spatial) in chlorophyll concentrations (marine/river/beach)
- Changes (temporal/spatial) in nutrient (nitrates, phosphates) concentrations (marine/river/beach)
- Changes (temporal/spatial) in biochemical oxygen demand (BOD) concentrations (marine/river/beach)
- Groundwater quality (nitrates and heavy metals)

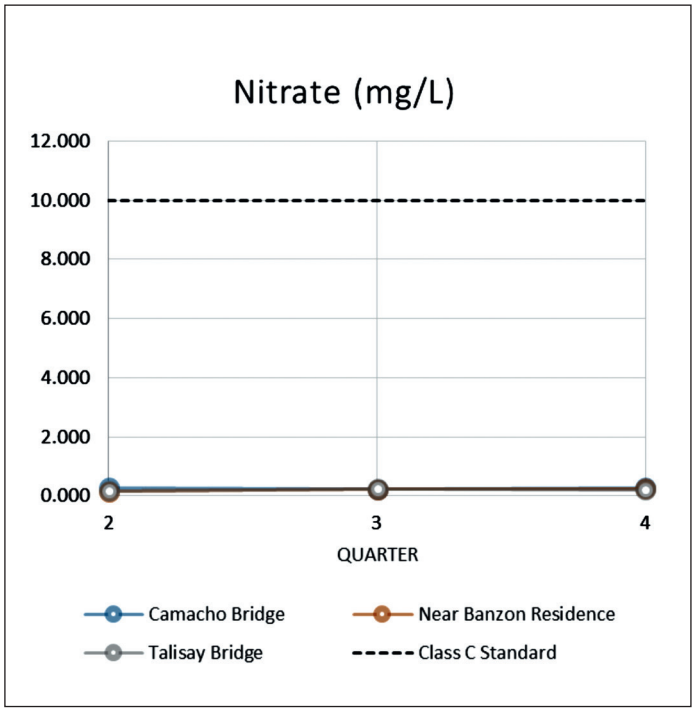
Results

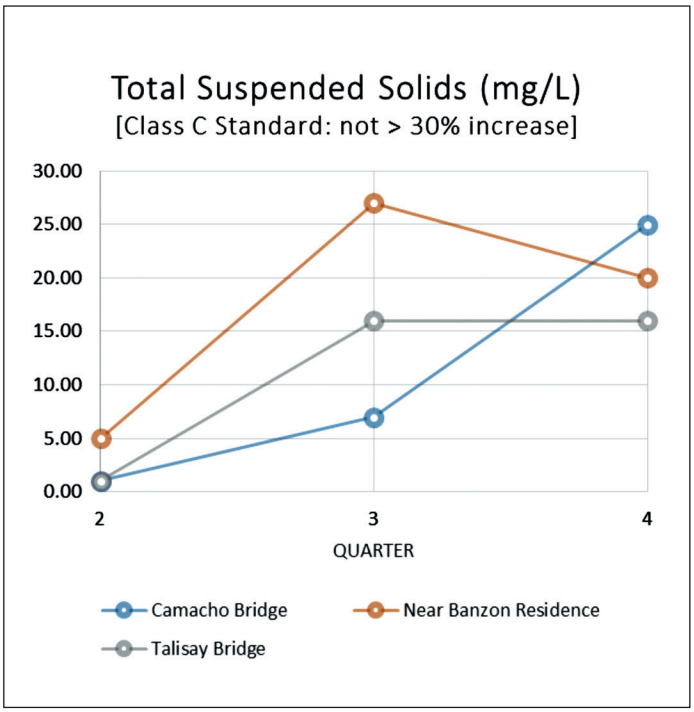
The DENR (PENRO, EMB Region III) conducts monitoring of Talisay River and bathing beaches in Mariveles and Limay, as part of the monitoring program for Manila Bay. Water quality parameters measured included nutrients (PO_4-P; NO_3-N), pH, TSS, DO, total coliform and fecal coliform counts.

Monitoring results showed that Talisay River, a major tributary of the Manila Bay, has relatively low nutrient levels (**Figure 23**). Phosphate concentrations are generally decreasing over time, from an average value of 0.141 mg/L in the 2nd quarter of 2012 to 0.094 mg/L in the 4th quarter of the

Figure 23. Water quality monitoring for Talisay River (2012).

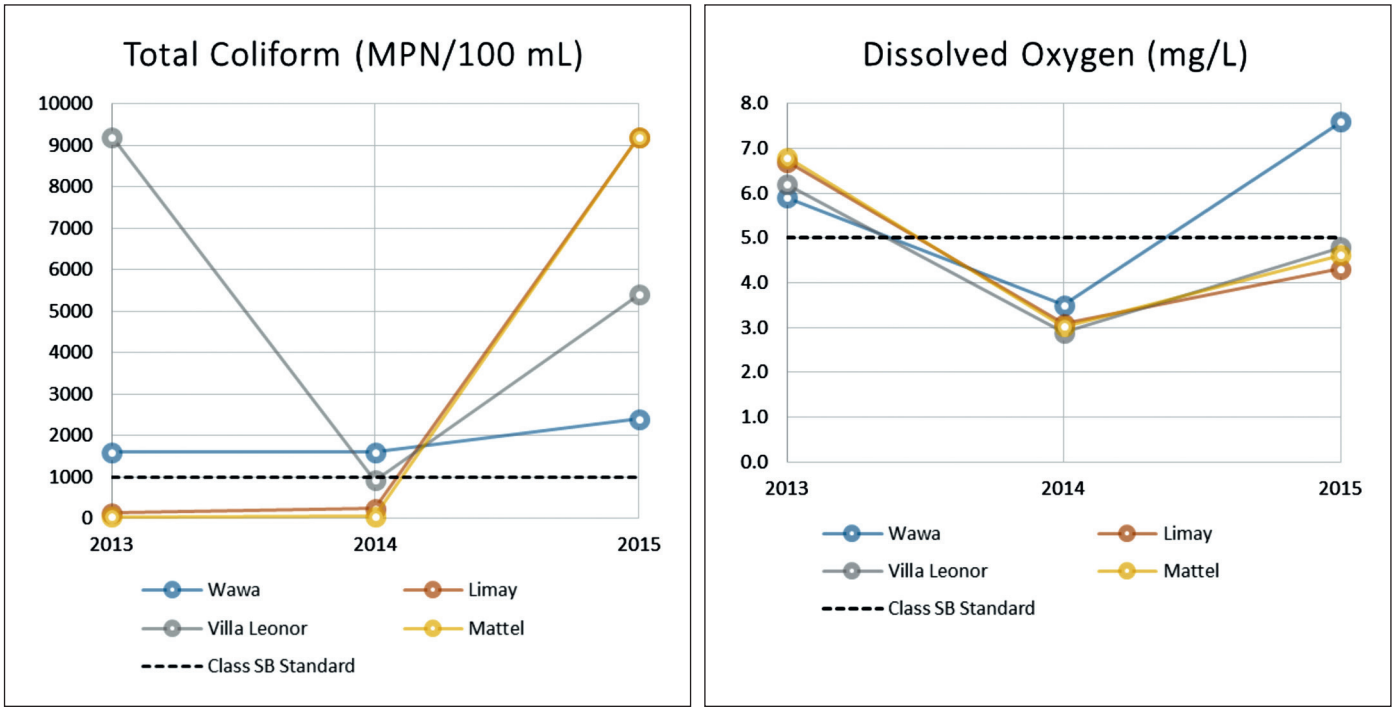






Source: DENR/PENRO, Bataan.

Figure 24. Marine water monitoring for Bataan (2012–2015).



Source: DENR/PENRO, Bataan.

same year. It can be noted that the phosphate level in Talisay River is well within DENR standards for Class C waters, the upper limit of which is at 0.400 mg/L. On the other hand, nitrate concentrations in the river have been found to be increasing, albeit in small increments. During the 2nd quarter of 2012, the average concentration is at 0.203 mg/L; while for the 4th quarter of the same year, the average concentration is 0.241 mg/L. Despite the increasing trend, nitrate concentration level in Talisay River is also well within the Class C DENR standard of 10.0 mg/L.

Meanwhile, 2012 data shows that Talisay River has a generally increasing concentration of total suspended solids (TSS), from an average of 2.33 mg/L to an average of 20.33 mg/L. With all the readings within Class C standards (DENR standard value of 80 mg/L), the trend for TSS can be indicative of natural causes or sources, such as siltation, rather than of loading from pollution sources.

Marine water monitoring results showed that bathing beaches along the coast of Manila Bay (southwestern portion of Bataan) have high total coliform counts, reaching as high as 9,200 MPN/100 mL, with the standard for Class SB waters being 1,000 MPN/100 mL (**Figure 24**). Dissolved oxygen (DO) levels in the southwestern beaches of the province are also deteriorating. Except for Wawa station in Limay, DO measurements for said marine waters are below the DENR Class SB standard of 5.0 mg/L for the past two years.

DENR also conducts water quality monitoring in some industries' premises and surrounding environments on a quarterly basis. Water and air quality parameters are monitored against the national standard/guideline values set by DENR. Monitoring results are summarized in the industries' Self-Monitoring Report (SMR) and Compliance Monitoring and Validation Report (CMVR). At present, all industrial locators in Bataan are compliant in terms of their pollution abatement and control measures, since recent CMVRs indicated monitoring parameters within DENR standards. **Table 27** shows the monitoring parameters measured by selected industries in Bataan.

Table 27. Environment monitoring parameters measured by selected industries in Bataan.

Industry	Location	Water Quality Parameters Monitored	Air Quality Parameters Monitored
GNPower Mariveles Coal Plant Ltd., Co.	Alasasin, Mariveles	Temperature, color, TSS, BOD, DO, phenols, oil & grease, pH, total coliform, *E. coli*, total N, PO_4-P, heavy metals	NO_2, SO_2, TSP, PM_{10}, VOC, CO, heavy metals
Herma Shipyard Corp.	Baseco Country, Mariveles	BOD, COD, color, oil & grease, pH, TSS, heavy metals, total coliform, fecal coliform	TSP, VOC, SO_2, NO_2
PNOC Alternative Fuels Corp.	Batangas II, Mariveles	BOD, COD, TSS, color, oil & grease, TDS, phenols, heavy metals, pH	TSP, PM_{10}, SO_2, NO_2
Petron Bataan Refinery	Alangan, Limay	pH, temperature, color, BOD, COD, TSS, settleable solids, phenols, surfactant, oil & grease, total coliform, other organic compounds	SO_2, NO_2, CO, H_2S, TSP, Pb, VOC, PCE, benzene, noise
Bataan 2020, Inc.	Gugo, Samal	BOD, TSS, color, oil & grease, temperature, COD	CO, NO_2, PM, SO_2

Source: Environment Management Bureau, DENR/PENRO Bataan.

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Implications and Recommendations

Based on available data, Talisay River, the province's major tributary that drains into Manila Bay, is maintaining its Class C status. However, to have a more complete picture of the status of its water quality, more parameters must be monitored over a longer period of time. Special attention should be paid to heavy metals and coliform, since Talisay River is mainly used for irrigation.

On the other hand, Bataan's marine (beach) waters are deteriorating over time, which calls for better pollution mitigation measures from the residential, commercial, tourism and industrial sectors. As for freshwater quality monitoring, stronger conclusions can be made with more spatial and temporal data.

It is recommended that the provincial government build its capacity for water quality monitoring in order to better manage its more than 100 freshwater and marine water bodies, especially those at risk of deterioration due to anthropogenic pollution sources. The province must procure water testing equipment and build testing laboratories. Partnerships with the Department of Health and Bataan Peninsula State University and other concerned parties may strengthen the monitoring mechanism of the province.

References

DENR-PENRO Bataan

DENR Administrative Order No. 34 Series of 1990, Revised Water Usage and Classification/Water Quality Criteria Amending Section Nos. 68 and 69, Chapter III of the 1978 NPCC Rules and Regulations.

032 Air quality

Description

This indicator reports on the quality of air in terms of total suspended particulates, sulfur oxide, nitrogen oxide, carbon oxide and volatile organic carbon.

Rationale

Air pollution is harmful to human health and the quality of the environment.

Data Requirements

- Changes in concentration of total suspended particulates (TSP)
- Changes in concentration of other air pollutants (particulate matter, sulfur oxide, nitrogen oxide, carbon oxide, volatile organic carbon)

Results

Emissions inventory results from DENR-EMB Region III show that in 2015, CO and volatile organic carbon (VOC) are the dominant pollutants in the province, most likely from mobile sources such as motor vehicles (**Table 28**). Another major pollutant is SO_2, which can be traced to the coal-fired power plants located in the province, as well as fuel consumption of stationary sources (industries) in Bataan.

Available air quality monitoring data in the province are from the industrial towns of Limay and Mariveles. These areas monitor TSP, PM (Mariveles only), NO_2, SO_2, and CO (**Figure 25**). All parameters meet the DENR national ambient air quality standards over the past two years. The concentrations of the criteria pollutants are also generally downward, representing improving air quality. Exceptions are total suspended particles (TSP) and CO levels in Limay, which appear to be increasing, due to sources such as road conditions, roadworks, and trucks and heavy equipment frequenting the area.

Table 28. Inventory of criteria pollutant emissions in Bataan (CY 2015).

Criteria Pollutant	Total Emissions (tons/year)
PM	9,918.26
CO	35,425.70
NO_2	6,427.28
SO_2	12,512.40
VOC	16,116.90

Figure 25. Air quality monitoring data (2014-2016).

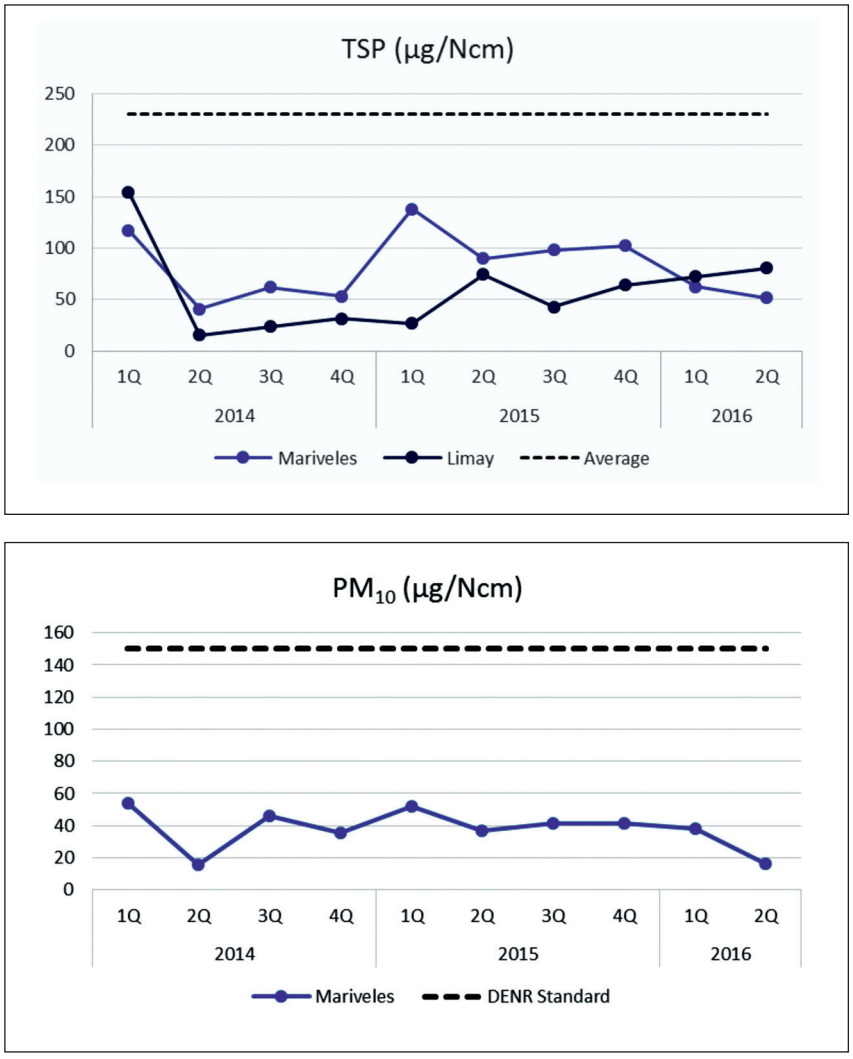
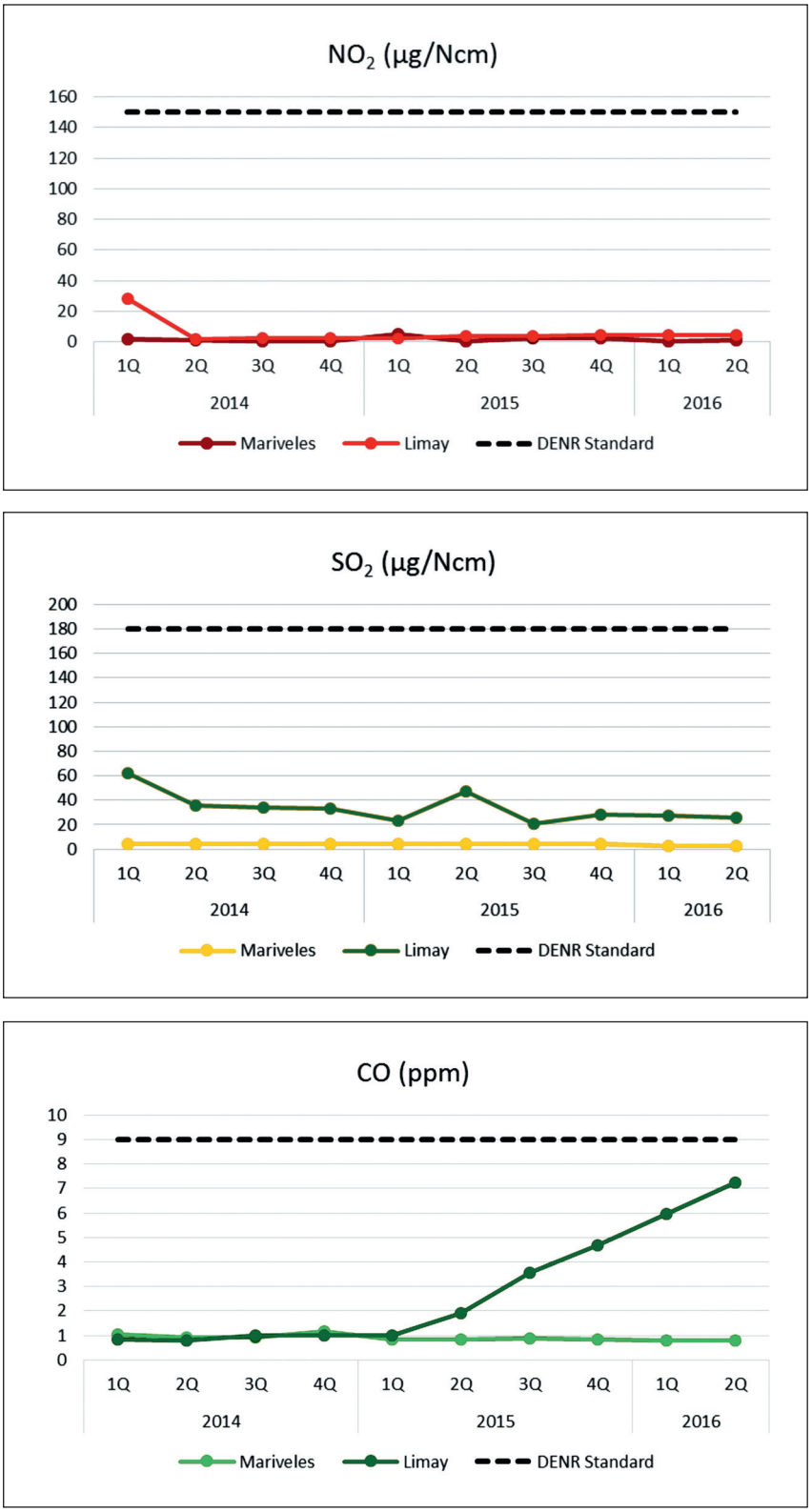


Figure 25. Air quality monitoring data (2014–2016) (continued).



Source: Environment Management Bureau, DENR.

Implications and Recommendations

The monitoring data are representative of the two areas of concern in the province in terms of air quality. With the other LGUs in Bataan being predominantly commercial, agricultural and residential, it can be assumed that emissions of pollutants are relatively lower. And with local mitigation measures that are currently in place (e.g., greening activities, fuel efficiency programs, engineering interventions), it can be safely concluded that the overall good air quality in the Province of Bataan will be maintained.

The provincial government, in partnership with relevant NGAs, must further intensify its efforts to address the transportation sector — both infrastructure and motor vehicles — in order to curb emissions of air pollutants. Similar to water quality, it is also recommended that the province build its capacity for air quality monitoring to cover other areas in the province, as well as to generate more robust data for a more informed decisionmaking on air quality management.

References

Compliance Monitoring and Validation Report (CMVR), GNPower Mariveles Coal Plant Ltd. Co.
Compliance Monitoring and Validation Report (CMVR), Petron Bataan Refinery
Emissions Inventory for CY 2015, DENR-EMB Region III
Republic Act 8749, Philippine Clean Air Act of 1999

033 Sanitation and domestic sewerage

Description

This indicator reports the proportion of the population with access to sanitation and sewerage systems.

Rationale

The lack of sanitation facilities can affect human well-being and have negative impacts on the quality of the environment, especially when disposed untreated to the coastal and marine environment. Moreover, data on access to sanitation also monitors progress in meeting one of the Millennium Development Goals (MDG) targets for environmental sustainability.

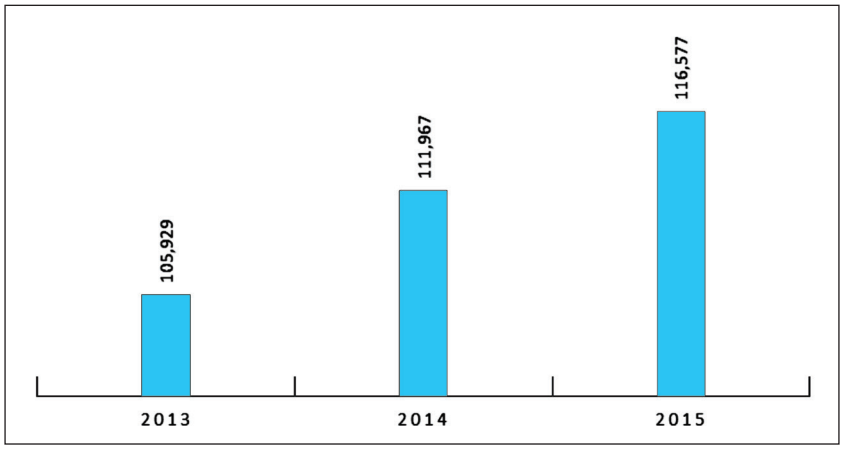
Data Requirements

- Population with access to improved sanitation
- Households connected to septic tanks
- Volume of septage collected/treated
- Population served by public sewerage system (collection)
- Location of sewerage treatment plants and discharge pipes
- Level of treatment and volume of sewage treated
- Volume of domestic wastewater generated, treated, recycled or reused

Results

As of 2015, there are 116,577 households in the province with sanitary toilets, which is equivalent to 91.48 percent of total households in Bataan. The number of households with sanitary toilets has increased from previous years. Similarly, there has been an increase in the number of households in the province with complete basic sanitation facilities such as toilet, safe water and proper disposal from 101,148 in 2013 (83.02%) to 111,170 in 2015 (87.24%) (**Figure 26**).

Figure 26. Number of households with sanitary toilets.



Source: Provincial Health Office.

There is currently no sewerage system in the province. Household sewage is stored in septic tanks. While there is one private company (Soliman EC Septic Tank Disposal) providing septic tank siphoning services in Bataan and neighboring provinces in the region, households seldom avail of its services due to a relatively costly service charge.

Existing sewage/wastewater treatment facilities in Bataan are owned and operated by private entities. These are in the Freeport Area of Bataan (FAB) in Mariveles, Anvaya Cove in Morong, and Petron Bataan Refinery in Limay. These facilities exclusively treat the sewage/wastewater from the said establishments, although FAB occasionally accepts and treats sewage from other sources.

Implications and Recommendations

Access to improved sanitation in Bataan is relatively high and on a positive trend. However, proper disposal and treatment of domestic sewage/wastewater remains a concern for the province. As sanitation is an essential component of healthy living, it is important that local governments continue to provide sanitary toilets, particularly in rural areas, safe water and proper disposal facilities. Information campaigns are necessary, as well as seeking additional sources of funds for the construction of sewage treatment facilities in addition to the privately-owned and operated facilities.

The provincial government is currently seeking partnerships with private service providers for sewerage system/sewage treatment. Given the costs of the said service, greater private sector participation is needed, including market competition, so that households in the province will have more access to safe and affordable sanitation services.

Moreover, one feasible option is to avail of the National Sewerage and Septage Management Program under the Department of Public Works and Highways (DPWH). Under this scheme, the National Government covers 40 percent of the total cost of the project.

Reference

Provincial Health Office, Environmental Health Services

034 Municipal solid waste

Description

This indicator measures the tonnage of solid waste generated, the proportion being recycled or reused, and volume received in dumpsites or sanitary landfills.

Rationale

Improper waste management have negative impact on human and ecological health as well as the aesthetic and recreational values of coastal areas.

Data Requirements

- Volume of solid waste generated
- Volume of solid waste received in landfills/dumpsites
- Volume of solid waste received at material recovery facilities

Results

The number of open dumpsites in the province has decreased from 11 in 2014 to 0 (zero) in 2016. This is due to the closure and rehabilitation of these disposal facilities starting 2015, in compliance with RA 9003 or the Ecological Solid Waste Management Act of 2000. Eight (8) of the twelve (12) component LGUs of Bataan have proposed to establish a sanitary landfill; however, none have finished the construction or started the operation of such a facility yet.

In the absence of any functional central disposal facilities, the city and municipalities in Bataan resorted to utilizing their central material recovery facilities (MRFs) to store, segregate and process their solid wastes. However, with increasing municipal waste generation, the LGUs further decentralized SWM by requiring *barangays* within their jurisdiction to establish their own *barangay* or cluster MRFs. Consequently, the total number of MRFs in the province increased from 23 in 2014 to 54 in 2016 (**Table 29**).

Table 29. SWM facilities in Bataan Province (2014 and 2016).

SWM Facility	2014	2016
Open dumpsite	11	0
Sanitary landfill	0	0
Materials recovery facility	23	54

As mentioned, the volume of waste generated is increasing, which is mainly associated with urbanization and population growth. In 2015, total waste generation in Bataan is estimated at 287.29 tons/day (**Table 30**). In 2016, total waste generation in the province is placed at 299.32 tons/day. With the closure of dumpsites and limited capacities of MRFs, waste diversion activities (e.g., recycling, composting) among municipalities have slightly increased since 2015, from 1 to 26 percent of waste generated in 2015 to 2 to 30 percent in 2016 (**Table 31**). Accordingly, waste disposed (i.e., brought to residual containment areas in MRFs) decreased over the past years, from 74 to 99 percent of waste generated in 2015 down to 70 to 98 percent in 2016.

Table 30. Waste generation by city/municipality.

LGU	Waste Generation 2015		Waste Generation 2016	
	kg/day	tons/day	kg/day	tons/day
Abucay	9,858.24	9.86	10,027.92	10.03
Bagac	13,246.71	13.25	13,608.18	13.61
City of Balanga	54,700.86	54.70	57,127.73	57.13
Dinalupihan	54,480.00	54.48	56,370.00	56.37
Hermosa	20,664.28	20.67	21,097.33	21.10
Limay	25,108.64	25.11	25,628.38	25.63
Mariveles	25,886.54	25.89	27,670.67	27.67
Morong	10,779.56	10.78	11,488.10	11.49
Orani	7,965.36	7.97	8,058.72	8.06
Orion	33,431.40	33.43	35,021.15	35.02
Pilar	18,358.04	18.36	18,785.20	18.79
Samal	12,811.63	12.81	14,437.42	14.44
Total	**287,291.26**	**287.31**	**299,320.80**	**299.34**

Table 31. Waste diversion and disposal by city/municipality.

LGU	2015		2016	
	Waste Diverted (%)	Waste Disposed (%)	Waste Diverted (%)	Waste Disposed (%)
Abucay	5	95	15	85
Bagac	9	91	15	85
City of Balanga	26	74	30	70
Dinalupihan	20	80	30	70
Hermosa	3	97	5	95
Limay	15	85	20	80
Mariveles	20	80	30	70
Morong	10	90	12	88
Orani	1	99	2	98
Orion	1	99	2	98
Pilar	9	91	20	80
Samal	5	95	20	80

Aside from the establishment and operationalization of MRFs, another key strategy of LGUs that helped increase waste diversion in the province was the implementation of the "No Segregation, No Collection" Policy in five (5) LGUs in the province (Abucay, City of Balanga, Dinalupihan, Limay and Pilar). Waste segregation at source and segregated collection ensured the diversion of biodegradable wastes, which comprise majority of the municipal solid waste generated in the province.

Current monitoring programs of LGUs for SWM include ocular inspections and estimations of waste volume in order to check compliance with RA 9003 and other DENR-EMB directives on SWM (**Table 32**). It is expected that upon approval and adoption of the SWMPs, LGUs will implement more comprehensive monitoring programs as proposed in the plans.

Table 32. Sample SWM monitoring program, City of Balanga.

SWM Program	Indicators	Expected Trend	Responsible Entity	Schedule
Waste segregation	Percentage compliance with "Yes Segregation, Yes Collection" Policy (Households and non-households)	Increasing – 100%	CENRO, Barangays, CPSOs	Monthly
	No. of violation notices issued	Decreasing		
Segregated collection	Percentage compliance with "Yes Segregation, Yes Collection" Policy (Households and non-households)	Increasing – 100%	CENRO, Barangays, CPSOs	Monthly
	No. of violation notices issued	Decreasing		
Bio-waste management (composting and bio-charcoal briquetting)	kg biodegradables collected by city	Decreasing	CENRO, Barangays	Quarterly
	No. of operational composting centers	Static - Increasing		
	Units of output produced	Increasing		
Recycling	kg recyclables collected by city	Decreasing	CENRO, Barangays	Quarterly
	No. of operational MRFs	Increasing - Static		
	Units of output produced	Increasing		
Waste Disposal	Percentage physical accomplishment of construction projects	Increasing – 100%	CEO	Quarterly
	Timeliness of dumpsite rehabilitation, IWMF development	On Time		
IEC	No. of meetings conducted	Increasing – Static	CENRO	Quarterly
	No. of IEC materials produced	Increasing - Static		
	No. of IEC materials distributed	Increasing - Static		

Implications and Recommendations

Solid waste management in the province has seen an improvement from previous years, starting with the closure of dumpsites and the consequent activation of MRFs at the barangay and municipal levels. However, waste diversion is still low due to lack of machineries and equipment for processing solid wastes at a larger scale.

It is thus recommended that the province assist the LGUs in investing on SWM facilities and equipment. In addition, given the inevitability of disposal and the high cost of establishing a sanitary landfill, the province will have to initiate the establishment of a cluster or provincial integrated waste management facility.

References

City of Balanga, Bataan. Ten-year Solid Waste Management Plan of the City of Balanga 2016-2025.
Municipality of Abucay, Bataan. Ten-year Ecological Solid Waste Management Plan 2015-2024.
Municipality of Bagac, Bataan. Ten-year Ecological Solid Waste Management Plan 2014-2024.
Municipality of Hermosa, Bataan. Ten-year Solid Waste Management Plan.
Municipality of Limay, Bataan. Ten-year Solid Waste Management Plan (2014-2024).
Municipality of Morong, Bataan. Ten-year Solid Waste Management Plan.
Municipality of Orani, Bataan. Ten-year Municipal Solid Waste Management Plan.
Municipality of Orion, Bataan. Ten-year Solid Waste Management Plan (2016-2025).
Municipality of Pilar, Bataan. Ten-year Solid Waste Management Plan.
Municipality of Samal. Bataan, Ecological Solid Waste Management Plan 2015-2024.
National Solid Waste Management Commission.

035 Industrial, agricultural and hazardous waste

Description

This indicator measures the quantity of agricultural, industrial and hazardous wastes being generated and properly managed within the local government's jurisdiction.

Rationale

Agricultural, commercial, institutional and industrial sectors generate income and employment but they also generate wastes that may affect human health and livelihoods in communities. Hazardous and toxic wastes (e.g., oily waste, pesticide residues; cleaning compounds; hospital wastes; etc.) are byproducts of various goods, services, processes and systems that customers/citizens demand. The proper management of these wastes is a major challenge to local governments and to sustainable development.

Data Requirements

- Volume of industrial and agricultural wastes generated, handled, treated and disposed
- Volume of hazardous and toxic waste generated, handled, treated and disposed

Results

Available data from PG-ENRO shows that in 2015, an estimated 10,590 kg or 10.59 tons of waste are generated by industrial establishments in the province (**Table 33**). Of this amount, hazardous wastes comprised about 40 percent, which is equivalent to 4,205.20 kg/day or 4.21 tons/day. This included used oil, oil-contaminated materials, busted lamps and bulbs, chemical containers, coal ash, and healthcare wastes.

As industries in Bataan operate based on the Environmental Compliance Certificate (ECC) and permits issued by DENR-EMB Region III, among others, they strictly comply with the condition of having an accredited hauler/treater for the regular handling, treatment and final disposal of 100 percent of their hazardous wastes. The strict compliance of industries with hazardous waste management is maintained due to regular (quarterly) monitoring by the multipartite monitoring team (MMT) of each industry.

Table 33. Industrial waste (domestic and hazardous) generation (2015).

Name of Industry	Type	Location	Domestic Wastes Generated	Hazardous Wastes Generated
GNPower Mariveles Coal Plant Ltd. Co.	Coal power plant	Mariveles	1,867.00 kg/day	344.00 kg/day
PNOC Alternative Fuels Corp.	Petrochemicals	Mariveles	6.67 kg/day	3.00 kg/day (31.3 L/day)
Herma Shipyard Inc.	Shipyard	Mariveles	667.86 kg/day	40.60 kg/day
Petron Bataan Refinery	Petroleum	Limay	ND	ND
Orica Philippines Inc.	Explosives	Limay	690.00 kg/day	170.00 kg/day
Petron Power Plant	Power plant	Limay	1,185.67 kg/day	32.67 kg/day
Philippine Resins Industries, Inc.	Petrochemicals	Limay	444.40 kg/day	3,609.00 kg/day
SMC Global	Coal power plant	Limay	1,331.77 kg/day	-
Bataan 2020 Inc.	Paper mill	Samal	1.35 kg/day	-
Charoen Pokphand Foods Philippines Corp.	Aqua feed mill plant	Samal	191.06 kg/day	5.93 kg/day
Total			**6,385.78 kg/day**	**4,205.20 kg/day**
Grand Total			**10,590.98 kg/day**	

Implications and Recommendations

Industrial/hazardous wastes generated in the province are properly managed by the industries, given that regulations are strictly implemented and monitored by DENR-EMB Region III, in partnership with the provincial government and other local stakeholders. Hospital wastes on the other hand are disposed in a sealed vault underground and monitored by the Department of Health.

The province, for its part, must strengthen its monitoring capabilities, permitting systems, and municipal waste management system to ensure that industrial wastes are always dealt within the environmental management systems of the industries, in compliance with RA 6969, RA 9003 and other pertinent laws and regulations.

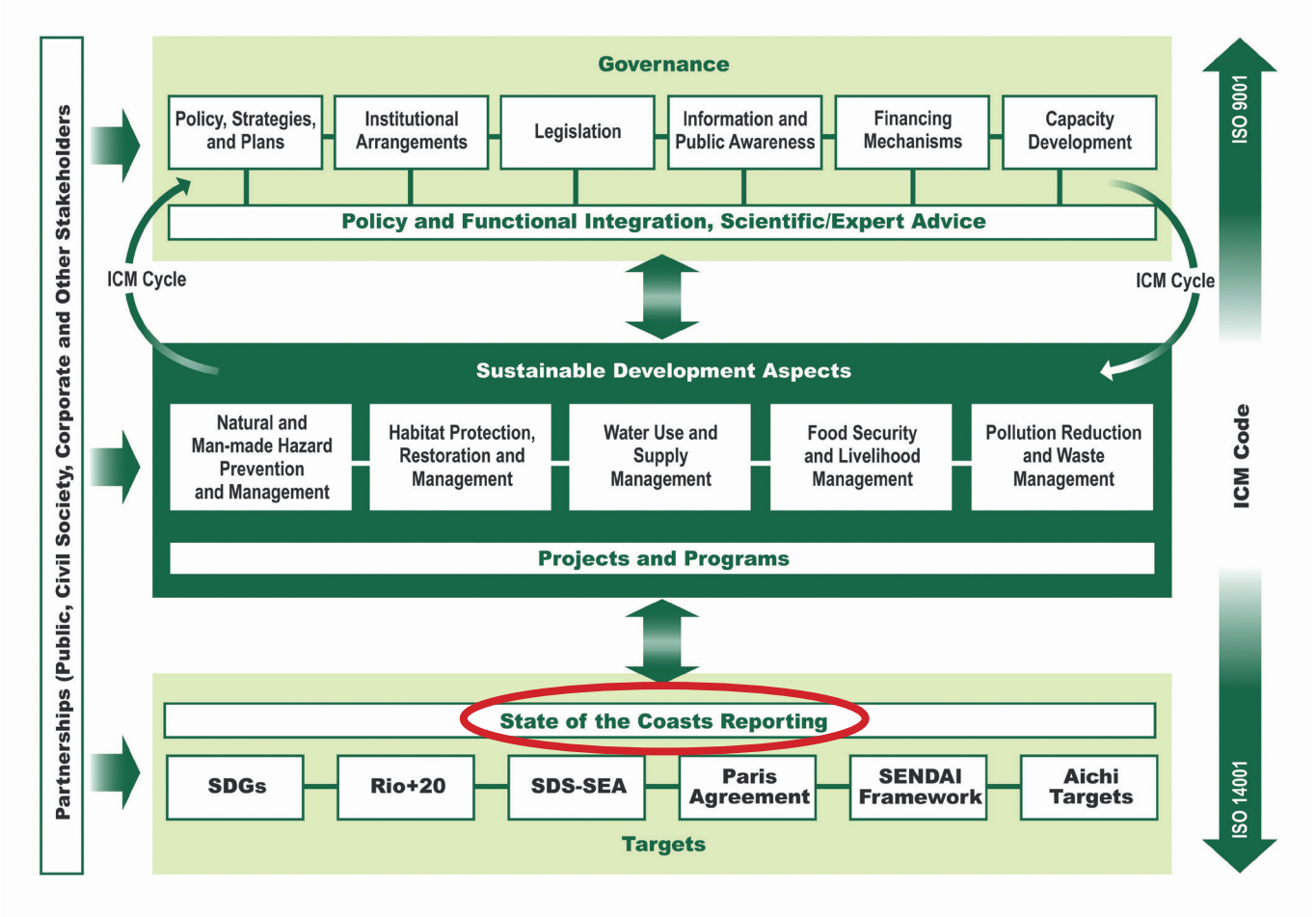
Reference

Provincial Environment and Natural Resources Office (PENRO)

Egrets and heron at Lote, Puerto Rivas, Balanga City

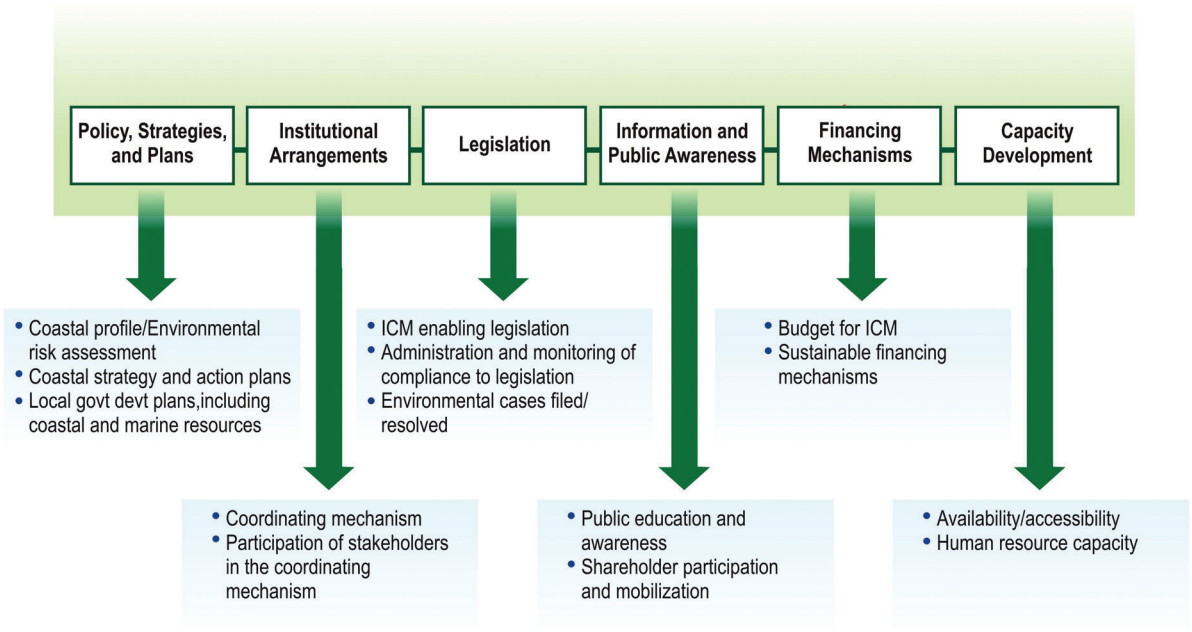
Annexes

Annex 1. Framework for the Sustainable Development of Coastal Areas thru ICM.*

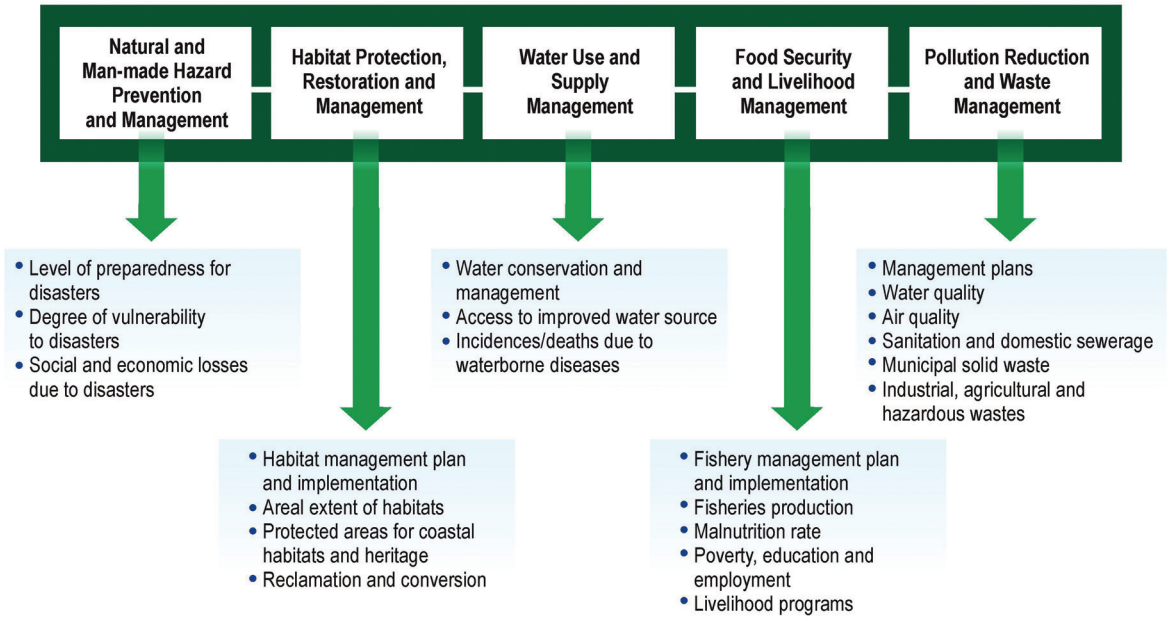


* This section is taken from PEMSEA. 2007. *Partnerships in Environmental Management for the Seas of East Asia (1994-2010): A Regional Mechanism Facilitating Sustainable Environmental Benefits in River Basins, Coasts, Islands and Seas.* PEMSEA IEC Material 2. 80p. Global Environment Facility/United Nations Development Programme/International Maritime Organization Regional Programme on Building Partnerships for the Seas of East Asia (PEMSEA), Quezon City, Philippines.

Core indicators for the governance elements



Core indicators for the sustainable development aspects



Annex 2. Relevant legislations in the municipalities of Bataan Province.

Municipality/City	Ordinance/Resolution No. and Year	Title
1. Balanga City	Resolution No. 98, S' 93 Ordinance No. 03	Regulating fishing and/or fisheries in the Municipality of Balanga, Province of Bataan and other purposes
	City Ordinance No.15, S. 2008	Ordinance strictly regulating smoking at public places, business establishments and while riding public utility vehicles
	Resolution No.101, S. 2001	Accepting and adopting for implementation of the Strategic Agricultural and Fishery Development Zones (SAFDZ) of the City of Balanga, Province of Bataan
	Resolution No.17, S. 2002	Granting the request of the City Agriculture and Fishery Council (CAFC) to acquire two (2) units of PH meter to be utilized for their farmlands
	Resolution No.24, S. 2005	Authorizing Hon. City Mayor Melanio S. Banzon, Jr. to purchase one (1) speedboat for the use of the Bantay Dagat in Barangay Tortugas, City of Balanga, Bataan
	Resolution No. 149, S. 2005	Prohibiting the use of *Panagap* in fishing in all rivers and coastal water within the City of Balanga, and the sale thereof
	Resolution No. 140, S. 2002	Amending some of the pertinent provisions of Municipal Ordinance No. 43, Series of 1997, otherwise known as the Comprehensive Solid Waste Management in the City of Balanga
	Approving City Ordinance No. 09, S. 2008"	Ordinance providing for the rehabilitation of the Talisay River, prohibiting the dumping of garbage and waste materials and other similar activities in the Talisay River and providing penalty therefore
2. Abucay	Municipal Ordinance No. 16, S. 1997	Declaring seven (7) km from Abucay shoreline as fisheries reserve and prohibiting all fishing vessels thereof
	Municipal Ordinance No. 3, S. 1992	*Pambayang kautusan sa pagtatapon ng basura, pagpapataw ng kabayaran at kaparusahan*
	Municipal Ordinance No. 13 S. 1994	*Kautusan sa pag-aalaga ng baboy sa loob at labas ng pamayanan*
	Municipal Ordinance No. 13, S. of 1996	Comprehensive solid waste management ordinance of the Municipality of Abucay
3. Bagac	Municipal Ordinance No. 19, S. '94	An Ordinance declaring unlawful the disposal of nuclear waste in any manner, anywhere within the jurisdiction of this municipality and providing penalties for any violation.
	Municipal Ordinance No. 02, *Serye 1988*	Prohibiting quarry activity on sand, gravel, and stones four hundred meters (400 m) from irrigation canals"
	Municipal Resolution No. 01 S. 64	Requesting the members of the Sangguniang Panlalawigan of Bataan through the Committee of Environmental Protection chaired by Board Member Dante R. Manalaysay to cause the funding of the resurveying of certain areas covered by stewardship contracts and SIFMA of the Department of Environment and Natural Resources at Bgy. Banawang, Bagac, Bataan
	Municipal Resolution No. 02 S. 27	Endorsing the management plan for the Bataan Natural Park to the Protected Area Management Board (PAMB)
	Municipal Resolution No. Blg. 03 S. 09	Requesting the Provincial Environment and Natural Resources – Bataan and the Office of the Community Environment and Natural Resources – Bagac, to temporarily suspend all cutting permits na pansamantalang bawiin ang mga permiso na mamutol ng mga puno sa lugar na tinaniman ng Manila Seedling Bank, Inc. na kanilang ipinagkaloob sa mga ilang tao
	Municipal Ordinance No. 76-4 (5 *(Hunyo 1997)*	Prescribing the use of red lights in fishing vessels and penalizing violation thereof
	Municipal Ordinance No. 76-1	Prescribing rules on cleanliness in the Municipality of Bagac
	Municipal Ordinance No. 15, S. '83	An Ordinance regulating and controlling the discharge of industrial and other wastes into the atmospheric air or body of water within the territorial limits of the Municipality of Bagac for the purpose of abatement and prevention of pollution providing penalties for the violation and for other purposes
	Municipal Ordinance No. 99-04 (17 May 1999)	Prohibiting the collection of aquarium fishes within the municipal waters of Bagac, Bataan

Municipality/City	Ordinance/Resolution No. and Year	Title
	Mun. Ordinance 05-03 (Amending Mun. Ord No. 03-03) (21 March 2005)	"Prohibiting the Operation of *Hulbot-hulbot* or *Kayakas*, baby trawls and BASNIG using fine meshed nets less than 3 cm. Operations of fishing boats 3 gross tons below within a distance of 15 km perpendicular from the shoreline in the coastal areas of Bagac engaged in electro-fishing"
4. Limay	*Kapasiyahan Blg.76 (Disyembre 17,1997)*	*Kapasiyahang nagpapatibay ng pangunahing ordinansa sa Pangingisda at Pangisdaan at Para sa iba pang layunin nauukol sa tubigang pambayan ng Limay, Bataan*
	Pambayang Ordinansa Blg.165, Serye ng 2005 (15 August 2005)	*Ordinansang pambayan na kikilalanin bilang "Limay Fish Sanctuary Zone Ordinance of 2005*
	Kautusan Blg. 83 Serye 1990	*Isang kautusang nag-aalinsunod, nagbabawal o pumipigil sa nag-papawala o nagtatapon ng anumang uri ng dumi ng mga industriya at mga mamamayan sa himpapawid, kalawakan, mga ilog at karagatan sa loob ng nasasakupan ng Bayan ng Limay, Lalawigan ng Bataan, para subaybayan/bawasan at hadlangan o tuluyang pigilin ang polusyon, at naglalapat ng basura sa lumalabag nito at iba pang mga layunin*
	Resolution No. 43	Resolution respectfully requesting CENRO Balanga to institute urgent actions necessary to recognize and grant the claim of the Local Government Unit of Limay over that parcel of land in Lot 637 Limay Cadastre for the establishment of the Municipal Tree Park and for the development of the Biga Natural Springs into a municipal multipurpose water resource
	Kapasiyahan Blg. 53	*Kapasiyahang nagpapatibay ng pagsususog sa ordinansang pambayan bilang 113, pangunahing ordinansa sa pangingisda at pangisdaan at para sa iba pang layuning nauukol sa tubigang pambayan ng Limay*
	Resolution No. 07	Resolution creating the position for a Municipal Environment and Natural Resources Officer (MENRO) who shall be responsible for the planning and implementation of DENR-devolved functions, programs and projects pursuant in Section 17 of RA 7160
	Resolution No. 51	Resolution respectfully requesting Hon. Marcia F. Gesmundo, Acting Director of the EIAB, to release initial funding for the approved phases of the Limay Agro-Forest Development Project for the DOE-administered funds accruing from the CCPP established under DOE ER No. 1-94 and in accordance with DOE Circular No. 95-11-009
	Kapasiyahan Blg. 76	*Kapasiyahan nagpapatibay ng pangunahing ordinansa sa pangingisda at pangisdaan at para sa iba pang layuning nauukol sa tubigang pambayan ng Limay, Bataan*
	Resolution No. 50	Resolution declaring the fishing grounds of the Alangan River down to and including the coastal areas of Barangay Alangan in a state of calamity due to oil spill from Petron Bataan Refinery on June 14, 1999
	Resolution No. 51	Resolution urgently requesting Petron Bataan Refinery to decommission or divert the outfall from the Alangan River that drainage system where the oil spill on June 14, 1999 had occurred
	Resolution No. 63	Resolution strongly adopting the Strategic Agricultural and Fisheries Development Zone (SAFDZ) map of Limay, Bataan in pursuance to Republic Act No. 8435
	Resolution No. 67	Resolution approving the revised scope of the Limay Reforestation Project and endorsing it for review and approval of the watershed management and operations project services of the NPC-MMRC for implementation under the provisions of the DOE-ER No. 1-94
	Resolution No. 34	Resolution respectfully requesting the Department of Environment and Natural Resources to allow the Local Government Unit of Limay to develop the foreshore area of the Alangan River Cove into a multipurpose municipal park
	Resolution No. 36	Resolution creating the position of a Municipal Environment and Natural Resources Officer (MENRO)
	Resolution No. 44	Resolution respectfully requesting the Hon. Antonio H. Cerilles, thru the Hon. Gov. Leonardo B. Roman and the Sangguniang Panlalawigan to include Bataan in the list of priority provinces in the delineation of the boundaries of the permanent forest line
	Resolution No. 46	Resolution of commitment to support the DENR policy on sustainable forest management as the most appropriate and viable approach for managing the country's forest resources
	Resolution No. 57	Resolution giving due recognition to all participating sectoral groups in the Kontra Kalat sa Dagat activities in the Municipality of Limay and confirming their inter-sectoral partnership commitment to the integrated coastal management framework of the Bataan Coastal Care project
	Resolution No. 23	Resolution accepting to host the establishment and operation of the integrated clean fuels and waste-to-energy conversion project of the PNOC-EDC within the existing Petron Refinery Complex and endorsing it to the DENR for issuance of ECC

Municipality/City	Ordinance/Resolution No. and Year	Title
	Resolution No. 33	Resolution endorsing to the Department of Energy the proposed priority projects for the Municipality of Limay, Bataan to be funded by DOE funds provided for and by ER-1-94 as amended
	Resolution No. 50	Resolution requesting the Department of Environment and Natural Resources to identify/allocate the unfunded Parcel II of the then CFP-Limay subproject as site for implementation of the LGU-Limay community-based forest management project
	Municipal Ordinance No. 137	Prescribing rules on domestic animals
	Municipal Ordinance No. 140	*Isang kautusang nagtatakda ng patakaran at pagpapatupad ng pamamahala at pagpapalakad ng pambayang katayan ng hayop (Municipal Slaughterhouse)*
	Resolution No. 86	Resolution respectfully endorsing the Limay integrated forestry establishment project to NPC and DOE for priority funding under the provisions of ER-No. 1-94, as amended and authorizing Mayor Nelson C. David, to enter into and sign all MOAs and or contracts pertaining to this project
5. Mariveles	Municipal Ordinance No.13 S-96	Municipal Fishery Code of Mariveles
	Municipal Ordinance No.14 2001 (25 July 2001)	Amending Municipal Ordinance No.13-S-96 known as the Municipal Fishery Code
	MFARMC Res.10, Series of 2001	Technical description and location of Marine Reserve Number 1 (PNOC Petrochemical Development Corporation, Brgy. Batangas Dos
	Municipal Resolution No.54-2007	Authorizing the Municipal Mayor to sign a MOA for the joint establishment of "artificial reef project," as Livelihood and Environmental Protection Program in the Municipality of Mariveles, particularly at Sitio Marina Area, Barangay Alas-asin, Mariveles, Bataan
	Municipal Resolution No. 098-2007	Approving the establishment of artificial reef at the vicinity of coastal water, South of Sitio Marina, Barangay Alas-asin, Mariveles, Bataan
	Res. No. 071-2008	Resolution approving the installation of artificial reefs (PAYAO) at designated areas in the coastal barangay of Mariveles
	Municipal Ordinance No. 07-S-94	An ordinance on maintaining municipal waters free from pollutants, effluents and other prohibited or dangerous chemicals to marine and human lives
	Municipal Ordinance No. 05-S-95	An ordinance imposing the share of local government units from the proceeds derived by any government agency or government-owned or controlled corporation in the development and utilization of the national wealth, specifically natural fresh water
	Ordinance No. 09-S-96	An ordinance regulating the establishment and operations of quarrying and related milling services in this municipality
	Municipal Ordinance No. 13-S-96	Municipal Fishery Code of Mariveles
	Kautusang Pambayan Blg. 17-98	*Kautusang nagtatalaga ng permanente at maayos na tapunan ng basura ng Bayan ng Mariveles*
	Resolusyon Blg. 477-98	Pagtatalaga ng permanente at maayos na tapunan ng basura ng Bayan ng Mariveles
	Resolution No. 017-99	Respectfully requesting Hon. Gregorio Vigilar, Secretary of the Department of Public Works and Highway (DPWH) for the construction and development of modern port facilities in the town of Mariveles to hasten economic growth and development of the area
	Municipal Ordinance No. 06-99	Prohibiting the dumping of waste refuse, garbage, non-biodegradable objects and other waste materials in any place in the street or other places not designated as dumping place and imposing penalties thereof
	Resolution No. 087-99	Urging the Chief Executive to institute necessary legal action against any person or group who shall commence to implement or continue implementation of any project, plan or program within the Mariveles Lake, shore, coast and surrounding vicinity without previous clearance from the duly constituted authority
	Resolution No. 158-99	Providing relocation site for squatters or informal dwellers in the Municipality of Mariveles
	Municipal Ordinance No. 03-2000	Strictly prohibiting backyard piggeries, poultries and other backyard farming activities within residential areas and providing penalties thereof
	Resolution No. 162-2000	Creating the position of coastal garbage collector along Mariveles Bay

Municipality/City	Ordinance/Resolution No. and Year	Title
	Resolution No. 225-2000	Endorsing the Comprehensive Land Use Development Plan and Zoning Ordinance of the Municipality of Mariveles for review and approval by Provincial Sanggunian
	Resolution No. 243-2000	Respectfully requesting the Department of Environment and Natural Resources (DENR), the Philippine Air Force (PAF), and the National Disaster Coordinating Council (NDCC) to conduct an aerial survey on the mountains and forests of Mariveles
	Resolution No. 264-2000	Resolution expressing strong opposition to the plan of the National Government of using the Municipality of Mariveles as landfill or dumping site of Metro Manila's garbage
	Executive Order No. 002	Creating the Municipal Solid Waste Management Board
	Resolution No. 077-2001	Declaring an Alay Tanim Day, in support to DENR's Environmental Protection Month and hiring of four (4) volunteer workers to look over the trees planted during the program
	Resolution No. 091-2001	Creating a flagship project for the Municipality of Mariveles to be called "Mariveles Town Center Renewal and Expansion Project" that will involve the reclamation of land at the foreshore area adjacent to the existing commercial district, and the modernization and expansion of all infrastructure, public utilities and services, and tourism facilities that may be affected of needed for the project
	Municipal Ordinance No. 14-2001	Amending Municipal Ordinance No. 13-S-96 known as the Municipal Fishery Code of Mariveles
	Resolution No. 153-2001	Joint resolution, encouraging all Mayors of Bataan to oppose the dumping of Metro Manila's waste/garbage in any part of Bataan
6. Morong	Municipal Ordinance No. 10. Series of 2000 (6 March 2000)	Basic Fishery Ordinance No.10
	Municipal Resolution No.39, Series of 2011 (4 July 2011)	Requiring the coastal carangays in the Municipality of Morong, Bataan to identify and establish their own Protected Areas
	Municipal Resolution No.29, S.2005	Resolution enacting an Ordinance declaring Matikis Bay and immediate coastal and areas within the jurisdiction of Morong Municipality, Bataan as eco-tourism zone
	Pambayang Kautusan Blg. 04-93	*Pagbabawal sa lahat ng mga mamamayan na magtapon at maglagay ng mga basura sa mga ilog, sa mga daan, upang mapanatiling malinis ang mga pamayanan sa ikabubuti at kalusugan ng buong Bayan ng Morong, Bataan*
	Pambayang Kautusan Blg. 08-94	*Pagbabawal sa mga may-ari ng mga hayop kalabaw, baka, kabayo, baboy, kambing at aso na magpakawala sa mga publikong lugar, sa mga daan ng Bayan ng Morong. Ipinagbabawal din ang mga pagtatali/pagsusuga ng mga nasabing hayop sa daan National Highway upang mapangalagaan ang mga punong tanim ng clean and green program.*
	Municipal Ordinance No. 04, Series of 1996	An Ordinance prohibiting and penalizing selling/disposing and buying/acquiring public lands or national parks
	Municipal Ordinance No. 04, Series of 1999	Regulating the gathering, shipment, sale and distribution of shellfish within the Municipality of Morong, Province of Bataan
	Municipal Ordinance No. 05, Series of 1999	An Ordinance penalizing unsanitary backyard piggery owners emitting bad odor inimical to the health of neighboring residents
	Municipal Resolution No. 24, Series of 1999	Resolution Enacting Municipal Ordinance No. 06, otherwise known as an Ordinance on DENR "Pawikan Conservation Project" within the Municipality of Morong, Province of Bataan
	Municipal Ordinance No. 10, Series of 2000	Basic Fishery Ordinance of the Municipality of Morong
	Municipal Resolution No. 45, Series of 2000	Resolution expressing approval of the Subic Bay Marine Exploratorium, Inc. project and endorsing the same to DENR (Department of Environment and Natural Resources) for securing an ECC (Environmental Clearance Certificate)
	Municipal Ordinance No. 11, Series of 2000	Comprehensive Solid Waste Management Ordinance
	Municipal Resolution No. 70, Series of 2001	A Resolution approving the establishment of a fish cage project by Alson Aquatic Technologies, Inc. at Subic Bay Freeport Zone
	Municipal Resolution No. 85, Series of 2001	Resolution on the Establishment of Fisheries and Aquatic Resources Management Councils in the Municipality of Morong

Municipality/City	Ordinance/Resolution No. and Year	Title
	Municipal Resolution No. 88, Series of 2001	Resolution Adopting the Comprehensive Land-Use Plan of the Municipality of Morong
	Municipal Resolution No. 16, Series of 2002	Resolution reserving an area within the municipal waters of Morong for the establishment of a mariculture park
	Municipal Resolution No. 36, Series of 2002	Resolution requesting Hon. Secretary Patricia A. Sto. Tomas, Department of Labor and Employment (DOLE) to assist in sourcing out financial assistance to the Municipality of Morong for acquiring two (2) units patrol boat with an estimated amount of four hundred thousand pesos (P400,000.00)
7. Orani	*Kapasiyahan Blg.118 (25 Setyembre 2001) Ordinansa Blg.5*	*Ordinansang ipinagbabawal sa sinuman ang manguha o manghuli ng anumang uring tubig sa pamamagitan ng barilyas, skylab, galadgad, suddos o anumang uring panghuli ng lamang tubig na hinihila o itinutulak ng bangkang de makina, saplad, koryente o sa pamamagitan ng panglalason sa lahat ng tubigan na nasasakupan ng Bayan ng Orani.*
8. Orion	Municipal Ordinance No. 94-20-07 (17 February 1994)	Regulating fishing and/or fisheries in the Municipality of Orion, Province of Bataan and other purposes
	General Municipal Ordinance No.94-20-08 (10 Mar 1994)	Establishing the Orion Kent Fish Sanctuary in the Municipality of Orion, Province of Bataan
	Municipal Ordinance No. 94-020-009 (14 July 1994)	Ordinance amending certain provisions of Municipal Ordinance No. 94-020-007 Basic Fishery Ordinance of the Municipality
9. Pilar	*Ordinansa Blg.19 S.2002 (20 Mayo 2002)*	*Ordinansang nagtatakda ng mga regulasyon ukol sa labinlimang (15) kilometrong pangisdaang tubigan na nasasakop ng Bayan ng Pilar, Bataan*
	Municipal Ordinance No. 2008-04	Ordinance declaring the delineation of boundaries of the Coastal Land and Sea Use Zoning Plan of the Municipality of Pilar
	Municipal Ordinance No.11, S.2005	Ordinance prohibiting the hunting of wildlife within the parameters of Mt. Samat Shrine and the entire barangays of Nagwaling, Diwa, Liyang and the entire coastal areas of Pilar, Bataan
	Resolution No. 60 Series of 2001	Approving Municipal Ordinance No. 17 (An ordinance prohibiting the dumping of waste, refuse, garbage, non-biodegradable materials in the street and other places not otherwise designated as dumping areas and providing penalties thereof)
10. Samal	*Pambayang Kauutusan Blg.08-006*	*Kautusan sa pamamahala sa tahungan sa baybayin ng Bayan ng Samal, Lalawigan ng Bataan*
	Res. No. 06-001	Authorizing the Hon. Rolando Z. Tigas, Municipal Mayor to enter into an MOA by and between the Municipality of Samal and the Provincial Anti-Illegal Fishing Task Force, duly represented by the Governor, Hon. Enrique T. Garcia
	Kapasiyahan Blg.02-058	*Pagsasantabi sa reklamo sa Bataan 20/20 nanggaling ang maruming tubig na naging dahilan ng pagkamatay ng mga isda sa palaisdaan*
	Kapasiyahan Blg.06-025	*Pagpapahayag sa resulta ng ginanap na pagtatalakay sa paksang kahilingang bigyan ng pahintulot ng punong bayan na pumasok sa isang kasunduan ng pagpapaaryenda ng pambayang palaisdaan*

Annex 3. List of trainings from 2000–2013 (PMO and DENR).

Year	Training Title	Organization that sponsored/ conducted the training	
April 3-29, 2000	Regional Training Course on the Development, Implementation and Management of the Coastal and Marine Environmental Projects	GEF/UNDP/IMO PEMSEA	6
November 11-13, 2000	Workshop for the Establishment of Fishery Reserve	Bataan Coastal Care Foundation/Local Government of Mariveles	1
June 4-8, 2001	Advocacy and Communication Planning Workshop	Manila Bay Environmental Management Project/DENR/ UNDP IMO	2
May 2002	Training on IIMS Query System	PEMSEA	
July 31, 2002	Contingent Valuation Method (CVM) Survey Training for Enumerators for the Province of Bataan.	PEMSEA, UNDP, DENR Region III	4
August 19-12, 2002	Coastal Zone Zonation and Sea Use Planning workshop	PEMSEA	
February 18-21, 2003	Training Workshop on Claims, Recovery and Contingency Planning for Oil Spill and Ship Pollution	PEMSEA	
March 3, 2003	ICZUP Plan Orientation Workshop for all MPDCs of Bataan	PEMSEA	
August 19-24, 2003	Regional Training Workshop on the Development of Coastal Use Zoning Plan and Institutional Framework for Implementation		
August 2003	Planning and Resource Mobilization/Social Mobilization and IEC for Poverty Alleviation	La Liga Policy Institute	
April 26-28, 2005	4th Forum of Regional Network of Local Governments Implementing Integrated Coastal Management Bali, Indonesia	PEMSEA	
June 8-9, 2005	Coastal Use Zoning Plan and Inception Workshop		65
January 26-27,2006	Educational Field Trip (Lakbay Aral) of PCC members to Mangrove Reforestation Project of Mirant Phil Foundation at Pagbilao, Quezon.		
November. 7-8, 22-23, 2006	Capacity Building Workshop on Coastal Zoning and Sea Use Plan for the Province of Bataan.	PEMSEA, BATAAN Coastal Care Foundation	
October 15-19, 2007	Training on the Introduction to GIS Using Manifold System.	Bataan Provincial Government/ NAMRIA	4
	National Consultative Workshop for Manila Bay		
	Oil Spill Contingency Plan Workshop		
	Orientation Workshop for Writers Institutionalizing ICM		
	National Forum on Partnership and Governance on Coast/ Oceans and Islands		
	Coastal Use Zoning Workshop in Bataan		
	Coastal Use Zoning Plan Workshop in Naic, Cavite		
	East Asian Seas Congress (PR China) December 2006		

Year	Training Title	Organization that sponsored/ conducted the training	
2008	Training on Participatory Coastal Resource Assessment on Coastal Resources Management.	DENR Region III	
November 2008	PNLG Forum Sihanoukville, Cambodia	PEMSEA	
July 7-8, August 18,19, 2011	Training on Local Oil Spill Preparedness and Response for the Province of Bataan	Bataan Coastal Care Foundation, DENR Region III, Mepcom PCG	
November 19–21, 2009	Regional Training on the Implementation and Enforcement of Land and Sea Use Zoning	PEMSEA	2
June 18-19, 2009	Orientation Seminar on Integrated Coastal Management and Sea Use Zoning for Manila Bay Region	DENR - RBCO	
November 23-27, 2009	East Asian Seas Congress 2009, Manila Philippines	PEMSEA	4
April 2010	International Workshop on Gender Technology and Climate Change Adaptation and Mitigation	Approtech Asia	
	Integrated Environmental Monitoring Plan for Manila Bay	PEMSEA, RBCO, DENR	
	IIMS Training for NCR and Region III	PEMSEA, RBCO, DENR	
	Workshop on Updating/Preparation of 10 years SWM Plan for LGUs in Manila Bay Region	RBCO, DENR and NSWMCI	
	Law Enforcement Seminar	OPA and BFAR Region III	
	ICM Training for scaling up of sites in Region III for Bataan, Pampanga, and Bulacan	PEMSEA and DENR	
	South China Sea Seascape Visioning Workshop	Conservation International	
	Marine Mammal Stranding Response	PVO and PMMSN	
May 29, 2010	Manila Bay Integrated Information Management System (IIMS) Re-Echo Training	DENR Region III	
October 6-7, 2010	Integrated Coastal Management (ICM) Orientation Workshop for Region III	DENR-Region III	
November 21-24, 2010	PNLG Forum at Chonburi, Thailand	PEMSEA	
April 11-15, 2011	Training Workshop on GIS for Manila Bay Project	DENR-Region III	40
May 24-27, 2011	Refresher Course on Participatory Coastal Resource Assessment (PCRA) with Emphasis on Situational Analysis and Enhancement of the Integrated Coastal Management (ICM) Plans for DENR Field Implementers	DENR-Protected Areas, Wildlife and Coastal Zone Management Service	
July 25-27, 2011	PNLG Forum at Dongying, Peoples Republic of China	PEMSEA	
August 16-17, 2011	Coastal Land and Sea Use Zoning Orientation for Local Government Units of Bulacan and Pampanga	DENR Region III	
August 18-19, 2011	Training on Local Spill Preparedness and Response	DENR-MBCO-PMO-PCG	
November 22-24, 2011	Orientation Workshop on Pawikan Conservation and Management	DENR PAWB	2
November 27-30, 2011	Writeshop on the Area-based Rehabilitation Plan for the Manila Bay Region and Conduct of MPBCS Yearend Assessment	DENR-MBCO	
January 19-20, 2012	1st West Philippine Sea National Stakeholders Conference		

Year	Training Title	Organization that sponsored/ conducted the training	
January 22-27, 2012	COBSEA Regional Workshop on SIDA-supported projects on Spatial Planning in the Coastal Zone		1
March 13-16, 2012	Four (4) days intensive GIS Training	Provincial Government of Bataan and MAAP	4
May 25, 2012	Isher Database Training for Local Government Units (LGUs) within the Manila Bay Provinces–Region 3	DENR-MBCO	
June 14-15, 2012	Area-based Management Workshop for Manila Bay Project	DENR Region III	
	Basic Geographic Information System (GIS) Operation and Global Positioning System (GPS)		
July 25-27, 2012	Training on DENR Charcoal Briquetting Technology	DENR-MBCO	
	Training Workshop on the Integration of Manila Bay IIMS Database in Region 3, 4A and NCR as well as ICM sites In Bataan and Cavite		2
Octtober 29-30, 2012	Northern Luzon Cluster Consultation/Workshop on the Review and Updating of the National Tourism Strategy (NES) and Action Planning	DENR-Protected Areas and Wildlife Bureau	
January 22-24, 2013	Marine Protected Area Network Forum for West Philippine Sea	Conservation International	
	State of the Coast Inception Workshop for the Province of Bataan		
February 11-14, 2013	Basic Intermediate Incident Command System	PDRRMC	1
February 20-22, 2013	Training to IIMS Query system and Linkage to GIS (IIMS Module II)	PEMSEA	
February 22,2013	Integrated Information Management System	PEMSEA	2
March 6-8, 2013	Re-Echo training on Manila Bay – Integrated Information Management System (IIMS module II)	PEMSEA	1
March 12-13, 2013	Development of Strategic Action Plan (SAP) for Marine Protected Areas in the West Philippine Sea (WPS)	Conservation International/ UNEP-COBSEA	1
April 23, 2013	Flipinnovation on Coral Reef Restoration for Bataan	DOST and BPSU	2
June 6-7, 2013	National Collaborative Planning and Consultative Workshop on the GEF/UNDP/PEMSEA Project (2014-2019) Scaling up on the Implementation of SDS-SEA in the Philippines	PEMSEA	2
May 20-22, 2013	Strategic Planning Workshop for Marine Protected Area Network for West Philippine Sea		