



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 Cavite, Philippines

Prepared by: Provincial Government of Cavite, PEMSEA

## Component D: Doc: D1-2

Partners:



August 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 Cavite Province



The Provincial Government of  
Cavite, Philippines



Cavite is ISO 9001 certified



# State of the Coasts of Cavite Province



The Provincial Government of  
Cavite, Philippines



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# State of the Coasts of Cavite Province

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August 2017

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Republic of the Philippines  
Province of Cavite

Office of the Governor  
Trece Martires City

*Message*



It is with pride that I present the State of the Coasts of the Province of Cavite (2002–2015). This work is a product of the diligent and careful labor of our tireless personnel in the Provincial Government of Cavite, and a testament to the collective efforts the government and the various sectors in the community have exerted to protect and conserve our coasts.

Cavite has become a center of industrial development in the country, primarily due to its proximity to the nation's capital and its robust human resources. With that, we have consistently maintained a commitment not only in fostering investments but also in ensuring that the progress does not come at the cost of the environment. As we recognize the importance of coastal conservation and the invaluable role our waters play in the local economy, we have always made environmental protection a priority in leading the province. Our Provincial Development and Physical Framework Plan provides policies on the proper use of land and the environment, while the Integrated Coastal Management Division of our environment office remains hard at work to study, evaluate, and implement programs for the efficient management and protection of our coasts.

Through this document, we have gained significant insights on the work we have done so far and the work yet to be done in order to ensure that the next generations of Caviteños benefit from our natural resources. The job to ensure sustainable development, particularly in our coastal areas, remains a formidable one, and we, in the provincial government, have nothing less than passion to meet this challenge head on.

We are grateful to have the Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) for guiding us throughout the task of protecting our seas. With our strong commitment to this mission, the dedication of our officers and PEMSEA's continuous support, we are confident that the State of the Coasts of the Province of Cavite will only continue to progress in the years to come.

ATTY. JESUS CRISPIN REMULLA  
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 Cavite 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 Cavite 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 Cavite 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 Cavite, 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.

**Habib N. El-Habr, PhD**  
Coordinator

**Global Programme of Action for the Protection of the  
Marine Environment from Land-Based Activities  
UN Environment**



**Partnerships in Environmental Management  
for the Seas of East Asia**



*Message*

I would like to commend the Provincial Government of Cavite and its partner national and local government agencies, academe, nongovernmental organizations and relevant stakeholders for their commitment and effort in preparing the first State of the Coasts (SOC) report of the Province of Cavite.

This SOC report provides a comprehensive assessment of the socioeconomic and environmental status of Cavite Province from 2002-2015, including the management interventions and implementing arrangements that have been put in place for the sustainable development of the province's coastal and marine areas. The effectiveness and success of the Cavite integrated coastal management (ICM) program can only be properly evaluated through systematic data gathering and analysis, as well as stakeholder consultation and participation. This approach applied in the SOC reporting system is important in order to determine both the changes that are occurring in the province's ecosystem and the people's perspectives and perceptions of the value and benefits of those changes, and the management program itself.

With more than a decade of ICM program implementation, the report highlights the positive achievements of Cavite Province in putting in place the governance mechanisms (i.e., enabling policies and legislation, institutional and multisectoral mechanisms, stakeholder participation and awareness building, capacity building, and financing) necessary for the sustainable development and management of its coastal and marine areas. The report also highlights the significant progress of the province in implementing management programs to address various priority concerns, including natural and man-made hazards, habitat protection and restoration, water use and supply, fisheries, food security and livelihoods, and pollution reduction and waste management.

It can also be gleaned from the report how strong leadership support and support from the relevant stakeholders, scientific community and academe, government agencies, and other entities, were instrumental in the successful implementation of ICM activities. This is working to the province's advantage and should be nurtured and strengthened.

The SOC reporting system allows local government to track its progress towards achieving its sustainable development targets. To fully realize the objectives and benefits of the Cavite ICM program, PEMSEA encourages the Provincial Government of Cavite to incorporate the SOC reporting system into its regular monitoring and reporting process. This will serve as basis for the continual evaluation and refinement of the ICM program and, ultimately, facilitate the achievement of the sustainable development targets for the marine and coastal areas of the province.

I believe that the significant and useful information contained in this report would be of great use to the general public, environmental managers, and policymakers of Cavite, all of whom have a stake in the sustainable development of the province's rich coastal and marine resources.

Congratulations!

**Stephen Adrian Ross**  
Executive Director  
PEMSEA

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# List of Abbreviations and Acronyms

<b>ACENRO</b>	–	Association of Cavite Environment and Natural Resources Officers	<b>DO</b>	–	Dissolved Oxygen
<b>AIP</b>	–	Annual Investment Plan	<b>DOST</b>	–	Department of Science and Technology
<b>AO</b>	–	Administrative Order	<b>DPWH</b>	–	Department of Public Works and Highways
<b>BFAR</b>	–	Bureau of Fisheries and Aquatic Resources	<b>DRR</b>	–	Disaster Risk Reduction
<b>BFARMC</b>	–	Barangay Fisheries and Aquatic Resources Management Council	<b>EMB</b>	–	Environmental Management Bureau
<b>BOD</b>	–	Biochemical Oxygen Demand	<b>EO</b>	–	Executive Order
<b>BWSA</b>	–	Barangay Waterworks and Sanitation Association	<b>GEF</b>	–	Global Environment Facility
<b>CALABARZON</b>	–	Cavite, Laguna, Batangas, Rizal, Quezon	<b>GPS</b>	–	Global Positioning System
<b>CAVITEX</b>	–	Cavite Expressway	<b>ICC</b>	–	International Coastal Cleanup
<b>CBD</b>	–	Convention on Biological Diversity	<b>ICM</b>	–	Integrated Coastal Management
<b>CCA</b>	–	Climate Change Adaptation	<b>ICP</b>	–	Incident Command Post
<b>CEC</b>	–	Cavite Environment Code	<b>IEC</b>	–	Information, Education, Communication
<b>CEP</b>	–	Coastal Environment Profile	<b>IFARMC</b>	–	Integrated Fisheries and Aquatic Resources Management Council
<b>CFMP</b>	–	Cavite Fisheries Management Plan	<b>IIMS</b>	–	Integrated Information Management System
<b>CICMP</b>	–	Cavite Integrated Coastal Management Program	<b>IMO</b>	–	International Maritime Organization
<b>CIWRMMP</b>	–	Cavite Integrated Water Resources Management Master Plan	<b>IRA</b>	–	Internal Revenue Allotment
<b>CLUP</b>	–	Comprehensive Land Use Plan	<b>IYRR</b>	–	Imus-Ylang-Ylang Rio Grande Rivers
<b>CLUZR</b>	–	Cavite Land and Coastal Use Zoning Report	<b>IWRMP</b>	–	Integrated Water Resource Management Program
<b>CLSUZP</b>	–	Coastal Land and Sea Use Zoning Plan	<b>JICA</b>	–	Japan International Cooperative Agency
<b>CMR</b>	–	Cañas Maalimango River	<b>LDRRMF</b>	–	Local Disaster Risk Reduction and Management Fund
<b>CRM</b>	–	Coastal Resource Management	<b>LDRRMO</b>	–	Local Disaster Risk Reduction Management Office
<b>CSO</b>	–	Civil Society Organization	<b>LGU</b>	–	Local Government Unit
<b>CSR</b>	–	Corporate Social Responsibility	<b>MAO</b>	–	Municipal Agriculture Office
<b>CvSU</b>	–	Cavite State University	<b>MBEMP</b>	–	Manila Bay Environmental Management Project
<b>DA</b>	–	Department of Agriculture	<b>MBOSCP</b>	–	Manila Bay Oil Spill Contingency Plan
<b>DAO</b>	–	DENR Administrative Order	<b>MDG</b>	–	Millennium Development Goals
<b>DENR</b>	–	Department of Environment and Natural Resources	<b>MENRO</b>	–	Municipal Environment and Natural Resources Office
<b>DILG</b>	–	Department of Interior and Local Government	<b>MFARMC</b>	–	Municipal Fisheries and Aquatic Resources Management Council
			<b>MLD</b>	–	Million liters per day

<b>MLGU</b>	–	Municipal Local Government Unit	<b>PG-ENRO</b>	–	Provincial Government – Environment and Natural Resources Office
<b>MOA</b>	–	Memorandum of Agreement	<b>pH</b>	–	Potential of Hydrogen
<b>MPA</b>	–	Marine Protected Area	<b>PHO</b>	–	Provincial Health Office
<b>MRF</b>	–	Materials Recovery Facility	<b>PLGU</b>	–	Provincial Local Government Unit
<b>NAMRIA</b>	–	National Mapping and Resource Information Authority	<b>PMO</b>	–	Project Management Office
<b>NDRRMC</b>	–	National Disaster Risk Reduction and Management Council	<b>PNLG</b>	–	PEMSEA Network of Local Governments for Sustainable Coastal Development
<b>NGA</b>	–	National Government Agency	<b>PNP</b>	–	Philippine National Police
<b>NGOs</b>	–	Nongovernmental Organizations	<b>PO</b>	–	People’s Organization
<b>NIPAS</b>	–	National Integrated Protected Areas System	<b>PPDO</b>	–	Provincial Planning and Development Office
<b>NSO</b>	–	National Statistics Office	<b>PPP</b>	–	Public-Private Partnership
<b>OPA</b>	–	Office of the Provincial Agriculturist	<b>PSWDO</b>	–	Provincial Social Welfare and Development Office
<b>PAGASA</b>	–	Philippine Atmospheric, Geophysical and Astronomical Services Administration	<b>PSWMB</b>	–	Provincial Solid Waste Management Board
<b>PCC</b>	–	Project Coordinating Council	<b>RA</b>	–	Republic Act
<b>PCG</b>	–	Philippine Coast Guard	<b>SAFDZ</b>	–	Strategic Agriculture and Fishery Development Zone
<b>PCLEDO</b>	–	Provincial Cooperative, Livelihood and Entrepreneurial Development Office	<b>SDSSEA</b>	–	Sustainable Development Strategy for the Seas of East Asia
<b>PEMSEA</b>	–	Partnerships in Environmental Management for the Seas of East Asia	<b>SEPP</b>	–	Socio-Economic and Physical Profile
<b>PDPFP</b>	–	Provincial Development and Physical Framework Plan	<b>SOC</b>	–	State of the Coasts
<b>PDRRMC</b>	–	Provincial Disaster Risk Reduction and Management Council	<b>SWM</b>	–	Solid Waste Management
<b>PDRRMF</b>	–	Provincial Disaster Risk Reduction and Management Fund	<b>TSP</b>	–	Total Suspended Particulates
<b>PENRO</b>	–	Provincial Environment and Natural Resources Office	<b>TSS</b>	–	Total Suspended Solids
<b>PEZA</b>	–	Philippine Economic Zone Authority	<b>UNDP</b>	–	United Nations Development Programme
<b>PG-COPS</b>	–	Provincial Government – Cavite Office for Public Safety	<b>UNEP</b>	–	United Nations Environment Programme
			<b>UNFCCC</b>	–	United Nations Framework Convention on Climate Change
			<b>WQMA</b>	–	Water Quality Management Area
			<b>WSSD</b>	–	World Summit on Sustainable Development
			<b>WTE</b>	–	Waste-to-energy

# Acknowledgments

The *State of the Coasts* baseline report for Cavite Province was initiated by the Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) in partnership with the ICM Division of the Provincial Government – Environment and Natural Resources Office (PG-ENRO) and in collaboration with the following government agencies, scientific community, nongovernmental organizations, the private sector and other stakeholders:

- Governor's Office
- Provincial Government-Environment and Natural Resources Office (PG-ENRO)
- Office of the Provincial Agriculturist (OPA)
- Provincial Planning and Development Office (PPDO)
- Provincial Engineering Office (PEO)
- Provincial Government – Cavite Office for Public Safety (PG-COPS)
- Provincial Information and Community Affairs Department (PICAD)
- Provincial Health Office (PHO)
- Provincial Social Worker Development Office (PSWDO)
- Department of Environment and Natural Resources (DENR)
- Cavite State University (CvSU)
- City/Municipal offices of the following local government units:
  - Alfonso
  - Amadeo
  - Bacoor City
  - Carmona
  - Cavite City
  - Dasmariñas
  - General Emilio Aguinaldo
  - General Mariano Alvarez
  - General Trias City
  - Imus City
  - Indang
  - Kawit
  - Magallanes
  - Maragondon
  - Mendez
  - Naic
  - Noveleta
  - Rosario
  - Silang
  - Tagaytay City
  - Tanza
  - Ternate
  - Trece Martires City
- People's organizations and other stakeholders:
  - Association of Cavite Environment and Natural Resources Officers (ACENRO)
  - IFARMC
  - MFARMC

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# Introduction

## What is Integrated Coastal Management?

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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 use of limited space and resources (Chua, 2006).

## What is a State of the Coasts Report?

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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 being 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 forces 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?

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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?

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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.

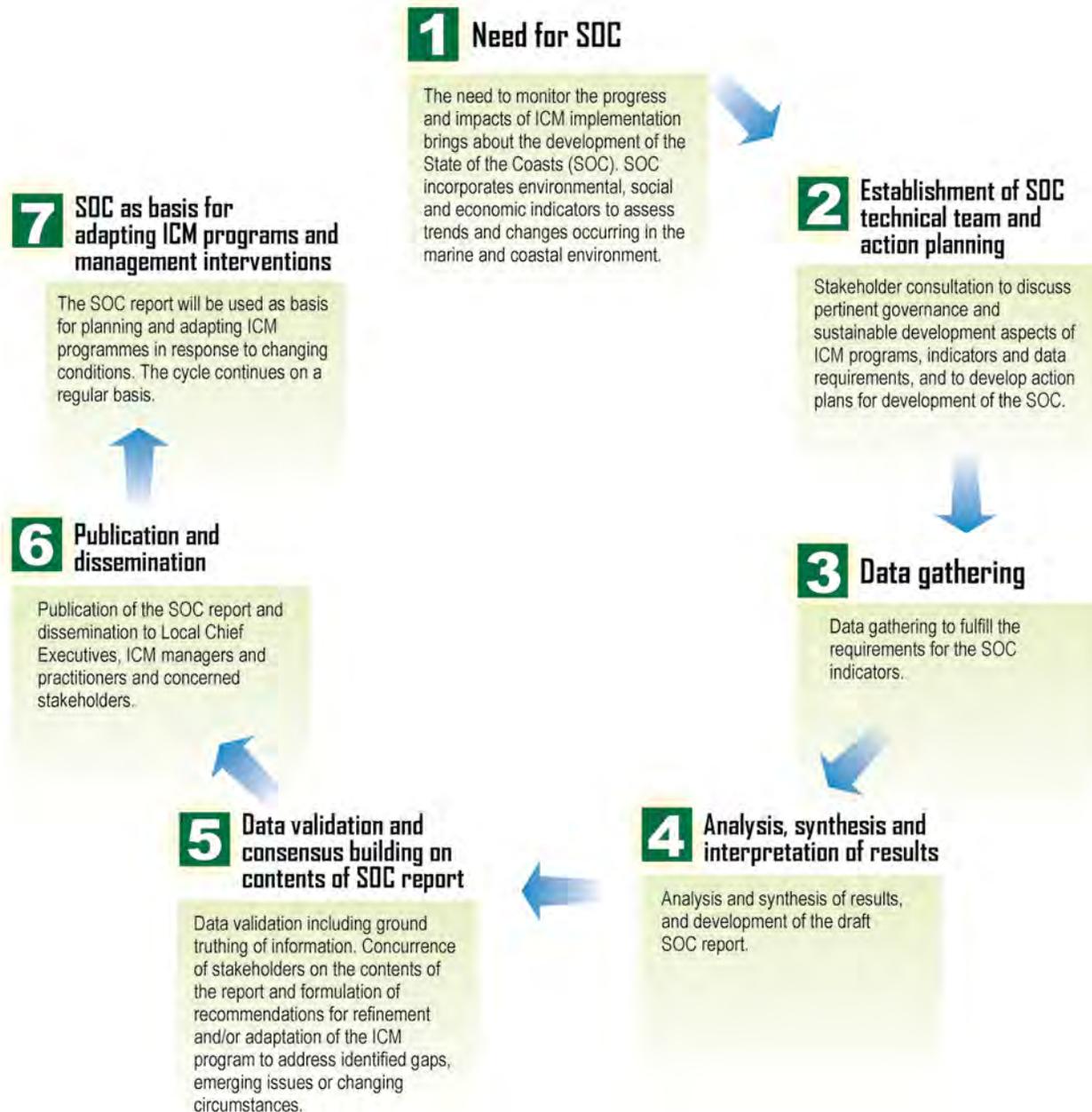
### Reference

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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.

# Guide to SOC Development

## Development of the State of the Coasts Report for Cavite Province



## Core Indicators for SOC Reporting for Cavite Province

Category	SOC Code	Indicator	Trend* (2002–2015)
<b>Governance</b>			
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	
<b>Sustainable Development Aspects</b>			
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* (2002–2015)
<b>Sustainable Development Aspects</b>			
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



*Photo by Maragondon Tourism Office*

# Executive Summary

The State of the Coasts of Cavite Province, Philippines, was developed to assess and analyze the progress, achievements and impacts of ICM implementation in the province. It seeks to provide information on the changing social, economic and environmental conditions in the province and to determine the scope and effectiveness of coastal management programs that have been implemented. The report, in particular, aims to evaluate the governance mechanisms and management interventions that have been put in place and provide recommendations where improvements are necessary and critical. The SOC report may be refined and updated through time to monitor trends, changes and developments in the coastal areas of Cavite and to adopt the necessary policies and management strategies in response to these changes.

This SOC report, which covers the period 2002-2015, was prepared through the combined efforts of various stakeholders including national, provincial and city/municipal government agencies, nongovernmental organizations (NGOs), people's organizations (POs), the private sector and the academe.

The data and information contained in this report were obtained from concerned provincial departments, city/municipal environment and natural resources offices of the 23 cities and municipalities, national agencies, academic institutions as well as through site visits and interviews with both government and nongovernment stakeholders and entities. Available data and information were consolidated, reviewed and analyzed and presented to the relevant stakeholders for concurrence during the validation workshop prior to the drafting of the SOC report. The final SOC Report was presented during the TWG meeting and public consultation on November 25, 2016 in Trece Martires City, Cavite, Philippines, where comments, suggestions and recommendations were considered in refining the report.

The major findings and recommendations are summarized in this section.

## Governance of Marine and Coastal Resources in the Province of Cavite

### Policies, Strategies and Plans

Results of coastal surveys, assessments and profiling that were conducted in Cavite Province have provided valuable information in the development of the Cavite Sustainable

Development Strategy (CSDS), a long-term strategic framework for the integrated management of the province's coastal and marine resources and environment and the coastal land and sea use zoning plan (CLSUZP), which enhances the spatial planning of the province by resolving use conflicts and promoting the rational use of the coastal areas and resources.

The province has demonstrated its commitment to adopt an integrated approach for the sustainable development of its marine and coastal areas through the alignment and integration of the CSDS and CLSUZP and other elements of the ICM program into the local government's development plans such as the Cavite Annual Investment Plan (AIP) and Provincial Development and Physical Framework Plan (PDPFP 2011-2020). However, there is still a need to assess and align the CLUPs and various sectoral plans and programs, including the preparation of CLSUZPs at the municipal level to facilitate integration and coordination. In addition, as an essential component of the ICM program, it is imperative that the province adopts the CSDS and CLSUZP to ensure their implementation.

### Institutional Arrangements

There exists a functional interagency and multisectoral coordinating mechanism comprising of the ICM Provincial Council, ICM city/municipal councils and the Project Management Office (PMO). The ICM provincial and city/municipal councils serve as management bodies and provide the necessary policy direction for the ICM program. The PMO on the other hand serves as the secretariat which is tasked to oversee the day-to-day operations of the ICM program. In particular, the PMO develops the ICM work plan and budget for submission to and approval by the ICM Provincial Council.

The PMO has been institutionalized and renamed the ICM Division of the Cavite Provincial Government – Environment and Natural Resources Office (PG-ENRO) in 2005 pursuant to Section 51 of the Cavite Environment Code (2008). The ICM Division is mandated to prepare and coordinate the ICM program and guide the coastal municipalities in delineating, establishing, managing, maintaining and protecting their respective municipal waters. It is also involved in facilitating and implementing projects identified by the ICM provincial and municipal councils.

The ICM Division enabled close coordination and collaboration with government agencies at the national and local levels and with other stakeholders regarding projects and activities for the management of the province's marine and coastal resources. However, local governments should endeavor to strengthen the operations of the Cavite ICM Division and ICM city/municipal councils through capacity building and enhanced financial, technical and logistical support. Moreover, adequate administrative resources — staff, budget and equipment — are important to oversee, guide and coordinate the implementation of coastal strategies and action plans. It is important to ensure that meetings are regularly conducted to discuss the progress made and identify constraints on program implementation.

## Legislation and Enforcement of Laws

The Cavite Environment Code (Provincial Ordinance No. 001-S-2008) was legislated to guide the local government units (LGUs) in formulating and implementing programs to safeguard and conserve land, water, marine, forest and other natural resources of the province. Its ICM-related provisions include the protection and rehabilitation of mangroves; water resources utilization and management; protection of watersheds; water quality monitoring; protection of riverbanks and easements; enforcement of fishery laws in municipal waters; extension and onsite research services and facilities related to fishery activities such as aquaculture structures; formulation, planning and implementation of the ICM program; and coastal tourism development and promotion.

Legislation creating the coordinating mechanisms and coordinating office has been enacted. The coastal municipalities have also enacted ICM-enabling legislations. These ordinances cover fishery, utilization of natural resources, establishment of marine protected areas (MPAs), pollution, and solid waste management, among others. Public hearings involving concerned stakeholders were conducted in the course of developing these ordinances. The Municipal Fisheries and Aquatic Resources Management Councils (MFARMCs) and Barangay Fisheries and Aquatic Resources Management Councils (BFARMCs) help disseminate information on fishery-related legislations through their regular meetings.

Strict compliance monitoring, however, needs to be improved. This requires enhancing the capacity of local authorities in law enforcement and compliance monitoring, including data recording and management.

## Information and public awareness

The province recognizes the importance of conducting regular information, education and communication (IEC) campaigns to inform the public of the environmental issues and concerns and the actions being undertaken by the local government. Aside from IEC campaigns conducted prior to actual simultaneous

river and coastal cleanups held annually every September, tree-planting activities are part of the regular public awareness and mobilization programs of the province. The fishers' organizations participate in information dissemination during the conduct of regular assemblies in their respective areas. Seminars and lectures on environmental laws, solid waste management, climate change adaptation, coastal cleanup, mangrove rehabilitation, river rehabilitation and trainings on environmental leadership are also held in some coastal municipalities. Participants included students and faculties, barangay residents, senior citizens, women and youth organizations as well as private sector representatives. Public hearings and consultations are also held prior to the passage of local legislations at the provincial and municipal levels.

These public awareness programs and activities have created a sense of responsibility and ownership of the ICM program. IEC campaigns also enabled the public to appreciate the management interventions being undertaken by the local governments and other organizations involved in the ICM program.

## Capacity Development

The number of staff and budget for ICM program implementation have steadily increased over the years. Since the establishment of the ICM program in 2004, the province has been conducting ICM training for staff at the provincial and municipal levels. However, human resources with capacities in coastal management are not evenly distributed among the coastal municipalities. Some municipalities have insufficient data regarding staff and budget allocation, access to training facilities and programs as well as technical resources.

Apart from developing a roster of ICM experts at the provincial and municipal levels, it is recommended that the provincial and municipal governments seek partnership arrangements with national agencies and international organizations to create an ICM learning network. Local experts with experience in ICM implementation may also be tapped to conduct trainings and impart knowledge and experiences in coastal management. A provincial ICM training center may also be established to serve as the training arm of the province for ICM capacity development.

## Financing Mechanisms

The commitment of local governments to sustainable development of the coasts is reflected through the continuous allocation of financial resources. It can be noted that the budget of the provincial and municipal governments for ICM implementation has increased through the years, and were utilized for the implementation of various ICM activities, including capacity building of ICM coordinators and participation to the PEMSEA Network of Local Governments for Sustainable Coastal Development (PNLG). However, some coastal municipalities

have no available data on budget allocation for ICM. Thus, it is recommended that the local governments should properly report and track their respective budget allocations, expenditures and their contribution to ICM goals and targets.

The LGUs should also endeavor to generate additional funds and not solely depend on the regular allocated budget from the national government in the form of the Internal Revenue Allotment (IRA). The participation of private companies through their Corporate Social Responsibility (CSR) programs may also be sought. The imposition of environment user's fees and penalties, which is within the legal authority of LGUs, may also be utilized for the protection of the environment. However, all PPP projects and undertakings must be guided by the principles of good governance and transparency.

## **Sustainable Development Aspects of Marine and Coastal Management in the Province of Cavite**

### **Natural and Man-made Hazard Prevention and Management**

Cavite is a hazard-prone province. The Cavite Provincial Disaster Risk Reduction and Management Plan (2011-2016), Cavite Contingency Plan (2012), and the Provincial Physical Development and Framework Plan (2011-2020) revealed that the province is vulnerable to hydrometeorological (floods, rainfall-induced landslides and storm surges) and geological hazards (ground shaking, liquefaction, tsunamis, ground ruptures and earthquake-induced landslides) mainly due to its geographical location.

In compliance to Republic Act 10121 (Disaster Risk and Reduction Act of 2010), Cavite Province re-organized the Provincial Disaster Risk Reduction and Management Council (PDRRMC), by virtue of Executive Order No. 2 – S 2011 to further strengthen the province's capacity to build disaster-resilient communities, to institutionalize measures for reducing disaster risks and to mitigate the effects of climate change. The Cavite Office of Public Safety (COPS) was also created, wherein a specific division was tasked to focus on disaster risk reduction and management and climate change adaptation initiatives. The PDRRMC, with the approval of the Provincial Development Council, has identified projects and programs to be covered by the PDRRM Fund, which corresponded to five percent (5%) of the province's total revenue to provide the necessary logistical support to lessen the impacts of natural and man-made hazards and disasters in Cavite.

The organization of the PDRRMC and COPS has rendered the province adequately prepared to respond to disasters. It is recommended that the province and municipalities should continue to improve and strengthen their capacities to respond to disasters both at the operational and institutional levels. The province and municipalities also need to augment equipment

to monitor key parameters related to disaster risk reduction and management. Strengthening the development and implementation of community-based disaster risk reduction and management programs may supplement the local government's DRR efforts and help reduce the number of casualties during extreme events.

### **Habitat Protection, Restoration and Management**

Cavite Province is endowed with rich coastal habitats. However, due to the transformation of the province from rural and agricultural to urban and industrialized, this has resulted to a decrease in the areal coverage of important coastal habitats such as mangroves, coral reefs and mudflats. The city and municipal governments have declared several areas within their jurisdictions as protected areas in response to the continuing threat brought about by rapid urbanization. In particular, areas that are designated for protection come in the form of fish sanctuaries, fishery reserves and MPAs with supporting ordinances and resolutions.

It is recommended that the provincial, municipal and city governments strengthen the enforcement of the ordinances and regularly monitor the management effectiveness of the protected areas, including economic and industrial activities that may destroy the coastal habitats. The public should also be made aware of the benefits of MPAs in order to elicit their participation and support in monitoring and enforcement of ordinances.

### **Water Use and Supply Management**

Cavite Province conducted a comprehensive study on water resources management in 2012 which led to the development of the Cavite Integrated Water Resources Management Master Plan (CIWRMMP). The plan aims to bridge the widening demand and supply gap for groundwater, infrastructure backlog and the irrational allocation of water resources in the province. The plan also identifies measures to address the demand and supply gap through the utilization of wells and major rivers specifically Maragondon River, Panaysayan River, Balsahan River and Ylang-ylang River and some tributaries.

The province still has adequate water resources. However, it is projected that the province will face challenges in securing freshwater resources in the near future due to the increasing demand for domestic use, agricultural purposes, industrial and recreational purposes. Groundwater availability has reached a critical point in two municipalities, with six more cities and municipalities having critical levels of water availability. These areas must therefore be given priority in the implementation of water resource management actions.

While majority of Caviteños have access to clean and safe water delivered by public and private water service providers

and water systems provided by homeowners' associations and Barangay Waterworks and Sanitation Associations (BWSAs), the incidence of waterborne diseases is still occurring in the province, which is partly attributed to the increasing industrial and commercial developments and deteriorating water quality.

The development of the Cavite IWRMP is a good starting point towards developing effective water resources management strategies for the province. However, the IWRMP is yet to be adopted by the *Sangguniang Panlalawigan* (provincial council). The province should also enact sound water use policies and ordinances that cover water allocation/licensing, tariff systems, water conservation and reuse, as well as protection of water resources.

The establishment of water testing laboratories and a septage and wastewater collection and treatment system (or a centralized sewerage system) will help in providing safe and clean water for Caviteños. Pollution reduction programs, cleanup drives and watershed monitoring and surveillance programs also need to be enhanced.

### Food Security and Livelihood Management

In compliance with Republic Act 8550, Cavite Province established the Integrated Fisheries and Aquatic Resources Council which guides and coordinates matters relating to fisheries, with the Provincial Agricultural Office serving as its secretariat. Municipal Fisheries and Aquatic Resources Councils (MFARMCs) are also institutionalized at the municipal level. However, the province lacks a provincial integrated fisheries management plan. Only two among the nine coastal municipalities have prepared their respective fisheries management plans. Being highly dependent on fisheries for livelihood and food security, it becomes imperative that the province provide a strategic direction for fisheries management, in accordance with the Comprehensive National Fisheries Industry Development Plan (2005).

The province, through the Provincial Social Welfare and Development Office (PSWDO), addresses the issue of malnutrition by implementing various programs and activities, including the annual celebration of Nutrition Month, training of Barangay Nutrition Scholars (food production and fortification, maternal and child health nutrition, nutrition information and education and livelihood assistance) and Food for Growth Program, among others. Cavite also conducts regular livelihood training programs through its Provincial Cooperative, Livelihood and Entrepreneurial Development Office (PCLEDO) and PG-ENRO (i.e., eco-bag making and Practical Skills Development Program) to help alleviate poverty and empower disadvantaged individuals, families and communities.

Although the development of various economic zones in the province has generated a significant number of jobs for

Caviteños, it is still necessary to provide more employment and livelihood opportunities for the people. For instance, aquaculture fisheries and fisheries product processing industries must also be explored by coastal communities.

### Pollution Reduction and Waste Management

Cavite Province has enacted several policies and legislations to reduce pollution and encourage proper waste management. Among these are Executive Order No. 29 requiring all cities and municipalities to establish waste reduction and recovery schemes and to convert their open dump sites to controlled ones, Provincial Ordinance No. 007-S-2012 which regulates the use of plastics and promotes the use of eco-bags and other environment-friendly practices and Provincial Ordinance No. 001-S-2003 prohibiting the improper disposal of used oil generated from automotive and industrial lube oil and petroleum sludge, among others. The Provincial Solid Waste Management Board was also created, pursuant to Republic Act 9003 (Ecological Solid Waste Management Act of 2000).

Aside from daily garbage collection and street sweeping, IEC campaigns and public awareness programs concerning solid waste segregation, climate change and the environment are conducted. However, no waste segregation at point sources is conducted in spite of information campaigns, enacted ordinances and presence of Materials Recovery Facilities (MRFs). Only a few municipalities have controlled dumpsites while many still operate open dumpsites. The completion of the ten-year solid waste management plans of all the cities and municipalities in Cavite will serve as an impetus for the LGUs to strictly enforce their SWM laws. The establishment of a waste-to-energy (WTE) scheme may also be studied and explored.

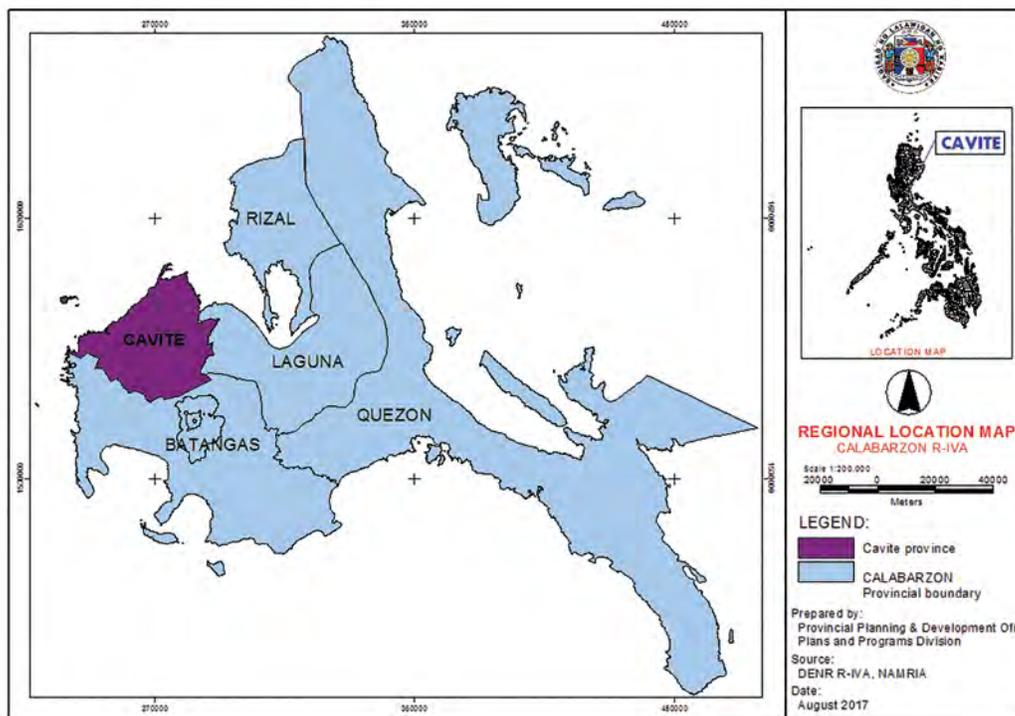
In terms of water pollution, the province lacks a comprehensive wastewater management plan while the passage of a provincial ordinance for the establishment of septage treatment plant and facilities is still at the development stage. Moreover, despite the programs undertaken by the provincial government and corresponding budget, water quality particularly in major river systems exhibited high levels of total and fecal coliform. This may be attributed to the lack of a centralized septage treatment system in the province, which resulted to the direct discharge of septage and untreated wastewater into the bodies of water. It is recommended that the provincial government proceed in finalizing the Comprehensive Wastewater Management Plan and endeavor to establish partnerships with the private sector for the construction of centralized septage and sewerage facilities with supporting ordinance. Regular monitoring of industrial and hazardous waste generation, collection and disposal must also be strengthened. The establishment of the Cavite Water Testing Laboratory in collaboration with the Cavite State University is anticipated to improve water quality monitoring in the province.

# Cavite Province

The Province of Cavite is situated at the southern part of Luzon Island, the northernmost island of the three major islands of the Philippines (Table 1). Cavite is bounded by the Province of Batangas on the south, the Province of Laguna on the east, the Province of Rizal on the northwest, Metro Manila — Manila being the country's capital — and Manila Bay on the north, and the West Philippine Sea on

the west (Figure 1). Cavite belongs to the country's administrative division of Region IV-A, also known as CALABARZON, together with the Provinces of Laguna, Batangas, Rizal and Quezon. With seven cities and sixteen municipalities, the Province of Cavite has a storied past, dating back to the Spanish occupation of the country during the 16th century.

Figure 1. Geographical location of Cavite Province.



The Province of Cavite was once a mooring place for Chinese Junks that came to trade with settlements around Manila Bay. It was in this hook-shaped peninsula in the southern Luzon coast, where the land was marshy and covered by mangrove trees, when still wary Spanish expeditionary forces landed in 1571, a few days before they occupied Manila.

It was in the present town of Kawit, where they decided to build their settlement until they found their ideal place for the repair and construction of their ships. They called it Puerto de Cavite (Port of Cavite) or Cavite Nuevo (New Cavite) to distinguish it from Kawit which they now referred to as Cavite Viejo (Old Cavite).

The name Cavite evolved from the word "Kawit" or "Cauit," meaning hook, referring to the shape of the land along the coast of Bacoor Bay. It was mispronounced by the Spaniards as "Kawite" or "Cavite," there being no "K" in the Castilian alphabet, then changing "w" to "v" to conform to their accentuation.

On June 12, 1898, Gen. Emilio Aguinaldo of the Filipino revolutionary forces declared independence from Spanish rule on the balcony of his residence in Kawit, Cavite. The house is declared as a Shrine and houses the memorabilia dedicated to these historic events. In 1998, a park named Liwasang Aguinaldo was built in front of the house to celebrate the Centennial of Philippine Independence.

Table 1. Key facts about Cavite Province.

Key facts (as of 2010)	
LAND AREA	142,706 ha (0.4% of the total land area of the Philippines)
COASTLINE LENGTH	122.574 km
WATER AREA	93,679.3750 ha
CLIMATE	Relatively Dry Season from November to April Wet Season from May to October
POPULATION (as of 2010)	3,090,691
CAPITAL	City of Imus
SEAT OF PROVINCIAL GOVERNMENT	Trece Martires City
NO. OF CITIES	7 <ul style="list-style-type: none"> <li>• Bacoor</li> <li>• Cavite City</li> <li>• Dasmariñas</li> <li>• Imus</li> <li>• General Trias</li> <li>• Tagaytay</li> <li>• Trece Martires</li> </ul>
NO. OF MUNICIPALITIES	16 <ul style="list-style-type: none"> <li>• Alfonso</li> <li>• Amadeo</li> <li>• Carmona</li> <li>• General Emilio Aguinaldo</li> <li>• General Mariano Alvarez</li> <li>• Indang</li> <li>• Kawit</li> <li>• Magallanes</li> <li>• Maragondon</li> <li>• Mendez</li> <li>• Naic</li> <li>• Noveleta</li> <li>• Rosario</li> <li>• Silang</li> <li>• Tanza</li> <li>• Ternate</li> </ul>
NO. OF BARANGAYS	829
PRODUCTS	<p><b>Food Products:</b> Coffee, cocoa tablets, <i>kaong</i> (sugar palm) vinegar, mussel chips, smoked fish, and other processed seafood, processed fruits and vegetables, milk and milk products, native delicacies, etc.</p> <p><b>Other Products:</b> Novelties and furnitures, ceramics, bags, wallets, novelty items, scented candles, virgin coconut oil</p>

**Table 2. Population of Cavite per district, municipality/city based on 2010 population census.**

City/municipality	Population (as of 2010)
<b>1st District</b>	<b>313,260</b>
Cavite City	101,120
Kawit	78,209
Noveleta	41,678
Rosario	92,253
<b>2nd District</b>	<b>520,216</b>
City of Bacoor	520,216
<b>3rd District</b>	<b>301,624</b>
City of Imus	301,624
<b>4th District</b>	<b>575,817</b>
City of Dasmarinas	575,817
<b>5th District</b>	<b>427,016</b>
Carmona	74,986
General Mariano Alvarez	138,540
Silang	213,490
<b>6th District</b>	<b>570,093</b>
Trece Martires City	104,559
Amadeo	33,457
City of General Trias	243,322
Tanza	188,755
<b>7th District</b>	<b>382,665</b>
Tagaytay City	62,030
Alfonso	48,567
General Emilio Aguinaldo	17,507
Indang	62,030
Magallanes	21,231
Maragondon	35,289
Mendez	28,570
Naic	88,144
Ternate	19,297
<b>TOTAL</b>	<b>3,090,691</b>

The province is known to be one of the top three most populous provinces in the Philippines with a total population of 3,090,691 in 2010, dominated by migration due to numerous numbers of industries and its proximity to Metro Manila (Table 2).

Cavite is broadly categorized into two land resources: these are forest lands with a total area of 21,022 ha and the Alienable and Disposable (A&D) Land, with an aggregate area of 121,684.2 ha.

Under Presidential Proclamation Number 1594 series of 1976, Mt. Palay-palay, Mt. Mataas na Gulod and vicinities situated in the Municipalities of Ternate and Maragondon, Province of Cavite and in the municipality of Nasugbu, Province of Batangas, having an area of more or less 4,000 ha, was declared a national park, game refuge and bird sanctuary.

Included also as protected areas are the ten islands in the Province of Cavite with a total area of 620.57 ha (Table 3).

**Table 3. Ten islands in the Province of Cavite Province.**

Island	Area (in hectares)
Corregidor	546.3800
Caraballo (Fort Hughes)	27.3700
Carabao	5.5500
Limbones	24.0000
Sta. Amalia	3.9962
El Fraile (Fort Drum)	1.0980
La Monja	0.9758
Balut	9.0000
Niño de Franco	0.1985
Island Cove (Pulo ni Burungoy)	2.0000

Source: PPDO, 2016

The province has six major rivers namely: (a) Maragondon River with a catchment area of 2.7615 km<sup>2</sup> with two sub-watersheds namely Maragondon sub-watershed comprising the Municipalities of Maragondon, Naic and Ternate and Naic sub-watershed comprising the Municipalities of Alfonso, Indang, Mendez-Nuñez, Tagaytay City and portion of Naic and Maragondon; (b) Labac River with an area of 1.92 km<sup>2</sup> passing through the City of Tagaytay, the municipalities of Mendez, Indang and Naic; (c) San Juan River with an area

of 1.044 km<sup>2</sup> originated from Maitim, Amadeo, passing through Silang, Gen. Trias, Noveleta and Kawit; (d) Imus River where point of origin is north of Tagaytay City passing Silang, City of Dasmariñas, Imus down to Salinas and Mabolo, Bacoor; (e) Bacoor River with an area of 0.2188 km<sup>2</sup>; and (f) Cañas River which has two major tributaries sources both in Tagaytay City passing through Indang, Amadeo, Trece Martires City, Gen. Trias and Tanza with an area of 1.3785 km<sup>2</sup>.



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## What are indicators?

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Indicators are quantitative/qualitative statements or measured/observed parameters that can be used to describe existing situations and to measure changes or trends over time (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 state of 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?

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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 (SDSSEA), and relevant international conventions such as Convention on Biological Diversity (CBD) and UN Framework Convention on Climate Change (UNFCCC).

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

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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?

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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 | e. Data requirements  |
| b. Name of the indicator  | f. Results which describe the current status, management actions and impacts of management interventions in the area relating to the particular indicator |
| c. Description of the indicator   | g. Implications of results and recommendations to respond to changing conditions  |
| d. Rationale for using the indicator in the SOC   |   |

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## Policy, Strategies and Plans

### 001 Coastal profile and environmental risk assessment

#### Description

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This indicator measures the percentage of 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

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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 priority concerns

for coastal managers and policymakers. This strategic assessment should be the basis for developing strategies and action plans for coastal management.

#### Data Requirements

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

- Length of coastline covered by environmental assessment

#### Results

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The Province of Cavite is composed of 16 municipalities and 7 cities, 9 of which are classified as coastal, namely, Ternate, Maragondon, Naic, Tanza, Rosario, Noveleta, Kawit,

Cavite City and Bacoor City. Total coastline length is 122.57 km and total area of coastal water is about 93,679.38 ha (Table 4).

Table 4. Area of coastal water and coastline length by city/municipality of Cavite Province.

Municipality/city	Water area (ha)	Coastline length (km)
1. Bacoor	957.2472	5.778
2. Maragondon	12,786.7200	18.526
3. Naic	6,324.6200	9.122
4. Rosario	6,017.8690	3.442
5. Tanza	10,552.8100	11.244
6. Ternate	10,331.2300	23.627
7. Kawit*	612.2814	6.445
8. Cavite City*	16,051.8174	20.081
9. Noveleta*	4,291.4671	2.895
10. Corregidor Island	25,753.3129	21.410
<b>TOTAL</b>	<b>93,679.3750</b>	<b>122.570</b>

\* Municipality with existing boundary disputes.

Source: PG-ENRO, 2012.

There are ten identified satellite islands within the territorial jurisdiction of the province based on the municipal water delineation conducted by DENR-NAMRIA in 2012, for the proposed coastal land and sea use zoning of Cavite (Figure 2). These satellite islands are Balot, El Fraile, Niño de Franco, Carabao, Caballo, Island Cove (formerly known as Pulo ni Burungoy), Sta. Amalia, La Monja, and Corregidor (the biggest among the islands and declared under territorial jurisdiction of Cavite City).

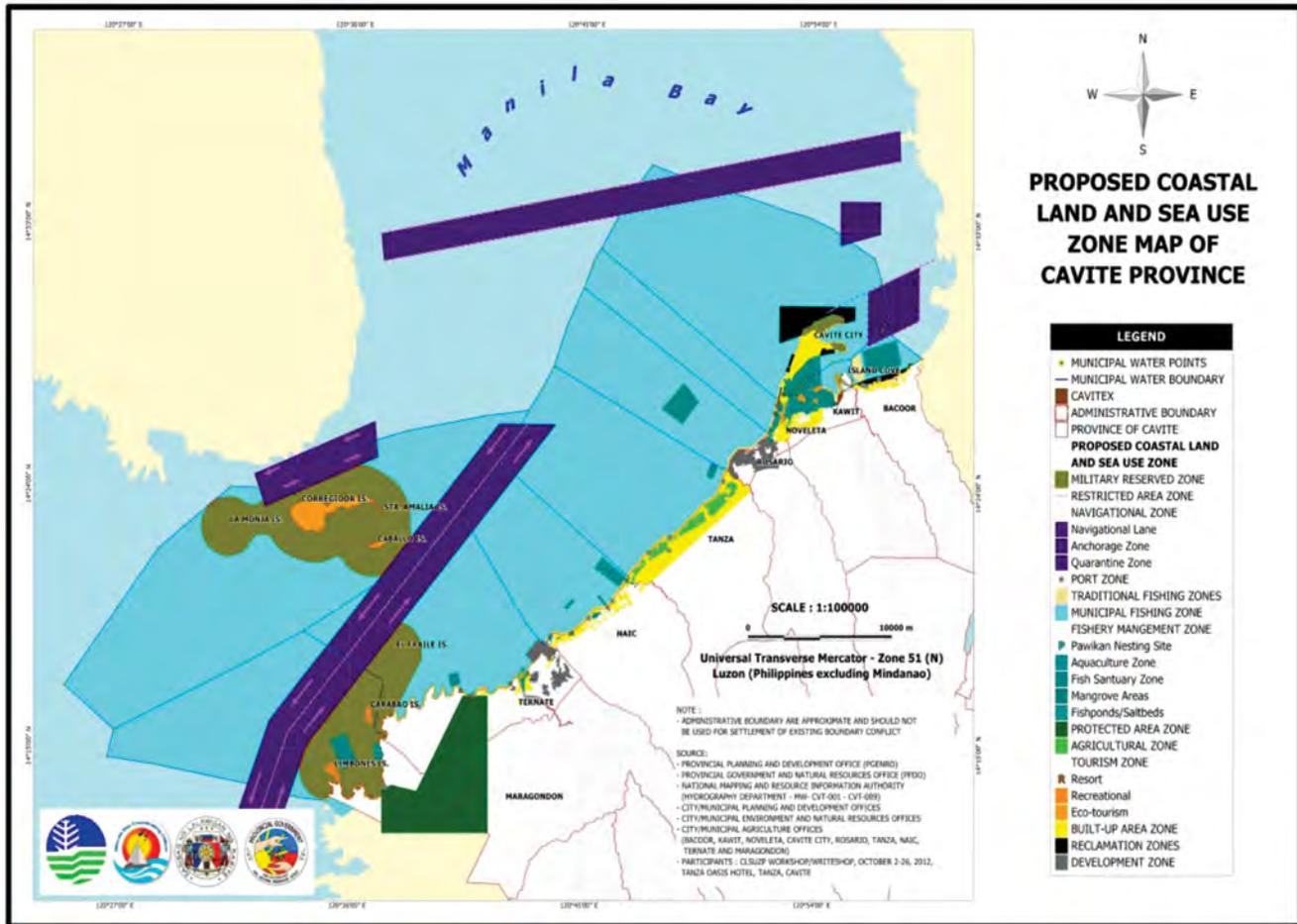
The province, through the Integrated Coastal Management (ICM) Division under the Provincial Government – Environment and Natural Resources Office (PG-ENRO), has conducted environmental researches and coastal surveys aside from the coastal assessments conducted by the LGUs, the academe and the DENR (Table 5).

Under the Manila Bay Environmental Management Project (MBEMP), Cavite benefited from the conduct of initial and refined risk assessments, the reports of which were published in 2001 and 2004, respectively, by PEMSEA and DENR. The initial risk and refined risk assessments provided a glimpse of the environmental concerns in Manila Bay using available secondary data, the data gaps and uncertainties and recommended areas for management interventions or for further assessment.

Relevant data on the geo-physical attributes, natural resources (minerals, forest and coastal), socio-political profile, geologic and natural hazards, and environmental management initiatives on the other hand are contained in the Cavite Socio-Economic and Physical Profile or Cavite SEPP 2011 (PPDO, 2012) and Provincial Development and Physical Framework Plan or PDPFP 2011-2020 (PPDO, 2016).



Figure 2. Proposed coastal land and sea use zoning map of Cavite Province.



Source: PG-ENRO, 2012.

Table 5. Summary of the coastal surveys and assessments conducted in Cavite Province from 2002-2012.

Survey/assessment	Year	Lead agency
Refined Risk Assessment of Carabao Island Fish Sanctuary	2015	DA-BFAR and LGU of Maragondon
Refined Risk Assessment of Naic Fish Sanctuary	2003	DA-BFAR and LGU of Naic
Refined Risk Assessment of Tanza Fish Sanctuary	2009	DA-BFAR and LGU of Tanza
Refined Risk Assessment of Bulaklakin Reef Fish Sanctuary	2005	DA-BFAR and LGU of Ternate
Ground truthing of Mangroves in the Province of Cavite	2005	DENR Region IVA and ICM Division, PG-ENRO
Avifauna Assessment	2005	DENR Region IVA
Initial and Refined Risk Assessments in Manila Bay	2001 and 2004	PEMSEA and MBEMP TWG-RRA
Cavite Socio-Economic and Physical Profile	2009, 2010, and 2011	PPDO
Vulnerability Assessment to Eight Hydrometeorological Hazards	2012	PPDO and PG-COPs

In 2014, river profiling of the six major river systems was conducted by PG-ENRO with the objective of identifying the issues and concerns in the watershed areas with focus on pollution loading. Likewise, prior to the designation of Imus-Ylang-Ylang Rio Grande Rivers as a Water Quality

Management Area (WQMA) on January 24, 2013 (pursuant to DENR Administrative Order No. 02 s 2013), river profiling of the said river systems was conducted by PG-ENRO and DENR-EMB Region IV-A from 2010-2012.

## Implications and Recommendations

The proposed Coastal Land and Sea Use Zoning Scheme of Cavite Province enhances the spatial planning of the province by resolving use conflicts and promoting the rational use of the coastal areas and resources. It also provides comprehensive information on the status of the coastal environment and utilization of coastal resources. In addition, there were several assessments conducted during the past ten years which provided valuable information for the development and implementation of appropriate

management programs based on the priorities and concerns identified in the assessments.

It is recommended that Cavite Province finalize the Coastal Land and Sea Use Zoning Scheme and update the environmental and risk assessment as data becomes available in order to identify emerging risks and vulnerabilities.



*Development of the Coastal Land and Sea Use Zoning Plan for Cavite Province (ICM Division, PG-ENRO, 2008).*



*ICM Coordinators from nine coastal towns of Cavite (ICM Division, PG-ENRO, 2008).*

## References

- Provincial Government - Environment and Natural Resources Office (PG-ENRO). 2014. Cavite River Profiling.  
 Provincial Government - Environment and Natural Resources Office (PG-ENRO). 2012. Cavite Land and Coastal Use Zoning Report.  
 PPDO. 2016. Provincial Development and Physical Framework Plan 2011-2020. Cavite, Philippines.  
 PPDO. 2012. Cavite Socio-Economic and Physical Profile 2011.



Policy, Strategies and Plans

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. The 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
- Operational management plans
- Multisectoral participation mechanisms
- Local government commitments to implementation
- Monitoring and evaluation program

Results

The Cavite Integrated Coastal Management Program (CICMP) was officially established in 2004 by virtue of the Memorandum of Agreement (MOA) between the Provincial Government of Cavite, PEMSEA and DENR. One of the key outputs of the CICMP includes the coastal environmental profiles and CRM plans at the municipal level which were developed following a participatory coastal resource assessment approach. The coastal municipalities have likewise delineated their municipal coastal boundaries and

are in the process of drafting their coastal land and sea use zoning plans (CLSUZPs).

The province has initiated the development of the Cavite Sustainable Development Strategy (CSDS) in 2015 which serves as the long-term strategic framework for the management of coastal and marine areas of Cavite, particularly covering Bacoor City, Cavite City, Kawit, Noveleta, Rosario, Tanza, Naic, Ternate, and Maragondon.

The CSDS sets out relevant planning policies and strategies at the provincial and municipal levels and offers guidance on how to address various threats and issues affecting the coast. It also provides a comprehensive environmental management framework that provides policy directions for the sustainable use of the province's coastal resources in order to address issues regarding the multiple and conflicting uses of the coastal areas, coastal tenure and settlement, tourism, coastal access, infrastructure development, coastal land and sea using zoning, climate change adaptation, and disaster risk reduction and management.

Moreover, the CSDS seeks to define what needs to be done and describes the institutional mechanisms that should be put in place, as well as the financial, technical and logistical support that are critical for the implementation of the action plans.

Furthermore, to promote the principles of sustainable development, the Cavite Environment Code (CEC) was enacted in 2008 by virtue of Provincial Ordinance No. 001-S-2008. The CEC operationalizes the powers and responsibilities of the LGUs in adopting adequate and appropriate measures to safeguard and conserve land, mineral, marine, forest, and other natural resources. The CEC contains a specific provision (Section 31, Article V) on the formulation of a strategic water resources management plan for the protection of watersheds.



*ICM Coordinators' Consultation for the Cavite Sustainable Development Strategy.*

## Implications and Recommendations

The development of the CSDS is an essential component of the Cavite ICM program. As the blueprint for the long-term sustainable development of the marine and coastal areas of the province, it is necessary that the province adopt the CSDS to ensure its implementation.

The strong political support extended by the province's local chief executives provides significant opportunities in strengthening the implementation of the ICM program

in Cavite. It is recommended that the different coastal municipalities prepare and integrate their respective CLSUZPs into their CLUPs to enable the province to develop a consolidated provincial land use and sea use Zoning Plan. It is further recommended that the province work towards the adoption of the Cavite Sustainable Development Strategy. These initiatives will help strengthen the mechanisms for the implementation of the activities identified in the Cavite ICM program.

### Reference

Provincial Government - Environment and Natural Resources Office (PG-ENRO, ICM Division).



## Policy, Strategies and Plans

## 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 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 environmental policy and planning approach.

## Data Requirements

- Local development plans

## Results

The province and the nine coastal municipalities have prepared their respective development plans in line with the Provincial Development and Physical Framework Plan 2011-2020 (PPDO, 2016), which establishes land use policies and set out rules governing the utilization of the environment and the development of the other physical resources of the province. Pursuant to the passage of Executive Order No. 533, which declares ICM as the national strategy for the sustainable management of the country's marine and coastal resources, ICM has been identified as one of the major programs in the PDPFP.

In particular, the PDPFP is an enhanced development plan that merges the traditionally separate Provincial Development Plan and the Provincial Physical Framework Plan to address spatial-sectoral, medium-term and long-term plans of the province. It embodies the land use policies, which would guide the direction of land use activities, environmental management, settlement pattern and the development of other physical resources of Cavite. It enhances the horizontal linkages among planning, investment programming and revenue generation, project evaluation and development, and budgeting and expenditure management while strengthening

the vertical linkages among the network of plans and investment programs at various levels. The PDPFP seeks to provide the analytical basis for understanding existing conditions and identifying key development issues, problems, opportunities, objectives and targets of the province based on the provincial government's Development Agenda. In addition, the plan aims to identify programs and projects consistent with proposed development strategies.

Moreover, coastal and river basin management at the provincial and municipal levels are integrated into the provincial and municipal development and investment plans. The comprehensive land use plans (CLUPs) of the different municipalities cover coastal and marine issues and management and provide annual allocation for its implementation.



*The province, its municipalities and cities were awarded the Seal of Good Housekeeping by the Department of Interior and Local Government (DILG) in 2012.*

## Implications and Recommendations

The Provincial Government of Cavite is steadfast in its commitment to achieve sustainable development of its marine and coastal areas. The ICM program is integrated into the development and investment plans of the province, such as the PDPFP and the Cavite Annual Investment Plan (AIP). However, there is a need to assess and align existing

land use plans, various sectoral plans, and programs related to ICM in order to reconcile socioeconomic development and sustainable use of our coastal areas and resources. It is likewise recommended that the ICM program of the different coastal municipalities be incorporated into their respective CLUPs.

## References

Comprehensive Land Use Plans (CLUPs)  
PPDO. 2016. Provincial Development and Physical Framework Plan 2011-2020. Cavite, Philippines.



## 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 entities, 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 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

By virtue of Executive Order No. 48 - Series of 2004, the Cavite ICM Project Management Office (PMO) was established as part of the institutionalization of ICM at the provincial and municipal levels. The PMO, which serves as the ICM secretariat, is responsible for overseeing the day-to-day operations of the ICM program and facilitating the reporting process to the ICM Provincial Council. The PMO, in particular, is tasked to develop the ICM work plan and budget for submission and approval by the council.

The PMO was institutionalized in 2005 through the establishment of the ICM Division of the PG-ENRO. It was created pursuant to Section 51 of the Cavite Environment Code (CEC). Aside from serving as the coordinating office and technical arm for the implementation of the ICM program in the province, the ICM Division is tasked to provide guidance to the coastal municipalities in delineating, establishing, managing, maintaining and protecting their municipal waters. It is also involved in facilitating and

implementing projects identified by the ICM provincial and municipal councils.

The ICM Division consists of seven staff with a total budget of about PhP 1,378,423.02 (US\$ 29,421) in 2015. The said allocation was the highest budget given to the ICM program which had an initial budget of PhP 350,000 (US\$ 6,457.17) in 2003.

To sustain the ICM initiatives both at the provincial and municipal levels, a Provincial ICM Council (PICMC) and municipal/city ICM councils in the nine coastal towns of the province have been created. Section 53 (a) of the CEC mandates the establishment of city and municipal ICM Councils in the coastal towns of Cavite.

The provincial government mandated the local chief executives of concerned local government units to designate one permanent coordinator (either from the municipal/city planning and development office, the municipal/city environmental and natural resources office or the municipal/city agriculture office) who shall serve as the Vice Chair of their respective municipal/city ICM councils. The ICM councils consist of representatives from government agencies, private sector and the civil society (see **Figures 3 and 4**). Both PICMC and municipal/city ICM councils serve as management bodies of the ICM program which shall be engaged in planning, information sharing and training programs for the development and implementation of the Cavite ICM program.

Figure 3. Cavite provincial ICM council.

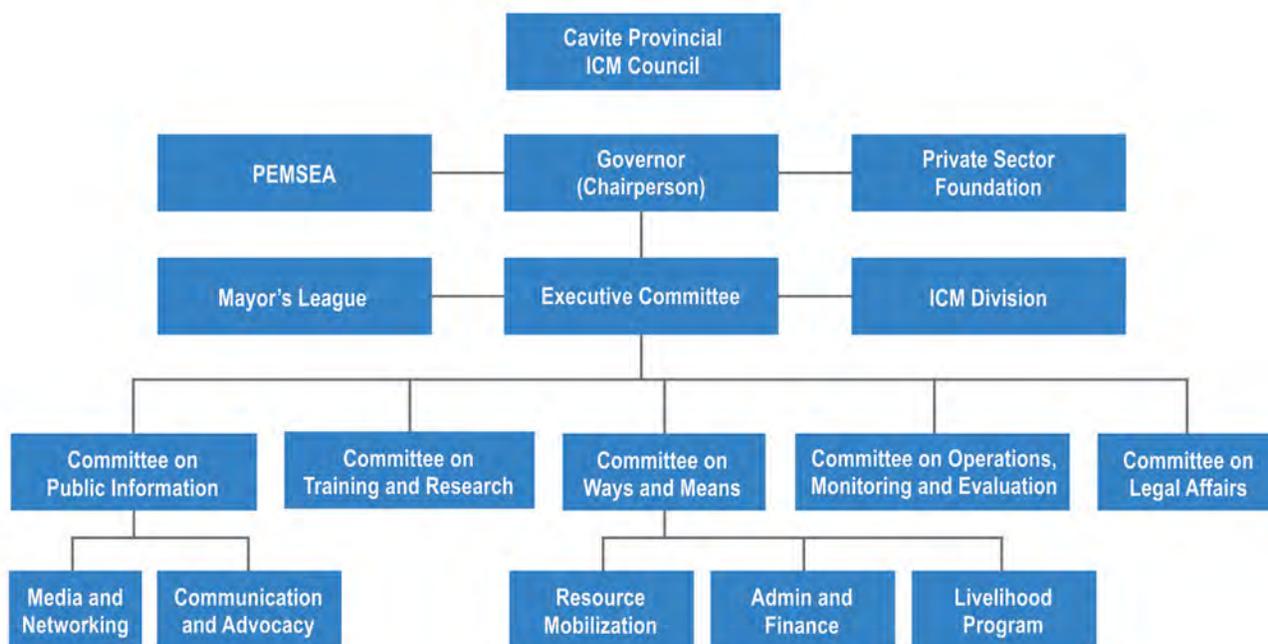
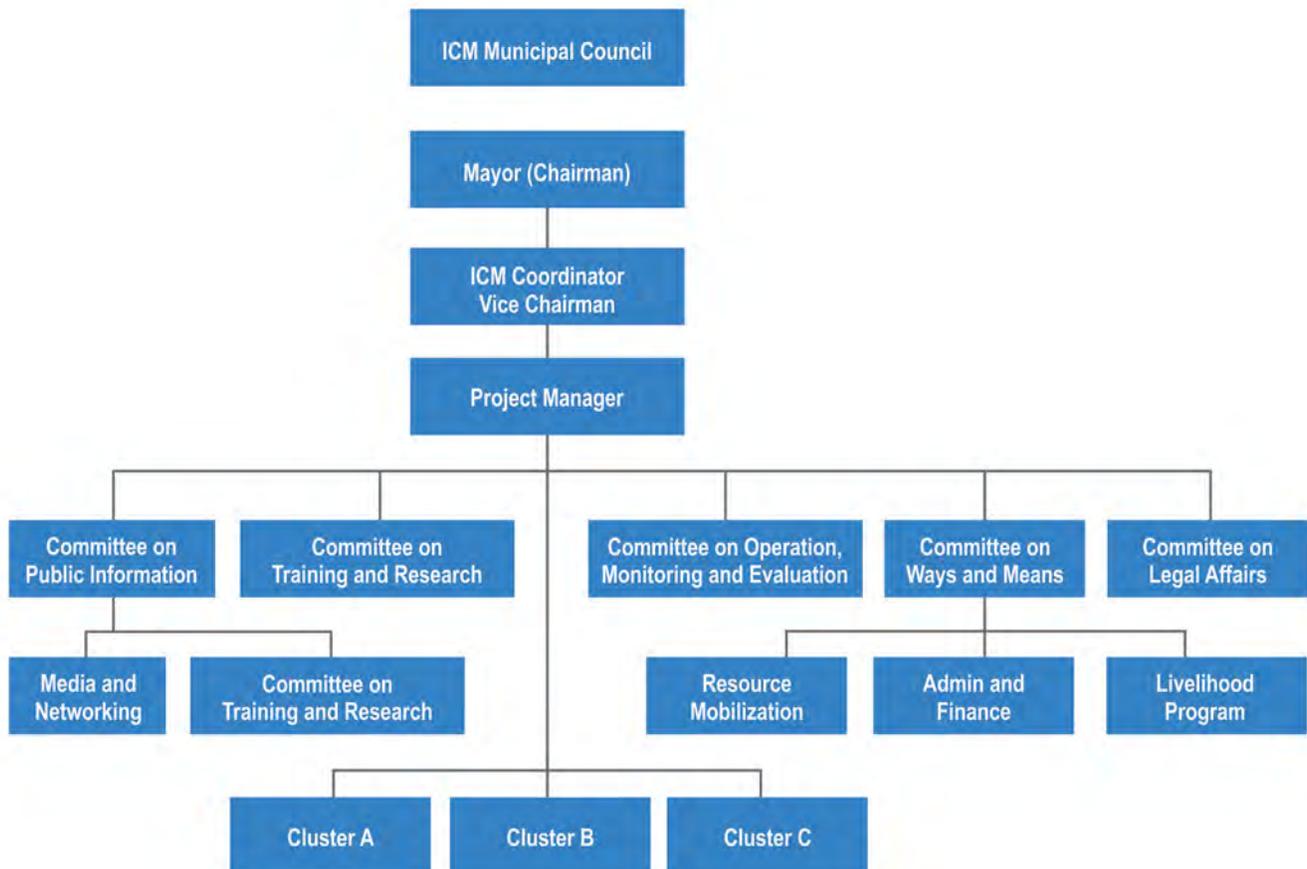


Figure 4. City/municipal ICM council.





*Members of the Provincial ICM Council.*

## Implications and Recommendations

The province's multisectoral coordinating mechanism has evolved since the initiation of the Cavite ICM Program in 2004. The creation of the Cavite ICM Project Management Office, which was later renamed and established as the ICM Division of the PG-ENRO in 2005 enabled close coordination and collaboration with government agencies at the national and local levels and other stakeholders regarding projects and activities for the management of the province's marine and coastal resources. This underscores the importance of communication and multistakeholder involvement to ensure

the continuing engagement and commitment of the key stakeholders in implementing ICM.

Although there exists a functional coordinating mechanism that oversees the development and implementation of the ICM program, its operations need to be further strengthened through capacity building and enhanced logistical support. It is recommended that regular meetings be conducted to serve as venue to discuss the progress made and identify solutions to challenges and constraints in program implementation.

## References

Loyola, A. 2005. Pioneering Actions for the Sustainable Development of Cavite Area through Integrated Coastal Management (ICM). PEMSEA Regional Network of Local Government (RNLG) Forum, Bali, Indonesia. Executive Order No. 48 – Series of 2004. Province of Cavite.



## Institutional arrangements

### 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 an 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 processes and activities. It provides concerned parties with the satisfaction that their views and concerns are taken into account in the planning and 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 nongovernment 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 different sectors and stakeholders are well-represented in the province's coordinating mechanism. Consultations on the various activities of the ICM program ensured the involvement of representatives from the national agencies, LGUs, NGOs, POs, fisherfolk and fisher's organizations, the business sector, and the academe. At the LGU level, the city/municipal environment and natural resources officers, city/municipal planning and development coordinators, city/municipal tourism officers, *Sangguniang Bayan/Panlungsod* committee chair on environment and concerned barangay

officials were regularly invited to attend meetings on CRM programs and activities. The general public was also consulted through public hearings and information, education and communication (IEC) campaigns conducted in coastal communities. For instance, IEC campaigns were regularly conducted prior to the actual coastal cleanup activities held annually in September. Various stakeholders participate in the IEC campaigns including barangay officials, local residents, and representatives from NGOs, the academe and the business sector.

The ICM Division regularly conducts ICM Coordinators' Meetings, which were attended by the 16 focal persons from the 9 coastal towns and concerned provincial departments. The meetings also involve representatives from LGUs, national government agencies, POs, NGOs, the academe, and the private sector. They convene to discuss the activities of the ICM programs, such as the development of case studies on good management practices, support to the establishment of marine protected areas (MPAs), annual coastal cleanup drives, and support to the implementation of area-based management plan and water quality management areas (WQMAs) of major rivers, among others.



*Regular ICM Coordinators' Meeting.*

## Implications and Recommendations

It is critical for the province's multisectoral coordinating mechanism to remain active in order to elicit continuing stakeholders' participation and ownership. It is likewise recommended that regular meetings be conducted to inform various sectors and stakeholders of the progress and updates on ICM implementation and seek their guidance in addressing challenges and potential constraints.

The participation of the scientific community/academe (e.g., Cavite State University [CvSU], and University of the Philippines–Marine Science Institute [UP–MSI]) is also an important aspect of the ICM coordinating mechanism. Aside from providing the local government access to scientific information which serves as basis for sound management actions, academic institutions also help analyze information that is critical to the development of coastal environmental profiles. It is recommended that Cavite continue to engage the academic community, particularly the CvSU to assist in establishment and operationalization of the integrated information management system (IIMS), a decision-support

system for coastal, marine and river basin management. The academic partners can likewise assist in analyzing and integrating data and information into the ICM plans.



*One of the stakeholder consultations held to address the illegal fishing activities in the Province of Cavite.*

## References

- PG-ENRO. Annual Accomplishment Report 2012.  
Quarterly Minutes of the Meeting of ICM Coordinators. 2015.



## Legislation

### 006 ICM enabling legislation

#### Description

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

#### Rationale

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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

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

#### Results

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The Cavite Environment Code (Provincial Ordinance No. 001-S-2008) was enacted to guide the LGUs in formulating and implementing programs to safeguard and conserve land, mineral, marine, forest and other natural resources of the province. It has specific provisions on the formulation, planning and implementation of ICM, including management of forests; protection and rehabilitation of mangroves; quarrying and mining of minerals; water resources utilization and management; protection of watersheds; water quality monitoring; protection of riverbanks, easements; enforcement of fishery laws in municipal waters; conservation of mangroves, extension and onsite research services and facilities related to fishery activities such as aquaculture structures; coastal tourism development and promotion; air and noise pollution management; ecotourism development; environmental impact assessment; and land use planning.

There are specific ordinances such as the prohibition and regulation on the use of plastics embodied in Provincial Ordinance No. 007-S-2012, entitled "An ordinance prohibiting, regulating, and prescribing certain uses of plastics for goods and commodities that end up as residual wastes, and promoting the use of eco-bags and other environment-friendly practices as an alternative and providing penalties for violations thereof."

The coastal municipalities of Cavite have also enacted ICM-enabling legislations. These ordinances cover fishery, extraction of natural resources, establishment of MPAs, pollution, and solid waste management, among others (Table 6).

Public hearings involving concerned stakeholders were conducted in the course of developing these ordinances. Information on fishery-related legislations was disseminated to the fishing communities through the regular meetings conducted by the Municipal Fisheries

and Aquatic Resources Management Councils (MFARMCs) and Barangay Fisheries and Aquatic Resources Management Councils (BFARMCs). ICM-enabling legislations in the cities and municipalities of Cavite during 2002-2012 is shown in **Annex 2**.

**Table 6. Legislations on environmental management in Cavite Province (2002-2012).**

Ordinance/ resolution no.	Year	Title
004	2002	An Ordinance prohibiting the smoking and selling of cigarettes in all public and private primary and secondary schools and within a radius of 100 meters from the school compound, premises and providing penalties for violations thereof
001	2003	An Ordinance prohibiting the Improper disposal of used oil generated from automotive and industrial lube oil and petroleum sludge, providing penalties for violation thereon and for other purposes
004	2005	An Ordinance to curtail illegal activities of professional and illegal squatters in the province of Cavite
005	2005	An Ordinance creating the Cavite Youth Development Council
007	2005	An Ordinance prescribing safety measures in the refueling at any gasoline station within the territorial jurisdiction of the Province of Cavite and providing penalties for violation thereof
005	2006	An Ordinance regulating the operation of all junkshops and other similar business establishments and individuals engaged in buying and selling of metals with monetary value within the Province of Cavite and for other purposes
004	2007	An Ordinance on the establishment of animal Quarantine Checkpoints for foot and mouth disease (FMD) and other zoonotic diseases at strategic entry points in the Province of Cavite and imposing fees thereof
001	2008	Cavite Environment Code
005	2011	An Ordinance adopting the National Code on Sanitation in the Province of Cavite
001	2012	An Ordinance for the implementation of anti-dengue campaign at the barangay level
003	2012	An Ordinance adopting the Manila Bay Oil Spill Contingency Plan (MBOSCP)
007	2012	An Ordinance prohibiting, regulating, prescribing certain uses of plastics for goods and commodities that end up as residual wastes and promoting the use of eco-bags other environment-friendly practices as an alternative and providing penalties for violations thereof
026	2012	An Ordinance regulating cigarette smoking within the Provincial Capitol compound of Cavite and providing penalties thereof

## Implications and Recommendations

Cavite has passed resolutions and ordinances on environmental management and sustainable development, as embodied in the Cavite Environment Code. The CEC also mandates the formulation of a provincial coastal zoning and management planning guideline which shall serve as basis in formulating municipal coastal and marine use zoning and management plans. However, the guidelines are yet to be developed, adopted and approved.

It is also necessary that the Cavite Sustainable Development Strategy (CSDS) be adopted and approved by the *Sangguniang Panlalawigan* to ensure its implementation. It is likewise recommended that overlapping laws and ordinances on coastal resources management be reviewed, harmonized and nested in one umbrella legislation.

## References

- Ordinances and legislations passed by the Sangguniang Panlalawigan of the 23 cities and municipalities in Cavite.  
 PG-ENRO. Annual Accomplishment Report 2012.  
 PG-ENRO. Cavite Environment Code. Provincial Ordinance No. 001-S-2008.  
 PPDO. 2016. Provincial Development and Physical Framework Plan 2011-2020. Cavite, Philippines.

## 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 legislation.

#### 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 Province of Cavite and the LGUs under its jurisdiction regularly conduct environmental compliance monitoring and inspections. Economic activities in the province are regulated through the issuance of permits from concerned offices and/or agencies. Data on the number of permits

issued for fisheries as well as number of permits issued for building structures in the environment, including aquaculture structures for Noveleta and Tanza are shown in **Figures 5 and 6**.

Figure 5. Number of permits issued for fishing in the Municipalities of Noveleta and Tanza.

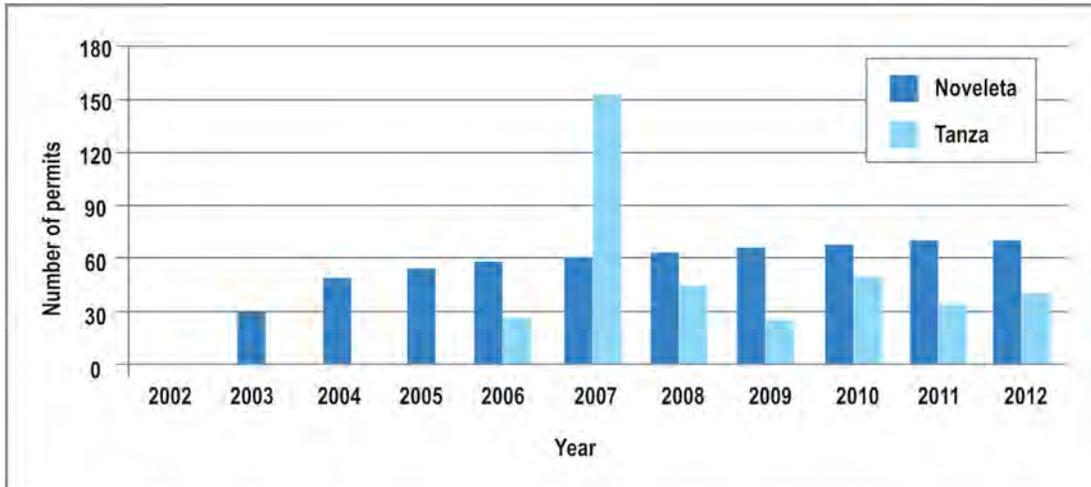
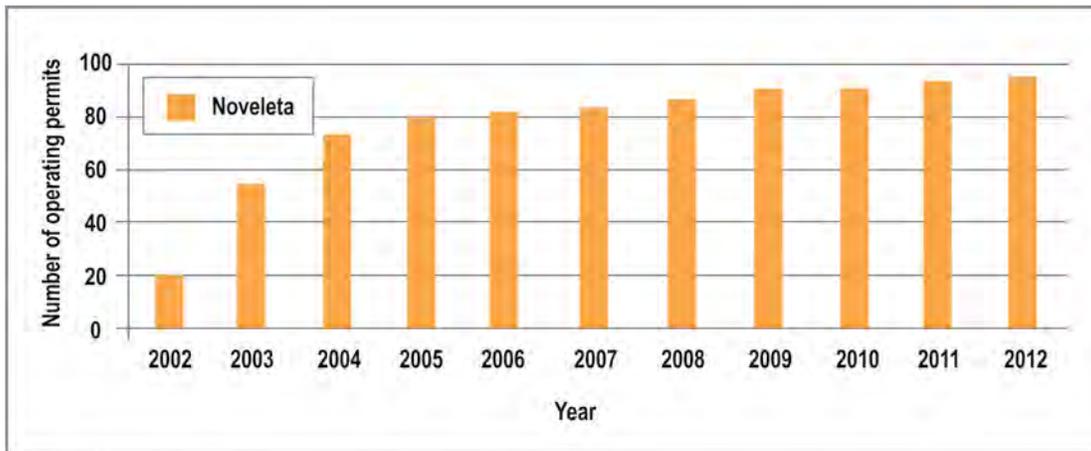


Figure 6. Number of permits issued in the Municipality of Noveleta in 2012.



Fishing and other extraction-related activities are also being regulated through the issuance of permits. From 2002-2015, a total of 2,502 fishing permits were issued in the municipalities of Noveleta, Tanza, Kawit, and Rosario.

Manufacturing companies and establishments are inspected prior to the issuance of municipal permits. However, inspection and monitoring of piggeries and other water-polluting industries are conducted only when the need arises or when complaints are lodged.

Aside from the deployment of *Bantay Dagat* volunteers (also known as sea patrols or sea wardens) to watch over the municipal waters and monitor



*Dismantling of illegal structures within the municipal waters of Cavite.*

illegal fishing activities, the MFARMCs assist in the enforcement of fishery laws at the municipal level in addition to their role as advisory and recommendatory councils.



*Monitoring of illegal structures within the municipal waters of Cavite.*



*Apprehension of Illegal Logging Operations at Silang, Cavite (Photo by PG-COPS).*

## Implications and Recommendations

There are a number of policies and regulations on environmental management at the provincial and municipal levels. However, strict compliance monitoring can be considered an issue. The law enforcement capacity of *seal fish wardens* and authority of the *Bantay Dagat* volunteers need to be strengthened. Confusion of jurisdictional roles among authorities and deputized local enforcers, ambiguous policies caused by different interpretations of the law, overlapping roles of national agencies in the issuance of permits and licenses, discretionary prosecution and minimal punishment of offenders are among the major **obstacles in effective enforcement of fishery laws and legislations**. In addition, data recording and management are weak and oftentimes overlooked by enforcers and

agencies tasked to monitor environmental compliance such that information and data sharing is limited.

Aside from enhancing the capacity of local authorities in law enforcement and compliance monitoring, it is **recommended that a Cavite fisheries management plan (CFMP) be developed**. Proper budget should also be allocated for this purpose. In addition, available technologies may be adopted to facilitate **the monitoring of the behavior of fishing vessels and impose the appropriate fines and penalties**. It is also necessary to streamline current licensing and permitting system of the national and local governments to reduce or eliminate overlaps.

## Reference

Coastal LGUs Accomplishment Report. 2002-2015.



## 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

Most of the violations reported by the Provincial Government–Cavite Office of Public Safety (PG-COPS) were fishery-related. These included illegal fishing activities such as dynamite fishing and use of active fishing gears on municipal waters. Table 7 shows the total number of reported fishery-related complaints in the Municipality of Naic from 2002-2012.

According to PG-COPS, violators were either asked to pay fines or are reported to the Philippine National Police (PNP). Penalties collected range from PhP 1,000 (US\$ 23.68) – PhP 12,000 (US\$ 284.17), depending on the violation committed. The list of cases filed and resolved by PG-COPS from 2002-2015 is shown in Table 8.

**Table 7. Fishery-related complaints in the Municipality of Naic.**

Year	Total number of reported fishery-related complaints
2002	75
2003	35
2004	40
2005	45
2006	30
2007	25
2008	15
2009	20
2010	25
2011	20
2012	15

The Municipality of Tanza has reported violation against Republic Act No. 7942 (Philippine Mining Act of 1995) in February 2013 while two cases on pollution-related activities were reported in 2011 where offenders were penalized and corresponding fines were collected. In addition, aquaculture monitoring is conducted only through farm and home visits to monitor the status of fish production in their localities. Data submitted by the City of Imus indicated that most environmental cases filed and solved were violations of City Ordinance 134-s-2012 or the prohibition on the use of plastic bags and styrofoam.

It can be noted that the province, through the PG-COPS, regularly keeps a record of the number of fishery-related violations and has imposed corresponding penalties to offenders. However, proper documentation of fishery-related complaints and violations at the municipal level remains a concern. Most coastal LGUs have not provided data regarding the total number of cases filed and resolved, as well as the total value of fines issued for non-compliance to fishery laws and other coastal legislations.



**Table 8. List of environmental cases filed and resolved by PG-COPS from 2011-2012.**

Case filed	Date filed	Violation	Penalty per person	Remarks/status
Illegal Fishing	23 March 2011	Violation of Sec. 90 of RA. 8550	US\$ 277.05	Resolved
Illegal Fishing	5 September 2011	Violation of Environmental Pro. Code on illegal fishing	US\$ 115.44	Resolved
Illegal Fishing	7 September 2011	Violation of Environmental Pro. Code on illegal fishing	US\$ 115.44	Resolved
Use of Active Fishing Gear in Municipal Waters	17 October 2011	Violation of Provincial Code 43-S-2008	US\$ 115.44	Resolved
Use of Active Fishing Gear in Municipal Waters	29 December 2011	Violation of Provincial Code 43-S-2008	US\$ 115.44	Resolved
Use of Compressor in Fishing in Municipal Waters	19 January 2011	Violation of Provincial Code 43-S-2008	US\$ 115.44	Resolved
Use of Active Fishing Gear in Municipal Waters	21 January 2012	Violation of Provincial Code 43-S-2008	US\$ 118.40	Resolved
Use of Active Fishing Gear in Municipal Waters	8 February 2012	Violation of Provincial Code 43-S-2008	US\$ 23.68	Resolved
Use of Compressor in Fishing in Municipal Waters	8 February 2012	Violation of Provincial Code 43-S-2008	US\$ 23.68	Resolved
Dynamite Fishing	29 March 2012	Violation of Sec.86 & Sec. 88 Par. 1	US\$ 97.72	Resolved
Use of Active Fishing Gear in Municipal Waters	2 April 2012	Violation of Provincial Code 43-S-2008	US\$ 236.80	Resolved
Use of Active Fishing Gear in Municipal Waters	12 April 2012	Violation of Provincial Code 43-S-2008	US\$ 118.40	Resolved
Use of Active Fishing Gear in Municipal Waters	16 April 2012	Violation of Provincial Code 43-S-2008	US\$ 47.36	Resolved
Use of Active Fishing Gear in Municipal Waters	17 April 2012	Violation of Provincial Code 43-S-2008	US\$ 236.47	Resolved
Illegal Fishing	5 September 2012	Illegal gathering of Fish	US\$ 23.68	Resolved
Illegal Fishing	17 September 2012	Possession of Dynamited Fish	US\$ 118.40	Resolved
Dynamite Fishing	21 September 2012	Possession of Dynamited Fish	US\$ 47.36	Resolved
Illegal logging	22 September 2012	Violation of Sec. 77 of PD. 705 as amended by ED No. 77 Series of 1987; RA 7161 ED No. 23 Series of 2011; RA 9075 (Chainsaw Act of the Phil.); and Violation of Sec. 90 of RA No. 8550	Temporary Detained at Capitol Police Unit	Out on Bail
Dynamite Fishing	26 September 2012	Possession of Dynamited Fish	US\$ 23.68	Resolved
Dynamite Fishing	12 October 2012	Possession of Dynamited Fish	US\$ 35.52	Resolved
Dynamite Fishing	19 October 2012	Possession of Dynamited Fish	US\$ 118.40	Resolved
Illegal Fishing	3 November 2012	Violation of the Provincial Environmental Code	US\$ 47.36	Resolved

## Implications and Recommendations

Most of the violations recorded at the provincial level were fishery-related. This emphasizes the need to strengthen enforcement of fishery-related laws and ordinances to reduce, if not eliminate, the violations. Moreover, since most LGUs lack data on the total number of cases filed and resolved, as well as the total value of fines issued for non-compliance to fishery laws and other coastal legislations at the municipal level, it becomes difficult to clearly establish how prevalent the offenses and violations are. Thus, it is recommended that coastal LGUs properly document the nature of environmental cases committed as well as the corresponding action of authorities. Knowing the extent of the problem will enable policymakers to develop a comprehensive and effective plan of action to address gaps in the enforcement of environmental laws.

An integrated and unified ordinance on the management of fisheries is also critical. PG-ENRO can serve as a repository of information on apprehensions and facilitate the sharing of quantitative data and other relevant information among enforcement agencies. It is further recommended that the province put more effort on enforcement of environmental regulations other than fisheries.

Moreover, aside from the LGUs and national agencies with mandates in coastal law enforcement (e.g., Philippine National Police (PNP), PNP Maritime Group, Philippine Coast Guard, BFAR under the Department of Agriculture or DA, Philippine Navy, DENR, and Department of Justice), the active participation of citizens, volunteer groups, municipal and barangay FARMCs, *Bantay Dagat* (sea wardens) is also key to effective coastal law enforcement. For instance, *Bantay Dagat* personnel may assist uniformed law enforcement personnel in coastal law enforcement operations. BFARMCs, MFARMCs and fisher organizations whose members have undergone training on law enforcement may also be designated by the LGU or BFAR as deputized fish wardens tasked to enforce fishery laws and regulations. Provincial, city and municipal LGUs may also form alliances, such as coastal law enforcement councils to attain the common objective of enforcing coastal laws. It is necessary to allocate adequate funds to cover its operational requirements, such as the purchase of patrol boats, hand-held GPS units, communications equipment, camera, and computer units. Sufficient budget must also be allocated for conducting trainings on law enforcement.

## References

ICM Coordinator Annual Accomplishment Report.  
PG-COPS. Accomplishment Report 2002-2015.



## Information and Public Awareness

### 009 Public education and awareness

#### Description

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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

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Easy access to information can promote awareness of stakeholders. Public education promotes increased awareness of the value of the coastal and marine resources,

the issues affecting the environment, and the need for coastal management to protect and conserve these resources.

#### Data Requirements

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- Communication plan available
- Budget and staff allocation for implementation of communication plan
- Local governments have facilities for public access of information
- Local awareness programs
- Frequency of community participation activity
- Number of participants in community participation activity

#### Results

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The province recognizes the importance of conducting regular information, education and communication (IEC) campaigns to inform the public of the environmental issues and the responses being undertaken by the government to address the issues. The public awareness campaigns help people understand the economic, aesthetic, cultural and

ecological importance of preserving natural resources and the negative impacts of anthropogenic activities. Aside from public hearings especially before an ordinance is enacted into law, fishers' organizations conduct regular assemblies in their respective areas. These organizations help disseminate information related to coastal and marine management.



Public education and information activity in General Trias, Cavite.

The province has been conducting monthly tree-planting activities since June 2011, in support of the National Greening Program. These tree-planting activities are part of the regular public awareness and mobilization program of the province. IEC campaigns involving various stakeholders are also conducted prior to the actual simultaneous river and coastal cleanups held in September of each year.

The City of Imus has been actively conducting public awareness activities since 2009. These included seminars and lectures on environmental laws, solid waste management, climate change adaptation, river preservation/rehabilitation, and training on environmental leadership. The participants include students and faculties,

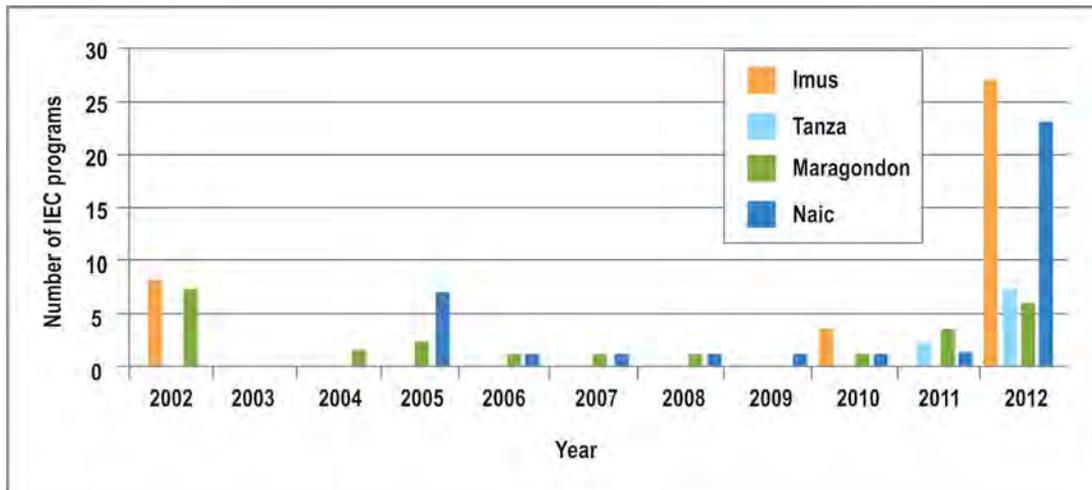
*barangay* (village) residents, senior citizens, women and youth organizations as well as representatives from the private sector. The Municipality of Tanza is also active in conducting IEC campaigns on various topics, such as waste segregation, coastal cleanup, de-clogging activities, tree planting and mangrove rehabilitation. The Municipality of Naic also conducted public consultations during the formulation of their coastal resource management (CRM) Plan. The organizations of fishers in Barangay Bucana Sasahan, Bucana Malaki, Timalan Balsahan, and Mabulo also conducted clustered meetings as part of their public awareness programs. **Figure 7** shows the number of IEC programs implemented in four LGUs for the period 2002-2012.





IEC on Solid Waste in Naic, Cavite.

Figure 7. IEC programs in Cavite Province.





*Sectoral IEC on Manila Bay Oil Spill Contingency Plan.*

## Implications and Recommendations

Public understanding and awareness of the economic, cultural and ecological importance of the province's coastal and marine resources is critical to sustainably manage and develop these resources. Through IEC campaigns and information dissemination programs, Caviteños become aware of the values and threats to the marine environment.

The ability to understand these interlinkages creates a sense of responsibility and enables the public to appreciate the management interventions being undertaken by the provincial government and other organizations involved in coastal resource management programs. This will not only

boost stakeholder participation but will also create a sense of ownership of the ICM program.

It is recommended that a communication plan be developed at the provincial and municipal levels to serve as a tool to resolve conflicts and build consensus in coastal resources management, including fisheries management. The communication framework may be used by coastal managers in collaboration with different stakeholders to help identify conflicts and their underlying causes and to formulate suitable strategies for improving communication among and between stakeholders.

## Reference

Data from LGUs in Cavite.



## Information and Public Awareness

### 010 Stakeholder participation and mobilization

#### Description

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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

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

#### Data Requirements

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- 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

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Cavite recognizes the role of nongovernmental organizations (NGOs), civil society organizations (CSOs), people's organizations (POs), and other stakeholder organizations as indispensable partners in carrying out ICM-related activities and projects. For instance, various NGOs, POs and private sector representatives, as well as students and members of academic institutions and universities actively participate in the simultaneous river and coastal cleanup activities every

September, which coincides with the celebration of the International Coastal Cleanup. CSOs also participate in mangrove-planting activities in the Municipality of Noveleta. In addition, members of the Naic Pawikan Conservation Group actively conduct activities in celebration of the annual *Pawikan* Festival (marine turtle festival) in their municipality, particularly in Barangay Labac.



*Pawikan Festival celebration in Naic, Cavite (Photo by LGU Naic).*



*Cavite participates in the annual International Coastal Cleanup Day (ICC).*

Information and public awareness

Stakeholder participation and mobilization



The list of active CSOs, POs, and NGOs in the province with programs and activities that support environmental

protection and management is shown in **Table 9**, including the number of members per organization.

**Table 9. List of participating stakeholders.**

Municipality/ agency	Year	CSOs and other stakeholder organizations in the area	Number of members per organization	Programs and activities of CSOs and other stakeholder organizations	Stakeholder participation in environment-related programs and activities
Noveleta	2003	Bantay Dagat	10	Monitoring of illegal fishing, coastal cleanup	Assist in monitoring of illegal fishing activities
	2004	Fisheries Credit Cooperative	25	Lending	Coastal cleanup
	2005	MFARMC	10	Coastal cleanup, mangrove planting, registration fishing boat	Planting of mangroves
	2007	Strengthening MFARMC		Assist in mangrove rehabilitation	Registration of fishing boat 3 tons and below
	2008	-	-	-	-
	2009	PAMANGKA	18	Assist in fingerlings disposal	Registration of fishing boat 3 tons and below
	2010	Samahang Mandaragat	22	Assist environmental protection	Coastal cleanup/ monitoring
	2011	Samahang Mandaragat	22	-	Coastal cleanup/ monitoring
	2012	Samahang Mandaragat	22	-	Coastal cleanup/ monitoring
Amadeo	2004	2			
	2005	2			Sponsorship of traditional games
	2006	3		Design/supervision of municipal projects	Participation in town plaza department
	2007	3		Town planning	Participation in festival venue
	2008	3		Documenting the festival	Preparation and documentation
	2009	3		Relics	-
	2010	3	40	Alay Lakad Pahimis Program	Alay lakad for Ilayang Ilog Development
		3	-		Tree planting projects
		5	-		Linis Ilog Program
Magallanes	2002	LGU Magallanes	45	-	Clean and Green
	2003	LGU Magallanes	45	-	Clean and Green
	2004	LGU Magallanes	50	-	Clean and Green
	2005	LGU Magallanes	52	-	Clean and Green
	2006	LGU Magallanes	55	-	Clean and Green
	2007	LGU Magallanes	60	-	Clean and Green
	2008	LGU Magallanes, MAWCO, CSPMPC, MCDC	80	Livelihood Programs	Clean and Green

Table 9. List of participating stakeholders (cont.).

Municipality/ agency	Year	CSOs and other stakeholder organizations in the area	Number of members per organization	Programs and activities of CSOs and other stakeholder organizations	Stakeholder participation in environment-related programs and activities
Magallanes (continued)	2009	LGU Magallanes, MAWCO, CSPMPC, MCDC	90	Livelihood Programs	Clean and Green
	2010	LGU Magallanes, MAWCO, CSPMPC, MCDC	90	Livelihood Programs	Clean and Green
	2011	LGU Magallanes, MAWCO, CSPMPC, MCDC	90	Livelihood Programs	Clean and Green
	2012	LGU Magallanes, MAWCO, CSPMPC, MCDC, MMECCC	95	Livelihood Programs	Clean and Green
Rosario	2010	Coast guard/Petron/PENRO	20+	Coastal Cleanup	
	2011	Coast guard/Petron/PENRO	20+	Coastal Cleanup	
	2012	Coast guard/Petron/PENRO	20+	Mangrove planting coastal	Petron/PENRO



## Implications and Recommendations

A number of active CSOs, POs, NGOs and representatives from the academe participate in various environmental management programs and activities of the province. Their views are likewise sought through public hearings and consultations, making them key actors and indispensable allies in environmental protection and management.

It is recommended that the province continuously engage CSOs and NGOs to facilitate sharing of technical, logistical and financial resources in the course of implementing activities of the ICM program. Strengthening partnership with these groups and encouraging other stakeholders to participate in the program are also very important.

### Reference

Data from LGUs in Cavite.

## Capacity Development

### 011 Availability/accessibility

#### Description

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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

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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

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- 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

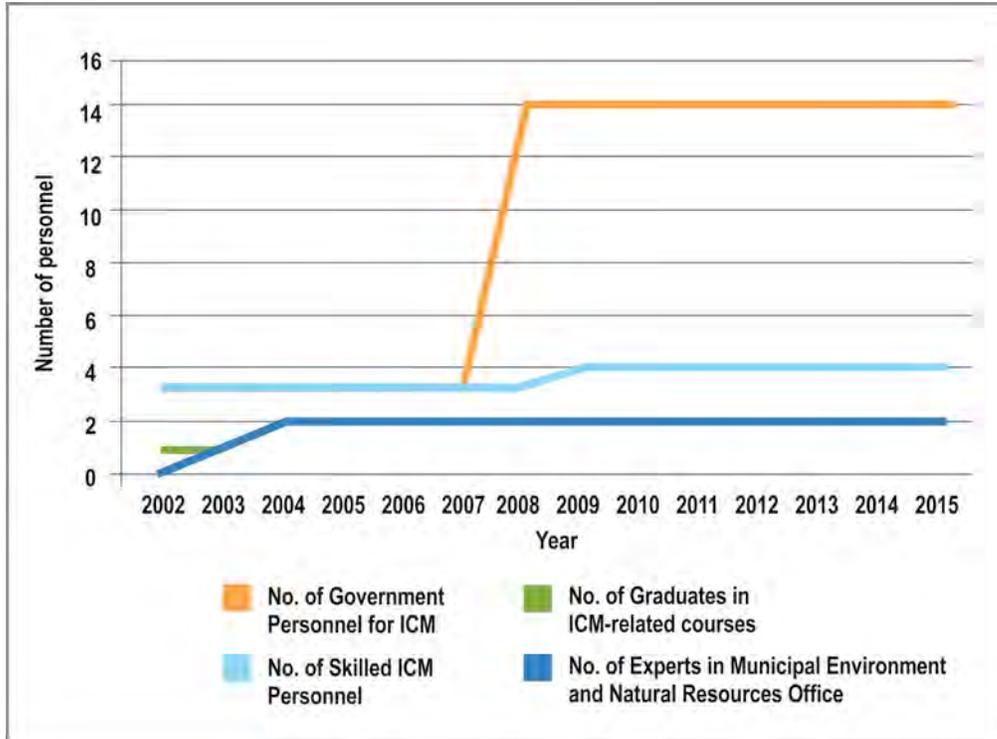
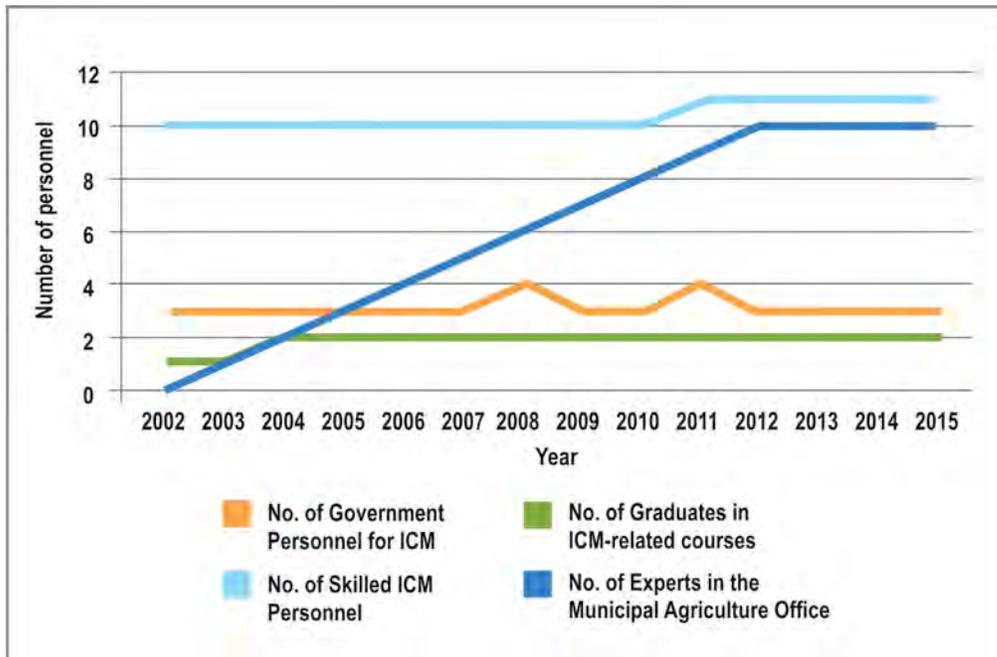
#### Results

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Since the establishment of the ICM program in Cavite, the province has increased the number of staff and budget for ICM implementation. **Figure 8** shows relevant data of some LGUs on budget and personnel allocation for coastal

management. As shown in the figure, ICM personnel in the MAO and MENRO have been increased significantly, notably between 2007-2010.

Figure 8. Personnel allocation for coastal management in the Municipality of Noveleta.



Source: MAO and MENRO of Noveleta.





*Signing of MOA between the Provincial Government of Cavite, PEMSEA and CvSU in 2015 during the Cavite Water Summit.*

It should be noted that only a few coastal municipalities of Cavite Province have available data regarding staff and budget allocation, access to facilities and training programs and technical resources available for coastal management. Human resources with capacities in coastal management are not evenly distributed among the municipalities. Thus, there is a need to conduct regular ICM training and orientations at the municipal level.

There are a few institutions that can provide technical and scientific support to ICM implementation in Cavite. To actively engage the academe in ICM implementation, a Memorandum of Agreement (MOA) between the Cavite State University (CvSU), the Provincial Government of Cavite and PEMSEA has been signed in 2015 focusing on scaling up ICM implementation in the province.



*Local government unit of Cavite during Cavite Water Summit in 2015.*



## Implications and Recommendations

Apart from developing a roster of ICM experts both at the provincial and municipal levels to serve as a pool for technical resources, it is recommended that the provincial and municipal governments seek partnership arrangements with national agencies and international organizations to create or be part of the ICM learning

network. Local experts with experience in ICM implementation may also be tapped to conduct trainings and share knowledge and experiences in coastal management. Furthermore, a provincial ICM training center may also be established to serve as the training arm for ICM capacity development.

## References

Data from the Local Government Unit of Noveleta.  
Data from Provincial Government - Environment and Natural Resources Office (PG-ENRO).

## Capacity Development

### 012 Human resource capacity

#### Description

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

#### Rationale

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

#### Data Requirements

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- 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

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The Province of Cavite recognizes the importance of strengthening individual and institutional capacities towards developing an effective ICM program. It is necessary to expand the network of competent coastal resource management practitioners and ICM professionals with broad-based planning and management skills both at the provincial and municipal levels.

Since the establishment of the ICM program in Cavite in 2004, the province has been conducting ICM trainings for the ICM staff at the provincial and municipal levels. **Table 10** shows available data on the number of people trained in ICM from 2002-2015 by some LGUs at the municipal level.

Table 10. Number of people trained in ICM.

PLGU/MLGU	Year														
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2012	2013	2014	2015
1. Provincial Government of Cavite	2	2	2	3	4	4	4	4	4	4	12	12	12	12	9
2. Noveleta	8	8	9	9	10	10	10	10	10	10	10	10	10	10	10
3. Naic	2	2	2	7	7	7	7	7	7	9	9	9	9	9	9
4. Kawit	2	2	2	4	4	4	4	4	4	4	4	4	4	4	4
5. Tanza	3	3	3	3	3	5	5	5	5	5	5	5	5	5	5
6. Ternate	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3
7. Bacoor	2	2	2	2	2	2	2	2	3	3	3	4	4	4	4
8. Cavite City	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3
9. Rosario	2	2	2	2	2	2	2	2	6	6	6	6	6	6	6

### Implications and Recommendations

It is recommended to conduct training workshops which provide opportunities for mutual learning among professionals. These capacity development interventions should be learner- and participant-centric. It is likewise suggested that the provincial government and local authorities at the municipal level establish a pool of coastal management practitioners and implement human resource development strategies that would facilitate information and knowledge transfer.

It is also necessary for local governments to seek partnerships with local and international institutions to provide technical assistance in the conduct of training and other capacity-building activities in support of ICM implementation. The development of coastal management-related courses in colleges and universities in Cavite will also be advantageous to ICM implementation.

### References

Annual Investment Plans of LGUs.  
PG-ENRO. Annual Investment Plan of the Province of Cavite 2002-2015.

## Financing Mechanisms

### 013 Budget for ICM

#### Description

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This indicator reports the financial requirements for coastal management and the government allocation including investments for environmental infrastructures. It also looks

into the financial sources for coastal management, such as loans, and grants from financing institutions and donors.

#### Rationale

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

#### Data Requirements

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- 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

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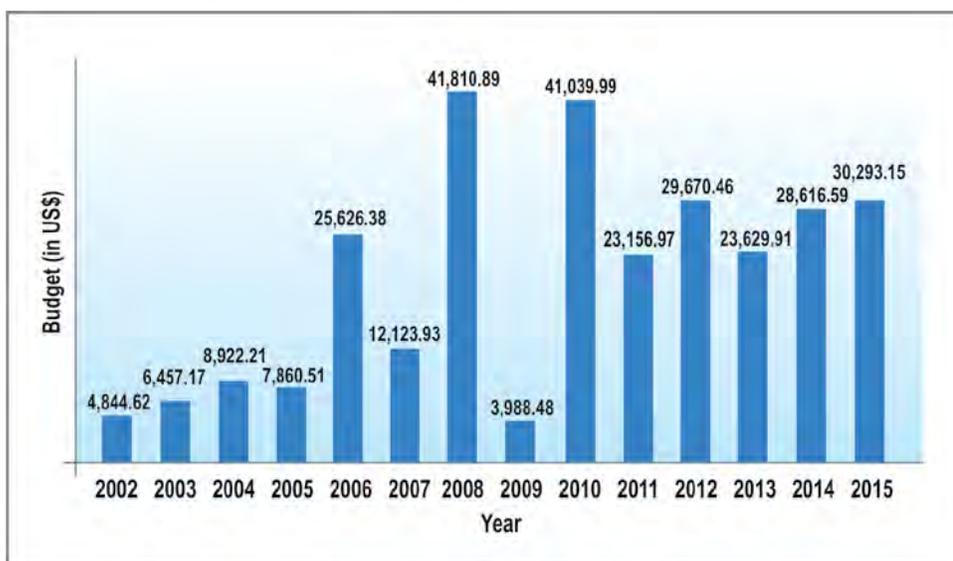
Since 2004, the Provincial Government of Cavite through the PG-ENRO was able to provide sustainable financial resources for the implementation of the ICM program. The allotted budget is intended to support various ICM activities, such as mangrove rehabilitation, coastal cleanup activities, maintenance of patrol boats, development of coastal use zoning plan, public-private partnership (PPP) programs, protection of existing marine sanctuaries and environmental profiling. A portion of the ICM budget is also used to support Cavite's membership to the PEMSEA

Network of Local Governments for Sustainable Coastal Development (PNLG), as well as training and capacity building for ICM Coordinators. However, the budget for ICM implementation is not sufficient to support various programs that would contribute to achieving the targets for the rehabilitation and cleanup of Manila Bay as part of compliance to the writ of continuing mandamus of the Supreme Court in 2008, directing 13 government agencies to clean up, rehabilitate and preserve Manila Bay.

On average, budget allocated for the ICM program of the province amounts to US\$ 18,795.99 per year, with 2008 having the largest budget and 2009 having the smallest. It is important to note that in 2009, Cavite's ICM program had only

US\$ 3,988.48 allocated due to the counterpart provided by the LGUs and by the private sector, not to mention the relatively few number of projects initiated during that year (Figure 9).

Figure 9. Annual ICM budget of PG-ENRO (in US\$), 2002-2015.



Values were converted with the Philippine Peso per US Dollar Exchange data from the Bangko Sentral ng Pilipinas (BSP), using the average peso per US dollar rate for the corresponding year.

## Implications and Recommendations

It is recommended that LGUs establish a mechanism to properly report and track their respective budget allocations, expenditures and their contribution to ICM goals and targets.

Furthermore, coastal municipalities are encouraged to consider augmenting their budget for ICM in order to improve and expand coastal management initiatives.

## References

PG-ENRO. Annual Investment Plan of the Province of Cavite 2002-2015. Provincial Budget Office. 2002-2015.



## Financing Mechanisms

### 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.

allocation from the government, various financing options must be explored to sustain financial inputs for coastal management activities and environmental infrastructure and service.

Transparency in all financial transactions is necessary to avoid suspicion from stakeholders. Apart from regular

#### Data Requirements

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

#### Results

In allocating and utilizing budget for ICM, the Provincial Government of Cavite follows the standard Philippine Government procurement process as stipulated in Republic Act 9184, known as the Government Procurement Reform Act of 2003.

The province is also authorized to engage in public-private partnerships (PPP), by virtue of Provincial Ordinance No. 002-S-2012. However, the province has not engaged in PPP projects so far to support environmental conservation and environmental infrastructure improvements. The same situation also applies at the municipal level. Moreover, the province is yet to propose the imposition of environment user fees.

## Implications and Recommendations

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The province recognizes that a sustainable source of financing is necessary for achieving long-term sustainable development goals and targets. Available data imply that the provincial and municipal LGUs are dependent on government funds to finance their projects and programs. Also, no ordinance or legislation has been passed to serve as legal basis for the imposition of environment user fees to augment available financing on coastal management.

It is therefore recommended that the provincial and municipal governments do not solely depend on the

regular allocated budget from the Internal Revenue Allotment (IRA). They must also consider creating a conducive climate for investments by donors and seek the participation of the private sector. Funds sourced from private companies through their corporate social responsibility (CSR) programs, as well as revenues generated from environment user fees may also be utilized for the protection of the environment. All PPP projects and undertakings must be guided by the principles of good governance and transparency.

## References

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Data from Municipalities and Cities in Cavite.  
PG-ENRO. Annual Investment Plan of the Province of Cavite 2002-2015.



## Natural and Man-made Hazard Prevention and Management

### 015 Level of preparedness for disasters

#### Description

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

#### Rationale

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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

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- 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

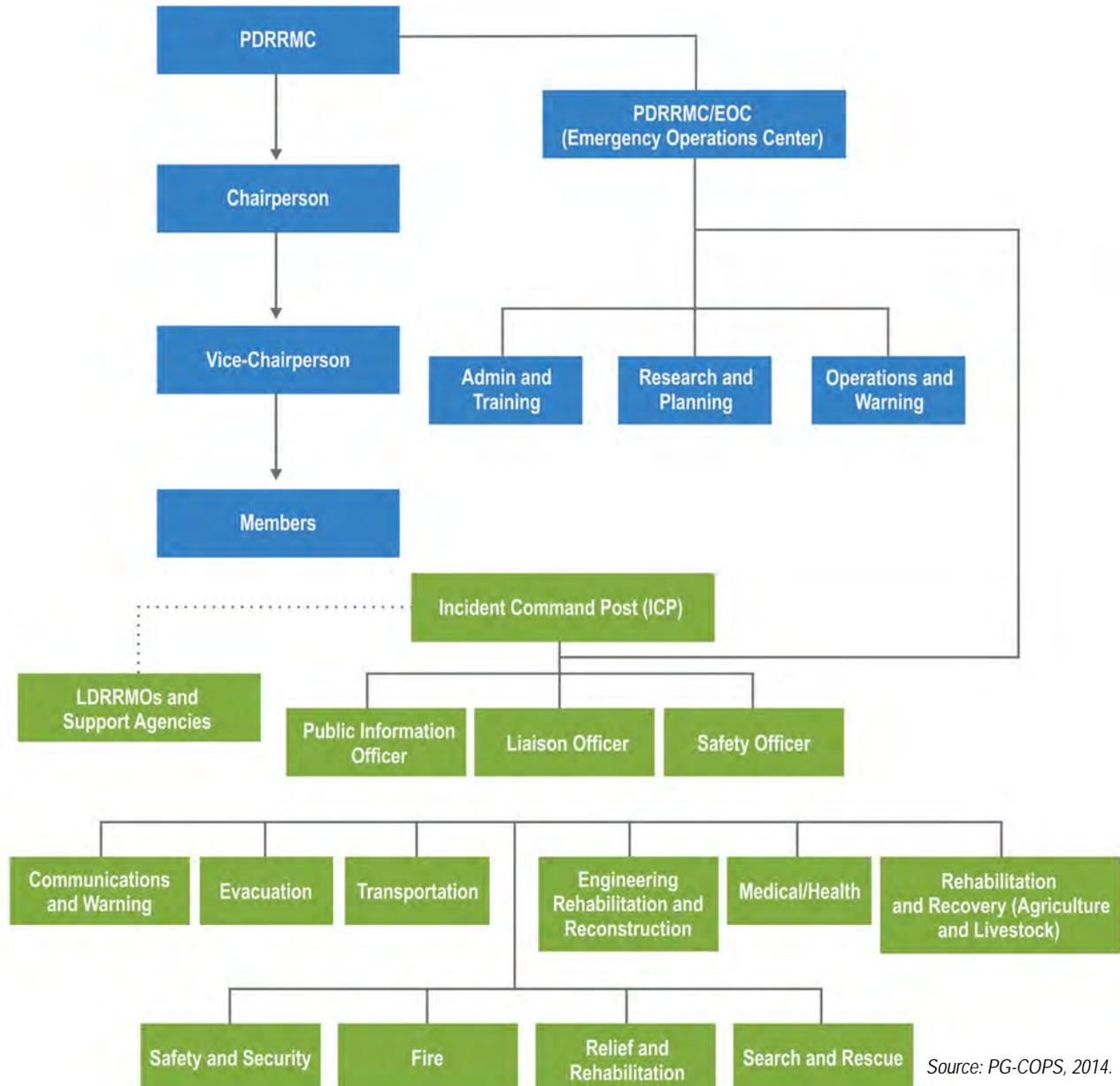
#### Results

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Disaster preparedness in Cavite is supervised by the Provincial Disaster Risk Reduction and Management Council (PDRRMC), which was re-organized by virtue of Executive

Order No. 2 – S 2011 issued by former Governor Juanito Victor C. Remulla, Jr. **Figure 10** shows the organizational structure of the PDRRMC.

Figure 10. Organizational structure of PDRRMC.

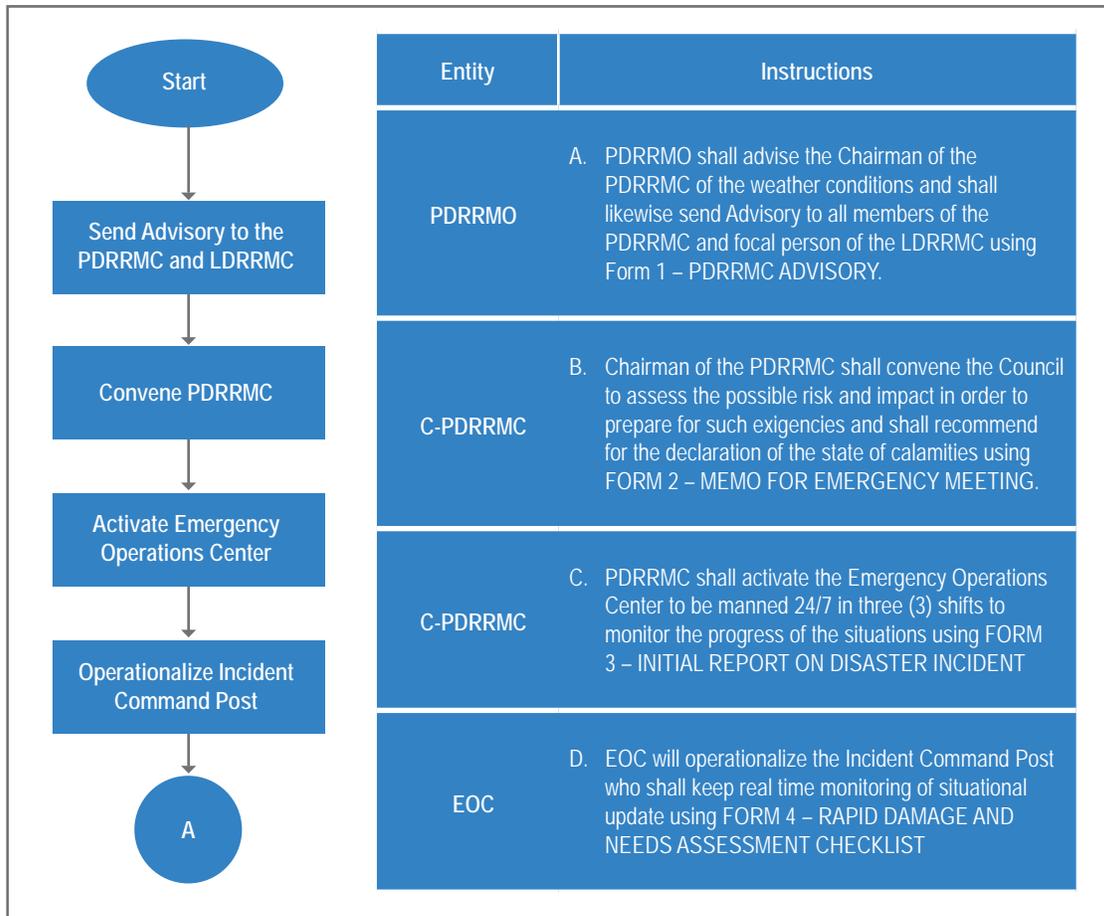


In 2012, the PDRRMC and the Provincial Planning and Development Office (PPDO) developed the Provincial Disaster Risk Reduction and Management Plan (PDRRMP) which provides guidelines for timely response to emergencies and disasters. The PDRRMP aims to provide an analytical basis in understanding the existing conditions and identifying key development issues, problems, opportunities and strategies in mitigating and addressing possible effects of identified hazards. Eight hazards classified into two types (hydrometeorological and geological hazards) were considered to be detrimental to the development of Cavite

Province, if not properly monitored. Hydrometeorological hazards are brought about by typhoons, and include floods, rainfall-induced landslides and storm surges, while geological hazards are triggered by earthquakes, and include ground shaking, liquefaction, tsunamis, ground rupture and earthquake-induced landslides. This is based on the disaster risk assessment (DRA) conducted prior to the preparation of the PDRRMP. The plan is currently in the revision process. Figure 11 shows the coordination process flow in time of disaster as indicated in the PDRRMP.



**Figure 11. Process flow for coordination in time of disaster.**



The Provincial Government – Cavite Office of Public Safety (PG-COPS), which was created in 2010 by virtue of Sangguniang Panlalawigan Resolution No. 139-S-2010, aims to strengthen the provincial government's capacity to build disaster resilience, reduce disaster risks and enhance disaster preparedness and response. The PG-COPS is also mandated to conduct search and rescue operations during calamities, and to coordinate with government and nongovernment offices for the delivery of basic health services.

The passage of Republic Act No. 10121 strengthened the Philippine Disaster Risk Reduction and Management System and mandated the NDRRMC to provide the necessary guidelines and procedures on the release, utilization, accounting and auditing of the Local Disaster Risk Reduction and Management Fund (LDRRMF). The law provides that not less than five percent (5%) of the estimated revenue from regular sources shall be set aside to support disaster risk management activities. Table 11 shows the budget allocation for the Provincial Disaster Risk Reduction and Management Fund (PDRRMF) from 2012-2015. As shown in the table, the fund is constantly increasing.

**Table 11. Budget allocation for the PDRRMF from 2012-2015.**

Year	Budget allocation for provincial disaster risk reduction and management (in US\$)
2012	2,826,268.35
2013	3,006,468.66
2014	3,266,118.86
2015	4,054,695.54

Source: Cavite Annual Investment Program, 2012-2015.

Being geographically located on the southern shores of Manila Bay, the Province of Cavite took part in the preparation of the Manila Bay Oil Spill Contingency Plan, which was published by PEMSEA in 2006. The plan outlines the multisectoral arrangement to properly respond to oil spills in Manila Bay.

The province, in partnership with the Department of Public Works and Highways (DPWH) and the Japan International Cooperation Agency (JICA), also conducted a study on flood mitigation and published the report in 2009. The study

formulated a master plan on flood mitigation, conducted a feasibility study for priority project components and developed flood management capacity for counterpart organizations in order to mitigate flood damage in the province's lowland areas.

At the city and municipal levels, repair and improvement of drainage systems, emergency response plan and early warning systems are in place to serve as mitigation strategies.

### Implications and Recommendations

Due to the organization of PDRRMC and the creation of PG-COPS, the province is adequately prepared to respond to natural and man-made hazards and disasters. However, there is a need to recruit personnel with technical expertise, and/or for existing personnel to be trained to acquire the necessary skills and expertise. Cavite is also short of equipment to monitor key parameters. At present, the equipment used by the province is provided for by the national government. In addition, there should be good

coordination between the provincial and city/municipal governments to ensure the efficient implementation of DRRM programs.

It is recommended that the provincial, municipal and city governments continue to improve and strengthen their capacity to respond to disasters both at the operational and institutional levels.



Barangay Ko Alerto Program of the PG-COPS, in Brgy. Poblacion, Noveleta. (Source: PG-COPS)

### References

- Cavite Annual Investment Program, 2015-2016.  
 GEF, UNDP, IMO and PEMSEA. November 2006. The Manila Bay Oil Spill Contingency Plan.  
 Japan International Cooperation Agency. February 2009. The Study on Comprehensive Flood Mitigation for Cavite Lowland Area in the Republic of the Philippines, Volume 1: Master Plan Study.  
 PG-COPS. 2014. Contingency Plan for Disaster Risk Reduction and Management.  
 Provincial Risk Reduction and Management Council. 2014. Disaster Risk Reduction and Management Contingency Plan.



## Natural and Man-made Hazard Prevention and Management

### 016 Degree of vulnerability to disasters

#### Description

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

#### Rationale

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The greater the degree of potential exposure to natural and man-made hazards, the more that government and local communities should be prepared and must put in

place mitigation measures for disasters. Identification of the levels of threat from various hazards can also help focus preparations on the most relevant types of threat.

#### Data Requirements

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

#### Results

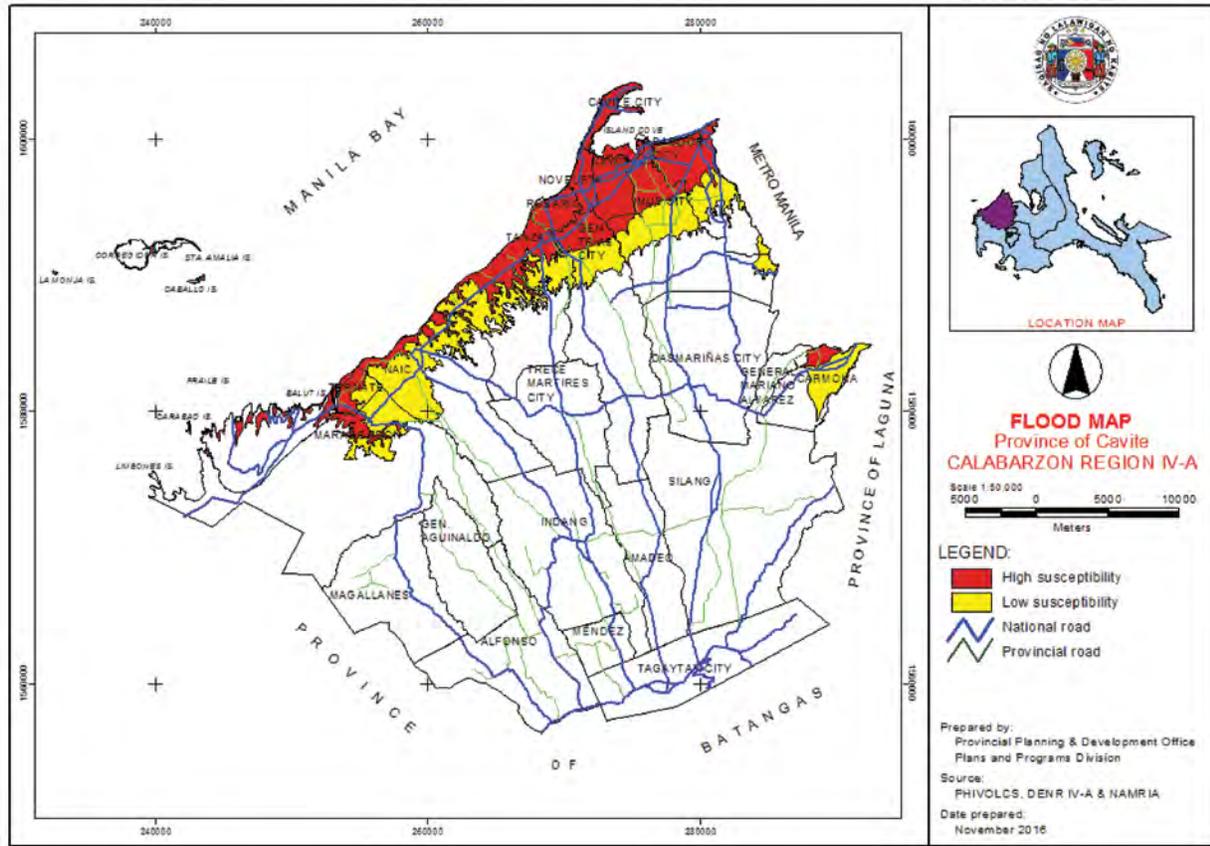
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The Cavite Provincial Development and Physical Framework Plan (PDPFP) indicated that the province is vulnerable to two major types of hazards: hydrometeorological and geological.

Hazard maps were generated through the Hazard Mapping and Assessment for Effective Community-based Disaster Risk Management or "READY" Project. The maps showed that the lowland areas of Cavite are vulnerable to flooding and tsunamis. Further, the lowland areas are classified as highly susceptible to both river overflow flooding and inland

flooding, affecting a total of 298 barangays covering 10,461 ha or 7.3 percent of the total land area of the province. In addition, 157 barangays are considered highly susceptible to tsunamis, affecting 2,355.503 ha of Cavite's land area. **Figure 12** shows the flood hazard map of Cavite where the red color indicates highly vulnerable coastal city/municipality to flooding. **Table 12**, on the other hand, shows the number of barangays with high susceptibility to hydrometeorological and geological hazards.

Figure 12. Flood hazard map of Cavite Province.



Source: PPDO, 2012.



Flooding in low-lying areas in Cavite Province (ICM Division, PG-ENRO).

Natural and Man-made Hazard Prevention and Management

Degree of vulnerability to disasters



Table 12. Number of barangays with high susceptibility to hydrometeorological and geological hazards.

City/municipality	Flooding (River Overflow and Inland)	Storm Surge <sup>1</sup>	Rainfall Induced Landslide	Earthquake-Induced Landslide <sup>2</sup>	Ground shaking	Liquefaction	Tsunami	Ground Rupture
Cavite City	All	11			All	All <sup>3</sup>	All	
Kawit	All				All	17	16	
Noveleta	All	5			All	9	5	
Rosario	All	8			All	18	10	
Bacoor City	55				All	32	21	
Imus City	38				All	2		
Dasmariñas City	11				All			
Carmona	1				All			3
Gen. M. Alvarez					All			
Silang			6		All			4
Trece Martires City					All			
Gen. Trias	7				All			
Tanza	26	9			All	10	14	
Amadeo					All			
Tagaytay City			11		31			
Alfonso					30			
Gen. E. Aguinaldo					5			
Indang					All			
Magallanes								
Maragondon	3				13			
Mendez			4		All			
Naic	8	3			3	5	7	
Ternate	8	2	1		9	4		

<sup>1</sup> In this hydrometeorological hazard, the susceptibility level for affected areas is classified as moderate.

Source: PPDO, 2016.

<sup>2</sup> A total of 444.4985 ha are considered highly susceptible to earthquake-induced landslides; majority of the area is located in Tagaytay City, Silang and Carmona.

<sup>3</sup> Excluding Corregidor Island.

Data shows that the municipalities of Naic and Tanza are the most susceptible to the identified hazards, that is, these municipalities are vulnerable to seven (7) out of eight (8) hazards. The entire province is also vulnerable to ground shaking, where a total of 125,756 ha of Cavite's total land area covering about 90% of the barangays are highly susceptible.

A total of 298 barangays, with a population of 738,310, are considered highly susceptible to flooding and storm surge, 231 of which are located along the coastlines. These 317,569 inhabitants are considered living in disaster-prone areas. The remaining barangays are inland barangays located at the lowland portion of General Trias and Imus (PDPFP 2011-2020). According to the report of the Provincial Housing Development and Management Office, 1,309 people (mostly from Kawit and Imus) were relocated to Sta. Isabel and Toclong in Kawit (Table 13).

Table 13. Total number of relocates.

Place of origin	Actual no. of relocates	Places of relocation
Brgy. Manulat, Kawit (along the seashore)	101	Sta. Isabel A Resettlement Project
Brgy. Bantayan Tramo, Kawit (along the creek)	122	Sta. Isabel B Resettlement Project
Brgy. Pulborista, Kawit (along the creek)	315	Pinagkaloob Toolong A, Kawit
Brgy. Tramo, Gahak and Pulborista, Kawit (along creek)	267	Pinagkaisa Toolong B, Kawit
Salawag, Dasmariñas	25	Pinagkaisa Toolong B, Kawit
Aplaya, Kawit	283	Pinagkaisa Toolong B, Kawit
Tabon III, Kawit	21	Pinagkaisa Toolong B, Kawit
Balsahan-Bista, Binakayan, Kawit	15	Pinagkaisa Toolong B, Kawit
Medicion 2-E, Imus; Wakas 1, Kawit	14	Pinagkaisa Toolong B, Kawit
Brgy. Pulborista, Kawit (along seashore – CAVITEX)	20	Pinagkaisa Toolong B, Kawit
Gen. Yengco, Poblacion IV-B, Imus (along the creek)	35	Pinagkaisa Toolong B, Kawit
Anabu 1-G, Anabu (along Imus River)	32	Pinagkaisa Toolong B, Kawit
Purok 10, Trece Martires City	44	Pinagkaisa Toolong B, Kawit
<b>Toolong, Imus (affected by fire catastrophe)</b>	15	Pinagkaisa Toolong B, Kawit
<b>TOTAL</b>	<b>1,309</b>	

Source: Provincial Housing Development and Management Office, 2016.

## Implications and Recommendations

Barangays along the lowland areas of the province are especially vulnerable to hydrometeorological hazards such as typhoons, while almost the entire province is considered susceptible to ground shaking. Due to the large population living in disaster-prone areas, it is imperative that the provincial government closely review its housing and

development programs and widen its scope to cover more affected barangays.

It is also necessary to document the good practices and lessons learned to improve current and future programs on disaster management.

## References

2010 Census of Population (2010), as stated in the Comprehensive Land Use Plan of General Trias.  
 PPDO. 2016. Provincial Development and Physical Framework Plan 2011-2020. Cavite, Philippines.  
 Provincial Housing Development and Management Office, 2016.



## Natural and Man-made Hazard Prevention and Management

## 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

A total of 22 tropical cyclones crossed or directly hit the Province of Cavite from 1948-2009 (PAGASA, DOST). Higher frequency of typhoons occurred in the months of September and October, where 4 to 9 typhoons have been recorded. The duration of these typhoons averaged about 4.6 days, the longest of which were Tropical Storm Karing in 1979 (May 10-16), Tropical Storm Ruping in 1982 (September 5-11) and Typhoon Reming in 2000 (October

25-31) (PPDO, 2012). From 2000-2006, there were four major river overflows recorded, caused by Typhoons Reming, Gloria, Inday and Milenyo. In September 2006, Typhoon Milenyo devastated the province, leaving 30 casualties and more than US\$ 16,272,267.18 in damages in its wake. **Table 14** shows the historical occurrence of typhoons in Cavite for the period 2002-2013.

Table 14. Historical occurrence of typhoons in Cavite Province from 2002-2013.

Description	Areas affected	Impact/losses
<b>Typhoon Maring</b> August 19, 2013	Carmona, Cavite City, Bacoor, Dasmariñas, Imus, GMA, Gen. Trias, Indang, Kawit, Naic, Noveleta, Rosario, Silang, Tanza, Ternate, Trece Martires	Dead – 8, Injured – 13, Missing – 1 Cost of Damages to: Corn – US\$19,316.51 High Value Crops – US\$ 242,457.06 Fisheries – US\$ 254,180.59 Motorized Banca (boats) – US\$ 39,461.72 Livestocks – US\$ 53,659.03 No. of affected fishers: 97 No. of motorized banca damaged: 90 No. of houses damaged: 173
<b>Tropical Storm Gener enhanced by Southwest Monsoon</b> July 12, 2012	Bacoor, Cavite City, Imus, Ternate, Kawit, Naic, Rosario, Noveleta, Ternate	724 individuals were evacuated 454 families were affected Low to medium flood level
<b>Typhoon Ambo</b> June 4, 2012	Rosario	Some schools declared “No Classes” due to low level flood No significant damages incurred
<b>Typhoon Ferdie</b> July 21, 2011	Rosario, Bacoor, Ternate, Naic, Cavite City	No significant damages incurred 40 families were forced to evacuate due to storm surge in Ternate
<b>Tropical Storm “Falcon”</b> June 21, 2011	Kawit - 23 barangays, 4,438 families, 8,870 individuals	No significant damages incurred
<b>Tropical Storm “Dodong”</b> June 9, 2011	Noveleta	20 families and 40 individuals were affected due to flooding No significant damages incurred
<b>Typhoon “Juan” (Megi)</b> October 13-24, 2010 (155 knots)	Tagaytay City – 1 barangay, 15 families, 57 individuals Ternate – 1 barangay, 64 families, 312 individuals Cavite City – 2 barangays, 107 families, 428 individuals	No significant damages incurred
<b>Typhoon “Basyang” (Conson)</b> July 11-18, 2010 (75 knots)	All municipalities of Cavite were affected with 729 barangays, 49,678 families, 247,537 individuals	Dead – 14, Injured – 13, Missing – 3 Totally damaged houses – 2,558 Partially damaged houses – 32,735 Cost of damages: Infrastructure – US\$ 49,423.96 Crops (rice and corn) – US\$ 262,088.42 Cost of assistance (LGUs) – US\$ 225,794.45
<b>Typhoon “Santi” (Mirinae)</b> October 27–November 3, 2009 (90 knots)	A total of 16 municipalities, 126 barangays, 4,141 families, 18,954 individuals were affected	No significant damages incurred
<b>Typhoon “Pepeng”</b> September 27–October 14, 2009 (130 knots)	A total of 5 municipalities, 470 families, 1,402 individuals were affected	No significant damages incurred



Table 14. Historical occurrence of typhoons in Cavite Province from 2002-2013. (cont.)

Description	Areas affected	Impact/losses
<b>Tropical Storm "Ondoy"</b> September 25-30, 2009 (90 knots)	A total of 19 municipalities, 442 barangays, 113,817 families., 534,209 individuals were affected	Dead – 6 persons, Injured – 5, Missing – 1 Totally damaged houses – 293 Partially damaged houses – 2,235 Cost of damages: Roads/Bridges/Other Structures – US\$ 200,893.41 Schools – US\$ 210,098.68 Crops (Rice and corn) – US\$ 311,053.96 HVCC – US\$ 54,797.40 Fisheries – US\$ 69,429.05 (364.9 ha) Cost of Assistance – US\$ 47,968.72
<b>Flashfloods – Pansol River</b> September 21, 2009	Municipality of Dasmariñas, Barangay Paliparan and Sampaloc IV	Dead – 5 persons
<b>Typhoon "Isang"</b> July 15-19, 2009 (65 knots)	Kawit, Rosario, Imus, Bacoor, Noveleta and Naic were affected with a total of 53 barangays, 16,993 families	Totally damaged houses – 11 Partially damaged houses – 120
<b>Typhoon "Feria"</b> June 22-27, 2009 (45 knots)	A total of 3 municipalities, 8 barangays, 706 families, 3,484 individuals were affected	Totally damaged houses – 84 Partially damaged houses – 5
<b>Typhoon "Frank"</b> June 18-26, 2008 (95 knots)	A total of 12 municipalities, 166 barangays, 40,645 families, 206,827 individuals were affected	Totally damaged houses – 43 Partially damaged houses – 227 Cost of Damages: Agriculture – US\$ 821,770.29 (2,426.00 ha) Fisheries – US\$ 87,420.68
<b>Typhoon "Hanna"</b> September 30–October 7, 2007 (70 knots)	The municipalities of Rosario and Noveleta were affected with a total of 639 families	Totally damaged houses -28 Partially damaged houses – 10
<b>Typhoon "Egay"</b> August 12-20, 2007 (140 knots)	A total of 14 municipalities, 232 barangays, 53,090 families and 260,561 individuals were affected	1 missing person
<b>Typhoon "Chedeng"</b> August 5-9, 2007 (65 knots)	A total of 11 municipalities, 122 barangays, 87,920 families, 438,701 individuals	Totally damaged houses – 2 Partially damaged houses – 13
<b>Typhoon "Milenyó" (Xangsane)</b> September 25, 2006 – October 2, 2006 (Maximum sustained winds of 125 knots)	All cities and municipalities of Cavite were affected with 463 barangays, 164,137 families, 794,339 individuals	Dead – 31 Injured – 64 Missing – 18 Totally damaged houses – 8,509 Partially damaged houses – 48,562 Cost of Damages: Infrastructure – US\$ 1,486,681.10 Agriculture – US\$ 14,199,713.00 Livestock and Poultry – US\$ 590,720.33
<b>Typhoon "Florita"</b> June 13, 2006	A total of 7 municipalities, 45 barangays, 2,260 families, 1,111 individuals were affected	Totally damaged houses – 51 Partially damaged houses – 38
<b>Typhoon Inday</b> July 2002	The municipalities of Bacoor, Noveleta, Rosario, Imus, Kawit, etc., with a total of 168,025 individuals were affected	Dead – 1
<b>Typhoon Gloria</b> July 2002	The municipalities of Bacoor, Noveleta, Rosario, Imus, Kawit, etc., with a total of 173,075 individuals were affected	

Source: PG-COPS, 2014.



## Implications and Recommendations

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Although data shows a decrease in the frequency of typhoons that hit the province, the economic and social costs of these damages were considered to be extensive.

Strengthening the development and implementation of community-based disaster risk reduction and management programs may help reduce the number of casualties since local residents can best identify their immediate needs and

coordinate preparedness and response measures. They can therefore supplement the local government's DRR efforts by implementing emergency response programs while participating in the decision-making process for future events. Moreover, local communities can provide a sense of connection with their neighbors, thereby decreasing the feeling of isolation and abandonment among residents during disasters and emergencies.

## References

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- Climate and Agromet Data Section, Climatology and Agrometereology Division, PAGASA, DOST.  
 PG-COPS. 2014. Contingency Plan for Disaster Risk Reduction and Management.  
 PPDO. 2016. Provincial Development and Physical Framework Plan 2011-2020.

### Habitat protection, restoration and management

#### 018 Habitat management plan and implementation

##### Description

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

##### Rationale

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Coastal habitats serve 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

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

##### Results

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Republic Act No. 7856 of 1992, or the National Integrated Protected Areas System (NIPAS) Act, encompasses outstandingly remarkable areas and biologically important public lands that are habitats of rare and endangered species of plants and animals, biogeographic zones and related ecosystems, whether terrestrial, wetland or marine, all of which shall be designated as protected areas. In accordance with the NIPAS Act, there are two national parks in the

Province of Cavite, which were declared as protected areas by virtue of Presidential Proclamation No. 1594, namely: Mount Palay-Palay and Mount Mataas na Gulod, which were later named Mounts Palay-Palay and Mataas na Gulod Protected Landscape. This landscape has a total land area of 3,973.13 ha located in the Municipalities of Ternate and Maragondon.

This national park is divided into ten management zones, namely:

1. Strict Protection Zone
2. Sustainable Use Zone
3. Restoration Zone
4. Habitat Management Zone
5. Multiple Use Zones
6. Buffer Zones
7. Recreational Zones
8. Alienable and Disposable Zone
9. Marine and Coastal Zone
10. Other management zone

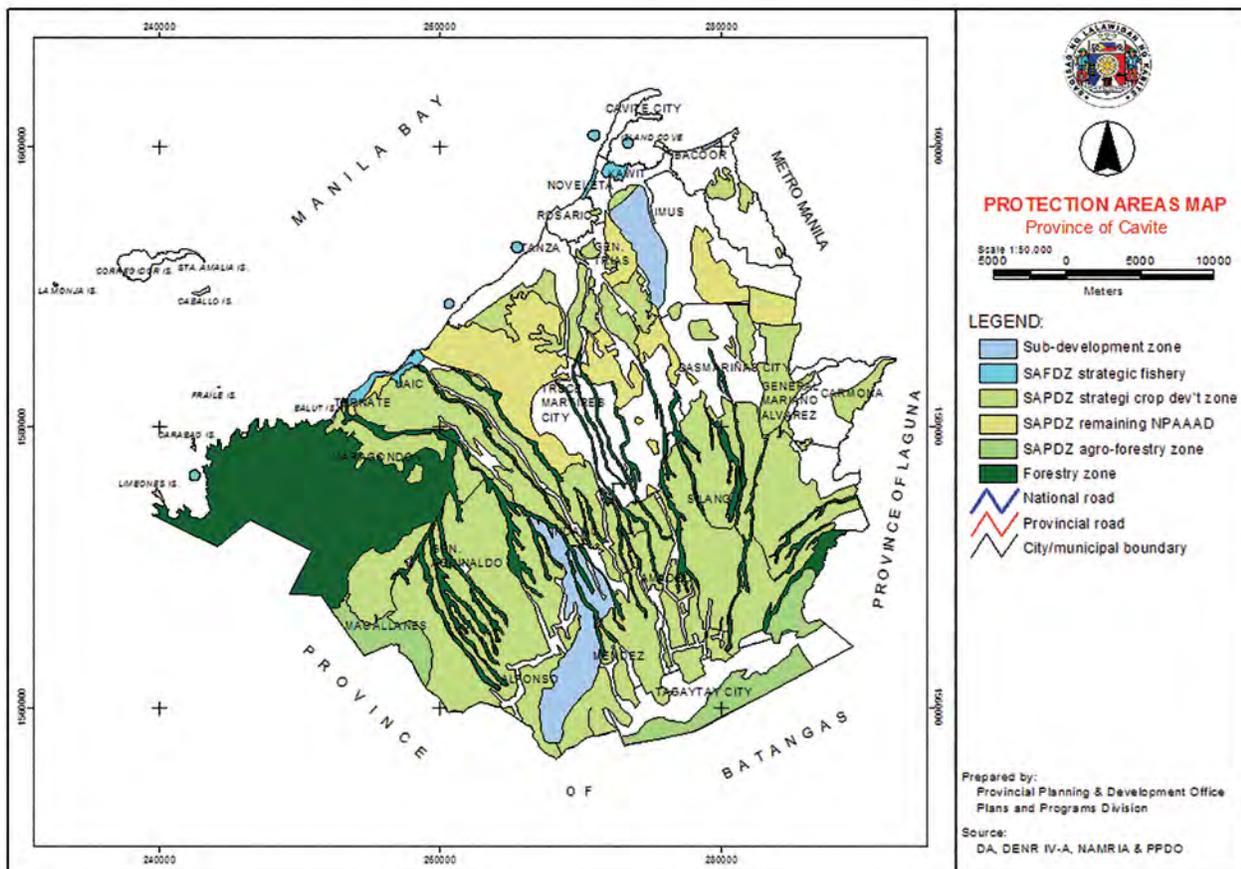
Table 15 shows the information on protected forest area while Figure 13 shows the protection areas map of Cavite.

Table 15. Protected forest area as percentage of total forest area in Cavite Province.

Predominantly timberland	Cover estimated	Land area (in hectares)
Vegetative Forest	62.50%	2,483.21
Non-Forest	37.50%	1,489.92
<b>Total Forest Area</b>		<b>3,793.13</b>

Source: Department of Environment of Natural Resources

Figure 13. Protection areas map of Cavite Province.



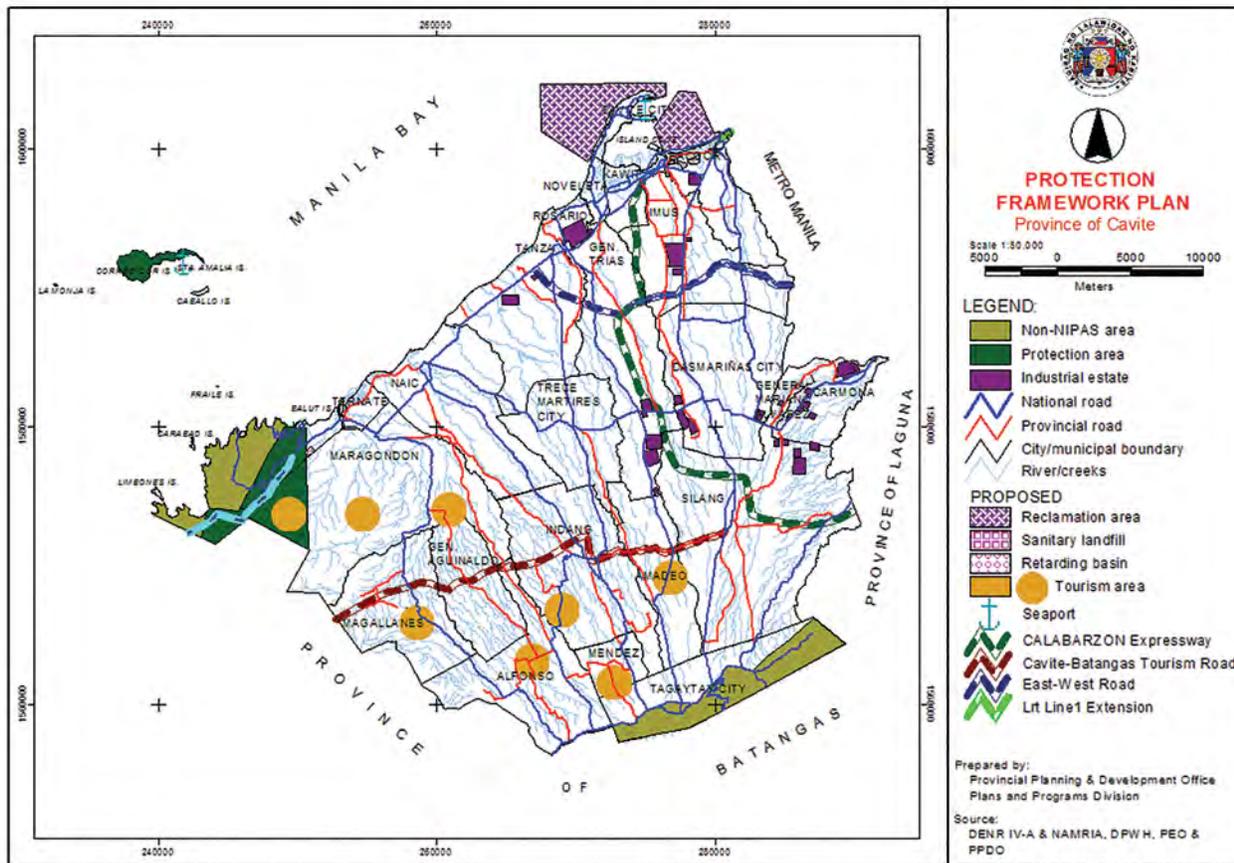
Source: PPDO, 2016.



Pursuant to Republic Act No. 8435 or the Agriculture and Fisheries Modernization Act of 1997, each municipality and city in the province must designate their Strategic Agriculture and Fishery Development Zone (SAFDZ) areas. The total

SAFDZ area in Cavite is 55,888 ha. The PDPFP has also formulated a Protection Framework Plan map, as shown in Figure 14.

Figure 14. Protection framework plan of Cavite Province.



Source: PPDO, 2016.

## Implications and Recommendations

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Aside from areas considered under NIPAS, there are other areas that require rehabilitation, conservation and sustained development and management. These are areas greater than 50 percent in slope which are located along Tagaytay Ridge with an area of 2,707 ha; forest lands in Magallanes with an area of 1,860.6 ha and in Maragondon with an area of 4,298 ha.

It is recommended that the Mounts Palay-Palay and Mataas na Gulod Protected Landscape be placed under the co-management of the provincial government. An agreement between the DENR and the province may be forged to undertake collaborative arrangements in the co-administration of the protected landscape. This will empower the provincial government to promote its eco-tourism potential and will help ensure that activities in the area are indeed beneficial and not damaging to the landscape's natural conditions.

## Reference

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PPDO. 2016. Provincial Development and Physical Framework Plan 2011-2020. Cavite, Philippines.



## Habitat protection, restoration and management

### 019 Areal extent of habitats

#### Description

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

#### Rationale

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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

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

#### Results

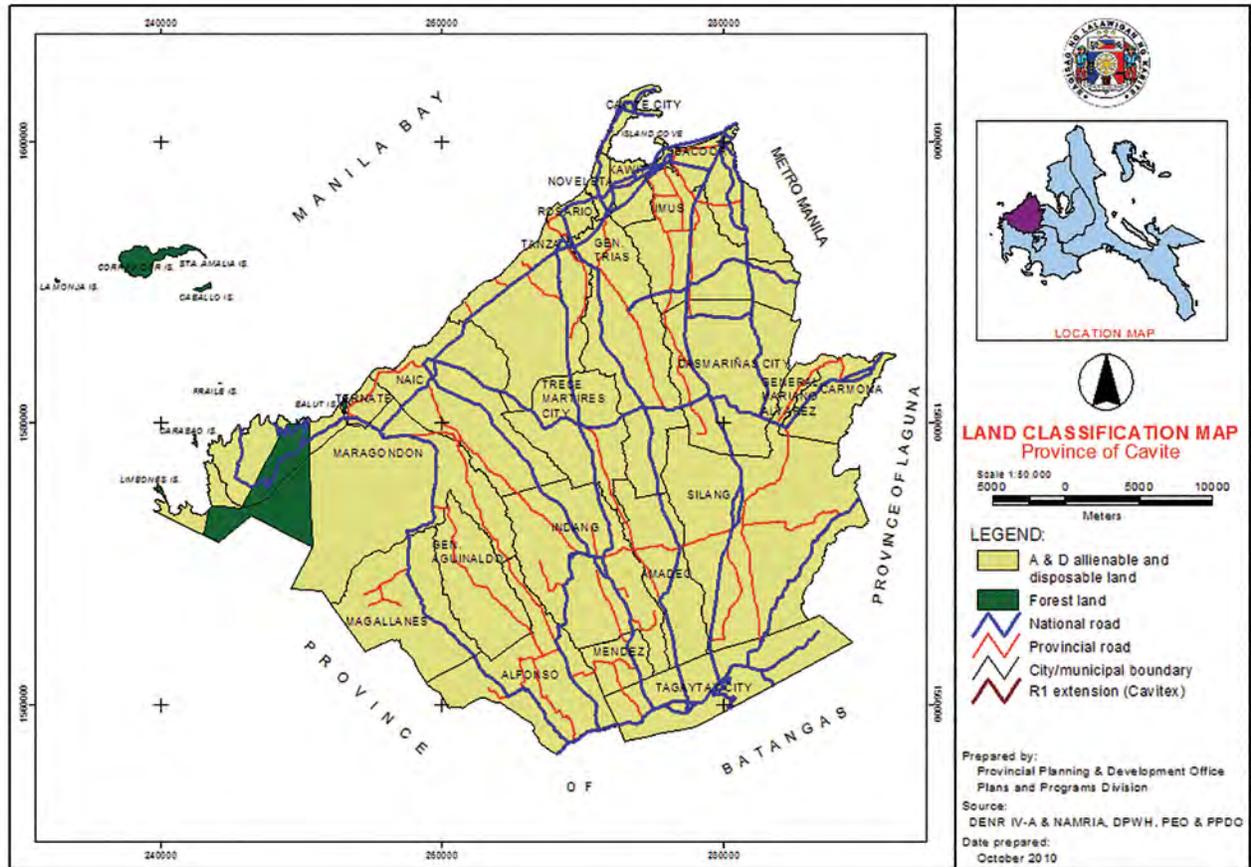
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Before transforming into an urban and industrialized province, Cavite was an agricultural province with vast areas of natural habitats. One of the most notable natural habitats is the mangrove areas, which serve as breeding grounds for marine organisms, act as shoreline protection against strong typhoons and protect the coastal areas from erosion.

The lands in the province are classified as: (a) alienable and disposable land production area (129,391 ha) including

built-up area, which is used for institutional, industrial and commercial purposes (57,916.09 ha) and agricultural area, which is used for crop production, livestock, poultry and fishery production (71,474.91 ha), and; (b) forest lands (13,315 ha) which are either classified (5,357.36 ha) or unclassified (7,957.64 ha) (PPDO, 2016). Figure 15 shows the land classification map of Cavite.

Figure 15. Land classification map of Cavite Province.



Source: PPDO, 2016.

Available data indicate that there is a total of 8,624.56 ha of forests, 32.65 ha of mangrove area, 4,179.38 ha of coral reef area, and 2,210.5 ha of mudflat area. It is also important to note that there was a sharp and steady decline of mudflat

area in Noveleta, from 2,748 ha in 2002 to 728 ha in 2012. Based on 2010 data, the existing total forest area within the province is 8,624.56 ha. **Table 16** shows the areal extent of habitat in Cavite.



Strip of mangroves in Noveleta, Cavite. (Source: PG-ENRO ICM)



Table 16. Areal extent of habitats.

	Total area (in hectares)	Percentage of Cavite's total land area	Location
Forest	8,624.56	0.060400	<b>Tagaytay City</b> Unclassified Forest – 1,802.90 ha <b>Magallanes</b> Unclassified Forest – 1,861.00 ha <b>Ternate</b> Unclassified Forest – 1,248.70 ha Classified Forest – 1,237.21 ha <b>Maragondon</b> Unclassified Forest – 2,140.90 ha Classified Forest – 2,690.79 ha
Mangrove Area	58.95	0.000413	Bacoor – 0.26 ha Kawit – 13.06 ha Cavite City – 0.99 ha Noveleta – 31.02 ha Tanza – 6.50 ha Rosario – 3.00 ha Naic – 0.50 ha Ternate – 2.12 ha Maragondon – 2.10 ha
Coral Reef Area	4,179.38	0.029300	
Mudflat Area	2,210.50	0.015000	
Urban "Green" Area	4,131.00		<b>General Trias</b>

Source: PG-ENRO ICM Division.

The DENR in coordination with PG-ENRO conducts various reforestation projects in the province. In 2011, a total of 60 ha was reforested through the joint efforts of the government and private sector. In addition, a total of 312.318 ha was reforested

by the DENR Provincial Environment and Natural Resources Office (PENRO). Table 17 shows the reforestation projects implemented from 1981-2011.



Mangrove planting of Philippine Coast Guard in Noveleta, Cavite.

Table 17. Reforestation projects from 1981 to 2011.

Year established	Area (in hectares)	Species planted	Location
1981-2001	697	Assorted species	Mts. Palay-Palay/Mataas Na Gulod reforestation project at Maragondon, Ternate and Magallanes, Cavite
2002	11	Assorted species	Mts. Palay-Palay/Mataas Na Gulod reforestation project at Maragondon and Ternate, Cavite
2004	10	Mahogany, Narra	Mts. Palay-Palay/Mataas Na Gulod reforestation project at Maragondon and Ternate, Cavite
2005	12	Mahogany	Mts. Palay-Palay/Mataas Na Gulod reforestation project at Maragondon and Ternate, Cavite
2007	24	Acacia, Camachile, Mahogany, Narra, Tuba-tuba	San Agustin, Magallanes, Cavite
2008	12	Acacia, Mahogany, Narra	Mts. Palay-Palay/Mataas Na Gulod reforestation project at Sapang, Ternate, Cavite
	32	Acacia, Akleng Parang, Mahogany, Narra	Mts. Palay-Palay/Mataas Na Gulod reforestation project at Sapang, Ternate, Cavite (under soil conservation and water management)
	52	Jackfruit, Kaimito, Mahogany, Mango, Narra, Rambutan, Santol	Pinagsanhan, Maragondon and Sapang, Ternate
2011	312.318	Alibangbang, Anahaw, Balete, Banaba, Eucalyptus, Fire Tree, Golden Shower, Kaong, Kupang, Narra, Mahogany, Molave	Urban Watershed, PACBRMA and CBFM areas
<b>TOTAL</b>	<b>1,162.318</b>		

Source: PG-ENRO.



## Implications and Recommendations

The transformation of the province from rural and agricultural, to urban and industrialized has resulted to the decrease in areal coverage of the important coastal habitats (e.g., mangroves, coral reefs and mudflats) due to infrastructure and other industrial development projects.

It is recommended that the province continue implementing various programs and projects to conserve and protect the remaining habitats, including monitoring and enforcement activities. It is also necessary to conduct valuation studies to show the benefits of maintaining healthy and resilient habitats.

## References

- PPDO. 2012. Cavite Socio-Economic and Physical Profile 2011.  
 PPDO. 2016. Provincial Development and Physical Framework Plan 2011-2020. Cavite, Philippines.

## Habitat protection, restoration and management

### 020 Protected areas for coastal habitats and heritage

#### Description

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

#### Rationale

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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

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- 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<sup>2</sup>)

#### Results

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As a consequence of urbanization, the coastal habitats in the province are under the constant threat of exploitation and degradation. The city and municipal governments have declared several areas within their jurisdictions as protected areas.

There are four marine protected areas (MPAs) established from 2002 to 2012, with an aggregate area of 35,803 ha, 40 ha of which are situated in the Municipality of Tanza and 45 ha are located in the City of Bacoor. Several LGUs of the

province have enacted ordinances and resolutions on the establishment of a fish sanctuary and fishery reserves within their jurisdictions. In Trece Martires, the city government has already designated areas to be classified as protected areas. The Municipalities of Maragondon, Naic, Rosario, Tanza and Ternate are currently in the process of establishing their respective MPAs.

By virtue of Ordinance No. 2 S-2011 by the Municipality of Ternate, the Maragondon River mouth (35,700 ha) has

been declared as an MPA, with provisions that the whole mangrove forest is a protected area, making it illegal to convert it into fish ponds.

The areas of Barangay Sta. Mercedes in Maragondon, a portion of the municipal waters in Brgy. Bagong Kalsada in

Naic, a portion of municipal waters within Brgy. Julugan I and III in Tanza and Bulaklakin Reef and a portion of Brgy. Sapang I in Ternate have been declared a Municipal Fish Sanctuary and Fishery Reserves by their respective municipal governments. **Table 18** shows the ordinances issued by the LGUs of Cavite on the establishment of protected areas.



*Maragondon River. (Source: Provincial Tourism Office)*



Table 18. Ordinances issued by the different LGUs on the establishment of fish sanctuaries, fishery reserves and MPAs.

Municipality	Ordinance/resolution no.	Title
Maragondon	Blg. 74 (2004)	An Ordinance establishing the Maragondon fish sanctuary in Brgy. Sta. Mercedes, Maragondon, Cavite.
Naic	No. 03 series of 2003	Resolution declaring a portion of the municipal waters of Brgy. Bagong Kalsada as fish sanctuary.
	No. 09 series of 2003	An ordinance declaring, establishing and regulating the Naic fish sanctuary and Naic reserve areas, prescribing the regulatory measures related thereto with fixed fines and penalties in case of violation and granting authority to the Naic Municipal Mayor to enter into a Memorandum of Agreement with an accredited nongovernmental organization for the full implementation and enforcement of this ordinance.
Tanza	No. 10-2009	An ordinance declaring, establishing and regulating the municipal fish sanctuary and fishery reserve areas in Tanza, Cavite, prescribing regulatory measures pertinent thereto and providing penalties for violation thereof.
Ternate	No. 04 S-2005	An ordinance declaring, establishing and regulating the Ternate Fish sanctuary and marine reserved areas, prescribing the regulatory measure related thereto with fixed fines and penalties in case of violation.
	No. 17 S-2005	Resolution declaring the creation of Bulaklakin Reef as fish sanctuary and fishery reserve.
Trece Martires City	No. 147-S-2008	An Ordinance designating Protected Areas in the city of Trece Martires.

## Implications and Recommendations

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Cavite has been actively designating areas for protection in the form of fish sanctuaries, fishery reserves and MPAs. To maintain the effectiveness of the protected areas, there is a need for strong enforcement of the LGUs' ordinances, and to continuously monitor the management effectiveness of these areas. The significance and benefits of declaring MPAs should also be communicated to the communities concerned to elicit their support, particularly in the monitoring and enforcement of ordinances.

It is recommended that the province develop management plans to guide the implementation of actions that would achieve the goals and objectives of the protected areas. These should include alternative livelihood programs for the concerned residents in the areas.

## Reference

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PPDO. 2016. Provincial Development and Physical Framework Plan 2011-2020. Cavite, Philippines.



## Habitat protection, restoration and management

## 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 is a total of 1,247.05 ha designated as reclassified areas in the province (Table 19). These areas were previously

agricultural lands and were reclassified for residential, commercial, institutional, religious and recreational purposes.

**Table 19. Reclassified areas in Cavite Province.**

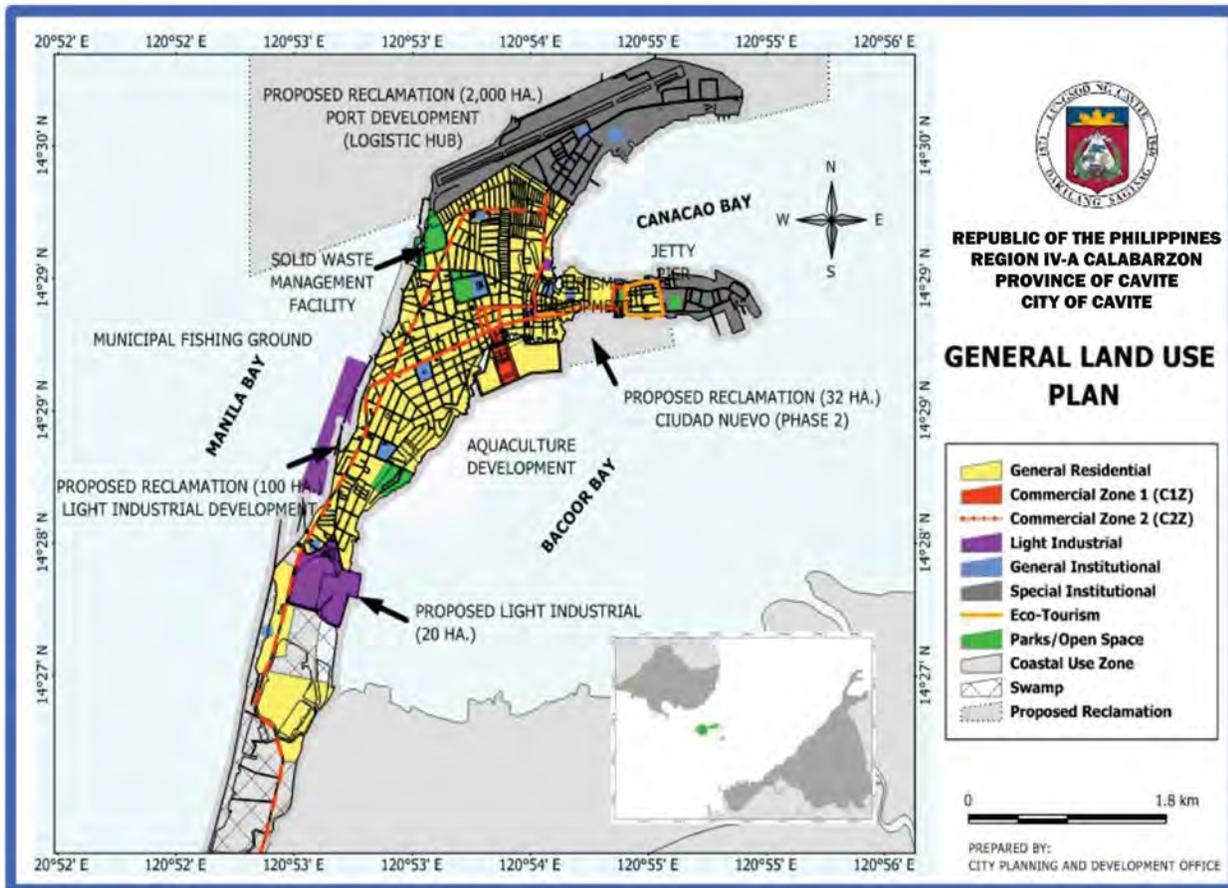
Municipality	Reclassified areas (ha)	Purpose
Amadeo	2.00	Commercial
Carmona	35.78	Parks and Recreation
General Trias	704.5	PUD (includes reclassified lots with pending development)
Maragondon	238.17915	Residential, Commercial, Institutional and Religious
Naic	266.59	Non-Agricultural
<b>Total</b>	<b>1,247.05</b>	

Source: Comprehensive Land Use Plans of Amadeo, Carmona, General Trias, Maragondon and Naic.

A total length of 7 km was reclaimed along the coast of Bacoor Bay to construct the extension of the Manila-Cavite Expressway (CAVITEX) connecting the province to Metro Manila. Cavite City has also proposed to reclaim some

areas for purposes of light industrial development and port development. The city's proposed reclamation project covers 2,152 ha (Figure 16).

Figure 16. General land use plan of Cavite City.



Source: Cavite City Comprehensive Land Use Plan.

### Implications and Recommendations

Cavite has limited areas for reclamation and reclassification. The PDPFP, the CLUPs and the Coastal Land and Sea

Use Zoning Scheme have identified proposed areas for production, settlement, protection and infrastructure.

### References

- Comprehensive Land Use Plan of Amadeo 2010-2020.
- Comprehensive Land Use Plan of Carmona 2012-2022.
- Comprehensive Land Use Plan of Cavite City 2012-2022.
- Comprehensive Land Use Plan of General Trias 2012-2021.
- Comprehensive Land Use Plan of Maragondon 2011-2020.
- Comprehensive Land Use Plan of Naic 2010-2020.



### Water use and supply management

#### 022 Water conservation and management

##### Description

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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

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

##### Data Requirements

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

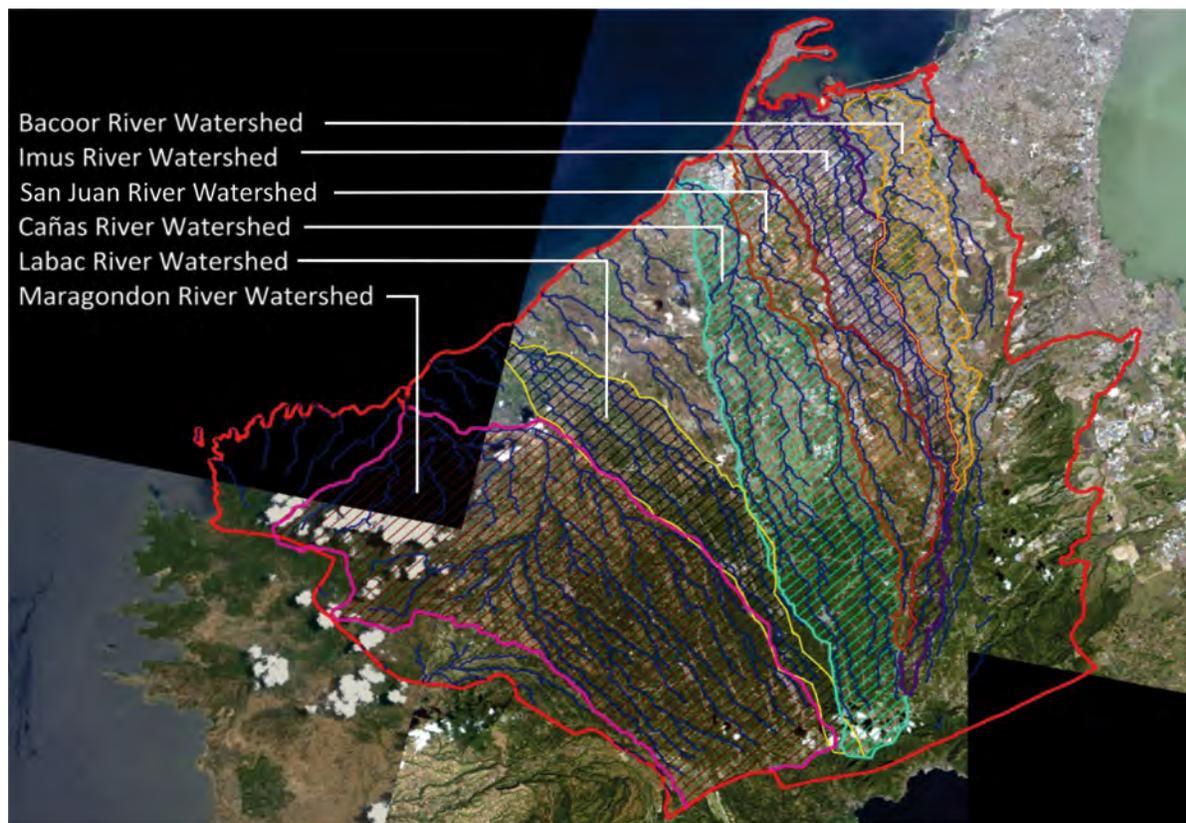
##### Results

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In 2012, a comprehensive study on water resources management was conducted by the province. The study led to the development of the Cavite Integrated Water Resource Management Master Plan (CIWRMMP). The CIWRMMP aims to address the widening gap between the demand and supply for groundwater, infrastructure backlog and the irrational allocation of water resources. The CIWRMMP also

identified measures to address the demand and supply gap through the utilization of wells and major rivers, specifically Maragondon River, Panaysayan River, Balsahan River and Ylang-ylang River, and some tributaries (**Figure 17**) to meet the projected demand for water in the province. The plan is due for adoption by the Sangguniang Panlalawigan of Cavite.

Figure 17. Six major river watersheds in Cavite Province.



Source: CvSU-DFES, 2014.

Projected water demand is shown in Table 20 based on major water usage for domestic, agriculture, industrial and recreational purposes. The supply-demand analysis shows that due to increasing population, it is projected that by 2020 there will be a deficit of 51 MLD (million liters per day) for domestic supply.

The water requirements of the province are being provided by both public and private water service providers as presented in Table 21.

There are 18 primary water service providers in Cavite including 12 water districts, 2 LGU-managed suppliers and 4 private providers. The distribution of water supply facilities is also shown in Figure 18.

Table 20. Projected water demand in Cavite Province.

Year	2012	2015	2020	2025	2030	2035	2040
Domestic Water Demand	525	538	669	838	1,063	1,297	1,549
Agricultural Demand	1,094	1,090	1,087	1,077	1,074	1,077	1,089
Industrial Water Demand	122	136	160	172	184	188	192
Recreational Water Demand	12.02	12.45	13.03	13.46	13.90	14.47	15.17
Water Demand	1,753	1,777	1,929	2,100	2,335	2,576	2,845

Source: CIWRMMP (July 2012).

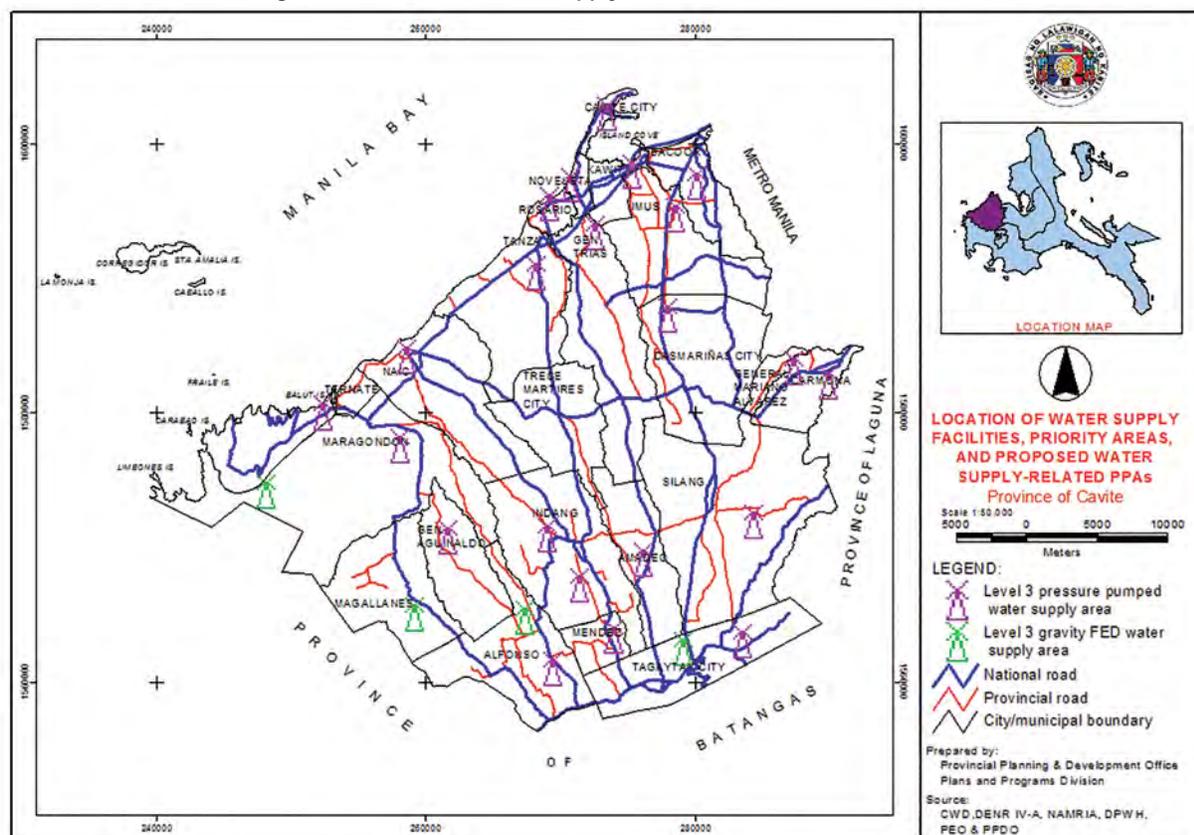


Table 21. Estimated maximum water production capacity per water agency.

No.	Water agency	Number of pumping stations	Maximum production capacity (m <sup>3</sup> /day)
1.	Alfonso Waterworks Office	3	1,898.00
2.	Amadeo Water District	10	3,123.00
3.	Carmona Water District	10	14,136.04
4.	Dasmariñas Water District	108	144,123.43
5.	Gen. Aguinaldo Water District	3	2,643.84
6.	GMA Water District	14	10,354.38
7.	Indang Water District	10	5,733.53
8.	Maragondon Water District	5	5,703.00
9.	Maynilad Water Services, Inc.	17	12,989.00
10.	Mendez Water District	7	3,869.00
11.	Naic Water Supply Corporation	4	124.19
12.	Silang Water District	60	39,892.30
13.	Tagaytay Water District	15	23,022.00
14.	Tanza Water District	6	7,779.67
15.	Western Cavite Water Supply and Services Corporation	1	13,750.00
16.	TMC Water District	20	14,255.96
<b>Total</b>		<b>293</b>	<b>303,397.34</b>

Sources: PPDO, 2012.

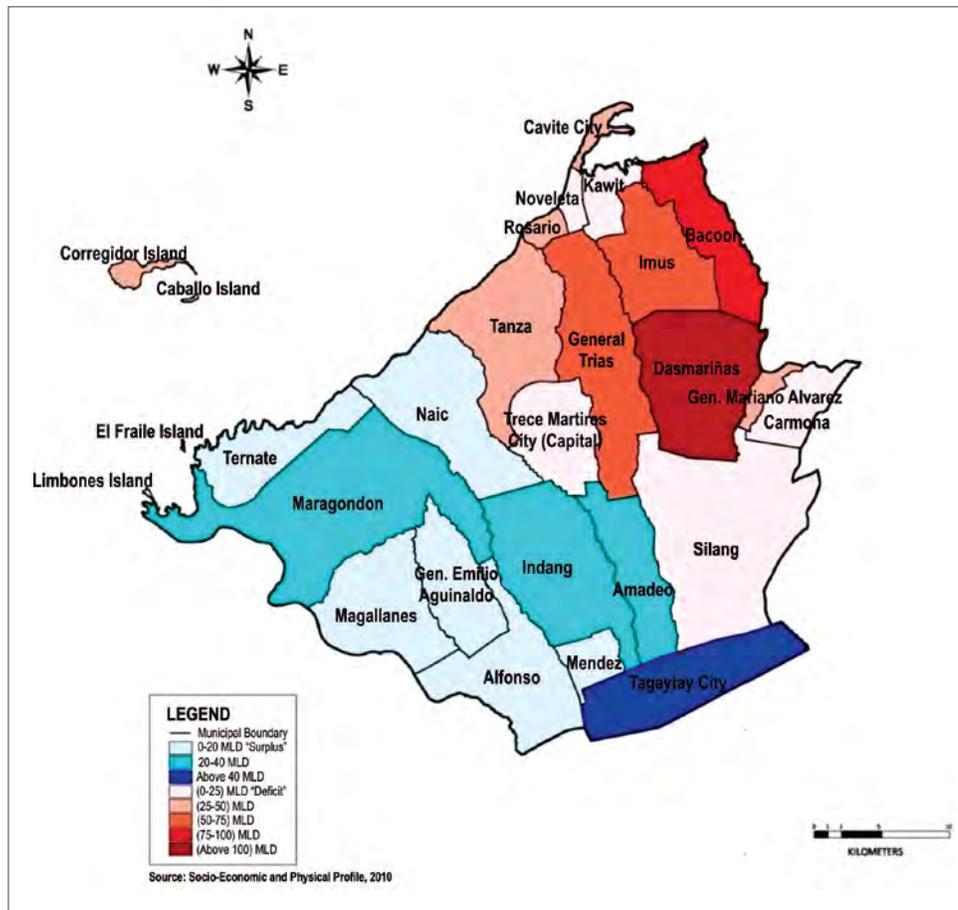
Figure 18. Location of water supply facilities in Cavite Province.



About half of Cavite is short of groundwater reserves (Figure 19). While most of the northwest municipalities show groundwater deficit, southwest municipalities are still able

to manage. In particular, the City of Dasmariñas is the most significantly short of groundwater.

Figure 19. Groundwater availability in Cavite Province, 2012.



Source: CIWRMMP, July 2012.

## Implications and Recommendations

Cavite still has adequate water resources. However, it is projected that the province will face challenges in securing freshwater resources in the near future. Although the CIWRMMP has been developed, its implementation is still limited. The province needs to step up its water resources management measures. As shown in Figure 19, groundwater availability has reached a critical point in two municipalities, with six more cities and municipalities having critical levels of water availability. Thus, these areas must be given priority in the implementation of water resources management actions.

It is recommended that the province adopt and implement the integrated water resource management program (IWRMP) to address the impending future water shortage in the province. The water management plan can be strengthened through the enactment of water resources management ordinances. The city and municipal governments may also implement management actions in line with the CIWRMMP, particularly educating their constituents on water conservation practices.

## References

- Cavite Integrated Water Resource Management Master Plan. 2012.  
 PPDO. 2016. Provincial Development and Physical Framework Plan 2011-2020. Cavite, Philippines.



### Water use and supply management

#### 023 Access to improved water source

##### Description

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

##### Rationale

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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

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

##### Results

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A large part of Cavite has access to clean and safe water delivered by public and private service agencies (e.g., 12 water districts, 2 LGU-managed and 4 private suppliers). Private subdivisions and barangays that are not covered by the service agencies have their own water systems in place, provided by the respective homeowners' associations and Barangay Waterworks and Sanitation Associations (BWSAs).

The main sources of freshwater are the groundwater wells and springs. While springs are commonly used in the upland and rural areas, all others use deep wells, being the traditional water source. About 95 percent of the entire households of Cavite have access to improved water services.



*Cavite Water Summit, 2015. (Source: ICM Division, PG-ENRO)*

The aggregate maximum production capacity of the water agencies serving the province, which corresponds to a total of 293 pumping stations, is estimated at 303,397 m<sup>3</sup>/day. For the 12 water districts, the minimum water service charge

(first 10 m<sup>3</sup>) for residential connections ranges from PhP 158 (US\$ 3.16) in Dasmarinas City to PhP 280 (US\$ 5.60) in General Mariano Alvarez. The average minimum monthly charge is PhP 198.29 (US\$ 3.97).

## Implications and Recommendations

Cavite is providing more than 95 percent of its residents safe and clean drinking water. The water pricing is also reasonable at PhP 15 (US\$ 0.30)/m<sup>3</sup> to PhP 28 (US\$ 0.56)/m<sup>3</sup>. However, it is a concern that the main source of clean water is groundwater. Excessive extraction of groundwater poses threats to water security as well as land security. Various detrimental effects such as land subsidence, saltwater intrusion, surface water diminishing and others can

occur in the near future. Therefore, the province should control and minimize groundwater extraction.

It is recommended that the province seek alternative solutions to groundwater extraction. Surface water should be tapped as a possible source of drinking water. This can be made possible through efficient management of the watershed areas and controlling pollution in major rivers of the province.

## Reference

Cavite Integrated Water Resource Management Master Plan. 2012.



### Water use and supply management

#### 024 Incidences/deaths due to waterborne diseases

##### Description

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

##### Rationale

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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

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

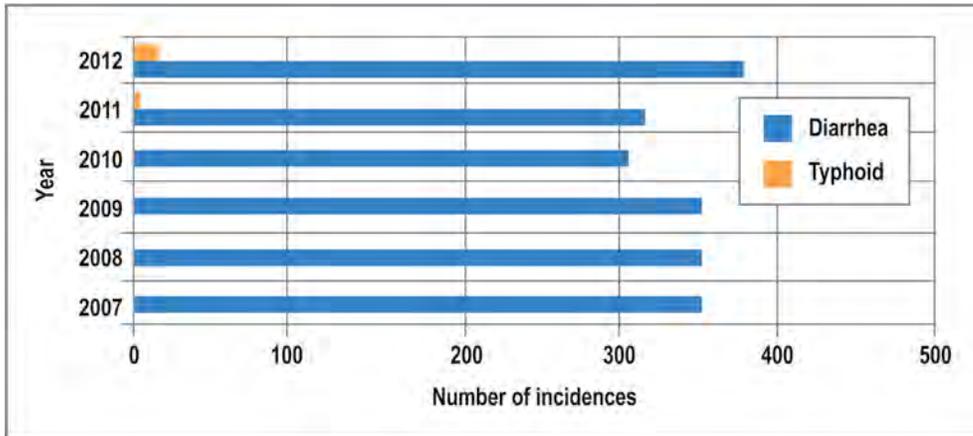
##### Results

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Waterborne disease outbreaks are still occurring in the province. In particular, typhoid fever, a serious disease, threatens the residents. As shown in **Figure 20**, diarrhea and typhoid are prevalent, affecting more than 300 residents since 2009.

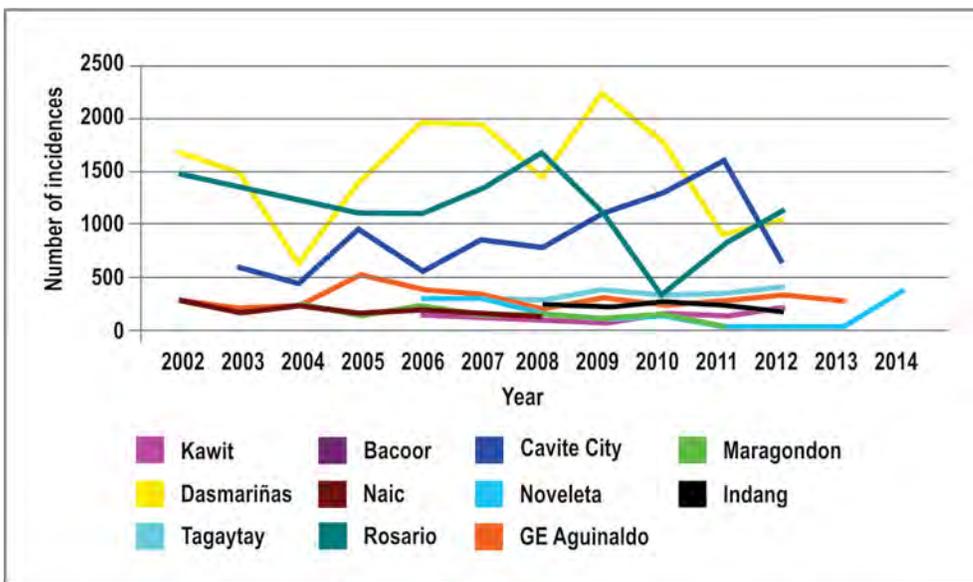
**Figure 21** shows the incidence of waterborne diseases in 11 municipalities between 2002-2014. The Municipalities of Dasmarinas, Rosario and Cavite City reported highest waterborne disease outbreaks. Also, there were 46 cases of cholera outbreaks with 3 deaths from the highly infectious disease.

Figure 20. Occurrence of typhoid and diarrhea from 2007-2012.



Source: Provincial Health Office 2007-2012.

Figure 21. Incidence of waterborne diseases in the different LGUs from 2002-2014.



Source: Provincial Health Office 2002-2014.

### Implications and Recommendations

Although the incidences of waterborne diseases in Dasmariñas, Rosario and Cavite City have been decreasing, the number of people afflicted with such diseases in these areas is still relatively high. This could be in part due to increasing industrial and commercial developments and deteriorating water quality of the concerned city and municipalities. These city and municipal governments must ensure the delivery of safe and clean water to the residents

by employing mitigating measures (food handling safety practices, pollution reduction programs, cleanup projects, etc.) to address this concern, with adequate support from the provincial government.

Securing clean and safe water sources through the implementation of watershed management, monitoring and surveillance programs need to be enhanced.

#### Reference

Provincial Health Office (PHO).



### Food security and livelihood management

#### 025 Fishery management plan and implementation

##### Description

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

##### Rationale

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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 but 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

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

##### Results

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In accordance with Republic Act No. 8550 or the Philippine Fisheries Code of 1998, Cavite established the Integrated Fisheries and Aquatic Resources Management Council (IFARMC) which provides policy guidance to the province on fishery-related matters. The Office of the Provincial

Agriculturist (OPA) serves as the secretariat to the council. The coastal city or municipal governments also established the Municipal Fisheries and Aquatic Resources Management Council (MFARMC).



Shell fisher in Bacoor, Cavite.

RA 8550 specifies that the IFARMC is tasked to assist in the preparation of an integrated fisheries management plan. The province, however, still lacks the plan, which is anticipated to provide the strategic direction for fisheries management in the province, including the coastal municipalities. Among the nine (9) coastal city/

municipalities, only Tanza and Naic have developed their respective fisheries management plans, which have both been implemented since 2006 (Table 22). The other city/municipalities, on the other hand, have enacted several fisheries ordinances through the MFARMCs (Table 23).



**Table 22. Staff and budget allocation for fisheries management in the Municipality of Tanza and Naic from 2006-2012.**

Municipality	Indicator	2006	2007	2008	2009	2010	2011	2012
Tanza	Staff Allocation	1	1	1	1	1	1	1
	Budget Allocation (in US\$)	5,456.57	5,417.31	5,621.19	5,248	6,650.45	6,926.31	7,104.16
Naic	Staff Allocation	10	15	20	15	1	20	10
	Budget Allocation (in US\$)	3,410.36	3,792.11	3,934.83	3,673.60	3,879.43	4,040.35	4,144.09

**Table 23. Ordinances passed by the LGUs on fisheries management from 2002-2012.**

Municipality	Ordinance/ resolution no.	Title
Cavite City	No. 06-3149	An ordinance prohibiting illegal fishing as well as fishing in fishery reserves, refuge and sanctuaries within 15 km from the shoreline and/ or within the territorial jurisdiction of Cavite City and providing penalty for violation thereof.
	No. 06-3132	An ordinance prescribing the procedures for registration and issuance of license/permit to operate fishing vessels three (3) gross tonnage and below in the City of Cavite, and providing penalties for violation thereof.
Bacoor	No. 25 series of 2009	An ordinance regulating the operation of oyster/mussel farms and other similar structures and business within Bacoor, Cavite, and providing penalties for violation thereof.
	No. 10 series of 2008	An ordinance prohibiting illegal fishing activities and other destructive forms of fishing as well as fishing in fishery reserves, refuge and sanctuaries within 15 km from the shoreline and/or within the territorial jurisdiction of Bacoor, Cavite, and providing penalties for violations thereof.
	No. 25 series of 2006	Fishing Vessel Registration Ordinance of Bacoor
Kawit	No. 03-10 series of 2010	<i>Kautusang Nagtatakda ng Pangkalahatang Alituntunin na Sumasaklaw sa Katubigan ng Bayan ng Kawit at Para sa Iba pang mga Layunin</i> (Ordinance setting general guidelines covering the waters of Kawit and other objectives)
Maragondon	Blg. 74 (2004)	<i>Ordinansang nagtatatag ng Maragondon santuwaryo ng isda sa Barangay Sta. Mercedes, Maragondon, Kabite.</i> (Ordinance establishing the Maragondon fish sanctuary.)
	Blg. 73 (2004)	<i>Ordinansang nagsusug sa Ordinansa Blg. 60, nagbabawal sa mga mangingisda na gumamit ng dinamita, hulbot, taksay at trawl at lahat ng mga labag sa batas na nakasaad sa R.A. 8550 sa loob ng karagatang nasasakupan ng Maragondon, Kabite, at nagtatakda ng kaukulang multa at kaparusahan sa sinumang lumabag sa ordinansa.</i> (Ordinance prohibiting fishers from using dynamite and other materials listed under R.A. 8550 in the waters of Maragondon, Cavite and providing penalties for violations thereof.)
	No. 83 series of 2006	Fishing Vessel Registration Ordinance of Maragondon, Cavite
Naic	No. 03 series of 2003	Resolution declaring a portion of the municipal waters of Brgy. Bagong Kalsada as fish sanctuary.
	No. 09 series of 2003	An ordinance declaring, establishing and regulating the Naic fish sanctuary and Naic reserve areas, prescribing the regulatory measures related thereto with fixed fines and penalties in case of violation, and granting authority to the Naic Municipal Mayor to enter into Memorandum of Agreement with accredited nongovernmental organization for the full implementation and enforcement of this ordinance.
	No. 13 series of 2004	Amended Fishing Boat Registration Ordinance of 1995
	No. 01 series of 2005	An ordinance regulating the color coding scheme of all fishing boats three (3) gross tonnage and below operating within the municipal jurisdiction of the municipality of Naic, Cavite.
Noveleta	No. 25 - 2006	Fishing Vessel Registration Ordinance of Noveleta, Cavite

Table 23. Ordinances passed by the LGUs on fisheries management from 2002-2012 (cont.).

Municipality	Ordinance/ resolution no.	Title
Tanza	No. 09-2009	Ordinance prohibiting illegal fishing activities and other destructive forms of fishing, as well as fishing in fishery reserves, refuge and sanctuaries within the territorial jurisdiction of Tanza, Cavite and providing for violations thereof.
	No. 10-2009	An ordinance declaring, establishing and regulating the municipal fish sanctuary and fishery reserve areas in Tanza, Cavite, prescribing regulatory measures pertinent thereto and providing penalties for violation thereof.
Ternate	No. 02 S-2006	The Comprehensive Fishery Ordinance of the Municipality of Ternate
	No. 04 S-2005	An ordinance declaring, establishing and regulating the Ternate Fish sanctuary and marine reserved areas, prescribing the regulatory measure related thereto with fixed fines and penalties in case of violation.
	No. 17 S-2005	Resolution declaring the creation of Bulaklakin Reef as fish sanctuary and fishery reserve
<b>TOTAL</b>	<b>19</b>	

### Implications and Recommendations

Strategic direction for fisheries management is lacking at the provincial level. Despite the existence of fisheries management plans in Tanza and Naic, the comprehensiveness of the plans need to be revisited, including the municipal fishery ordinances.

Since fisheries is one of the major sources of livelihood for the coastal communities, an integrated fisheries management plan is necessary to provide the strategic direction to the province on fisheries industry development in accordance with the Comprehensive National Fisheries Industry Development Plan (2005).

### References

- Comprehensive National Fisheries Industry Development Plan (2005). Bureau of Fisheries and Aquatic Resources, Department of Agriculture, Philippines.  
 Ordinances from the LGUs in Cavite.  
 Republic Act 8550 (1998). The Fisheries Code of the Philippines. Congress of the Philippines.



### Food security and livelihood management

## 026 Fisheries Production

### Description

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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

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

### Data Requirements

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

### Results

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A significant number of Caviteños living in the coastal areas rely on fishery products as source of sustenance and livelihood. As shown in **Tables 24** and **25**, total fish catch in the coastal municipalities increased from 6,554 mt in 2003 to 13,647 mt in 2012. During this 10-year period, both the number of vessels and fishers have also increased significantly.

It should be noted that the data is based on the fish landing at a specific site. According to the local fishers, not all the catches are coming from the municipal waters. Some are coming from other provinces such as Palawan, Batangas, Bataan, etc. Notwithstanding the source, the increase in fish landing suggests that there is high demand for fishery resources in the Province of Cavite.

Table 24. Size and composition of fish landing in 2003.

Municipality	Type of gear used	Number of fishing vessels	Gross tonnage	Number of fishers	Annual production (mt)
Bacoor		4	87.4	24	240
Rosario	Bag net, gillnet	50	0	1,300	3,200
Tanza	Travel net, bag net	55	3.1	550	3,025
Maragondon		0	0	0	0
Naic	<i>Pante, pana, kawit</i> , hook and line	4	4.75	24	89
<b>TOTAL</b>		<b>113</b>	<b>95.25</b>	<b>1,898</b>	<b>6,554</b>

Table 25. Size and composition of fish landing in 2012.

Municipality	Type of gear used	Number of fishing vessels	Gross tonnage	Number of fishers	Annual production (mt)
Kawit	Fishing net, <i>baklad</i> , fish cage	15	3	368	111.2
Noveleta	Gillnet, ring net, <i>pangulong</i>	108	3 below	240	105.48
Rosario	Bag net, purse seine, Danish Seine	48	3.1 above	1,300	2,880
Bacoor	Hook net, lift net, gillnet, hook and line				
Tanza	Trawl, ring net, bag net	55	3.1 and above	687	3,496.12
Maragondon	Trawl, drive net, long line, ring net	120	3 above	443	7,200
Naic		24	3 and above	150	70.95
<b>TOTAL</b>		<b>370</b>		<b>3,188</b>	<b>13,863.75</b>

## Implications and Recommendations

Fish catch and/or landing in the Province of Cavite showed an increasing trend. This can be partly attributed to the increase in the number of fishing vessels and fishers and partly due to the inflow of fish catch from other provinces. Despite the increase in fish landings, there is a lack of statistical surveys conducted on fish catch in the municipal waters.

It is recommended that a comprehensive study on fisheries resources be conducted to guide the identification of appropriate strategies to promote sustainable fisheries in the province. Regulations on the use of fishing gears and catch seasons for commercially important species should be enacted at the provincial and municipal levels, where appropriate. These studies can



Distribution of milkfish fry. (Office of the Provincial Agriculturist [OPA]).

be incorporated into the strategic and integrated fisheries management plan of Cavite.

## References

Comprehensive National Fisheries Industry Development Plan (2005). Bureau of Fisheries and Aquatic Resources, Department of Agriculture, Philippines  
Data from LGUs in Cavite.



## Food security and livelihood management

### 027 Malnutrition rate

#### Description

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

#### Rationale

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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

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- 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

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The number of malnourished children has more than doubled between 2002 and 2003, i.e., from 14,448 in 2002 to 38,411 in 2003. The increasing trend continued and peaked in 2005, with 40,286 recorded malnourished children. There was a sharp decrease in 2010 (21,022 from 33,704 in 2009), and the decline continued in 2012. On the other hand, the number of children aged 0-6 with normal weight saw a steady increase, from 198,223 (67.58% of preschoolers weighed) in 2002 to

369,423 (92.71% of preschoolers weighed) in 2012, with 2012 being the peak year.

**Table 26** shows the trend of the undernourished population in Cavite from 2006-2012. The data showed that the undernourished population is clearly declining. A drastic improvement was apparent in both undernourished population in all ages and under 5 years old group in 2010.

Table 26. Trend in undernourished population in Cavite Province from 2006-2012.

Indicators	2006	2007	2008	2009	2010	2011	2012
No. of undernourished males (all ages)	746	1,037	1,057	832	466	411	314
No. of undernourished females (all ages)	687	985	1,028	826	481	448	363
Proportion of undernourished population (less than 5 years old)	5.78%	5.94%	6.19%	5.35%	0.87%	0.55%	0.53%

Source: Provincial Health Office, Cavite.

Table 27 shows that 3rd degree malnutrition is among the top ten leading causes of infant mortality in the province in 2011 with 4 infants per 100,000 births affected. Although it is the least cause, the province should be keen in addressing the malnutrition problem.

The regular celebration of Nutrition Month, which aims to raise awareness about nutritional issues and to promote nutrition in general, is one of the means by which the provincial government is addressing the problem. There are also Barangay Nutrition Scholars who are trained in food production and fortification, maternal and child health nutrition, nutrition information and education, and livelihood assistance. Trainings are held in order to help them identify and monitor malnutrition in children, pregnant women and lactating mothers. Through these efforts, they are also enabled to provide counseling on good nutrition practices.

Table 27. Ten leading causes of infant mortality (Rate per 100,000 Population), 2011.

Causes	Number	Rate
<b>Pneumonia, unspecified</b>	22	0.49
Respiratory Stress Syndrome of newborn	17	0.38
<b>Feto-Placental Insufficiency</b>	13	0.29
Pneumonia Aspiration	13	0.29
Septicimia	12	0.27
Sepsis Neonatorum	10	0.22
Congenital Malformation	10	0.22
Hypoxic, Encephalopathy	5	0.11
Infectious Gastroenteritis	5	0.11
<b>3rd Degree Malnutrition</b>	4	0.09

Source: Provincial Health Office, Cavite.

## Implications and Recommendations

Data indicates that the province is not yet free from malnutrition. About 0.53 percent of the population in 2012 suffers from malnutrition and 0.09 percent of infants died from malnutrition in 2011. Although the Provincial Social Welfare and Development Office (PSWDO) is currently implementing the Food for Growth Program aimed at

eliminating and/or improving the nutritional status of 3-6 year old undernourished children (PPDO, 2012), the impacts of the program need to be assessed to further strengthen it. Therefore, it is recommended that Cavite Province implement the program aggressively to eradicate malnutrition in the province.

## References

- Provincial Health Office, 2011.  
PPDO. 2012. Cavite Socio-Economic and Physical Profile 2011.



## Food security and livelihood management

## 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

Table 28 shows that around 4.5 percent of families in the province were poor between 2003 and 2009. According to the Family Income and Expenditure Survey conducted by the National Statistics Office (now the Philippine Statistics Authority) in 2009, the average annual income of a Caviteño

family is PhP 282,606 or US\$ 5,932.46 (Table 29) and its average annual expenditure is PhP 255,018 or US\$ 5,353.34.\* This makes Cavite as having the highest average annual family income and expenditure in the region.

Table 28. Annual per capita poverty threshold in Cavite Province: 2003, 2006 and 2009.

Province	Annual per capita poverty threshold (in Pesos)*			Poverty incidence among families						Magnitude of poor families (estimates)		
				Estimates (%)			Coefficient of variation					
	2003	2006	2009	2003	2006	2009	2003	2006	2009	2003	2006	2009
Philippines	10,976	13,348	16,481	20.0	21.1	20.9	2.3	2.3	2.1	3,293,096	3,670,791	3,855,730
Cavite	13,976	16,350	20,163	4.8	4.2	4.5	18.2	22.8	18.7	24,802	22,490	26,088

\* Provincial poverty threshold are generated based on the weighted average of the urban and rural thresholds using the magnitude of poor population in urban and rural areas as weights. The poor population refers to those with annual per capita income below the urban/rural provincial poverty threshold.

Sources: National Statistics Coordination Board; PPDO, 2012.

The number of Caviteños employed exhibited a slow but steady increase, from 4,480 in 2006 to 4,966 in 2012. Employment generated by the economic zones has also been on the rise, from 67,325 jobs in 2002 to 69,430 jobs in 2011. **Table 30** shows the labor statistics of CALABARZON from 2006 to 2010. Since specific data for Cavite is not available, the CALABARZON statistics are used as proxy for Cavite. The unemployment rate is around 18.1 percent, which is quite high.

The literacy rate is estimated at 98 percent, which implies that almost all the people of Cavite can read and write. The Provincial Government of Cavite has designated the Provincial Social Welfare and Development Office to provide assistance to individuals, families and communities, particularly in effectively implementing programs, projects, and services that will alleviate poverty and empower disadvantaged individuals, families, and communities. This office is also mandated to help improve the overall quality of life of the Caviteños (PPDO, 2012).

**Table 29. Family income and expenditures in Cavite Province in 2009 compared with other provinces in CALABARZON.\***

Area	Average family income/year	Average family expenditure/year
Cavite	5,932.46	5,353.34
Laguna	5,228.94	4,768.44
Batangas	4,602.96	3,833.14
Rizal	6,180.09	5,341.25
Quezon	3,759.50	2,503.48

Note: \* Values were converted using the Daily, Monthly (Average and End-of-Period) and Annual Philippine Peso per US Dollar Exchange rates of the Bangko Sentral ng Pilipinas (<http://www.bsp.gov.ph/statistics/excel/posodollar.xls>), converting the data to the Annual and Average rates for 2009.

Source: National Statistics Office, 2009.

**Table 30. Labor statistics, CALABARZON, 2006-2010.**

CALABARZON Labor statistics	2006			2007			2008			2009			2010		
	Male	Female	Total												
Labor force (in thousands)	2,660	1,821	4,480	2,708	1,868	4,577	2,751	1,872	4,623	2,818	1,985	4,803	2,902	2,063	4,966
Labor force participation rate	77.6	50.3	63.5	77.0	50.2	63.3	76.7	48.9	62.3	76.8	50.6	63.2	76.7	51.3	63.6
Employment rate	88.9	91.5	90.0	89.8	92.2	90.8	90.3	91.3	90	88.8	90.7	89.6	89.5	92.0	90.5
Unemployment rate	11.1	8.5	10.0	10.2	7.8	9.2	10.9	8.7	10.0	11.2	9.3	10.4	10.6	8.0	9.5
Underemployment rate	21.2	13.7	18.1	18.2	11.8	15.6	18.8	12.3	16.1	18.4	13.8	16.5	19.8	14.3	17.4

Source: Department of Labor and Employment (DOLE)-Cavite.

## Implications and Recommendations

Although income and expenditures in Cavite are relatively higher compared to the other CALABARZON provinces, Cavite needs to improve its unemployment rate through creation of jobs and livelihood programs. There is also a need to uplift the quality of the life of more than 26,000 poor families recorded in 2009 in the province. While literacy rate is high, access to higher education is not readily available.

It is recommended that Cavite create more jobs for the coastal communities through, for example, promoting aquaculture fisheries and fisheries product processing industries.

## References

- PPDO. 2012. Cavite Socio-Economic and Physical Profile 2011.  
PPDO. 2011. Cavite Socio-Economic and Physical Profile 2010.



### Food security and livelihood management

#### 029 Livelihood programs

##### Description

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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

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

##### Data Requirements

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

##### Results

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One of the high impact livelihood programs in the province is the Eco-Bag Program. Between 2009 and 2012, the Waste Management Division of the PG-ENRO engaged students, concerned residents, and youth and women's organizations in eco-bag making from recyclable materials. Prison inmates

also participated in this activity, together with displaced workers, the elderly and residents of Imus, in 2010. This livelihood program increased the awareness of the participants on waste reduction, and provided them an additional source of income.

Livelihood programs in the Municipality of Tanza benefited low-income families and individuals with existing small-scale businesses, which led to increased family income and raised their level of well-being.

The province offers the Practical Skills Development Program, which aims to provide training skills to disadvantaged individuals (Table 31). Moreover, the province also offers the Self-employment Assistance, which aims to provide livelihood and income to economically active but poor families.

Table 31. Livelihood programs in Cavite Province.

Programs and services	Total served
Practical skills development and livelihood to different sectors	2,294
<ul style="list-style-type: none"> <li>a. Sewing craft</li> <li>b. Integrated Food Processing</li> <li>c. Non-food (Basic cosmetology, massage therapy, dishwashing training, fabric conditioner making, perfume making)</li> </ul>	
Self-employment Assistance	96

## Implications and Recommendations

Although Cavite Province has been implementing a few livelihood programs, the impact created by such programs is limited. Since the unemployment level is relatively high (about 18 percent), it is recommended that the province exert

more effort in identifying and providing alternative job opportunities to Caviteños. Developing a strategic plan for sustaining the livelihood programs in Cavite would be helpful.

## Reference

PPDO. 2012. Cavite Socio-Economic and Physical Profile 2011.



## Pollution reduction and waste management

### 030 Management plans

#### Description

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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

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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

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- 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

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Imus, Ylang-Ylang and Rio Grande Rivers (IYRR) in the province were designated as Water Quality Management Areas (WQMA) by virtue of DAO 02 s 2013, in pursuant of Republic Act No. 9275 or The Philippine Clean Water Act (Action Plan for IYRR-WQMA, 2015). The IYRR-WQMA is located in the cities of Tagaytay, Dasmariñas, General Trias, Imus and Bacoor and the municipalities of Amadeo, Silang, Noveleta and Kawit. It has a total area of 27,052.05 ha.

The ten-year IYRR-WQMA Action Plan of 2015 aims to facilitate the "revival, rehabilitation, protection and preservation of its water quality consistent with their **beneficial usage and classification as Class C Water**" through the concerted efforts of government agencies, communities, the private sector and POs. The Action Plan also aims to meet the national standards on key parameters, in order for the rivers to gain a Class B level.

By virtue of Provincial Resolution No. 508 enacted in June 2016, Cañas and Maalimango Rivers have also been designated as WQMs. The province has drafted an ordinance establishing a septage and sewerage management program for Cavite. An ordinance has been passed, requiring car wash establishments to install septic tanks prior to their operation. The provincial government is currently in the process of adopting a wastewater management program.

To address concerns on solid waste, the provincial government has enacted Executive Order No. 29, which

requires all cities and municipalities of the province to establish waste reduction and recovery schemes and to convert their open dumpsites to controlled ones. Provincial Ordinance No. 007-2012 regulates the use of plastics and promotes the use of eco-bags and other environmental-friendly practices. Provincial Ordinance No. 001-2003 was also enacted to prohibit the improper disposal of used oil generated from automotive and industrial lube oil and petroleum sludge. The Cavite Provincial Solid Waste Management Board was also created pursuant to Republic Act No. 9003, or the Ecological Solid Waste Management Act.



*Governor Jesus Crispin C. Remulla speaking at the 2015 Lingap Kalikasan in Tanza, Cavite.*



The province owns and uses 147 units of operational garbage trucks, compactors and mini dump trucks for its garbage collection system with capacities of 10/8 m<sup>3</sup>, 8/5 m<sup>3</sup> and 4 m<sup>3</sup>, respectively. It also employs 529 people as garbage collectors, street cleaners and office staff for the same purpose (Cavite Solid Waste Management Plan 2013-2022).

Table 32 shows the solid waste collection and disposal budget of Cavite. Public education and awareness programs concerning solid waste segregation have been implemented in Imus, Tanza, Maragondon and Naic.

Table 32. Budget for solid waste collection and disposal.

City/municipality	Frequency of collection	Annual budget (US\$)
Alfonso	Twice a week	29,449.04
Amadeo	Thrice a week	2,205.14
Bacoor	Daily	54,186.24
Carmona	Twice a week	4,440.30
Gen. E. Aguinaldo	Ten trips/week	13,546.56
Gen. Trias	Twice a week	82,457.32
Imus	Barangay - Weekly Market - Daily	1,413,554.10
Indang	Daily (excluding Saturdays)	47,118.47
Kawit	Daily	101,304.71
Magallanes		11,779.61
Maragondon	Daily	18,847.39
Mendez	Five times a week	8,245.73
Naic	Once or twice a week	12,957.58
Noveleta	Two trips/truck/day	55,364.20
Rosario	Daily	1,177,961.75
Silang	Once a week Public Market - Daily	50,887.95
Tanza	Twice a week	259,151.58
Tagaytay	Daily	194,899.36
Trece Martires	Daily	44,762.55

Source: Cavite Solid Waste Management Plan 2013-2022.



*International Coastal Cleanup in Bacoar, 2015.*

At present, the provincial government has partnered with the Cavite State University – Don Severino de las Alas Campus in Indang for the establishment of the Cavite Water Testing Laboratory, which aims to establish and strengthen the capacity of the province to conduct water quality monitoring

for the river systems, coastal and marine areas as well as potable water. It is anticipated that the water testing laboratory can evolve as a revenue generating outfit for the province considering the existence of commercial and industrial estates in Cavite.

### Implications and Recommendations

Although there are several initiatives to address water pollution in the province, a comprehensive wastewater management plan is lacking. The passage of a provincial ordinance for septage collection and treatment is still underway.

Since the major contributors to pollution are the households and commercial establishments, the LGUs should educate and mobilize the communities on proper disposal of wastes

and regulate commercial establishments on their disposal of wastes, with regular monitoring. The public should be informed of the causes of pollution, and its hazardous effects not only to the environment but also to their health and well-being. The city and municipal governments may also consider the enactment of a harmonized pollution management plan to provide an integrated and holistic solution to this problem.

### References

Cavite Solid Waste Management Plan 2013-2022.  
DENR-EMB CALABARZON Region. Action Plan for Imus-Ylang Ylang-Rio Grande Rivers Water Quality Area (YRR-WQMA). 2015.



Pollution reduction and waste management

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 (e.g., 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

Water resources in Cavite are classified as Class C. DENR Administrative Order No. 08 s 2016 indicates that the beneficial use of Class C waters are: (a) fishery water for the propagation and growth of fish and other aquatic resources;

(b) recreational water class II – for boating, fishing and other activities; and (c) for agriculture, irrigation and livestock watering. Table 33 shows the national standard for Class C waters.

Table 33. Standard parameters for water quality.

Parameters	Unit	National standard
BOD	mg/L	7
Chloride	mg/L	350
Color	TCU	75
Dissolved Oxygen (Min.)	mg/L	5
Fecal Coliform	MPN/100mL	200
Nitrate as NO <sub>3</sub> -N	mg/L	7
pH (Range)		6.5-9.0
Phosphate	mg/L	0.5
Temperature	°C	25-35
Total Suspended Solids	mg/L	80

Source: DAO 08 s 2016.

In Labac-Alemang River, average total coliform for the river stations is estimated at  $1.07 \times 10^5$  and reaching up to

$6.37 \times 10^4$ , well exceeding the national standard for Class C waters in 2014, although it meets other parameters (Table 34).

Table 34. Water quality of Labac-Alemang River watershed, 2014.

Station	Average total coliform (MPN/100 mL)	
	May 2014	August 2014
1. Brgy. Sabang	$1.60 \times 10^4$	$3.53 \times 10^6$
2. Brgy. San Roque	$2.40 \times 10^4$	$3.70 \times 10^4$
3. Near the middle of the stream towards the estuary	$2.10 \times 10^4$	$3.53 \times 10^6$
4. Balsahan River (Brgy. Balsahan)	$1.80 \times 10^4$	$6.37 \times 10^4$
5. Kay-Alemang River (Brgy. Balsahan)	$1.07 \times 10^5$	$3.53 \times 10^6$

Source: Democratizing and Sustaining Water, Sanitation and Well-being in Cavite Province, Philippines, 2015.



High levels of total and fecal coliform also characterized Cañas River although it meets the

standard for the rest of the parameters as shown in Table 35.

**Table 35. Physico-chemical and microbial characteristics of Cañas River, 2014.**

Station	Name of station	BOD	DO	PH	TSS	Total coliform	Fecal coliform
1	Julugan Wawa Hanging Bridge	4.75	4.86	7.75	25.17	3.50 x 10 <sup>5</sup>	1.80 x 10 <sup>5</sup>
2	Tejero Bridge	6.92	5.28	7.87	37.83	1.40 x 10 <sup>6</sup>	5.80 x 10 <sup>5</sup>
3	Paradahan Bridge	7.08	5.88	8.01	28.67	2.90 x 10 <sup>6</sup>	1.46 x 10 <sup>6</sup>
4	Mag-asawang Layon Bridge	3.58	7.57	8.10	65.58	9.24 x 10 <sup>4</sup>	2.81 x 10 <sup>4</sup>
5	Patda Bridge	5.83	7.22	8.17	83.67	3.75 x 10 <sup>5</sup>	2.72 x 10 <sup>5</sup>
6	Panaysayan Bridge	3.33	7.38	8.18	26.50	2.97 x 10 <sup>5</sup>	1.06 x 10 <sup>5</sup>

Source: *Bio-physical and Socio-economic Characterization, Vulnerability Assessment and Integrated Watershed Management Planning of Labac-Alemang River Watershed (DENR- PENRO, 2015).*

Tables 36 to 41 show the water quality monitoring stations in Manila Bay bathing beaches that are within Cavite's territorial jurisdiction, and the average concentration of pollutants in

Manila Bay beaches from 2011 to 2015. Water quality in Cavite's rivers, similar to Manila Bay, also exceeded the standards for total and fecal coliform.

**Table 36. Geographic locations of water quality monitoring stations in Manila Bay bathing beaches.**

Sampling station	Location	Geographical coordinates	
		Latitude	Longitude
1	Bacoor	14°27'36.99"N	120°56'2.42"E
2	Lido Beach	14°26'43.08"N	120°52'33.03"E
3	Villamar I	14°26'39.88"N	120°52'31.99"E
4	San Isidro	14°25'37.43"N	120°51'54.43"E
5	Celebrity	14°24'26.4"N	120°50'33.38"E
6	Garden Coast	14°2'1.32"N	120°46'55.3"E
7	Costa Eugenia	14°20'28.57"N	120°46'32.49"E
8	Villa Criselda	14°20'24.28"N	120°46'30"E
9	Antonio's Hideaway	14°17'26.41"N	120°42'33.06"E
10	Dalaroy's Beach Resort	14°17'18.08"N	120°42'24.06"E

Source: DENR-EMB Region IV-A.

Table 37. Average concentration of pollutants in 2011.

Station	Total Coliform	Fecal Coliform	Color	DO, mg/L	pH	TSS
	Geomean	Geomean				
1	22,697	16,153.0393	11.5	4.94	7.448	36.5
2	4,490	2,138.33476	6.5	5.70	7.812	49.0
3	1,334	645.407008	6	6.48	7.784	55.3
4	3,966	3,341.33885	8.5	6.43	7.793	69.4
5	7,515	5,511.54138	6.9	6.23	7.845	93.9
6	1,557	1,024.11244	8.8	6.57	7.877	68.7
7	2,696	1,632.12693	9	6.71	7.886	79.7
8	3,890	2,016.26887	7.5	6.66	7.875	74.5

Source: DENR-EMB Region IV-A.

Table 38. Average concentration of pollutants in 2012.

Station	Total Coliform	Fecal Coliform	Color	DO, mg/L	pH	TSS
	Geomean	Geomean				
1	22,846	12,162.97	62.91	6.00	7.47	26.75
2	1,103	704.25	32.08	6.36	7.89	77.33
3	1,492	746.82	30.41	6.60	8.00	81.08
4	10,019	4,862.58	36.66	6.275	7.93	87.25
5	6,016	4,447.99	23.33	6.45	7.96	63.66
6	988.2	405.27	68.33	6.80	8.01	108.91
7	1,441	879.81	46.66	6.65	8.01	102.66
8	2,077	1,186.21	37.50	6.64	8.00	90.83
9	781.1	307.22	21.66	6.75	8.05	80.25
10	281.3	214.99	23.33	6.65	8.09	95.66

Source: DENR-EMB Region IV-A.



Table 39. Average concentration of pollutants in 2013.

Station	Total Coliform	Fecal Coliform	Color	DO, mg/L	pH	TSS
	Geomean	Geomean				
1	26,112.60	891.59	60.25	6.06	7.54	34.58
2	3,241.82	1,783.30	55.83	6.67	7.81	65.75
3	5,671.52	11,758.93	63.50	6.88	7.90	58.00
4	18,016.55	6,030.12	70.75	6.96	7.87	103.00
5	13,911.39	4,144.36	69.75	7.03	7.93	63.83
6	1,112.47	408.01	101.42	6.80	8.02	103.08
7	3,491.26	1,225.59	93.67	7.05	7.98	91.67
8	2,238.28	1,268.67	91.00	7.13	7.99	84.42
9	843.14	388.68	82.33	7.05	7.94	76.25
10	380.97	155.73	61.92	6.77	8.00	58.25

Source: DENR-EMB Region IV-A.

Table 40. Average concentration of pollutants in 2014.

Station	Total Coliform	Fecal Coliform	Color	DO, mg/L	pH	TSS
	Geomean	Geomean				
1	50,638.06	28,850.69	123.25	5.25	7.50	26.42
2	2,695.67	1,381.84	41.83	6.78	7.86	39.50
3	1,183.35	499.85	63.92	6.57	7.90	43.25
4	14,303.71	6,240.05	59.42	6.78	7.94	66.42
5	27,780.05	14,670.01	46.67	6.65	7.88	41.92
6	3,085.92	1,426.47	97.08	6.41	7.90	57.75
7	3,799.71	1,223.82	69.00	6.63	7.88	39.42
8	2,113.40	596.53	65.58	6.71	7.93	42.00
9	502.93	306.69	32.50	6.68	8.00	38.33
10	788.71	232.70	24.17	6.52	7.98	31.67

Source: DENR-EMB Region IV-A.

Table 41. Average concentration of pollutants in 2015.

Station	Total Coliform	Fecal Coliform	DO, mg/L	pH
	Geomean	Geomean		
1	112,445.77	57,259.23	2.14	7.57
2	2,090.11	1,362.35	6.23	8.03
3	1,907.63	903.39	6.30	8.05
4	58,347.75	37,353.62	6.29	7.96
5	83,765.71	67,527.53	6.34	8.00
6	1,615.58	1,038.38	6.46	8.01
7	2,335.65	1,611.42	6.52	8.11
8	2,987.58	1,715.02	6.54	7.95
9	311.67	192.65	6.26	8.12
10	209.94	111.39	6.29	8.15

Source: DENR-EMB Region IV-A.

## Implications and Recommendations

Water quality in Cavite, particularly in major river systems, exhibited high levels of total and fecal coliform. The high level is due to the absence of a centralized sewage/septage treatment system in the province, which resulted to the direct discharge of septage and untreated wastewater into the bodies of water.

It is recommended that the provincial government **finalize the plan and establish partnerships with the private sector** while implementing mitigating strategies in the interim.

## References

- Bio-physical and Socioeconomic Characterization, Vulnerability Assessment and Integrated Watershed Management Planning of Labac-Alemang River Watershed (DENR- PENRO, 2015)
- Cavite's Impending Water Crisis: An Analysis. by Prof. Noel A. Sedigo Chair, Department of Forestry and Environmental Science Cavite State University, Indang, Cavite
- Democratizing and Sustaining Water, Sanitation and Well-being in Cavite Province, Philippines. 2015.



### Pollution reduction and waste management

#### 032 Air quality

##### Description

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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

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

##### Data Requirements

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- 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

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There is no data available for the entire province on air quality. Limited data is available from the Environmental Management Bureau (EMB), DENR. According to EMB, annual mean roadside TSP in Trece Martires was 84 ug/Nm<sup>3</sup> in 2003, with a minimum of 11 ug/Nm<sup>3</sup> and a maximum of

334 ug/Nm<sup>3</sup>. The following year, annual mean of 79 ug/Nm<sup>3</sup>, with a minimum of 21 ug/Nm<sup>3</sup> and a maximum of 336 ug/Nm<sup>3</sup> was recorded. The annual mean roadside TSP in 2006 was 59 ug/Nm<sup>3</sup> and 46 ug/Nm<sup>3</sup> in 2007. This is well below the national standard, which is 230 ug/Nm<sup>3</sup>.



*Ambient air sampling, 2005.*

### Implications and Recommendations

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No air quality data is available in the province.

There is a need to establish a stronger data-sharing mechanism between the provincial government and the concerned national agencies.

### Reference

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DENR-EMB, Region IV-A.



Pollution reduction and waste management

### 033 Sanitation and domestic sewerage

#### Description

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

#### Rationale

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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 (MDGs) targets for environmental sustainability.

#### Data Requirements

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- 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 sewage treatment plants and discharge pipes
- Level of treatment and volume of sewage treated
- Volume of domestic wastewater generated, treated, recycled or reused

#### Results

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Ninety-five percent (95%) of Cavite’s residents have access to sanitary facilities as shown in **Table 42**.

However, there is currently no septage collection and treatment system, no piped wastewater collection and treatment system, and no centralized sewerage system in the province. Desludging of households and commercial establishments is offered by private companies, but is not done regularly and does not cover substantial areas. The design of septic tanks in households is also a problem,

with the septic tanks in Cavite classified as unsealed. An unsealed, or bottomless, septic tank allows seepage of wastewater from households to the groundwater.

With this situation, also bearing in mind that a huge majority of septic tanks in Cavite are unsealed, groundwater contamination is a constant threat and can reach critical levels. The presence of informal settlers also contributes to water contamination, as their wastewater is directly discharged to creeks and rivers.

Table 42. Households with access to sanitary facilities, 2007.

City/municipality	Total no. of households	Households with access to sanitary facilities	Percentage
Alfonso	9,730.83	9,439	97.0
Amadeo	6,760.13	6,463	95.6
Bacoor	92,494.13	86,759	93.8
Carmona	14,909.19	13,716	92.0
Dasmariñas	113,768.92	111,152	97.7
Gen. Aguinaldo	3,446.42	3,267	94.8
Gen. M. Alvarez	27,487.53	26,251	95.5
Gen. Trias	47,475.43	45,387	95.6
Imus	54,796.10	53,262	97.2
Indang	12,604.77	12,290	97.5
Kawit	16,466.59	15,791	95.9
Magallanes	3,570.89	3,107	87.0
Maragondon	6,761.37	6,369	94.2
Mendez	5,562.79	5,396	97.0
Naic	18,328.00	17,485	95.4
Noveleta	8,523.64	8,217	96.4
Rosario	20,307.76	18,683	92.0
Silang	40,614.84	38,665	95.2
Tanza	36,091.39	35,009	97.0
Ternate	4,217.94	3,881	92.0
Cavite City	12,601.84	11,619	92.2
Tagaytay City	22,539.01	20,578	91.3
Trece Martires City	19,145.86	18,016	94.1
<b>TOTAL</b>	<b>598,205</b>	<b>570,802</b>	<b>95%</b>

Source: PPDO, 2012.

## Implications and Recommendations

Although more than 95 percent of the population have access to sanitary facilities, the design is an area of concern. The province is still in the process of constructing its own septage and sewerage facilities. As a consequence, septage coming from households and commercial establishments contaminates Cavite's water supply. The improper handling of industrial wastewater also poses a threat to water quality and endangers marine organisms.

Therefore, it is recommended to address this issue as a priority. There is a need for a centralized collection system to be put in place, and for a provincial ordinance to be passed regarding the collection and treatment of wastewater. Regular monitoring of industries, especially of water refilling stations and their compliance to existing regulations, can also be a focus.

## References

- Cavite Integrated Water Resource Management Plan. 2012.  
PPDO. 2016. Provincial Development and Physical Framework Plan 2011-2020. Cavite, Philippines.



## Pollution reduction and waste management

### 034 Municipal solid waste

#### Description

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

#### Rationale

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

#### Data Requirements

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

#### Results

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According to the definition provided by the Cavite Solid Waste Management Plan 2013-2022, municipal solid waste includes household refuse, food waste, inorganic wastes, container packaging, durable and non-durable goods and yard wastes generated by residential, institutional and commercial establishments.

A waste characterization survey conducted in 2003 showed that food wastes and yard/field wastes amount to 29.14 percent and 28.07 percent respectively, of the total wastes generated in the province. The survey also found that 52 percent of the total wastes generated are biodegradable and 27 percent are recyclable and reusable. Residential establishments produce the most amount of waste per sector, with 45 percent of the total wastes generated.

**Table 43** shows the amount of wastes and market wastes generated by each city and municipality in 2012. The data, gathered through surveys and interviews, indicate that Cavite produces, on average, 1,241 tons of solid waste per day. The City of Dasmariñas showed the highest generation with 250 tons/day, while Magallanes has the lowest generation of solid waste. It is important to note that there is already a 50 percent reduction of wastes generated in 2015. This was possible through the efforts of the LGUs to achieve the targets set forth by the National Solid Waste Management Strategy 2012-2016, which aims to have a 50 percent diversion of solid waste disposal facilities through reuse, recycling and composting.

To reduce waste generation, Cavite has also passed Provincial Ordinance No. 007-2012, or "The selective plastic ban and the use of eco-bag ordinance of the Province of Cavite." Section 5 of the ordinance prohibits the use of plastics as packaging materials and as containers for dry

goods, as packaging materials for wet goods, drinking straws, garbage bags and as flaglets, among others. The ordinance also promotes the use of eco-bags, as well as recycled and recyclable bags.

Table 43. Partial solid waste management survey of waste generated (2012).

Municipality/City	Amount of waste generated (tons/day)	Amount of market waste (tons/day)
Alfonso	1.5	0.15
Amadeo	5	0.8
City of Bacoor	260	23.76
Carmona	44.87	2.24
Cavite City	15	25
City of Dasmariñas	250	2
Gen. E. Aguinaldo	2	0.07
Gen. M. Alvarez	60	4
Gen. Trias	75	2
City of Imus	130	3
Indang	3	1
Kawit	30	3.96
Magallanes	0.00004	0.21
Maragondon	5	2.2
Mendez	4	1.5
Naic	62.5	4.12
Noveleta	7	1
Rosario	128	1
Silang	69	3
Tagaytay City	10.4	8
Tanza	60	6
Ternate	2	1
Trece Martires City	17	1
<b>TOTAL</b>	<b>1,241.27 tons/day</b>	<b>97.01 tons/day</b>

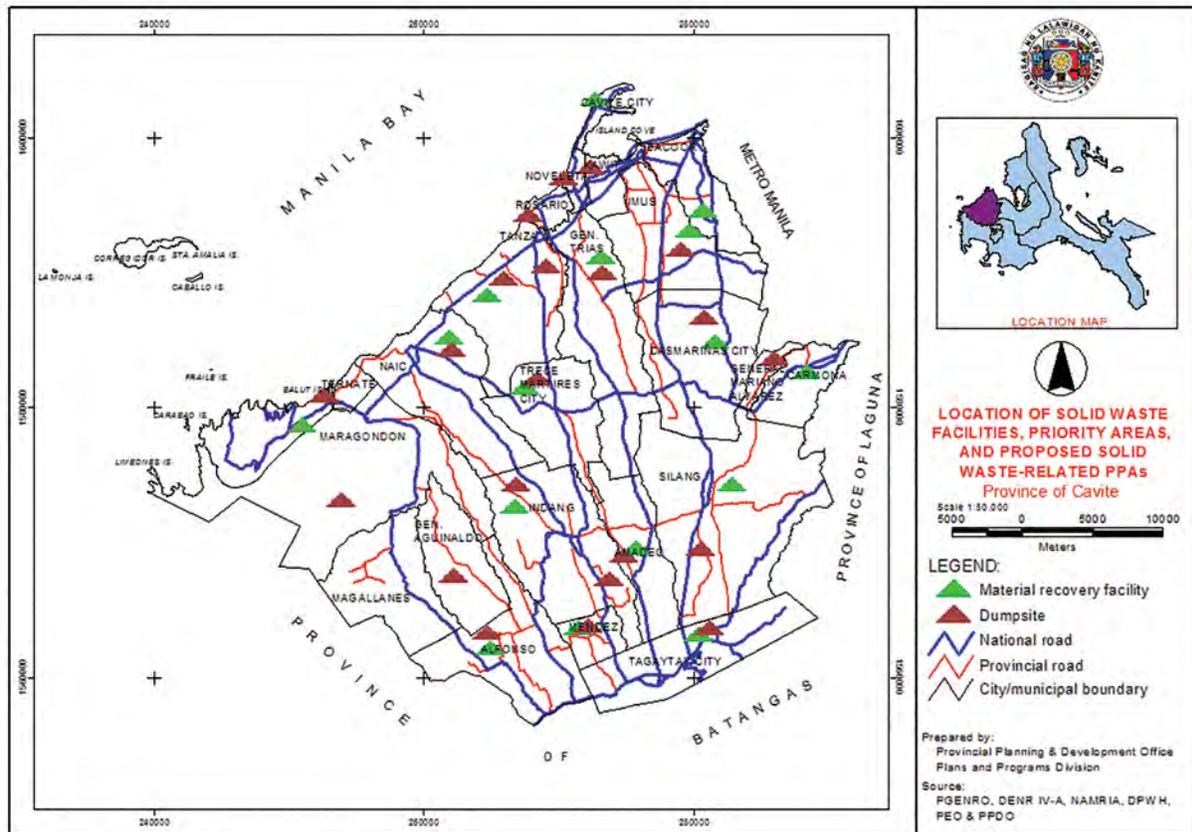
Source: PG-ENRO Solid Waste Management Division.



The province has 17 centralized material recovery facilities (MRFs), 89 barangay-level MRFs, most of which are located in Carmona and Imus, and 19 composting centers. Cavite also has two recycling facilities, Transnational Paper Mills and East Asia Paper Mills, both located in Naic. **Figure 22** shows the locations of waste management facilities in Cavite. Disposal of solid waste in Cavite is done through open dumping, composting and burning. The municipalities of Alfonso, Amadeo, Maragondon, Mendez, Naic and Ternate

dispose their wastes at the controlled dumpsites. Cavite City, Dasmariñas City, and the municipalities of General Emilio Aguinaldo, General Trias, Kawit, Magallanes, Silang and Tanza, on the other hand, use open dumpsites. The municipalities of Carmona, General Mariano Alvarez, Noveleta, Rosario and the City of Bacoor dispose of their wastes outside the province through private garbage haulers, while Imus and Trece Martires City have their own private sanitary landfills.

Figure 22. Location of solid waste facilities in Cavite Province.



Source: PPDO, 2016.



Distribution of shredders and tea brewers.



Materials recovery facilities in Imus (2007).

The dumpsites in Alfonso, Amadeo, Cavite City, Dasmarinas, Gen. E. Aguinaldo, Gen. Trias, Kawit, Magallanes, Maragondon and Tanza are operational. The dump sites at Mendez, Naic, Silang and Ternate, although operational, are undergoing rehabilitation. There are eight waste treatment facilities in the province, located in Silang, Gen. Mariano Alvarez, Gen. Trias and at the Philippine Economic Zone Authority (PEZA) in Rosario. It should be noted that there is no waste segregation at point sources in spite of information campaigns, enacted ordinances and the presence of available facilities (Sedigo, n.d.).



Kalinga sa Kalikasan Project in Noveleta (2013).

## Implications and Recommendations

At present, only three municipalities and two cities (Carmona, Alfonso, Gen. Mariano Alvarez, and Imus and Tagaytay) have initial efforts in composting. Burning of solid wastes, however, is still practiced. There is also a lack of recycling enterprises. Thus, it is necessary to mobilize the LGUs in practicing

sustainable waste management, and to involve households in solid waste management. This could be done through information campaigns, construction of additional MRFs, and waste segregation and recycling.

## References

- Cavite Integrated Water Resources Management Plan.
- Cavite Solid Waste Management Plan 2013-2022.
- National Solid Waste Management Strategy 2012-2016.
- PG-ENRO Waste Management Division. 2013. Data on Solid Waste Management in the Province of Cavite.
- Sedigo, A.N. (n.d.). Solid Wastes and Solid Waste Management in Cavite.



### Pollution reduction and waste management

#### 035 Industrial, agricultural and hazardous waste

##### Description

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

##### Rationale

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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

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

##### Results

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According to current estimates, wastes generated by industries reached 1,000 mt/day, half of which are classified as hazardous wastes (Cavite Solid Waste Management Plan 2013-2022). Accredited hazardous waste haulers collect the toxic and hazardous wastes and transport them to several

areas in the province, Manila and Laguna (Table 44). The province has also constructed an autoclave machine through a partnership with Pan Asia Environment Phil., Inc. to handle hospital wastes.

Table 44. Companies that offer special waste treatment in Cavite Province.

Company name	Location	Special wastes accepted
Asia Metal Trading Corp.	Gen. Trias	Electronic scraps and hazardous waste
Dome Consolidated Corp.	Bacoor	Hazardous waste
Cleanway Technology Corp.	Silang	Hazardous and hospital waste
E-Technology Phils.	Rosario	Hazardous waste
Fujihiro Phils.	Gen. Trias	Hazardous waste
Green Korea Inc.	Rosario	Hazardous waste
Intel Technology	Gen. Trias	Hazardous waste
Intergreen Resources Inc.	Trece Martires City	Hazardous waste
JORM Environmental	Gen. Trias	Hazardous waste
JRC Industrial Sales	Bacoor	Hazardous waste
Koki Phils. Corp.	Dasmariñas	Hazardous waste
OM Mfg. Phil. Inc.	Rosario	Hazardous waste
PAE Environmental Phil.	Trece Martires City	Hospital waste
Solvtech Consultancy	Silang	Hazardous waste
Southwing Enterprises	Gen. Trias	Hazardous waste
Southcoast Metal Ent.	Rosario	Electronic scraps and hazardous waste

Source: Cavite Solid Waste Management Plan 2013-2022.

According to a 2012 study on the waste stream of Regina Ville 2000, a subdivision in Trece Martires City, the said area generated an average of 0.009983 kg of hazardous wastes per day for each household (Herrera, 2012). Wastes generated by these households included bleach, dry cell batteries, expired medicine, bulbs, cosmetics, bug sprays,

nail polish removers, rubbing alcohols, toilet bowl cleaners and all-purpose sealants, with bleach amounting to 31 percent of the total average. Residents of Regina Ville 2000 dispose these hazardous wastes mostly through garbage collection, but a small percentage also bury them in their backyards or recycle them.

## Implications and Recommendations

Aside from the companies that offer treatment of industrial and hazardous wastes, there is also a need to determine the volume of wastes handled by these haulers, the process of treating these wastes, and if these wastes are disposed within or outside the province. This is necessary in order to determine if such practices are within acceptable standards, and to enforce measures if they are not. It is recommended that the province strengthen the monitoring/surveillance and

enforcement of industrial and hazardous waste generation, collection and disposal.

The absence of a comprehensive study on hazardous wastes is also an important area for improvement. To strengthen data integrity and for the information to be readily available for future policies and plans, it is suggested that this study be conducted.

## References

- Cavite Solid Waste Management Plan 2013-2022.  
Herrera, S.P. (2012). *Assessment of Hazardous Waste in the Waste Stream of Regina Ville 2000, Trece Martires City, Cavite*. Cavite State University, Indang, Cavite.



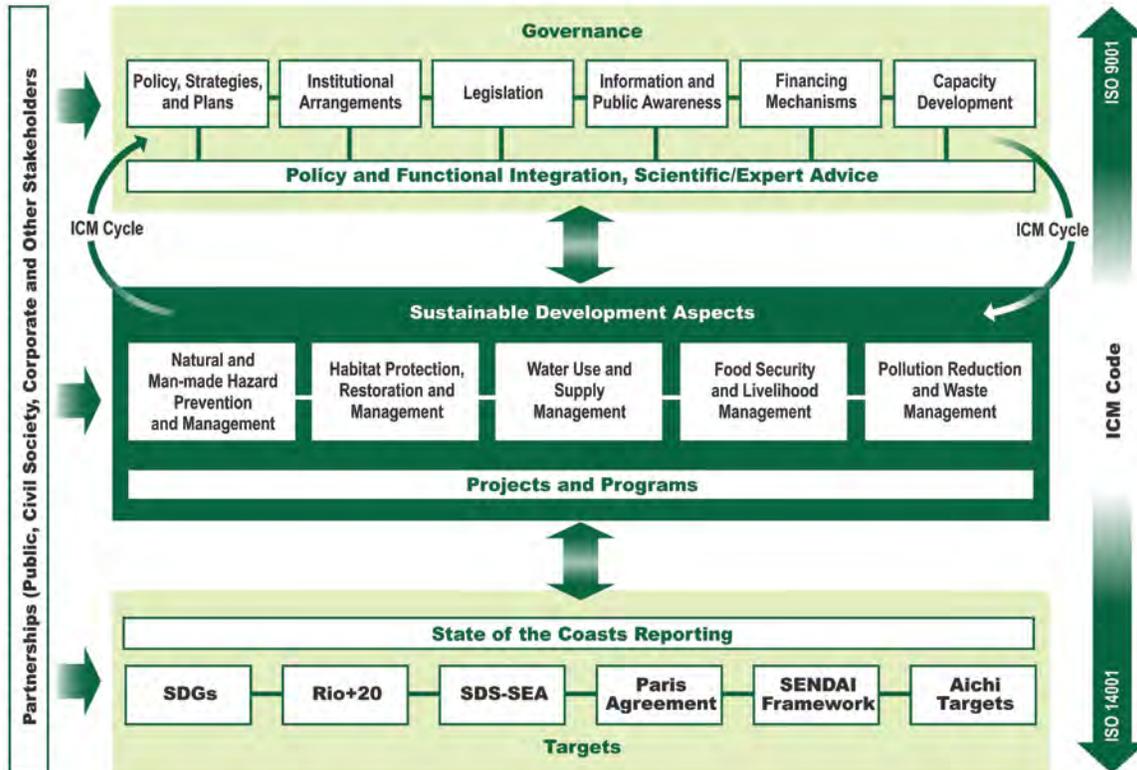


## Annexes



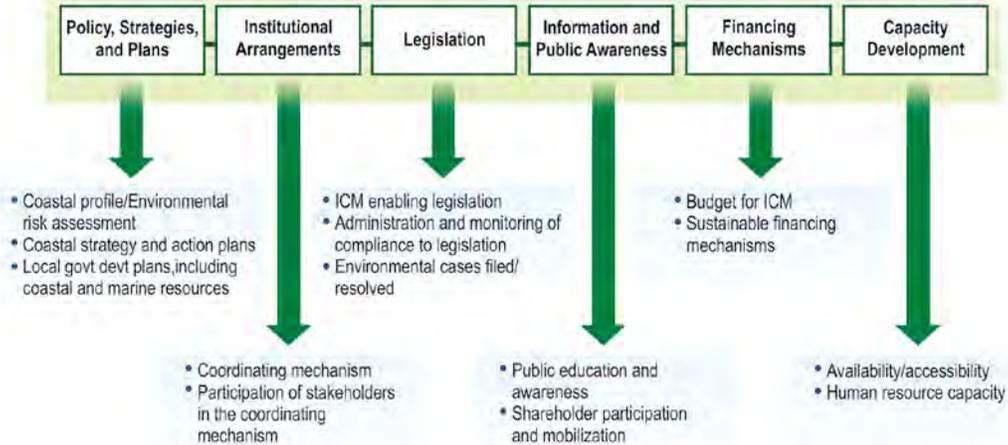
**Annex 1. Framework for the Sustainable Development of Coastal Areas thru ICM.\***

Process-oriented Common Framework for Sustainable Development of Coastal Areas through ICM Implementation.

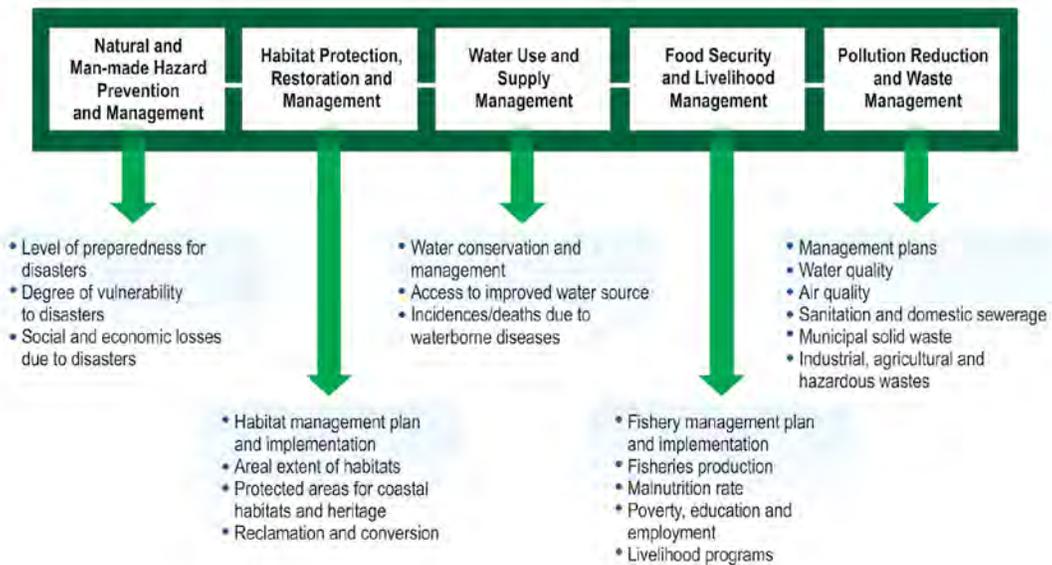


\* This section is taken from PEMSEA. 2007. *Partnerships in Environmental Management for the Seas of East Asia (1994-2010): A Regional Mechanism Facilitating Sustainable Environmental Benefits in River Basins, Coasts, Islands and Seas*. PEMSEA IEC Material 2. 80p. Global Environment Facility/United 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. ICM-enabling legislations in the cities and municipalities of Cavite (2002-2012).

Municipality	Ordinance No.	Year	Title
Bacoor	4	2002	An Ordinance prescribing specific drop stations and pickup stations within the territorial jurisdiction of the Municipality of Bacoor for the orderly and efficient garbage disposal and collection.
	14	2002	An Ordinance regulating the distribution of plastic bags and polystyrene (common name styrofoam), providing penalties for violation thereof.
	02	2006	An Ordinance adopting the registration of fishing vessels 3GT and below in the Municipality of Bacoor, Province of Cavite, providing penalties for violation thereof.
	11	2008	An Ordinance enacting the Health and Sanitation Code of Bacoor.
	20	2008	An Ordinance prohibiting illegal fishing activities and other destructive forms of fishing as well as fishing in fishery reserves, refuge and sanctuaries within 15 km from the shoreline and/or within the territorial jurisdiction of Bacoor, Cavite and providing penalties for violations thereof.
	9	2009	An Ordinance creating the Bacoor River Authority, defining its power and responsibilities and appropriating funds for its operations.
	27	2009	An Ordinance regulating the operation of oyster/mussel farms and other similar structures and businesses within Bacoor, Cavite and providing penalties for violations hereof.
	5	2011	An Ordinance requiring the installation of a "Grease and Used Oil Waste Disposal System" in all business establishments operating in Bacoor, Cavite.
	7	2011	An Ordinance regulating the passage and/or entry of all kinds of garbage trucks in all the streets and thoroughfares of the Municipality of Bacoor, Cavite, except those providing services to the Municipality, and prescribing penalties for violations hereof.
	11	2011	An Ordinance creating the Bacoor Disaster Risk Reduction and Management Office (BDRRMO), creating various positions thereunder, and for other purposes.
Dasmariñas	25	2011	An Ordinance requiring street vendors and ambulant vendors to bring or provide trash receptacles at their place/s of business.
	01	2002	Ordinance prohibiting the littering of garbage in public places in Dasmariñas, Cavite, and imposing penalties for violation thereof.
	01	2003	Ordinance adopting and implementing Chapter II, Water Supply of Presidential Decree No. 856 (otherwise known as the Code of Sanitation of the Philippines) including its rules and regulations in Dasmariñas, Cavite.
	Res. No. 090	2013	A Resolution ratifying Resolution No. 001-2013 of the Local Risk Reduction and Management Council, entitled: "A Resolution adopting the annual local risk reduction, management and financial plan for working year 2013."
	Ord. No. 3342	2011	An Ordinance establishing the Local Disaster Risk Reduction and Management Office (LDRRMO) in the City of Cavite, pursuant to Republic Act 10121 otherwise known as the Philippine Disaster Risk Reduction and Management Act of 2010.

Municipality	Ordinance No.	Year	Title
General Mariano Alvarez	Res. No. 502	2002	A Resolution enacting Ordinance No. 19-5-02 – Segregation of solid wastes through color coding
	Res. No.1170	2007	Ratification of MOA between Clean Save Waste Corp. for the establishment of a recycling plant.
	Res. No. 1237	2007	Resolution expressly amending Resolution #1146-5-07 and granting full authority to the Municipal Mayor to negotiate and enter into MOA with the Clean Save Waste Corp. for the purpose of putting up a steam reduction plant within the Municipality and other purposes.
	Res. No. 1563	2010	Resolution adopting the program of the AFP as Regular Environmental Program of the Locality – the GRASYA Basura Ecosavers Program of GMA, Cavite, and providing incentives and recognition to significant and valuable contributions of the participating schools in promoting waste reduction and good values to our youth.
	Res. No. 1591	2010	Declaring as a policy of the Municipality of GMA, Cavite, to plant at Coast 1 Tree in applying for a Marriage License (Authored by SMB Grabillo)
	Res. No. 044	2012	Resolution authorizing the Municipal Mayor of GMA, Cavite to enter and sign an MOA with the DOH-CHD Regional Office of IV - A for the issuance implementation of the 2012 Continuous and Safe Drinking Water.
	Res. No. 11	2013	Resolution declaring a State of Calamity in the Municipality of GMA, Cavite, due to the imminent threat of a serious health hazard brought about by flies and tons of garbage solid waste pumped in all 27 Brgy. of Metro San Jose, namely: Brgy. Tiago, Brgy. Virata, Brgy. San Jose, Brgy. De Jesus, and Brgy. F. Reyes
	Res. No. 59	2003	Adopting Gen. Trias Environmental Strategic Plan (GTESP 2004-2013 as an Executive and Legislative Policy in Line with the 15-year Development and Vision of the Municipality for a Sustainable Industry and Agricultural LED Economy as Contained in the Gen. Trias Comprehensive Land Use and Development Plan (2000-2015).
General Trias	Res. No. 35	2007	Granting Authority to the Municipal Mayor to enter into a contract/ agreement with YSPB Construction & Trading, Represented by Ms. Susan B. Baria to provide and furnish a bulldozer and backfilling and excavation of garbage in the municipal dumpsite of this Municipality.
	Res. No. 57	2009	Authorizing the Hon. Mayor Luis A. Ferrer IV in behalf of the Municipality of Gen. Trias to enter and sign a service agreement with Resei in the implementation of necessary Municipal Solid Waste Disposal Facility (controlled open dumpsite) in Bgy. Tapia, this Municipality.
	Res. No. 72	2011	Authorizing the Hon. Mayor Luis A. Ferrer IV to enter into and sign on behalf of the Municipality of Gen. Trias a Contract of Lease Agreement with JMOLL Trading as represented by its proprietor, Francisco D. Gayo, Jr., for the service of backhoe in the municipal dumpsite in Bgy. Tapia.

Municipality	Ordinance No.	Year	Title
	Ord. No. 03	2012	An Ordinance prohibiting, regulating, and prescribing certain uses of plastic materials for goods and commodities that end up as residual wastes and promoting the uses of eco-bags/reusable Bags and other environment-friendly practices as alternatives in the Municipality of Gen. Trias and providing penalties for violations thereof.
	Res. No. 41	2011	Adopting Provision of RA No. 10069 otherwise known as the "Health Workers Day Act", declaring May 7 of every year as "Health Worker's Day" in the Municipality of Gen. Trias.
	Res. No. 19	2012	Authorizing the Hon. Mun. Mayor Luis A. Ferrer IV to sign into the MOA for and on behalf of the Municipality of Gen. Trias with the DILG and DOH regarding the implementation of the "2012 Salintubig Projects".
Indang	024	2005	An Ordinance enacting the Environment Code of the Municipality of Indang (2005)
	043	2008	An Ordinance adopting the Municipality of Indang Solid Waste Management Code and providing penalty for violation thereof, subject to all laws and existing legal rules and regulations.
	Res. No. 103	2011	Adopting the 2011 Municipal Disaster Risk Reduction and Management Plan (Municipal Disaster Contingency Plan for CY 2011) of Indang Cavite.
	Res. No. 35	2012	Adopting Provincial Ordinance No. 007-2012 "Prohibiting regulating and prescribing certain uses of plastics for goods and commodities that end up as residual waste and promoting the use of Eco-Bags and other environment-friendly practice as an alternative, and providing penalties for violation thereof"
	Res. No. 66	2012	Resolution of concurrence of Resolution No. 03 Series of 2012 of the Municipal Development Council (MDC) Executive Committee of Indang, Cavite approving the Disaster Contingency Plan of Indang, Cavite for the year 2012.
Kawit	07-05	2005	An Ordinance to curtail illegal activities of professional and illegal squatters in the Municipality of Kawit, Cavite.
	06-08	2008	An Ordinance prohibiting the drinking of liquor or any intoxicating beverages by any person or group of persons along municipal and barangay roads, <i>sitio</i> ; <i>kalyehon sa eskinita</i> and public place and providing penalties of violation thereof.
	03-11	2011	This Ordinance shall be known as the "Environmental Protection Information Campaign Ordinance"
	03-12	2012	An Ordinance adopting Provincial Ordinance No. 007-2012 to the selective plastic ban and use of eco-bag ordinance in the Province of Cavite.
	Res. No. 27-02	2002	Resolution requesting Congressman Plaridel Abaya the amount of Php 5 Million for the Flood Control project of construction of river dikes, walls and Riprap on Kawit Rivers and Creeks.
	Res. No. 28-02	2002	Resolution requesting Senator Edgardo Angara to provide funds to the amount of Php 5 Million for the Flood Control Project, Desilting and Deepening of Rivers and Creeks in Kawit, Cavite.
	Res. No. 29-02	2002	Resolution requesting Senator Robert Barbers to provide funds for the Flood Control Project, Desilting and Deepening of Rivers and Creeks in Kawit, Cavite.
	Res. No. 30-02	2002	Resolution requesting Congressman Plaridel Abaya to provide funds to the amount of Php 5 Million for the Flood Control Project, Desilting and Deepening of Rivers and Creeks in Kawit, Cavite.

Municipality	Ordinance No.	Year	Title
	Res. No. 18-04	2004	Resolution requesting Governor Ireneo Maliksi to provide funds for the riprapping of portion of Marulas, Kaingen and Wakas River.
	Res. # 20-02	2004	Resolution requesting the appropriating of Two Million Pesos (PhP 2,000,000.00) from Senator Manuel Villar for the Riprapping of the River Bank of Barangay Kaingen, Marulas, Wakas and Poblacion, Kawit, Cavite.
	Res. # 09-07	2007	Resolution mandating the creation of an integrated solid waste management community educational initiatives within respective barangay government units, educational institutions, business establishment groups, homeowners associations and other associations within the Municipality of Kawit to accelerate its solid waste management programs in compliance to R.A. 9003, the Ecological Solid Waste Management Act of 2000.
	Res. # 11-07	2007	Resolution requesting the Department of Public Works and Highways (DPWH) the removal and clearing of debris and structures that causes clogging and blocking on the Bridge and the Waterways of Binakayan and Tabon Bridges and the Binakayan Detour Bridge.
	Res. # 28-10	2010	A Resolution requesting assistance from the Hon. Jejomar C. Binay, Vice-President of the Republic of the Philippines, for the dredging of Kawit River and its tributaries.
	Res. # 33-11	2011	A resolution authorizing Hon. Reynaldo B. Aguinaldo, Municipal of Kawit, Cavite, to enter into an MOA with DENR for the implementation of several projects in support to Manila Bay Critical Habitat restoration and rehabilitation
	Res. # 11-06	2006	Resolution declaring all barangay-flooded areas under the limited State of Calamity to help the fishers, farmers and residents who are all economically and physically affected by the recent flood.
	Res #. 04-02	2002	Resolution authorizing the Municipal Mayor to enter and sign Contract of Lease negotiated or not municipal foreshore as mandated by the Local Government Code for fishpen, fish corral, <i>pabiyayan</i> and for other economic purposes beneficial to the Municipality.
	Res. # 19-02	2002	Resolution authorizing the construction of fishpen, fish corral oyster and mussel farm on the zonified area of the municipal waters and authorizing the Municipal Mayor to execute and sign a lease contract for this purpose.
Maragondon	097-12	2012	Ordinance prohibiting, regulating and prescribing certain uses of plastics for goods and commodities that end up as residual waste and promoting the use of eco-bags and other environment-friendly practices as an alternative and providing penalties thereof.
Mendez	Res. No. 69	2002	Resolution authorizing the Municipal Mayor to enter into a contract with the consultancy group to undertake the initial environmental examination and environmental impact assessment for the proposed Mendez ecological processing center
	Res. No. 40	2002	Resolution authorizing the Municipal Mayor to release the amount of PhP 40,000.00 from calamity funds as assistance to the affected families of typhoons and calamities
	Res. No. 116	2002	Resolution adopting the creation of the Municipal Solid Waste Management Board in compliance with RA 9003 "An Act providing for an ecological solid waste management program creating the necessary institutional mechanisms and incentives, declaring certain acts prohibited and providing penalties, appropriating funds therefore and for other purposes"

Municipality	Ordinance No.	Year	Title
	Res. No. 118	2003	Resolution reclassifying the site of the proposed Mendez Ecological Center from agricultural area to industrial zone area
	Res. No. 141	2003	Resolution prioritizing the establishment of the project, Mendez Ecological Processing Center in compliance with RA 9003 "An act providing for an ecological solid waste management program creating the necessary institutional mechanisms and incentives, declaring certain acts prohibited and providing penalties, appropriating funds therefore and other purposes"
	Res. No. 60	2004	Resolution enjoining all Sangguniang Barangay to conduct cleanliness drive within their jurisdiction for the support of the 4 o'clock habit and dengue fever prevention
	Res. 11	2009	Resolution declaring Baging Tubig Spring as a reservation area and hereby proposing a rehabilitation and tree-planting program
	Res. 12	2009	Resolution declaring Ulo Spring as reservation area and hereby proposing a rehabilitation and tree-planting program
	Res. 13	2009	Resolution declaring Loob ng Anuling Spring as a reservation area and hereby proposing a rehabilitation and the tree-planting program
	Res. 14	2009	Resolution declaring Bolbok Spring as a reservation area and hereby proposing rehabilitation and tree-planting program
	Res. 16	2009	Resolution declaring Bukal Spring as a reservation area and hereby proposing rehabilitation and tree-planting program
	Res. No. 22	2009	Resolution in support of Provincial Ordinance regulating the operation of all junk shops and other similar business establishments and individuals engaged in the buying and selling of metal and other materials made of or containing metals with monetary value within the Province of Cavite and for other purposes
	Res. No. 173	2009	Resolution confirming the use of the Sanitation Code of the Philippines and complying with the same pertaining to the implementation of a sanitation code in Mendez, Cavite.
	Res. No. 62	2011	Resolution enjoining all barangays on the implementation of garbage segregation and the establishment of a materials recovery facility pursuant to RA 9003.
	Res. No. 104	2011	Resolution requesting all concerned strict compliance of RA 9003 for the proper waste disposal at the Ecological Processing Center, Maysili Road MC
	Res. No. 131	2011	Resolution requiring all barangay for the de-clogging of canals in Mendez, Cavite, subject to the provision of the new Local Government Code and issued DILG memorandum circulars
	Res. No. 165	2012	Resolution requesting the Municipal Mayor to implement the measure for all vendors in maintaining cleanliness of the Mendez Municipal Parks
Res. No. 165	2012	Resolution adopting provincial ordinance prohibiting, regulating and prescribing uses of plastic materials for goods and commodities that end up as residual wastes and promoting the use of eco-reusable bags and environment-friendly or alternatives and providing penalties thereof in Mendez, Cavite	
Rosario	212	2008	An Ordinance regulating the operations of all business establishment in the Municipality of Rosario to obligate strict compliance with regards to health and sanitation requirement and standards.
	229	2011	An Ordinance creating the Rosario Solid Waste Management Board, defining its duties and functions, and for other purposes and appropriating funds thereof.

Municipality	Ordinance No.	Year	Title
	Res. 43	2012	A Resolution adopting and enacting the provisions of Provincial Ordinance No. 007-2012, otherwise known as "An Ordinance prohibiting regulating and prescribing the use of plastic for goods and commodities that end up as residual wastes and promoting the use of eco-bags and other environment-friendly practices as an alternative and providing penalties for violation thereof, albeit to be included in the Municipal Ordinance adopting the comprehensive Environmental and Sanitation Code of Rosario, Cavite, or the Environment Code of Rosario, Cavite.
	Res. 242	2012	A Resolution Enacting the Comprehensive Environmental and Sanitation Code of the Municipality of Rosario, Cavite
Ternate	Ord. No. 5	2012	An Ordinance providing the Environmental Code of the Municipality of Ternate, Cavite.
	2	2011	An Ordinance amending ordinance providing for sustainable management, development and conservation of the Ternate Municipal Waters and its coastal and fishery resources harmonizing and integrating all ordinances pertinent thereto and for other purposes.
Trece Martires City	144	2008	An Ordinance enacting City Ordinance No. 2008-144 known as the Trece Martires Environment Code
	147	2008	An Ordinance declaring Protected Areas in the City of Trece Martires
	179	2011	An Ordinance institutionalizing the "Tapat mo, linis mo" program in the City of Trece Martires
	182	2011	An Ordinance requiring couples applying for marriage licenses, incoming freshmen in public and private high schools/colleges, and owner of business establishment in TMC to plant trees
	196	2011	An Ordinance providing for the Sanitation Code of Trece Martires City
	200	2011	Plastic bags and styrofoam reduction ordinance of TMC and its Implementing Rules and Regulations
Naic	03	2003	Resolution declaring a portion of the municipal waters of Brgy. Bagong Kalsada as fish sanctuary
	09	2003	An ordinance declaring, establishing and regulating the Naic fish sanctuary and Naic reserve areas, prescribing the regulatory measures related thereto with fixed fines and penalties in case of violation and granting authority to Naic Municipal Mayor to enter into Memorandum of Agreement with accredited nongovernmental organization for the full implementation and enforcement of this ordinance
Tanza	10	2009	An ordinance declaring, establishing and regulating the municipal fish sanctuary and fishery reserve areas in Tanza, Cavite, prescribing regulatory measures pertinent thereto and providing penalties for violation thereof





