

# CLIMATE CHANGE ADAPTATION IN COASTAL COMMUNITIES

A Documentation of Project Experience



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The World Bank in the Philippines  
Ortigas Center, Pasig City  
Telephone: +63-2-6375855  
Internet: [www.worldbank.org/ph](http://www.worldbank.org/ph)

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## Acronyms

CBMS	community-based monitoring system
CC	climate change
CCA	climate change adaptation
CCC	Climate Change Commission
CDP	comprehensive development plan
CLUP	comprehensive land use plan
DA	Department of Agriculture
DENR	Department of Environment and Natural Resources
DILG	Department of Interior and Local Government
DRRM	disaster risk reduction and management
DRRMC	Disaster Risk Reduction and Management Council
DOLE	Department of Labor and Employment
FARMC	Fisheries and Aquatic Resources Management Council
HLURB	Housing and Land Use Regulatory Board
LCCAP	local climate change adaptation plan
LGU	Local Government Unit
MERFI	Marine Environment and Resources Foundation, Inc
MGB	Mines and Geo-Sciences Bureau
MPDO	Municipal Planning and Development Office
NAMRIA	National Mapping and Resource Information Authority
NBFTC	National Brackishwater Fishery Technology Center
NCI	National Convergence Initiative
NIPAS	National Integrated Protected Areas System
NTF	Norwegian Trust Fund
NCCAP	National Climate Change Adaptation Plan
NGO	non-government organization
P3DM	participatory 3-dimensional modeling
PFEC	Philippine Federation for Environmental Concerns
PPDO	Provincial Planning and Development Office
UNDP	United Nations Development Program
UP-MSI	University of the Philippines Marine Science Institute
UP-NIGS	University of the Philippines National Institute of Geological Science
WBOM	World Bank Office Manila

# Chapter 1

# The Country Context

Chapter 1 provides a macro view of how climate change is impacting the Philippines. It highlights the enabling policy and institutional environment for climate change adaptation. It also describes current adaptation initiatives of the national and local governments.

## 1.1 Climate and Disaster Risks

A country of over 7,100 islands in the Pacific Ring of Fire and perennially in typhoons' path, the Philippines is a hot spot for natural disasters and for the expected adverse impacts of climate change. It ranks 6<sup>th</sup> among 16 "extreme risk" countries in the 2011 Climate Change Vulnerability Index (CCVI)<sup>1</sup> and is the third most vulnerable to disaster risks and natural hazards in the 2011 World Risk Index<sup>2</sup>.

Flash floods that occurred in the first half of 2011 in large areas of Mindanao, in the Bicol Region, in Metro Manila, in Pampanga, in Eastern Samar—and landslides caused by continuous heavy rains in Leyte, in Bukidnon, and in other areas when dry weather was expected—are clear indications of the country experiencing abnormal weather patterns and extreme weather events. The flash floods and landslides were not caused by typhoons but by low pressure areas (LPAs); loss to life, livelihood, and property were enormous. After exacting a heavy toll on life and property, typhoons *Pedring* (Nesat) and *Quiel* (Nalgae) in October 2011 left large portions of the major rice-producing provinces of Bulacan, Tarlac, and Pampanga in Central Luzon still inundated weeks after the typhoons had left. Human activities—the conversion of large areas of mangroves into aquaculture ponds and heavy siltation of rivers—aggravated the flooding.

Local scientists project that: (i) the rise in annual mean temperature in all areas in the country by 0.9°C to 1.1°C in 2020, and by 1.8°C to 2.2°C in 2050; (ii) the increasing warming of all parts of the country, more so in the summer months; and (iii) the increase in the number of tropical cyclones forming or passing through the Philippine Area of Responsibility are likely to cause more extreme

<sup>1</sup> Developed by the global risk advisory firm Maplecroft, the Climate Change Vulnerability Index is a global ranking instrument calculating the vulnerability of 170 countries to the impacts of climate change over the next 30 years. The index evaluated 42 social, economic, and environmental factors to assess national vulnerabilities (<http://www.maplecroft.com>).

<sup>2</sup> The World Risk Index developed by the United Nations University-Institute for Environment and Human Security calculates the risk values for 173 countries worldwide. The index consists of indicators in four components: exposure to natural hazards; susceptibility as a function of public infrastructure, housing conditions, nutrition, and the general economic framework; coping capacities as a function of governance, disaster preparedness, and early warning, medical services, social and economic security; and adaptive capacities to future natural events and climate change (<http://www.ehs.unu.edu>).

weather events.<sup>3</sup> The devastation wrought by typhoons *Ondoy* (Ketsana) and *Pepeng* (Parma) in 2009 is the worst the country has ever experienced so far; the possibility of stronger and more frequent extreme weather events occurring in the future with more devastating impact cannot be made light of, as the country's food security and attainment of other Millennium Development Goals (MDG) could be imperiled.

## 1.2 Government responses

### Policy and institutional initiatives

The Philippine Government has been cognizant of the urgency to address climate change. It is party to the United Nations Framework Convention on Climate Change (UNFCCC), the Clean Development Mechanism (CDM), and other international covenants. In 2009 the **Climate Change Act** (Republic Act 9729) took effect, creating the **Climate Change Commission**<sup>4</sup>, an oversight agency under the Office of the President, with the President as Chair (Table 1). The **National Framework Strategy on Climate Change** and the **National Climate Change Action Plan** (NCCAP) for 2011-2028, both crafted through broad national stakeholder consultations, are in place. The NCCAP is a comprehensive roadmap that will help determine national expenditure direction and public investment. With the approval of the NCCAP, drafting of Local Climate Action Plans (LCAPs) by all Local Government Units (LGUs) will follow as prescribed by the Climate Change Act.

Also in place is the **Disaster Risk Reduction and Management Act** of 2010 (RA 10121), which, together with the Climate Change Act, provides the legal framework for a stronger and more pro-active disaster risk management. RA 10121 provides that disaster risk reduction shall be integrated into climate change programs and initiatives. Recognizing that climate change and disaster risk reduction are interconnected, the Climate Change Commission and the **National Disaster Risk Reduction and Management Council (NDRRMC)** forged a memorandum of agreement in February 2011, signifying their intention to work together and to combine their resources and expertise to ensure that communities are made more resilient to climate disasters in the future.<sup>5</sup>

On May 13, 2011, President Benigno Simeon Aquino III signed **Executive Order (EO) No. 43**, elevating Climate Change as a priority issue—one of five requiring coordinated action and budgetary action. EO 43 recognizes that the climate crisis requires decisive action from the President and requires him to utilize public finance to protect vulnerable communities from the

<sup>3</sup> Philippine Atmospheric, Geophysical & Astronomical Services Administration (PAGASA), Manila Observatory

<sup>4</sup> The Climate Change Commission replaced the Climate Change Office created through Department Administrative Order in 2009 under the Office of the Secretary of the Department of Environment and Natural Resources (DENR).

<sup>5</sup> "CCC and NDRMC join forces to make communities climate resilient," <http://www.climate.gov.ph>.

worst impacts of climate change. As one of the key result areas of the President's Social Contract<sup>6</sup>, climate change mitigation and adaptation received greater funding focus in the 2012 National Budget. A **Cabinet Cluster<sup>7</sup> on Climate Change Adaptation and Mitigation** chaired by the Secretary of the Department of Environment and Natural Resources (DENR), has been organized to "lead the pursuit of measures to adapt to and mitigate the effects of climate change in the country" (EO 43, Sec 10).

On August 16, 2012<sup>8</sup>, President Benigno S. Aquino III signed Republic Act 10174, otherwise known as the **People's Survival Fund** (PSF) Act for local governments and communities. The PSF aims to provide incentives for early climate action from localities, which can tap the fund to support local climate adaptation plans, vulnerability assessment, and similar incentives. Funding will be provided to localities threatened by persistent flooding, to coastal communities facing rising sea levels, or to local government units (LGUs) seeking to promote agricultural programs resilient to extreme temperatures and changing rainfall.

### Convergence in national programs

In December 2010, the main agencies of the national government involved in rural development—the Department of Agriculture (DA), the Department of Agrarian Reform (DAR), and the DENR—launched an enhanced National Convergence Initiative (NCI) for "more focused and unified interventions for sustainable development." Under the NCI, clear mechanisms for harmonization and complementation among the three agencies are being put in place to avoid conflicts and overlapping policies that have slowed implementation of national programs on the ground in the past. The NCI also prescribes the "ridge to reef" or watershed ecosystems management approach to improve the lives of marginal groups in the uplands, lowlands, and coastal areas.

The Climate Change Commission, with its oversight function, also seeks to ensure that convergence is achieved in all programs and projects of the national government.

### Enabling of Local Government Units (LGUs)

The Climate Change Act mandates the LGUs to be the "frontline agencies in the formulation, planning and implementation of climate change action plans in their respective areas." It prescribes the role of LGUs as follows:

*"Barangays shall be directly involved with the Municipal and City Governments in prioritizing climate change issues and in identifying best practices and other solutions; Municipal and City Governments shall consider climate change adaptation as one of their regular functions; and Provincial Governments shall provide technical assistance, enforcement and information management in support of municipal and city action plans" (sec 13).*

<sup>6</sup> The five key result areas under the Aquino Government's Social Contract are: (i) anticorruption and transparent, accountable, and participatory governance, (ii) poverty reduction and empowerment of the poor, (iii) rapid, equitable and sustainable economic growth, (iv) just, inclusive and lasting peace and the rule of law, and (v) integrity of the environment, climate change mitigation and adaptation (EO 43, Sec 2).

<sup>7</sup> The Secretaries of the Departments of Science and Technology (DOST), Agriculture (DA), Interior and Local Government (DILG), Public Works and Highways (DPWH), Social Works and Development (DSWD), Agrarian Reform (DAR), Energy (DOE), and the Chairs of the Housing and Urban Development Coordinating Council (HUDCC) and Metro Manila Development Authority (MMDA) are members. The Climate Change Commission serves as the Secretariat.

<sup>8</sup> Source: Senate of the Philippines official website, <http://www.senate.gov.ph>

In 2010 and 2011, local government officials, members of the scientific community, and other local development partners came together in a series of national summits dubbed, “Mainstreaming Climate Change in the Philippines,” to increase their awareness of and commitment to climate change.<sup>9</sup> The local chief executives pledged before the President their commitment to mainstream climate change adaptation and disaster risk reduction and management in their development planning and governance.

In mid-2011 the “Strengthening the Philippines Institutional Capacity to Adapt to Climate Change” Project under the Millennium Development Goals Fund (MDGF) 165 Joint Program on Climate Change, through the leadership of the National Economic Development Authority (NEDA), started providing training sessions to key staff of the Provincial Planning and Development Office (PPDO) of over 43 provinces on the eastern seaboard, to build their capacity to mainstream climate change in local development planning. The PPDOs are expected to re-echo the training to the Municipal Planning and Development Offices (MPDO), the unit tasked to coordinate planning at the municipal level.

A few local governments with pro-active chief executives are making headway in making DRR and CCA an integral part of their governance. The provincial government of Albay declared climate change adaptation and DRRM as critical strategies in its pursuit of inclusive growth long before the enactment of the Climate Change and DRRM Acts. The Albay LGU in August 2011 established the **Climate Change Academy**, housed in Bicol University, that is envisaged to be a “repository of knowledge and expertise on local adaptation practices and a venue for dissemination of best practices in the country.” Also in 2011, the LGU of Surigao del Norte forged a memorandum of agreement with the Climate Change Commission and the Bureau of Fisheries and Aquatic Resources (BFAR) to demonstrate the “eco-town”<sup>10</sup> framework in Siargao Island. Other LGUs have partnered with various donor organizations to take action to address climate change.

<sup>9</sup> The summits were initiated by the National Economic and Development Authority (NEDA) in partnership with the Climate Change Commission, the DENR, and the League of Municipalities of the Philippines (LMP) as part of the MDG-Fund 165 Joint Program on Climate Change.

<sup>10</sup> The Climate Change Commission conceived the “eco-town” as an “ecosystem-based management and pro-poor, climate-resilient” local economic development where national and local government support converges to promote “green growth.” The eco-town is composed of municipalities near areas known for biodiversity but are deemed to be highly vulnerable to climate risks because of their respective locations and poverty situation (<http://www.climate.gov.ph>).

**Table 1. Key Enabling Policies for Climate Change Adaptation (as of October 2011)**

Year in effect	Policy	Key Provisions
2009	<b>Climate Change Act (RA 9729)</b>	<ul style="list-style-type: none"> <li>Mainstreamed climate change adaptation in government policy formulation; established the framework strategy and programs on climate change</li> <li>Created the Climate Change Commission under the Office of the President, with the President as Chair</li> <li>Mandated the crafting of: (1) a National Framework Strategy for Climate Change; (2) a National Climate Change Adaptation Plan (NCCAP); and (3) Local Climate Change Adaptation Plans (LCCAP)</li> </ul>
2010 (Feb)	<b>Disaster Risk Reduction and Management (DRRM) Act (RA 10121)</b>	<ul style="list-style-type: none"> <li>Mainstreamed disaster risk reduction and <u>climate change adaptation</u> in policy formulation, socio-economic development planning, budgeting, and governance.</li> <li>Allocated 5% of regular funds (Local DRRM Fund) not only for post- but also <u>pre-disaster preparedness programs</u>.</li> <li>Decentralized power, responsibilities, and resources for DRRM and for strengthening LGU capacity at regional and local levels</li> <li>Allocated initial fund of Php1 billion</li> </ul>
2010 (Apr)	<b>National Framework Strategy for Climate Change (2010-2022)</b>	<ul style="list-style-type: none"> <li>Emphasized <u>adaptation</u> as the anchor strategy; mitigation will be pursued as a function of adaptation</li> </ul>
2011	<p><b>Pursuing our Contract with the Filipino People Through Reorganization of the Cabinet Clusters (EO 43)</b></p> <p><b>National Climate Action Plan (2011-2028)</b></p>	<ul style="list-style-type: none"> <li>Declared Climate Change Adaptation and Mitigation a key result area of the President’s Social Contract<sup>11</sup></li> <li>Created the Cabinet Cluster on Climate Change Adaptation and Mitigation (and Food Security) chaired by the DENR Secretary, to oversee the achievement of this key result area with the Climate Change Commission as Secretariat</li> <li>Defined seven strategic priorities to be pursued for 2011-2028, as follows: (i) food security; (ii) water sufficiency; (iii) environmental and ecological stability; (iv) human security; (v) sustainable energy; (vi) climate-smart industries and services; and (vii) knowledge and capacity development.</li> <li>Recommended for priority action for 2011-2016 were the following: (i) vulnerability assessment; (ii) demonstration sites for eco-towns and (iii) research and development in components to support renewable energy and sustainable transport system<sup>12</sup></li> </ul>

*Continued on next page*

Continued from page 5

**Table 1. Key Enabling Policies for Climate Change Adaptation (as of October 2011)**

Year in effect	Policy	Key Provisions
2012	<b>People's Survival Fund (PSF)</b>	<ul style="list-style-type: none"> <li>Provides incentives for early climate action from localities, which can tap the fund to support local climate adaptation plans, vulnerability assessment, and similar incentives</li> <li>Funding will be provided to localities threatened by persistent flooding, to coastal communities facing rising sea levels, or to local government units (LGUs) seeking to promote agricultural programs resilient to extreme temperatures and changing rainfall.</li> </ul>

### Public-private partnerships

A growing number of national and multi-national private business corporations and groups are partnering with national government agencies (NGAs) and LGUs to discover and support the government's thrust to raise public awareness on climate change.

On top of this, Philippine media organizations have helped build awareness for climate change adaptation. In November 26, 2011, various national media organizations—the National Press Club (NPC), the *Kapisanan ng mga Brodkasters ng Pilipinas* (KBP), the Publishers' Association of the Philippines, the Foreign Correspondents Association of the Philippines (FOCAP), and the Philippine Network of Environmental Journalists—signed the **"Philippine Media Declaration on Climate Change"**, pledging their concerted effort to "catalyze public awareness and pursue a nationwide advocacy for climate change adaptation and mitigation" at the end of the "First National Media Conference on Climate Change Adaptation." They vowed to promote regional and international collaboration for the enrichment of climate change reporting and skills enhancement of media practitioners, through training and exchange of knowledge and best practices. The conference was initiated by the Albay LGU and by several agencies of the national government.

<sup>11</sup> The "Social Contract" is President Benigno Simeon C. Aquino III's Platform of Government, an election promise he had made and had declared to fulfill during his incumbency.

<sup>12</sup> Climate Change Commission, National Climate Change Adaptation Plan, <http://www.climate.gov.ph>

## Chapter 2 The Project

Chapter 2 provides the background and description of the World Bank-Norwegian Trust Fund (WB-NTF)'s *"Climate Change Adaptation in Coastal Communities: A Community-based Approach"* Project. It presents the framework of the adaption approach, as initially conceived by the Project planners, and shows how this has evolved to respond to situations on the ground as implementation progressed. It describes the multi-stage process of selecting the project sites and the strategies adopted in achieving the project objectives.

### 2.1 Background and project rationale

In support of the strategic directions of the Government of the Philippines (GOP) on climate change and consistent with the thrusts of the Bank in the country, the World Bank Office in Manila (WBOM), with funding support from the Norwegian Trust Fund (NTF), initiated the implementation of the *"Climate Change Adaptation in Coastal Communities"* Project in the last quarter of 2008 until September 2011.

Because of the Philippines' geographic location and archipelagic nature, its coasts are most vulnerable to climate and disaster risks. Over 60 million of the country's population is estimated to live in coastal areas (Box 2.1). As population and economic centers are situated near shorelines and riverbanks, the impacts of strong winds and waves and sea level rise can be costly. This is especially true for many of the country's poor who, bereft of land and productive assets, have made their homes near the shorelines. Those killed in the June 2011 flash floods in Davao City, in southern Mindanao, and whose homes and livelihoods were washed away, were the city's poor living near riverbanks. So were many of the over 1,000 deaths in the southern cities of Cagayan de Oro and Iligan in December 2011, in the aftermath of typhoon *Sendong* (Washi).

Many of those living near the coasts are artisanal fishing families dependent on the sea for their sustenance and livelihood. They have been mired in poverty because of declining fish catch due to overfishing, the destruction of fishery and marine habitats due to cyanide and dynamite use, and the intrusion of large fishing vessels. The expected adverse impacts

#### Box 2.1

#### Brief Profile of the Philippines' Coasts

- 7,107 islands
- 226,000 km<sup>2</sup> coastal waters
- 1.93 million km<sup>2</sup> oceanic waters
- 64 (out of 79) coastal provinces
- 832 (out of 1,541) coastal municipalities
- 64.7 M coastal population (2000)
- 289 km discontinuous coastline

Source: <http://www.census.gov.ph>

of climate change increase their vulnerability, and these have compromised GOP's efforts of achieving its Millennium Development Goals. Thus, the Project was conceived to help these most vulnerable communities and their local government to better adapt to climate change.

## 2.2 Project objectives

The Project sought to:

- 1) Establish a community-based adaptation strategy in the pilot sites by:
  - a) Setting appropriate policies;
  - b) Climate-proofing livelihoods;
  - c) Institutionalizing science-based decision support systems; and
- 2) Develop a replicable template that can be used by and adapted to all other similar sites in the Philippines

### Box 2.2

#### Criteria for project site selection

- Large areas and populations vulnerable to climate change risks and natural disasters
- Presence of significant areas of sea grass, mangroves, and coral reefs
- Demonstrated willingness of municipal/barangay LGUs to participate in project activities and to sustain initial gains

## 2.3 The Adaptation Approach Framework<sup>13</sup>

The Project had four major components:

- (i) Policy and legislation;
- (ii) Vulnerability assessment;
- (iii) Bio-physical adaptation measures; and
- (iv) Capacity-building and partnership.

Two sets of processes were initiated (Diagram 2.1). The initial activities—vulnerability assessment, policy study, and establishment of local weather station—were carried out to establish sufficient information that were then needed to craft effective and targeted solutions for on-the-ground implementation. From the assessment and studies, adaptation options were identified and implemented in partnership with the LGUs and the communities.

Follow-through activities included: workshops with local legislators, planners, mayors, and barangay captains; the enactment of local legislation to fill policy gaps; bio-physical measures such as the establishment of marine protected areas (MPAs) and the rehabilitation of mangrove areas; enabling an efficient weather data management and communications protocol; starting up of climate-resilient livelihoods; and building linkages and partnerships with national and local government agencies, private, and civil society sector groups.

The project activities aimed to yield, in the medium- and long-term, concrete impacts on the ground. These include the protection of sandy beaches from coastal erosion, the stabilization of the shorelines, the enhancement of the reef areas and an increase in fishery productivity, and disaster preparedness.

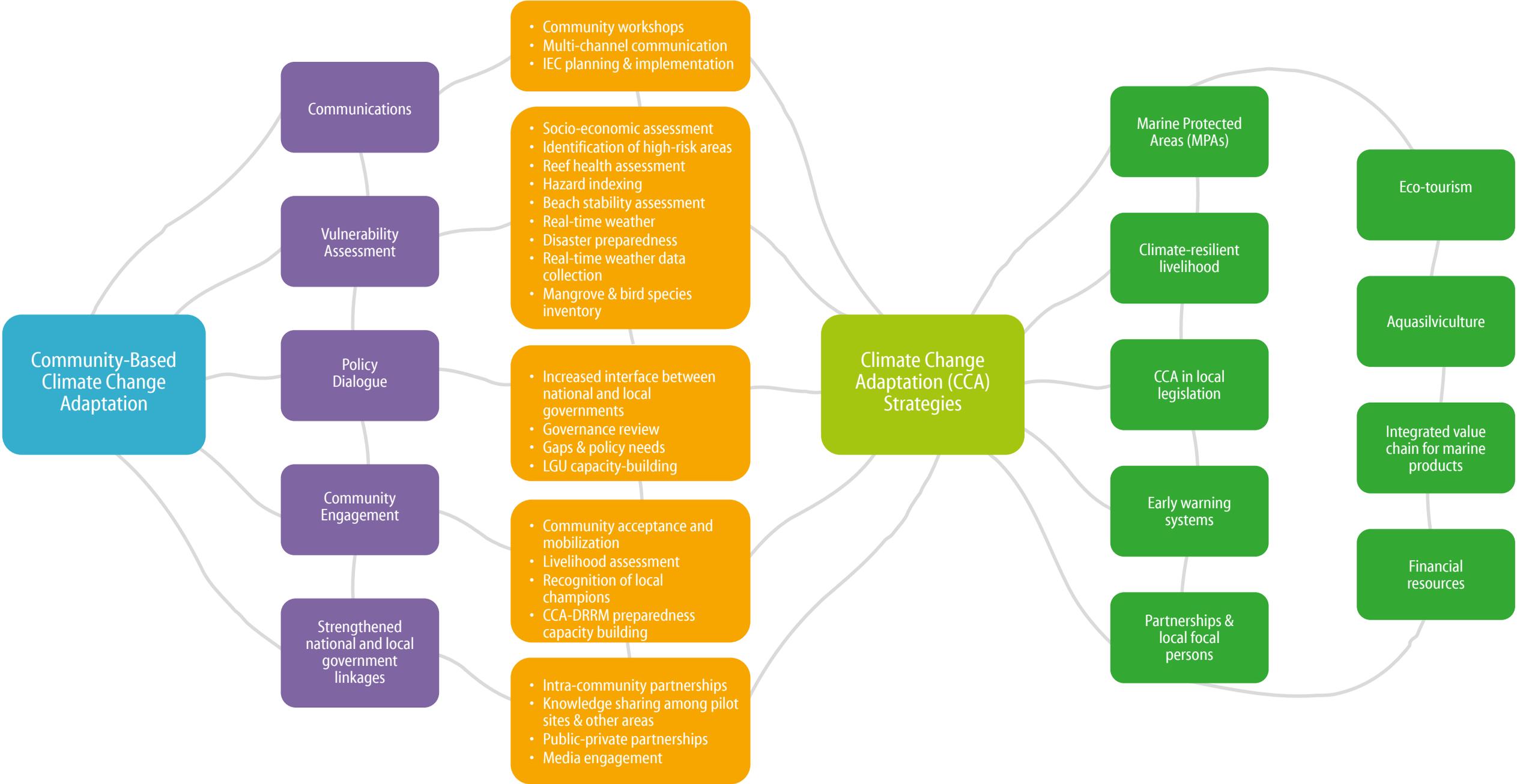
<sup>13</sup> Maya Villaluz, "Climate Change Adaptation: Community-based Approach Project," 2008, internal document.

Map 2.1: Location of Project Sites



Image taken from the Department of Agriculture website (<http://www.da.gov.ph>). Inset: Bicol's location in the Philippine map. Map taken from <http://islands.philippinemaps.ph>

**Diagram 2.1: Climate Change Adaptation Framework**



## 2.4 Selection of project sites

The Project adopted a multi-layered process in selecting the pilot sites. Masbate and Sorsogon provinces in the Bicol Region were pre-selected from a list of 10 provinces in the country considered most vulnerable to climate change (Diagram 2.2) The two provinces are the entry point of 30 percent of the typhoons that enter the country's area of responsibility each year. National poverty indices ranked the two consistently among the country's poorest (Table 2.1).

The most vulnerable municipalities from the two provinces, Gubat, Matnog, and Prieto Diaz in Sorsogon; and Monreal and Batuan in Masbate were subsequently selected through a comparative review of their geo-physical characteristics and socio-economic data. Matnog, Prieto Diaz, and Gubat are low-lying coastal towns and the latter two are situated on the eastern seaboard. Hence, they directly bear the brunt of strong winds and waves. Although not directly in typhoons' path, Monreal and Batuan are part of the small low-lying island of Ticao, which is at a high risk of inundation from potential sea-level rise.

In addition to the sites' physical vulnerability, the Project planners added a second criterion to their final choice of pilot municipalities: the presence of significant areas of sea grass, mangroves, and coral reefs (Box 2.2, page 8). Analysis of the cost-and-benefit of hard engineering structures and of healthy coastal ecosystems (coral reefs, sea grass, mangroves) undertaken by the University of the Philippines-Marine Environment and Resources Foundation, Inc. (UP-MERF), the agency engaged by the Project to undertake the scientific studies, indicated that the soft engineering response to the risks of sea-level rise, storm surge and flooding is generally more cost-effective and sustainable than sea walls or hard engineering. Other than providing a natural barrier to the potential adverse impacts of climate change by dissipating wave energy reaching the coast, the protection of coral reefs, sea grass beds, mangrove and beach forests contribute to biodiversity conservation and poverty reduction in coastal communities.

The assessments showed that though Prieto Diaz is more vulnerable to typhoon hazards due to its location and geography, Gubat had more areas and populations exposed to potential sea-level rise, flooding, and storm surge; based on consultation with provincial leaders, the latter was prioritized. of LGU executives to participate proved to be a critical factor in the implementation of adaptation measures (Chapter 4).

Caramoan in Camarines Sur, joined the project as a replication site after a year when the framework developed in Sorsogon and Masbate proved to be trailblazer in their local development planning process. One of the recipients of a World Bank-assisted riverbank protection project, Caramoan's mayor and local government officials signified their willingness to participate in the project in the hope of finding a solution to the devastating floods that repeatedly submerge the town center for several days at a time. Biodiversity-rich Caramoan is at risk of human-induced hazards from unplanned development; it is fast developing as a popular tourism destination but its tourism infrastructure has yet to be put in place. Moreover, the Caramoan LGU has yet to formulate its comprehensive land use plan.

Table 2.1 Profile of Project Sites

PROJECT SITES	CATEGORY	LAND AREA (HA)	BARANGAYS			POPULATION*
			TOTAL	COASTAL	% OF TOTAL	
Gubat, Sorsogon	2 <sup>nd</sup> class <sup>14</sup>	13,451	42	12	29%	55,501
Batuan, Masbate	5 <sup>th</sup> class	5,341	14	9	64%	12,585
Caramoan, Camarines Sur	2 <sup>nd</sup> class	27,741	49	19	39%	40,810

\*2007 NSO Census of Population

## 2.5 The project stakeholders

**National Government Agencies (NGAs).** The Project sought to engage agencies of the national government whose mandate and programming directly impact the country's coastal zones and communities, by supporting measures to enhance their institutional capacity and programming. The Project financed national seminars on climate change adaptation initiated by the DENR, the agency tasked to protect and manage the country's mangrove forests. Educational videos on climate change produced by the Project were shared with the agency. The Project also supported a national consultation of the Bureau of Fisheries and Aquatic Resources (BFAR), the agency tasked to manage and develop the country's fishery and aquatic resources. It was the first time in 10 years that the BFAR had conducted such an activity. The Project linked up the agency with the LGUs in the project site to address the latter's need for climate resilient livelihood technologies.

The Project also mobilized expert services to support the newly set-up office of the Climate Change Commission. Working closely with the Commission, the Project's Climate Change Adaptation consultant formulated a "Guide to Local Adaptation Planning", which seeks to inform LGUs of their options to mainstream climate change adaptation in their development planning.<sup>15</sup> A communication and knowledge management specialist was brought in to assist the Commission in crafting an integrated communication strategy to promote appropriate adaptation practices and to effect behavioral change at national and local levels.

The assistance of the military was sought for patrolling the sanctuaries, especially when the LGU did not have enough resources to carry these out. Toward the end of the Project, partnerships with other organizations were established.

**Local Government Units (LGUs).** The Project recognized the key role of LGUs—local governments at the provincial, municipal and barangay levels—in initiating adaptation measures on the

<sup>14</sup>Municipalities are classified according to average annual income. According to the National Statistical Coordination Board (NSCB): first-class municipalities have an annual income of at least Php55 million (USD1.32 million); second-class municipalities have an annual income of at least Php45 million (USD1.08 million) but less than Php55 million; third-class municipalities have an annual income of at least Php35 million (USD800,000) but less than Php45 million; fourth-class municipalities have an annual income of at least Php25 million (USD600,000) but less than Php35 million; fifth-class municipalities have an annual income of at least Php15 million (USD350,000) but less than Php25 million; sixth-class municipalities have an annual income of less than Php15 million.

<sup>15</sup>Noela Lasmarias, "Enabling Local Actions on Climate Change: A Guide to Local Adaptation Planning." The full report is available at WBOM.

ground, in the communities where the adverse impacts of climate change and natural disasters are likely to be most felt. The LGUs have to be equipped with the knowledge, the skills, and the resources to enable them to prevent climate risks from becoming disasters.

The Climate Change Act mandates provincial LGUs to “provide technical assistance, enforcement and information management in support of municipal and city action plans” (Sec 13). The governors’ endorsement of the Project was sought to ensure cooperation and participation of the mayors; selection of project sites was done in consultation with each site’s respective governor. The Project also sought to review the development policies and programs of the Provincial Government, as these affect the development plans and programs of the municipal LGUs.

The mayor, as the local chief executive, together with the *Sangguniang Bayan* or the Municipal Council, has the power to allocate and direct the use the resources and machinery of the LGU for adaptation measures. Similarly, the *barangay* captain, with his or her Barangay Council, has the power to initiate and implement actions at the community level. Their leadership is a key variable in the successful implementation of adaptation measures.

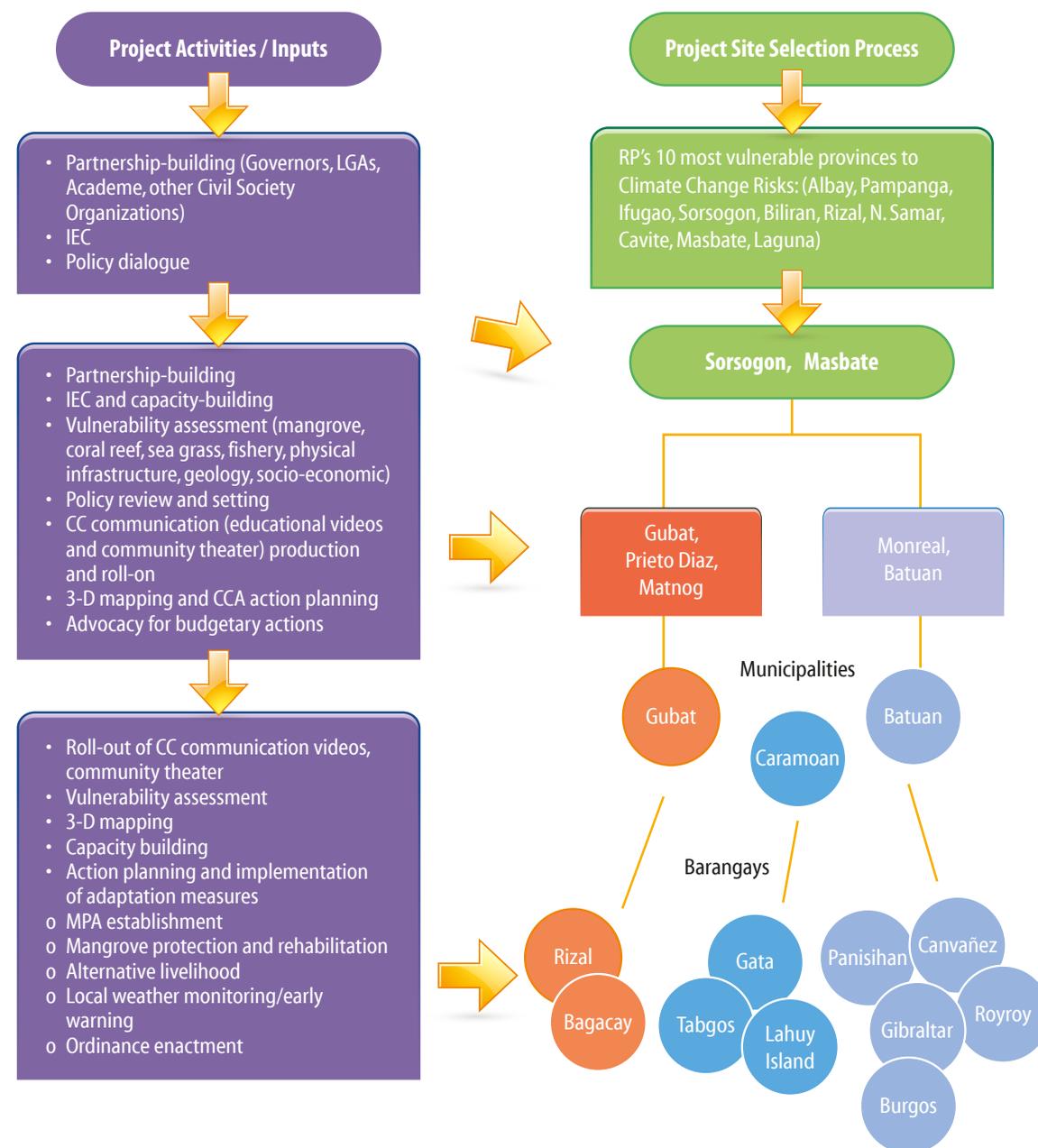
**Pilot communities.** Those communities assessed by the Project to be most vulnerable to climate and disaster risks were engaged and became partners in project implementation. In communities where functioning peoples’ organizations (POs) such as Fisheries and Aquatic Resources Management Councils (FARMCs)<sup>16</sup> or multi-purpose cooperatives existed, partnerships were strengthened through the capacity building initiatives and awareness raising efforts on climate change adaptation. Where POs are non-existent, communities were organized to implement and manage the chosen adaptation measures.

**Private sector.** National and local media networks and individuals were key partners in communicating and “popularizing” climate change. In Chapter 4, media’s role, particularly that of television, in initiating adaptation measures is described. Local educational institutions, individual academics, and researchers were also engaged to provide expertise and support in implementing project activities. Partner communities were also linked with these resource institutions.

The support and participation of civil society leaders, such as local church groups and private individuals held in esteem in the community, were also sought especially in information dissemination.

<sup>16</sup> Executive Order 240, s. 1995 mandated the organization of FARMCs in barangays, municipalities and cities abutting municipal waters to institutionalize the role of local fisherfolk and other resources users in the community-based planning and implementation of policies and programs for the management, conservation, development, and protection of aquatic and fishery resources. They recommend the aquatic and fishery resource management policies and plans for integration into the local development plans and they can be deputized as fish wardens, among others.

**Diagram 2.2 Pilot Site Selection Process and Project Activities at Different LGU Levels**



## 2.6 Project implementation mechanism

Internationally renowned experts such as the Marine Environment and Resources Foundation, Inc.,(MERF), attached to the University of the Philippines Marine Science Institute (UP-MSI), and individual Filipino specialists rendered their knowledge in carrying out the policy review, vulnerability assessment, other scientific studies, social engagement and mobilization of the pilot LGUs and communities, value chain modeling and capacity building (Table 2.2).

Also engaged were advocacy and media groups such as the media network Net 25, to feature the project sites and activities in the network's news and travel shows; and the environmental advocacy group Wild Bird Club, to undertake rapid inventory and photo documentation of birds in mangroves in the project sites.

The Project was implemented over a period of three years, beginning the last quarter of 2008 and ending in September 2011. To date, the policy dialogue in these areas continue.

**Table 2.2. Community-Based Climate Change Adaptation Project Activities**

Project Activities	Project Sites		
	Gubat	Batuan	Caramoan
1. Vulnerability assessment	X	X	X
2. Installation of local weather monitoring system and training of operators	X	X	X
3. Policy review	X	X	X
4. Communicating CC impacts and risks	X	X	X
5. Capacity building of project stakeholders			
3-D Mapping	X	X	X
Marine Protected Area	X	X	X
Mangrove Protection and Rehabilitation	X	X	X
Climate-resilient community enterprise	X	X	X
6. Implementation of adaptation measures	X	X	X
7. Partnership building and networking	X	X	X

## Chapter 3

# Mobilizing Stakeholders for Adaptation

Chapter 3 provides an overview of the in-situ scientific studies and assessments that were carried out to generate information that guided the identification of biophysical adaptation measures. It also describes the strategies and processes employed by the facilitating agencies in preparing and mobilizing the communities to adopt the measures.

### 3.1 Generating science-based information for adaptation planning and decision-making

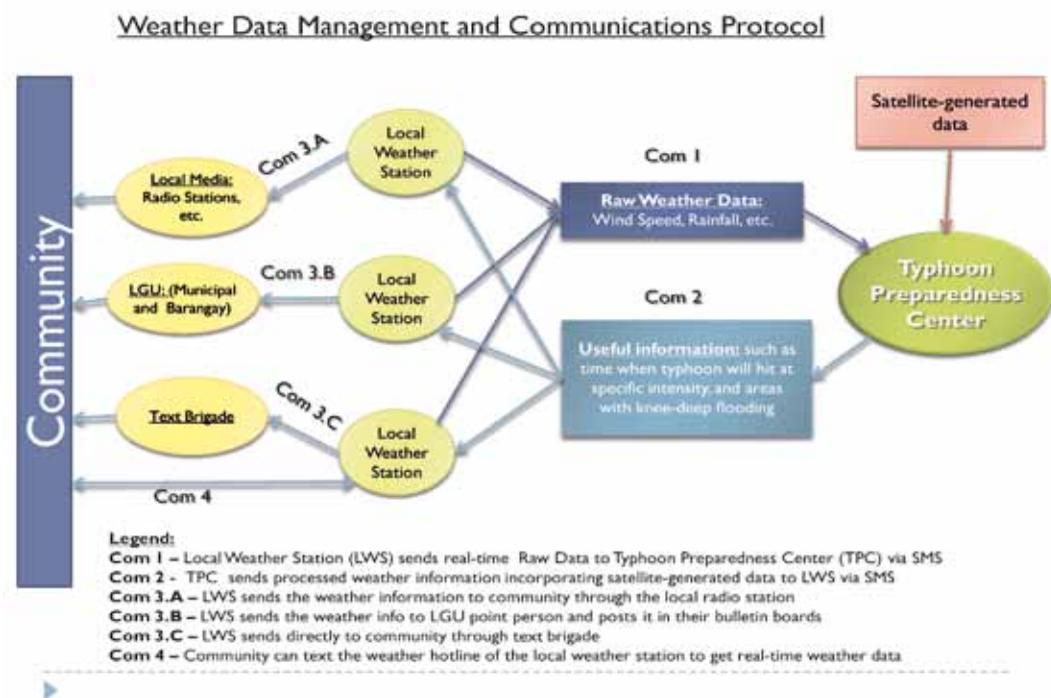
The Project, which generated science-based information to guide the LGUs and pilot communities of Gubat, Batuan, and Caramoan in identifying and deciding on their adaptation options, was considered groundbreaking. Various scientific studies were carried out in the project sites and are discussed briefly in this chapter and in detail in Chapter 4. In Gubat, a review of relevant local policies on land use, physical framework plans, among others, was also undertaken.

**Vulnerability Assessment and other studies.** In-situ vulnerability assessment was carried out in the different sites; the process and results are discussed in Chapter 4. The assessment results informed the choice of communities where pilot adaptation measures were undertaken; policy advice to the municipal LGU on climate proofing of physical infrastructure; and options for coastal protection.

**(Real-time) Local Weather Monitoring.** To assist the pilot LGUs in preparing their communities for typhoon and other extreme weather events, a stand-alone weather monitoring system, developed by Professor C.P. David of the UP National Institute for Geological Science (UP-NIGS), was installed in each of the project sites<sup>17</sup>. The system tracked wind direction and velocity, and measured amount of rainfall, in real time. A communication protocol illustrated in Diagram 3.1 was designed but variations in implementation and outcome were made on site, as described in Chapter 4.

<sup>17</sup> This system was also installed in the coastal municipalities of Bantayan and Sta. Fe in Cebu province. Due to logistical constraints, Project activities in these two sites were suspended in the 1st half of 2011.

Diagram 3.1



**Participatory 3-Dimensional Modeling (P3DM).** P3DM is a tool used to help stakeholders better understand the physical and biological characteristics of their communities, and how climate change impacts their livelihood and living conditions. It involves consultations with stakeholders, which feed into a 3D map that can be used in planning and monitoring DRR, and CCA strategies. These stand-alone scaled relief maps are overlapped on geographical information obtained from the National Mapping and Resource Information Authority (NAMRIA), and the Mines and Geosciences Bureau (MGB). The 3D maps include information on *barangay* location and boundaries, resource use, location and extent of flood-prone and landslide areas. It is made accessible to the public, allowing them to better appreciate and interpret geo-referenced information. LGU leaders and community representatives from the 42 *barangays* of Gubat and 14 *barangays* of Batuan went through the P3DM and an action planning workshop. Each *barangay* presented a draft climate adaptation plan. Of these, two *barangays* in Gubat and five in Batuan proceeded to implement some of their plans with LGU and Project support (see Chapter 4).

Some staff members of the Offices of the Municipal Engineer and Planning and Development Coordination of the LGUs were trained on the use of the **Geographic Information System**, providing them with the skills to locate the geographic positions of important landmarks that were used as geo-referencing positions for the 3D model.

## 3.2 Social Engagement

### Communicating climate risks

**The challenge.** Results of the vulnerability assessments were communicated to the project stakeholders to increase their awareness of climate change and its impacts; and facilitate the adoption of recommended adaptation measures. A four-day P3DM-cum-adaptation planning workshop (Appendix 3.1) was held, participated in by LGU and LGA municipal officials, *barangay* captains, and community representatives. During the adaptation planning session, the facilitator found that the participants' levels of awareness and understanding of climate change ranged from zero to minimal, making their identification of appropriate adaptation strategies difficult.<sup>18</sup> It was decided that the knowledge gap had to be addressed before proceeding with planned follow-through activities. A complementary Climate Change Communication Project was created focused on the implementation of Communications Strategy for the Project.

The communication project approved had three components: (i) a survey of the target audience to determine their profile, level of awareness of CC, medium of communication frequently used, and issues they were most concerned with; (ii) development and production of communication tools based on the survey results; and (iii) roll-out of the tools in the project sites. A communication consultant helped design and implement the survey and develop the communication package. The communication survey was carried out in Gubat and Batuan in the first half of 2009.

**Grounding the strategies and tools.** The communication survey found that radio and television were the main sources of information in these *barangays*; hence, the communication strategy involved the development of visual and audio presentations. The survey results also revealed that economic concerns were prioritized over environmental issues. Therefore, the messages had to be linked to the people's economic activities, i.e., the impact of climate change and how it will affect their livelihood and related activities.

Various communication materials (Table 3.1) and tools were produced and rolled out in the project sites and subsequently produced for mass distribution at relevant national forums.

To introduce basic climate change concepts, the video documentary, *Panahon Na (It's Time)!* was produced. *Panahon Na*, with narrations in English and Filipino by known and respected national actors, tackled the causes and impacts of changing climate and the important role of each person to address it now. The video was done in the local dialects, *Bicolano* and its variants, e.g., *Gubatnon*. The local version featured respected informal leaders such as a parish priest, pastor, and school principal talking about their observations of changes in the local climate over time and evidence of local impacts. The videos were shown in schools and *barangay* assemblies. To enhance recall of key concepts and messages, a quiz show on the video followed each showing. Prizes were awarded to those who gave correct answers.

<sup>18</sup> PFEC, "Reflections on the Implementation of the World Bank Climate Change Communication Project," 2010, internal project document.

Community theaters are popular avenues to convey messages on social issues in the Philippines. *Teatro Gubat* was organized as a medium to raise stakeholders' awareness of climate change. Children of fishing families, including some parents, auditioned to be included in the community theater. A local director was engaged to train and direct the actors. The group performed in big public gatherings in Gubat, Sorsogon City, Legaspi City and Caramoan. The actors dramatized how the destruction of coral reefs and mangroves had affected their families and how their situation could worsen unless everyone did his or her share to protect the coral reefs and fish sanctuaries.

Table 3.1 Climate Change Communication Tools Produced and Rolled-Out in Project Sites*		
Communication tools	Content/Messages	Audience
<b>Educational videos</b>		
<b><i>Panahon Na! Ang Pinoy at ang Hamon ng Climate Change</i></b> <b>[It's Time! The Filipino and the Challenge of Climate Change]</b>	<ul style="list-style-type: none"> <li>Present the signs of climate change globally and nationally, its causes, and effects. The Philippines is now feeling the adverse impacts of climate change—extreme weather conditions, warmer temperatures. The impacts can worsen but we must prepare and do something to reduce these.</li> </ul>	<ul style="list-style-type: none"> <li>Uploaded in YouTube</li> <li>At least 40 movie theaters nationwide</li> <li>Barangay LGU leaders and community members</li> </ul>
<b><i>Sangtawaryo [Sanctuary]</i></b>	<ul style="list-style-type: none"> <li>A short film in Filipino dramatizing the effects of dynamite or blast fishing on marine life and the lives of fisherfolk practicing it.</li> </ul>	<ul style="list-style-type: none"> <li>Shown in <i>barangay</i> assemblies and schools</li> </ul>
<b><i>Sa Pagbag'o San Panahon</i></b> <b>(Localized version of <i>Panahon Na!</i> done for Gubat and Batuan)</b>	<ul style="list-style-type: none"> <li>Community members, including authority figures and highly regarded individuals, present evidence of climate change and impacts in their communities, e.g. receding shoreline, changing weather patterns, houses washed out by strong winds and waves, etc.</li> </ul>	<ul style="list-style-type: none"> <li>National conferences, exhibits</li> </ul>
<b><i>Pag mangno</i></b>	<ul style="list-style-type: none"> <li>A play depicting local climate change impacts. It features children of fisherfolk in pilot project sites in Gubat. Delivered in the local dialect.</li> </ul>	<ul style="list-style-type: none"> <li>Shown regularly on a local cable network in Gubat and Legaspi</li> </ul>
<b>Videos of coral reefs in Gubat and Batuan</b>	<ul style="list-style-type: none"> <li>The state of the coral reefs in the project sites were captured on video and shown alongside the protected reefs of Anilao, Batangas.</li> </ul>	<ul style="list-style-type: none"> <li>Shown during MPA orientation workshops</li> </ul>
<b>Footprints (featuring Gubat, Caramoan, Bantayan and Santa Fe)</b>	<ul style="list-style-type: none"> <li>Features interviews of CCA project stakeholders on possible climate change scenarios; the impacts on the pilot communities; and potential (and actual) bio-physical adaptation measures planned and being implemented.</li> </ul>	<ul style="list-style-type: none"> <li>Shown on national television program, <i>Footprints</i>, Net 25 Channel, continuous reruns</li> </ul>
<b>Community theater</b> <b><i>Ang Sugo</i></b>	<ul style="list-style-type: none"> <li>Features trained local artists and children of local fisherfolk, acting out the adverse effects of climate change on the coastal environment, their parents' livelihood, and on their future.</li> </ul>	<ul style="list-style-type: none"> <li>Staged in Gubat, Batuan and Caramoan</li> </ul>

\**Panahon Na!* was produced by the Presidential Task Force on Climate Change; *Sangtawaryo* by the Law of Nature Foundation, et. al., *Footprints* by Net 25 and the rest by the CCA Project.

## Capacity-building approach

Capacity-building (Cap B) was integrated into all Project activities. This approach is captured by the upward arrow on the box. The target stakeholder groups were first given orientations and lectures on the ecosystem. These were followed by field trips to different ecosystems where they learned practical skills such as identifying mangrove species and their habitat, and how to bag propagules. Videos of coral reefs in their community were shown alongside healthier reefs elsewhere to help them visualize the effects of climate change on marine life.

The LGU engaged the services of local scientists, technical experts, and practitioners from various disciplines and from different parts of the country to provide the necessary inputs for this undertaking.

## Immersion of community organizers (COs)

Because of the key stakeholders' general lack of awareness and very limited knowledge of climate change issues, two community organizers (CO) were tapped, one each for Gubat and Batuan, at the start of the Project. The COs were simultaneously deployed in the pilot sites for three months starting February 2010. They were tasked to get acquainted with the communities; know the formal and informal leaders; and introduce the Project. The CO was the face of the Project in the area. This immersion enabled him/her to identify key personalities who can be engaged and mobilized to help in the implementation of Project activities. The CO prepared the groundwork for the implementation of project activities. The frequent interaction with community leaders and members and the municipal LGU focal person enabled early identification of operational issues.

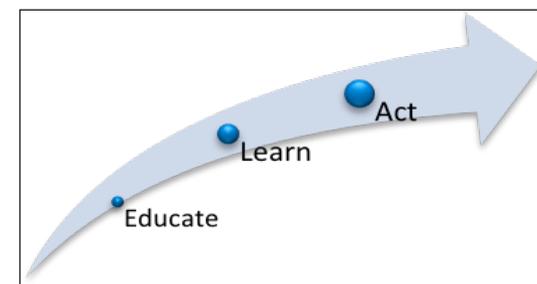


Diagram 3.2 The Community Organizing Experience

After the immersion period, the CO made intermittent visits to the site usually once or twice a month, or as required.

## Engaging focal persons and potential champions

Mayors should champion climate change adaptation for it to be institutionalized, given that they play an important role in policy formulation, institutional reform, and LGU resource mobilization (*Chapter 6, Box 6a: A Tale of Two Mayors*). It is practical and necessary to identify and engage a focal point in the LGU who has the mayor's ears, and can make himself or herself accessible to the Project. For the three project sites, the mayor designated focal persons to coordinate with the Project—the municipal engineers in Gubat and Batuan; and the coordinator of the Coastal Resource Management Office (CRMO) in Caramoan. Barangay captains play an equally critical role in ensuring the success of adaptation measures in the communities (*Box 4.3: La Kapitana*). Community leaders can also assume this role. For instance, in the pilot barangay of Rizal in

Gubat, an informal leader assumed this role in the face of a non-cooperating Barangay LGU (*Box 4.1: Overcoming Apathy and Opposition in Bgy Rizal*). These champions contributed to the overall success of the Project.

### 3.3 Toward an ecosystem-based approach to adaptation

#### MPA establishment

Scientific studies done by the academe on Gubat, discussed in detail in Chapter 4, established that coastal erosion occurred in channels or in gaps between reefs. The in-situ assessment finding was affirmed by the results of the wave modeling that was carried out, showing that wave energy reached the coast in areas where there were no reefs blocking incoming waves. Based on these findings, the Project promoted protection of coral reefs and sea grass beds through the establishment of marine protected areas (MPA); enhancement of protection efforts where these already existed; and stricter enforcement of the provisions of the Fishery Act banning destructive fishing practices.

Prior to the establishment of an MPA, key stakeholders attended an orientation session from the provincial office of the Department of Agriculture and founders of successful MPAs in other areas. Rapid underwater assessment of existing (to verify their viability) and potential new sites for MPAs was carried out by a team of divers comprising local fisherfolk guides, LGU leaders, key staff of the Offices of the Municipal Agriculturist and the Provincial Agriculturist. Key community stakeholders decided on the location and size of the MPA/s to be declared protected.

#### Mangrove rehabilitation and protection

Among the major marine ecosystems in the Philippines, including coral reefs and sea grass beds, mangroves have suffered the earliest and greatest degradation because of their relative accessibility and a long history of conversion into aquaculture ponds.<sup>19</sup> Despite the mangrove cutting ban, people continue with the practice, using this as fuel wood since the cost of liquefied petroleum gas is beyond reach and traditional fuel wood sources such as coconut husks are being depleted by competing commercial users. Apparently, people would rather satisfy their immediate economic needs over the benefits of preserving mangroves, which serve as a habitat for fish and other marine life and acts as a buffer against storm surges and strong winds. To protect remaining mangroves and rehabilitate abandoned (aquaculture ponds) or degraded ones, mangrove areas were mapped in the three sites to establish the actual cover and ascertain the ecosystem's health, so that appropriate measures can be planned and implemented. Comprehensive maps of mangroves areas overlaid with hazard maps should inform decisions on prioritization of areas for rehabilitation, or to strengthen protection efforts.

To establish biodiversity in the area, an inventory and documentation of mangrove species in each project site was carried out. The inventory results could be used in the production of

<sup>19</sup> J Primavera, "Development and Conservation of Philippine Mangroves: Institutional Issues," *Ecological Economics* 35 (2000) 91-106

IEC materials and would give project stakeholders and local community members a better appreciation of what they are protecting. In Caramoan, where illegal cutting is a concern for law enforcers, species identification and photo documentation would help enforcers counter violators' common alibi that the wood they cut are not from mangroves.

#### Birds in mangrove areas inventory in support of habitat protection

An inventory of birds in mangroves, the first to be done in the project sites, was done by the Wild Bird Club of the Philippines. The Wild Bird Club is an environmental advocacy group promoting protection of bird habitats. The Club did an inventory and photo documentation of various species of resident birds in the sites. They also taught community leaders how to identify birds through bird sounds. The inventory and photo documentation will be an added input for IEC initiatives of the LGUs and the Protected Area Management Board (PAMB) of the Bongsanglay Nature Reserve in Batuan, and a possible baseline indicator for assessing the health of the mangroves over the long term. Since the organization promotes bird watching, it could enhance the site's tourism potential and generate employment opportunities. This could be encouraged by posting photos of these birds online.

### 3.4 Toward building climate-resilient livelihoods

Poor fishing families living within 500 meters from the shoreline are most vulnerable to the adverse effects of climate change, according to social assessments carried out by the Project in pilot sites. This group lacks or has very limited access to productive assets such as motorized fishing boats and other livelihood sources. In the event of natural disasters, which are expected to intensify due to climate change, their ability to cope will be further tested.

Through the Project, people received product and market information on how to diversify their livelihood. The Project equipped them with new skills, and provided start-up funds that were leveraged to secure counterpart funding from the municipal LGUs and other sources.

Management teams organized to oversee the MPAs, comprising mainly artisanal fishers, were initially targeted to take part in the livelihood projects. Because protection activities take away time from fishing and other productive endeavors, a livelihood support component was added to enhance and sustain protection efforts. As the management teams gain legal standing (becoming associations and cooperatives) and the enterprise starts to take off, more community members are expected to join the PO.

**Sea cucumber ranching** was introduced in Gubat and group marketing of seaweed started in Gubat and Caramoan toward the end of the Project. In the future, the LGU expects to find ways to address climate-related variables affecting aqua- and marine-based livelihoods, including seaweed growing.

**BFAR Engaging LGUs.** Discussions initiated by the Bureau of Fisheries and Aquatic Resources (BFAR), the government agency mandated to develop, improve, manage, and conserve the

country's fishery and aquatic resources with the LGUs further enhanced the interests of the villagers to engage in climate resilient livelihoods. BFAR has been developing aquasilviculture, an environment friendly mangrove aquaculture system promoting the harmonious co-existence between fishery species and mangrove trees in a semi-enclosed system<sup>20</sup>. Thus far, municipal LGUs brought 12-15 each of their barangay LGUs and PO leaders to BFAR's National Brackishwater Fisheries Technology Center in Pagbilao Island to train on aquasilviculture technology. Pilot LGUs hope to adopt the technology learned from this session.

**Value chain study for seaweed.** Fishing families in Gubat and Caramoan farm seaweed to augment their income. However, seaweed production has been affected by a disease caused by toxic substances from fishponds (in Gubat) and by the warming of the waters. This has depressed farm gate prices and has prevented growers from optimizing their returns. In response, the Project initiated a value chain study to provide the LGUs and the communities with options to optimize the value of seaweed. To ensure the sustainability of seaweed growing as an enterprise, however, the LGU recognizes it has to provide greater support to the farmers in the form of technical training, marketing support, and possibly, financial assistance. Partnerships with the private sector and trade groups will be needed to build the market for seaweed, as well as establish the supply chain. The national government will also have to play its part in developing the market for seaweed and in providing the infrastructure for the development of the industry.

<sup>20</sup> <http://www.da.bfar.gov.ph>

## Chapter 4

# Climate Change Adaptation Initiatives

Chapter 4 describes the Project inputs and the adaptation measures initiated at each site. It describes the strategies and processes adopted by the facilitating agencies, given each site's socio-economic and political context, and the disaster and climate risks faced. It highlights the catalyzing role of different project stakeholders in achieving early gains.

## 4.1 Gubat, Sorsogon

### The Local Context

#### Socio-economic

Gubat is a second-class municipality with a population of 55,501 as of 2007. Rice farming, copra production, and fishing are the primary livelihoods of most of its population and the biggest contributors to its economy.

The town has a nascent tourism industry, with a long stretch of its coastline dotted with resorts and the white sandy beaches. The village of Rizal is a popular local destination. In 2006, an expedition of international astronomers observed the transit of Mercury at the beach.

Gubat is linked to regional market centers—the cities of Sorsogon, Legaspi, and Naga—by concrete road networks. From Manila, it is a 12-hour bus ride away and less than an hour by plane to the nearest airport in the town of Pili.

Gubat is comprised of 42 villages, 12 of them along the coasts. At the time of the Project, 243 artisanal fishers lived in the coastal villages. About 32 percent of them were fulltime fisherfolk; the others had second livelihood sources (farming in the uplands, occasional odd jobs as carpenters,



Artisanal fishers in Bagacay Village preparing to go fishing; behind them is a damaged part of the seawall / Photo by MERF-UP-MSI

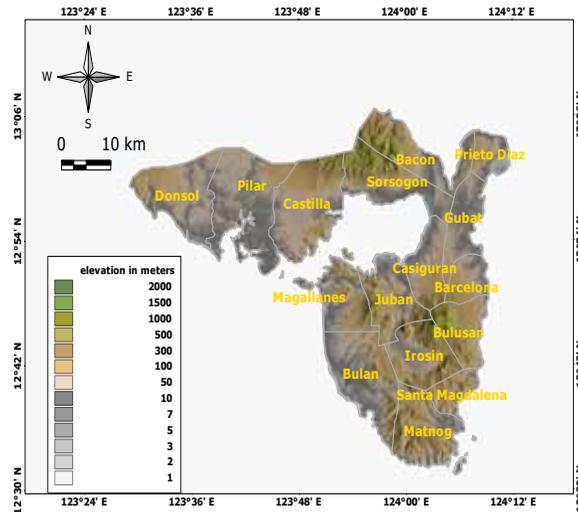
mechanics, etc.) Second income sources have increasingly been necessary because of declining fish catch and the rising cost of fishing, as fishers need to go farther offshore to find fish. Most of them have no access to motorized boats. Some families have turned to seaweed farming to augment their incomes.

The fishing grounds include sea grass and coral reefs as well as the open sea.

### Climate and Disaster Risks

Located on the eastern side of Sorsogon province facing the Pacific Ocean, Gubat is directly in the path of typhoons. It has an average coastal elevation of no higher than 10 meters above sea level (Map 2), which makes it susceptible to storm surges.

According to a marine geological study, Gubat has lost about 70 meters of its shore land to erosion over the past 50 years (Table 4.1a). Local leaders have noted the gradual disappearance of a resort built a decade ago by the Philippine Tourism Authority on the coast of one of the villages, which provides concrete evidence that the coastline is receding.



Map 4.1 Coastal elevation of Gubat and other municipalities of Sorsogon /Map by MERF/UPMSI

Table 4.1a Key Findings from the Scientific Studies on Gubat, Sorsogon, 2008.		
Studies Done	Parameters	Findings
Marine Geology	Coastal topology (SRTM-based digital elevation model)	<ul style="list-style-type: none"> <li>Low-lying Gubat is one of two coastal municipalities in Sorsogon facing the Pacific Ocean.</li> </ul>
	Shoreline change (beach erosion, etc.)	<ul style="list-style-type: none"> <li>In the past 50 years, 70 meters of its shore land was lost to erosion that could be attributed to shifts in position of the river mouth and resulting reduction in supply of sediments.</li> <li>Between 1999 and 2004, erosion pushed the shoreline landward from its position in the 1950s.</li> <li>Erosion is slower where there are wide reefs, which is consistent with results of wave modeling.</li> </ul>

Continued on next page

Continued from page 26

Table 4.1a Key Findings from the Scientific Studies on Gubat, Sorsogon, 2008.		
Studies Done	Parameters	Findings
Wave modeling	Wave energy Wave height	<ul style="list-style-type: none"> <li>Wave energy propagation reaches the coast in areas where there are no reefs to block incoming waves.</li> <li>Wave modeling results are corroborated by in-situ assessment in Rizal and Bagacay, where eroded coasts are located in areas without reefs or in gaps between reefs.</li> </ul>
Engineering	Geological and hydro-meteorological data Location	<ul style="list-style-type: none"> <li>The design of an existing seawall in Bagacay cannot withstand abrasive action of waves. Both ends of the seawall are collapsing.</li> </ul>

Source: Marine Environment and Resources Foundation, Inc., UP-MSI, "WB-NTF's Climate Change in Coastal Areas: A Community-based Adaptation Approach," Draft Final Report, December 31, 2008.

### Generating Science-Based Information for Adaptation Planning and Decision-Making

#### Vulnerability Assessment and Other Studies

**Most vulnerable communities.** In-situ vulnerability assessment was carried out in 2008 to establish which of Gubat's 12 coastal villages were at highest risk and to establish areas of engagement. Adopting the UNDP formula for risk, i.e., **Risk = Hazard x Exposure x Vulnerability**<sup>21</sup>, the villages of Bagacay and Rizal were found to rank highest in the risk index (Table 4.1b).

Bagacay, with a population of 3,181 in 2007, has a third of its population living within 500 meters of the shoreline. In Rizal, one-fifth of the population is similarly situated. Villagers living directly behind the seawall were found to be at highest risk. Most of them were fisherfolk whose houses would not withstand strong typhoons (see photos on next page), with or without climate change. Found to be at high risk of flooding, in addition to the fishing village, were the elementary school, the village hall, and the health center in Bagacay, which were situated a few meters from the seawall.

The state of physical infrastructure in Bacagay and Rizal also posed potential hazards (Table 4.1c). The main roads and public buildings lacked drainage that worsened the extent and magnitude of rain-induced flooding. The studies concluded that, given the projected increase in frequency and intensity of typhoons, inaction would exacerbate flooding in these communities.

<sup>21</sup> "Hazards" (H) are either the effects of climate change (e.g., flooding or landslides) or the loss of nature's protective ways because of how the community has altered its environment (e.g., erosion, the destruction of mangroves and coral reefs). "Exposure" (E) means the extent to which a community is exposed to hazards. Meanwhile, "Vulnerability" (V) is determined by a community's ecosystem, physical features, and population.



Fisherfolk's houses situated behind the seawall in Bagacay (left). Typhoon-damaged houses (right). The municipal government of Gubat has established an evacuation center on higher ground to shelter affected families. / Photos by UP-MSI.

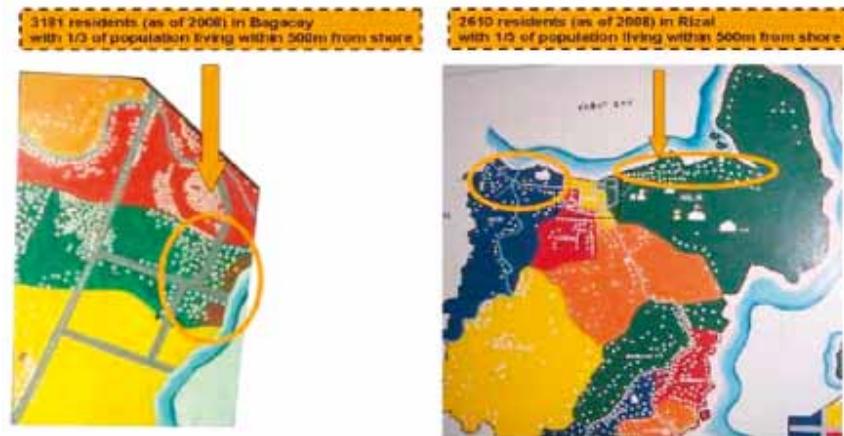


Figure B6. Density and distribution of the population of barangay Bagacay (left) and Rizal (right), respectively.

Density and distribution of the population of the villages of Bagacay (left) and Rizal (right), respectively. Source: WB-NTF CCA Project/UP-MSI

**Table 4.1b MERF/UP-MSI In-Situ Vulnerability Assessment Findings and Recommendations for Bagacay and Rizal Villages in Gubat, Sorsogon, 2008**

Parameters	Findings		Key Recommendations
	Bagacay Village	Rizal Village	
<b>[H] Hazard/s</b> <b>(a) Typhoon</b> <b>(b) Low-lying</b>	<ul style="list-style-type: none"> <li>30% pass in the vicinity of Sorsogon</li> <li>Flooding by sea level rise</li> </ul>		<ul style="list-style-type: none"> <li>In a scenario of a 1-meter rise in sea level, hard engineering will cease to be a viable option if done in isolation with other measures.</li> <li>Relocation is perhaps the best strategy, in which people will build or establish settlements on higher ground.</li> </ul>
<b>[E] Exposure</b>	<ul style="list-style-type: none"> <li>Top two coastal villages with the highest percentages of population exposed to hazards</li> </ul>		
<b>[V] Vulnerability</b>	<ul style="list-style-type: none"> <li>1,060 residents, or 1/3 of population, live within 500 meters of the shoreline, many behind the seawall, are at risk from flooding and destruction of dwellings</li> </ul>	<ul style="list-style-type: none"> <li>520 residents, or 1/5 of its total population, mostly fisherfolk, live within 500 meters of the shoreline and are at risk of flooding and destruction of dwellings</li> </ul>	
<b>Risk Index = [H]x[E]x[V] *</b>	<ul style="list-style-type: none"> <li>Highest among the coastal villages</li> <li>Increasing wave height by 1-2 meters would have enormous consequences on wave energy reaching the coastline of Bagacay and Rizal. Areas that would be hit by stronger and more abrasive waves would be more extensive. In Bagacay, the length of coastline that would be battered by strong waves would exceed the length of the existing seawall.</li> <li>The present height of the seawall would not suffice to prevent water from reaching the fishing community behind it. The reefs would continue to give protection to Bagacay in this scenario, and strong waves would reach the coast only through the channels. In Rizal, high wave exposure was found near Gubat Village and significantly lower exposure was found near Rizal Beach.</li> </ul>		

Source: Culled from "Climate Change in Coastal Areas: A Community-Based Adaptation Approach," Draft Final Report, Marine Environment and Resources Foundation, Inc., UP-MSI, December 31, 2008.

**Table 4.1c Physical Assessment of Potential Hazards in the Villages of Bagacay and Rizal in Gubat**

Village	Population	Findings
<b>Bagacay</b>	3,181	<ul style="list-style-type: none"> <li>Most roads have no drainage.</li> <li>Some pathways have no viable access.</li> <li>Buildings have no drainage and insufficient support.</li> <li>Flooding was observed in certain areas.</li> <li>Erosion, collapse, and corrosion of parts of the seawall noted.</li> <li>Evidence of strong wave action observed in the southern end.</li> <li>Liquefaction is likely, prone to ground settlement</li> </ul>

Continued on next page

Continued from page 29

**Table 4.1c Physical Assessment of Potential Hazards in the Villages of Bagacay and Rizal in Gubat**

Village	Population	Findings
Rizal	2,610	<ul style="list-style-type: none"> <li>Because of its orientation, the village is exposed to storm surges.</li> <li>Major and minor roads and pathways are without drainage.</li> <li>Building structures such as the elementary school have insufficient roof anchorage.</li> <li>Seawall was observed to be eroding at the base.</li> <li>Liquefaction is likely.</li> <li>Part of upland areas are at risk of landslides (between Rizal and Nazareno villages).</li> <li>Coastal erosion is evident in the northern area.</li> </ul>

Source: Culled from various project documents.

**Table 4.1d Impacts of Climate Change on Most Vulnerable Sectors of Bagacay & Rizal**

Most vulnerable sectors	Bagacay	Rizal	Impact of climate change
<ul style="list-style-type: none"> <li>People living within 500 meters of the shoreline (mostly fisherfolk and dependents)</li> </ul>	1,060	522	<ul style="list-style-type: none"> <li>Destruction of private properties and other private assets by tidal surges and strong typhoons</li> <li>Destruction of public facilities</li> <li>Threat to lives</li> </ul>
<ul style="list-style-type: none"> <li>People who derive their livelihood from coastal resources (these include some who live inland and some who are not residents of Bagacay)</li> </ul>	250	250	<ul style="list-style-type: none"> <li>Disruption of normal/traditional fishing practices by weather disturbances, i.e., stronger typhoons</li> <li>Decrease in catch of some species</li> <li>Destruction of habitats like coral reefs, sea grass, and mangroves due to stronger wave action</li> <li>Lower productivity and incomes</li> </ul>
<ul style="list-style-type: none"> <li>People who depend on those who earn their livelihood from coastal resources</li> </ul>	2,000	2,000	<ul style="list-style-type: none"> <li>Less food and consumption of other basic social services, such as health and education</li> </ul>

Source: Culled from UP-MSI draft report

### (Real-Time) Local Weather Monitoring

In the early phase of the Project, a stand-alone local weather monitoring system capable of tracking wind direction, wind velocity, and rainfall was installed in the Bagacay village hall, a few meters away from the seawall. A trained staffer of the village council monitored the system. Thus far, tracking of wind direction and velocity has been found to be most useful in providing early warning and preparing flood-prone segments of the communities.

Gubat is a recipient of other donor-assisted projects (FAO, USAID). One project (FAO) installed rainfall gauges as part of the donor's initiatives to address climate change impact on agriculture; this rendered the rain gauge installed by the Project redundant.

### Participatory 3-Dimensional Modeling (P3DM): Merging Science and Indigenous Knowledge

The first major project stakeholder mobilization in Gubat was a four-day P3DM-cum-action planning workshop in early 2010. An NGO, Green Forum-Western Visayas, was tasked to run the workshop.

The P3DM involved two main activities: setting up or modeling of the shape map that workshop participants would work on; and production of the 3D map by the participants. At least three representatives of each of Gubat's 42 villages, representatives of the offices of the Municipal Engineer, Municipal Planning and Development Coordination, Municipal Agriculturist, the Municipal Council participated.

The shape map that was used by workshop participants to identify resources, uses, and hazards in their respective communities was based on maps obtained from the National Mapping and Resource Information Authority (NAMRIA), the Mines and Geosciences Bureau (MGB) and the municipal government. During the community mapping process, the community representatives—the formal and non-formal local leaders—checked the maps and pointed out rivers and creeks that have disappeared or have changed paths. Corrections were made accordingly in the map produced. During the identification of hazards, the mayor came to know that a fishpond had been built at the river mouth and was blocking the flow of water during heavy rains or typhoons, causing flooding in nearby communities. The mayor subsequently ordered the dismantling of the structure.

The P3DM generated for the LGU/LGA and communities a common information base on hazards in specific areas in the municipality and established their causes. It also provided a forum to discuss ways to prevent disasters.

**Box 4.2b: Gubat P3DM in Snapshots**



Resource persons helping Gubat LGU/LGA staff model the shape map for Gubat. The mayor at the time, now Congressman Deogracia Ramos (in white shirt), points to hazard areas.

Community representatives putting landmarks, identifying resource and uses and locating hazards in their respective barangays / Photos by PFECC

## CC Adaptation Planning

At the end of the four-day P3DM workshop, Bagacay and the 41 other villages came up with their respective adaptation plans, identifying their options in addressing the impacts of climate change in specific areas in their communities (Table 4.1e).

**Table 4.1e. Workshop Output: Projected CC Impacts and Adaptation Options for Bagacay Village**

SPECIFIC AREA IN VILLAGE	EXPERIENCED IMPACTS, CAUSES AND CONTRIBUTING FACTORS			PROJECTED CLIMATE CHANGE IMPACTS				ADAPTATION OPTIONS
	IMPACTS	CAUSES	CONTRIBUTING FACTORS	SEA LEVEL RISE (3M)	TYPHOON & STORM SURGES	WETTER WET MONTHS	DRIER DRY MONTHS	
PUROK (DISRICT) 1, 2, 3, 4, 5 - ELEMENTARY SCHOOL	MORE THAN KNEE-DEEP FLOODING	DISTRICT IS A LOW-LYING AREA	DEFORESTATION				SHORTAGE OF WATER SUPPLY	RAISING COMMUNITY AWARENESS ON DISASTER MANAGEMENT
				MORE THAN KNEE-DEEP FLOODING	EROSION OF VILLAGE ROAD	MORE FLOODING IN MONTHS		CONSTRUCTION OF SEAWALL / DRAINAGE
PUROK 4, 5, 6		ALL RIVERS FUNNEL INTO THE SEA	POOR DRAINAGE	IN PUROK [ZONES]2 AND 3	PUROK [ZONES] 1, 2, 3, AND 4	FROM SEPTEMBER TO DECEMBER		ADOPTION OF NEW PLANTING CALENDAR
			NO DRAINAGE IN ELEM SCHOOL					NEW SEED VARIETIES
		PROLONGED DRY SEASON	IMPROPER WASTE DISPOSAL				DROUGHT	CROP INSURANCE
	SHORTAGE OF COMMON		POOR IRRIGATION	KNEE-DEEP FLOODING	EROSION OF FOUNDATION	SEA FLOODING		PROHIBITION OF ILLEGALLY BUILT FISHPONDS
AGRICULTURAL COMMODITIES		CLIMATE CHANGE	IN PUROK [ZONES] 1 AND 5	OF ALL HOUSES IN ALL	AUGUST AND SEPTEMBER		RESTORATION OF MANGROVE/ CORAL REEF THROUGH REPLANTING	
				ZONES OF THE VILLAGE	DURING HIGH TIDE		SUITABLE AND SAFE RELOCATION AREA	
							ORDINANCE REGARDING ADAPTATION OPTIONS	

Source: PFEC-WBOM, "Local Climate Science to Adaptation Planning Workshop: Documentation Report," unpublished project document.

## Social Engagement for Adaptation

### Immersion of Community Organizer (CO)

In December 2009, a team of community organizers came to Gubat to get acquainted with the area. Key informant interviews revealed that the level of awareness and understanding of climate change was very low, so it was decided to deploy young community organizers to the area full time for three months.

The level of interest of different village officials varied. Bagacay's village chairperson, a former school principal, mobilized officials, community members, and resources. An educator, the chairperson shared information using project IEC materials on climate change during village assemblies. In Rizal, there was less interest. In others, non-formal leaders played a larger role.

#### Box 4.1a: Local CCA Champion

##### Overcoming Apathy and Opposition in Rizal Village

Jun Caligajan, who became the first president of the Marine Protected Area-Rizal Fisherfolk Association, was not a fisherman, but he proved to be the fishing sector's most able and vocal advocate. A natural leader with project management skills, Jun was elected president of every community organization set up by various national government programs and projects in the village (e.g., microfinance, coastal resource management, etc.).

Jun met the community organizer by chance. A three-day Climate Change orientation workshop was scheduled for the next day and was to be attended by representatives of all 42 villages of Gubat and by municipal LGU and LGA officials, yet the CO had yet to meet a fisher or the village chairperson. After learning about the CCA Project, Jun agreed to be Rizal's representative in the orientation workshop.

Shortly after hearing the different speakers talk about climate change and its impacts on coastal communities, Jun recruited fisherfolk he knew. In the afternoon there were two of them; the next day, they were five, and on the third day, 11. At the end of the workshop, they formed what eventually became the core group that would oversee the establishment of Rizal's marine protected area (MPA). The group elected Jun as its president.

**Neutralizing opposition.** Recruiting members to the Marine Protected Area-Rizal Fisherfolk Association (MPA-RFA) was difficult. Some were unsure about participating. There were also some who stood to be deprived of their fishing grounds by the implementation of a "no-take," or sanctuary, policy in the core zone of the MPA.

Jun helped organize a series of *purok* (village zone) meetings. To drum up interest, he and his group of volunteers went around every *purok* with a megaphone, announcing a film showing. The documentary video, *Panahon Na!* ("The Time to Act is Now!")—part of the strategy to introduce CC concepts—attracted a sizeable audience in every *purok*. A quiz show followed the film showing, in which questions about the film were asked and prizes were given to those who gave correct answers.

With the CO, Jun embarked on one-on-one dialogues with members of the core group and, much later, with individuals he knew to be opposed to the “no-take” policy. He reached out to individuals believed to be involved in cyanide fishing. In turn, they listened to Jun and the CO’s explanations that their inconvenience would not last long and that they stood to benefit in the long term. Six months later, as anecdotal reports of increased fish population were heard in the community, they sent feelers to Jun to signify their interest in joining the MPA-RFA.

**Overcoming roadblocks.** In early 2011, the MPA-RFA had to deal with the challenges of establishing itself as a juridical entity registered with government agencies to maintain assets essential to its operations. Jun worked to get the registration, with help from the mayor and other local government agencies. With the MPA-RFA properly registered, the assets were now under its control.

As MPA-RFA membership grew, Jun could rely on the core group and on the younger members for operational needs, such as to repair the enclosure of the sea cucumber ranch in the MPA. As the floating guardhouse was highly visible from the shoreline where some members have their houses, daytime patrols were not necessary. Jun took note of the owners of boats fishing outside the buffer zone and could detect if intrusions had been made. It was during the night that vigilance was required. Jun took turns with the other leaders in sleeping over at the guardhouse.

Jun wanted to show his fellow residents, especially those dependent on the sea, that the MPA would reverse the decline in fish catch. He said that after six months of the MPA’s establishment, an increase in number of boats outside the buffer zone and accounts by hook-and-line fishers in the buffer zone gave early indications of growth in fish population.

Jun also said he was confident that the flooding in the nearby coastal village of Panganiban was unlikely to happen in Rizal because the coral reef was protecting Rizal’s coast.

## Saturating Communities with IEC Materials and Tools

**Village and district assemblies.** In Bagacay and Rizal, the various educational videos produced by the Project (Table 3.1) were shown at regular assemblies of the different villages and village zones (*purok*) to raise awareness on climate change, introduce the Project activities, and elicit community members’ participation.

**Teatro Gubat.** Children of fishing families and some parents in Bagacay and Rizal were recruited, trained, and organized to be part of *Teatro Gubat*, a community theater group depicting how destruction of coral reefs and other coastal ecosystems would worsen the impact of climate change on coastal communities and their livelihoods unless the community acted now. Trained by a local director and with its script written in the local dialect, *Teatro Gubat* staged a number of public performances in Gubat and in Caramoan, Camarines Sur, the Project’s replication site.

**Mobilizing local media.** The Gubat LGU signed a memorandum of agreement with a local cable network for the latter to air a video of the play staged by *Teatro Gubat* and the video *Pag mangno* produced by the Project to illustrate local climate change impacts, for a year, and every day during the Holy Week.



Film showing in a village assembly in Gubat (left) and *Teatro Gubat*’s public performance /Photo by PFEC.

## Biophysical Measures

### Establishing Marine Protected Areas (MPAs)

**Reef assessment.** Scientific studies established that the wide expanse of reef systems in Bagacay and Rizal was responsible for dissipating significant amounts of wave energy before the waves reached the coasts. Numerical modeling revealed that under normal conditions, without climate change, strong waves rarely reached the coastline except at the channels where there were no reefs. The studies concluded that, in general, reef systems reduced wave energy significantly in both strong wind and sea level rise scenarios, protecting the coasts from the erosive action of high-energy waves. As a result of these findings, the Project initiated an assessment and identification of existing and potential reef sites to declare protected. A team of divers, experts, and local guides, accompanied by representatives of the offices of the provincial and municipal agriculturists and the local Fisheries and Aquatic Resources Management Council and village officials, undertook the underwater assessments. The assessment was captured on video and used to produce IEC materials that were disseminated locally and at national forums on climate change.

The assessment found that the corals in the pre-existing site in Bagacay, known locally as *Butog-butog*, was covered with algae and silt, while the site recommended by the community stakeholders was in healthier condition. The underwater assessment reinforced the preference of Bagacay stakeholders for the new site. They noted that *Butog-butog* site was far from the shoreline and was blocked by mangroves from the view of local residents. The new site was within their sight and hence, easier to monitor for possible illegal activities.

**Orientation seminars.** Complementing the reef assessment was a social investigation to determine the perceptions, level of awareness, and knowledge of the stakeholders in Bagacay and Rizal on MPAs. In particular, this included the acceptability of declaring parts of their fishing grounds as “no-take” zones, and local leaders’ commitment to establishing an MPA. An orientation seminar on MPAs was subsequently carried out. The founder of the Gilutongan Marine Sanctuary on Olango Island in Cebu province, one of the oldest and more successful community-managed marine sanctuaries in the Philippines, shared his experiences in setting up and maintaining the

sanctuary, and how this benefitted Gilutongan in the form of increased fish catch and tourism. An orientation session on sea cucumber ranching was included in the MPA seminar to give the communities options for diversifying their livelihood sources. The deputy director of the School of the SEAS, an organization which has successfully integrated sea cucumber ranching with an MPA in Bantayan Island, Cebu province, shared his experience with the participants.

**MPAs established.** After four months of community organizing and capacity building in 2010, Bagacay and Rizal established their respective MPAs (fishery reserve, refuge, and sanctuary). They each declared 15 hectares as “no-take” zones and 50 hectares as a buffer zone. The boundaries of the “no-take” zone were delineated and physically demarcated by the village council leaders, fisherfolk representatives, and other project stakeholders. A village council resolution was passed to declare establishment of the MPA and organization of an MPA management team. A municipal ordinance was passed supporting the declaration of the MPAs and empowering the management teams to mete sanctions and penalties on violators.

**MPA Management Teams organized.** The management teams in Bagacay and Rizal, comprising initially 12-15 members, represent the local Fisheries and Aquatic Resources Management Council, the village council, and the community at large. Working groups or teams were also constituted for patrol and enforcement, fund sourcing, and solid waste management.

The management team in Rizal has been registered with the Department of Labor and Employment and is now called the MPA-Rizal Fisherfolk Association.



Top (from left): A parish priest blesses the buoys about to be laid in the MPA site to mark the boundaries of the “no-take” zone; members of the MPA management team preparing the sinkers; and dive teams dropping the sinkers and buoys.

Bottom (from left): The floating guardhouse installed in the buffer zone of the MPA in Bagacay and Rizal. In Rizal, the floating guardhouse also doubles as tourist attraction. The patrol boat used by the MPA team was procured by the Gubat LGU. /Photos by PFECC

## Climate-Resilient Livelihoods

To develop economic resilience among members of the more vulnerable households in the pilot sites, particularly those directly involved in patrols and monitoring of the MPAs, the Project started enterprises that could be pursued as livelihood alternatives. Diversification of livelihood sources enhances economic resiliency. The Project envisaged that by providing product and market information, climate-resilient technologies, and links to resource centers, the pilot LGUs and their communities would be better able to adapt to climate change.

### Sea cucumber ranching

In Rizal, where 10 sea cucumber species naturally grow, the Project supported the integration of a ¼-hectare sea cucumber ranch into the MPA. The integration facilitates management of both activities. Sea cucumber gathering, which is done at low tide and at dusk, is combined with fishing and other livelihood activities.

An orientation seminar was held for the members of the MPA-RFA. An NGO based in Cebu, which had successfully integrated sea ranching to a community-managed MPA on Bantayan Island, shared its experience, and gave technical inputs.



(Top from left): Sea cucumber ranch in a bamboo pen; the Rizal MPA Management Team discusses their plan to expand the ranch; nursery pen being towed to the ranch site. At left: different species of juvenile sea cucumber in Rizal. /Photos by PFECC.

## Seaweed farming

Sea cucumber is also harvested in Bagacay but the volume has long been declining because of overharvesting. Residents related that where one could gather two kilograms of sea cucumber in the past, the harvest was now barely a kilo. The MPA management team and the village council leaders decided to pursue seaweed production instead.

Seaweeds are grown by a number of families in the community. Access to seedlings, technology, and microfinance is available in Gubat. A local cooperative bank and the national government's Regional Training Center for Seaweeds in nearby Sorsogon City both provide micro-lending and marketing support. The NTSC also provides technical and extension services. However, the local growers have to find a solution to the problem of whitening of the seaweeds. They also need technologies that would add value to the raw product they sell.

Toward the end of the Project, a seed fund of PhP50,000 (USD1,200.00<sup>22</sup>) was extended to the MPA management team to start the seaweed enterprise.

## Mainstreaming CCA-DRR in Local Development Planning and Decision-Making

### Budgetary support

Early in the Project, the Gubat municipal government procured two motorized patrol boats, one each for Bagacay and Rizal, to support enforcement of the rules and regulations of the MPAs. The respective MPA management teams are responsible for the maintenance and operating costs of the boats. The Gubat government also shared in the cost of putting up floating guardhouses that the MPA management teams use in their night patrols. In Rizal, the boat and the floating guardhouse are used also for guided and limited tourism, thereby generating income.

A local legislator has likewise allocated PhP1.5 million (USD36,000.00) from his Countryside Development Fund for Gubat's training purposes, including preparations for a Technical Working Group for CCA/DRR.

### CCA-DRR Action Team

The Gubat municipal government has created a CCA-DRR action team consisting of officers of various municipal units (Planning and Development Coordination, Municipal Engineer's office, Municipal Agriculturist's office, Social Work and Development, the Municipal Council, and leaders of the association of village council chairpersons, among others) to plan and oversee the municipality's preparedness and response capability.

A multi-hazard map for each village has been developed and produced, and will be distributed in the villages. Information generated in the various studies and assessments done under the Project have been inputted into the maps.

<sup>22</sup> Rounded-off figures from average exchange rates in September 2012.

## CCA and DRR Information Gathering for CDP/CLUP Integration

In 2011, the Gubat government initiated a project called "Community-based Monitoring System," a baseline household survey that would inform the updating of the municipality's Comprehensive Development Plan and Comprehensive Land Use Plan, which all local government units are required by law to prepare. Its survey questionnaire included rider questions on climate change and DRR, in order to generate data that would enable the integration of these concerns into the two plans.

## 4.2 Batuan, Masbate

### Local Context

#### Socio-political and economic

Batuan is a fifth-class municipality, one of the poorest in the Philippines. In 2011, its IRA was PhP45 million (USD 1.1 million); income generated locally was a mere PhP700,000 (USD17,000.00). Nearly half of its local income came from the taxes and fees paid by Hacienda Batuan, a private company engaged in cattle ranching and copra production.

At the time of the Project, Hacienda Batuan owned half of Batuan's total land area of 5,341 hectares. It was the biggest employer in the municipality. The four villages encompassed by the *hacienda* were also the site of agrarian unrest and armed conflict. The conflict had de-escalated at the time of the Project but the presence of armed groups was still noticeable. The security issue was a contributing factor to the lack of investments and tourism in Batuan despite its numerous attractions.

Many in Batuan's population of 12,585 (2007) national census trace are related by blood or marriage. For the Project, one advantage of such close familial relationship in the governance structure was the speed in communication and coordination of activities, since people knew

### Box 4.1b

#### *Rizal Village's sea cucumber ranchers learn to adapt to extreme weather*

Soon after the MPA management team put up the pens of the ¼-hectare sea cucumber ranch in May 2011, a typhoon washed away half of the pens.

Transferring the ranch was out of the question because of internal dynamics.

Despite the setback, the fisherfolk insisted on rebuilding the pens but with a difference:

*The MPA management team decided to float the sinkers that kept the nets down, and tow them to the nearby mangroves and cove as soon as the first warning of inclement weather was issued. These would be towed back when the weather cleared.*

Toward Project end, the MPA management team, now with a legal personality, and with fund support from the Project, rebuilt the fish pens. In one pen is a nursery; in several others are 10 species of sea cucumber juveniles naturally occurring in the village, to be harvested in six months and which could yield a gross income of about PhP126,000 (USD3,000.00) and a net income of PhP15,000-20,000 (approx. USD360-480).

each other. A challenge was that the system did not encourage the employment of needed expertise from outside the family circle.

### Climate and disaster risks

Batuan is one of four municipalities on the small island of Ticao in Masbate province. It is on the southern end of the island, which lies directly northeast of San Bernardino Strait, one of two straits connecting the internal seas of the Philippines to the Pacific. Changes in conditions in the Pacific during El Niño Southern Oscillation (ENSO) or Pacific Decadal Oscillation (PDO) shifts are likely felt in Ticao before they are felt in the internal seas.

Ticao may also be liable to flooding in the event of a sea level rise. With the typical spring tidal range at 1.8-2.2 meters, a 4-cm projected increase in average sea level may translate to more extensive flooding of low-lying, low-slope areas on the island's eastern side, according to 2009 findings of Marine Environment and Resources Foundation, Inc. (MERF), the attached foundation of the UP-MSI. Three low-lying communities along Batuan's coasts—Cañares, Gibraltar, and Panisihan—were found to be at risk of coastal flooding. In Panisihan, seawater has already intruded into rice fields. In Gibraltar, the lone freshwater source is 300 meters from the shoreline and at risk of salt water intrusion. The islet village of Matabao on the southern tip becomes isolated during typhoons and during two to three days of heavy rains. Potential rise in sea level puts at risk the potable water source, the livelihood of farmers, and Batuan's food security.



Dwellings of light materials built within 50 meters of the shoreline in Panisihan Village /Photos by PFEC.

### The CCA Project

The original choice for piloting the CCA Project in Masbate was not Batuan, but Famosa on the northern tip of Ticao Island. A vulnerability assessment of Famosa had already been conducted when the municipal leadership decided to withdraw its participation. In contrast, the mayor of Batuan early on showed his interest in participating in the Project, providing counterpart funds and resources for every activity.

The assessment looked into the coastal geology of the former port of Batuan, in Burgos Village.<sup>23</sup>

### Selection of Pilot Communities

Two factors guided the selection of pilot communities in Batuan: the presence of significant areas of mangroves, coral reefs, and sea grass beds; and the willingness of the village chairperson to participate.

### Social Engagement

**CO immersion.** A full-time community organizer was deployed to Batuan for three months from January 2009. The CO's tasks in Batuan were to establish rapport with key stakeholders, profile the different coastal communities, and lay the groundwork for implementation of Project activities. However, moving around and reaching the farthest islet villages proved to be costly, as the presence of armed groups limited the mobility of the CO, who had to be accompanied by a local guide doubling as security detail. After the three-month immersion, the CO kept in constant touch with key local leaders mostly by mobile phone.

**P3DM.** A municipal-wide P3DM workshop was the first major stakeholder activity carried out. Representatives of the municipal government and its various units, village council heads, and other local leaders participated. An orientation on climate change was given and outputs of the scientific studies were shared. Each village identified resource uses and hazards in its area. Based on the information generated, each village came up with a draft adaptation plan (Table 4.2a).



From left: Batuan LGU/LGA representatives and resource persons preparing the shape model; a village council leader identifying landmarks and hazards in his community; and participants to the P3DM / Photos by PFEC

<sup>23</sup> MERF's terms of reference, which covered the period from Nov. 3, 2008 to Jan. 31, 2009, focused on Sorsogon. The lukewarm acceptance of the provincial government of Masbate limited the scope of work carried out in the province.

**Table 4.2a Workshop Output: Projected Climate Change Impacts and Adaptation Options – Gibraltar**

PARAMETERS	CC IMPACTS EXPERIENCED	CAUSES / CONTRIBUTING FACTORS	PROJECTED CLIMATE CHANGE IMPACTS			ADAPTATION OPTIONS
			SEA LEVEL RISE	EXTREMELY WET MONTHS	EXTREMELY DRY MONTHS	
HUMAN HABITATS	COASTAL EROSION	TYPHOON	60% OF HOUSEHOLDS SUBMERGED	INCREASE IN COASTAL EROSION	NO APPARENT EFFECT	REHABILITATION OF CORAL REEF
	HOUSEHOLDS SUBMERGED	HEAVY WAVES				RELOCATION AND HOUSE ELEVATIONS
FRESH WATER SOURCE	DEEP WELL DRYING UP	SEAWATER INTRUSION	SALINATION OF FRESHWATER	WATER CONTAMINATION	SHORTAGE OF WATER SUPPLY	CONSTRUCTION OF RAIN WATER COLLECTOR
AGRICULTURE	LOW CROP YIELD	LA NIÑA OR EL NIÑO	SUBMERGED RICE FIELDS	CROP LOSS	LOWER CROP YIELD	WATER CONSERVATION
						CROP ROTATION
FISHERIES/ COASTAL RESOURCES	LOW FISH YIELD	ILLEGAL FISHING	LOSS OF FISH BREEDING GROUNDS	SILTATION	RECEDING COASTLINES	USE OF CLIMATE-RESISTANT CROPS
		CORAL BLEACHING				CONSTRUCTION OF DRAINAGE OR CANAL
LIVELIHOOD AND OTHER ECONOMIC ACTIVITIES	DESTRUCTION OF FISHING/ PLANTING GROUNDS	TYPHOON	CROP LOSS / DAMAGE	SILTATION	LOWER CROP YIELD	COCONUT PLANTING
HEALTH AND DISEASES	DIARRHEA	HEAVY RAINS	VECTOR-BORNE DISEASES	CONTAMINATION	WATER SHORTAGE	FIND OR CREATE NEW SOLUTIONS
						RAIN COLLECTION
						CHLORINATION

## Adaptation Initiatives

### Local Weather Monitoring and Early Warning

Batuan and the rest of Ticao Island are accessible only by sea. As such, accurate and timely warnings are needed to ensure the safety of travelers and fishers out at sea. In 2008, a local weather monitoring system was installed in Burgos, where the Batuan wharf is located, through the Project. The early warnings disseminated by the system’s operator via text messaging were found most useful by travelers, boat operators, and local leaders of flood-prone areas (Box 4.2a).

### Box 4.2a: Local CCA Champion

#### The Local “Weatherman”

Travelers from Ticao Island and a neighboring typhoon hotspot, Burias Island, send text messages to Jeffrey Sese for weather updates especially during inclement weather. Some frequent texters, aware that Jeffrey Sese pays for his text warnings, send him prepaid phone credits to make sure he can text them back. He has been a reliable source of early warnings of inclement weather for LGU officials, village chairpersons of flood-prone areas and island villages that are isolated after two to three days of heavy rains, and boat operators.

Jeffrey was a political science graduate and was jobless in early 2010 before he volunteered to be trained by WB-NTF CCA Project consultants to become the local weather monitor. He has since been very dedicated to his job. The local weather monitoring system is atop his parents’ house and beside a room for his young family. Consisting of a wind vane, a rain gauge, and a battery-operated Wizard 3, the unit has never malfunctioned. If it does, Jeffrey knows how to fix it.



From left: The local weather instruments (wind vane, rain gauge, and Wizard 3) installed atop the residence of the weather monitor, J Sese in Burgos /Photos by PFEC

## Biophysical Measures

### ■ Mangrove Forest Protection

**Batuan’s mangrove forests.** Batuan has 267.53 hectares of mangrove forests, 69 percent of which is a pristine, closed primary forest. It is located in the wide tidal flats of Bitoon Bay, a protected area known as Bongsanglay Nature Forest Reserve (Map 4.2a). As a closed forest, it regenerates on its own; the only human intervention necessary is to continue the protection efforts. The mangrove reserve includes areas under the political jurisdiction of the villages of Royroy and Gibraltar in the south. Bongsanglay’s declaration as reserve and its relative inaccessibility have kept the forest intact. The village councils of Royroy and Gibraltar deploy five to seven fish wardens to patrol the reserve. The wardens are paid from the IRA of the village.

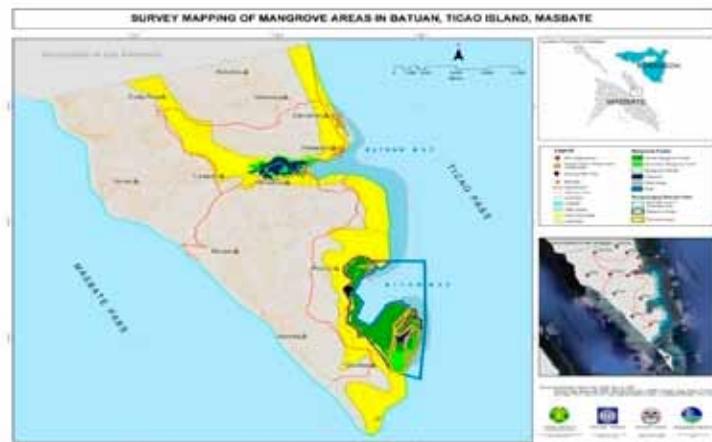
In the more populous part of Batuan in the north, the mangrove forest has been under threat of exploitation for fuel wood. About 80 hectares of secondary forests are in that area, in the villages of Panisihan, Canvañez and Poblacion (Map 4.2a). Dwellings are interspersed with mangroves, and the mangrove areas are used as toilets. All three villages experience coastal flooding.

**Biodiversity.** There are 23 species of mangroves from 10 families in Bongsanglay, including century-old *Rhizophora apiculata* trees with prop roots more than four meters high and *Avicenia marina* trees with circumferences of 388 centimeters. Plant density at Bongsanglay was calculated at 5,625 per hectare. In Panisihan, the mangrove survey recorded 24 species. The Wild Bird Club inventoried and documented various resident birds.

**Resource uses.** In the mangroves of Bongsanglay are found Batuan’s prized delicacies—locally know as *takla*—giant crabs and lobsters and a multitude of fish species and crustaceans.



From left: Century-old *Avicenia marina* in Bongsanglay Nature Reserve in Royroy; mangrove specialists conducting a species inventory in the reserve and showing local leaders photos of species found in their area / Photos by PFEC



Map 4.2a Comprehensive mangrove map of Batuan (mangrove areas in green) overlaid with flood map (areas in yellow are flood-prone areas) / Map produced by PFEC and consultants.

**Mangrove orientation, community nursery establishment, and mangrove rehabilitation.** A mangrove reforestation project, funded by a national government loan, was implemented earlier in Batuan. However, few of the mangroves survived. Upon investigation, the mangrove survey found that in Royroy, the mangroves were planted in seaweed beds while in Canvañez, the species planted was not appropriate for the environment. In both situations, the first seedlings

died. In subsequent replanting, many died and those which survived barely reached three feet several years later. A post-project evaluation team gave the same assessment: that planting should not have been done in the seaweed beds, which were an important habitat for marine life and a bio-shield against storm surges. However, the information was given late and the damage had been done. It was a case of having the wrong technical input and the right assessment given at the wrong time.

The orientation seminar initiated by the Project also gave emphasis to ecosystem benefits from beach forests, sea grass beds, and coral reefs—all present in Batuan. The municipal-wide seminar was participated in by LGU leaders, staff of LGAs, and representatives of various civil society groups.

Community nurseries were subsequently established in Poblacion, Panisihan, and Canvañez through the joint efforts of the municipal government, the three villages’ LGUs, and the Project. Community members were mobilized to plant in denuded areas. Memoranda of agreement were signed whereby the village LGUs committed to maintain the nurseries and continue planting.



Top, from left: Dr. Jurgenne Primavera, a noted mangrove specialist, providing inputs to LGU, sector and community leaders on the importance of mangroves as bio-shield against storm surges, tsunamis; workshop participants in the field, being shown different mangrove species. Bottom, from left: Participants being taught how to bag seedlings; a community nursery; local residents reforesting denuded areas in their community / Photos by PFEC.

**Bakhawan (Mangrove) Festival.** Beginning 2010, for three days in May, Batuan made *bakhawan*, or mangroves, the theme of its town fiesta. The mayor’s and the LGU’s initiative aimed to raise the residents’ awareness of the importance of mangroves.



Left: Youth take part in the parade with costumes depicting products from mangrove forests; shirts and floats announcing the festival theme; Mayor Charlie Yuson leading the festivities. Top: MAP 4.2b. The map shows the coastline and the marine protected areas in Batuan. /Photos by PFECC.

### MPA Establishment

Like Gubat, Batuan had pre-existing MPAs that had been declared through a local ordinance. One of these was in Canvañez and the other was in Royroy (Map 4.2b). Both were initiated under community-based coastal resource management programs of national government agencies. The MPA in Canvañez, established by the mayor when he was the village’s council chairperson, remained intact after a decade. However, this was not the case in Royroy, where the buoys demarcating the MPA boundaries were dismantled during the local election campaign of 2010.

In June 2011, after a series of community orientation sessions on fish sanctuaries, and with inputs from stakeholders, a new MPA site was chosen by the new set of village LGU leaders in Royroy and a pre-existing people’s organization, the RUFIA Fisherfolk Association. Following this, a 28-hectare fish sanctuary was established, supported by a village council resolution. A municipal ordinance declaring the MPA was to follow suit.



From left: Local officials of the Department of Agriculture share information on fish sanctuaries with Royroy residents; a composite team from Gubat and Royroy LGUs; leaders of the local cooperative, the WB Task Manager and underwater documenters validating conditions in the designated new MPA site / Photos by PFECC



From left: Community leaders preparing and laying sinkers to mark the boundaries of the core zone of the MPA / Photos by PFECC

### Box 4.2b: Local CCA Champion

#### Calming Royroy Village and Seeking Opportunities for Climate-Resilient Livelihoods

Royroy used to be one of Batuan’s law and order “hot spots.” Predominantly *hacienda* property, Royroy was the setting of intense conflict between different factions in the community.

In elections held in May 2010, Bonifacio Calinawan, Jr. won as village council chairperson. He worked to bring different community factions together, and also engaged the local management of the *hacienda* to seek its cooperation. Because of this, entry to the *hacienda* by the community organizers became possible.

A non-native resident of Royroy, Calinawan knew he had to show results to win the villagers’ trust. One of his first acts was to erect a walkway for the use and safety of schoolchildren living in a *sitio* in the vicinity of the Bongsanglay Mangrove Reserve. In the past, the children had to wade through the water and mud to reach their school on the main island. He built about one-fourth of the walkway using his village’s Internal Revenue Allocation (IRA) from the national government budget, and committed to complete it. Using village IRA funds, he also beefed up patrol of the mangrove forest. The wardens, on paddle boats, are on continuous patrol.

In 2011, after a series of focus group discussions with resource persons, he heard ideas on making the community's livelihood more resilient to climate change. Among these was the suggestion to earn income from the walkway to benefit Royroy's predominantly fishing and tenant community of 1,130 people. The walkway could bring in tourists to see the centuries-old *Avicenia marina*, witness the gathering of *takla* (a shrimp variant), ride on horseback in the rolling hills of the *hacienda*, and take a paddle-boat ride through the mangrove forests and through the MPA where beautiful corals and jumping fishes are visible even without a glass-bottom boat. Making these ideas a reality is now the biggest challenge for Calinawan.



From left: The walkway through the mangrove forest in Royroy; map of livelihood possibilities drawn by workshop participants from Royroy / Photos by Joel & JC Ganibe.

## Mainstreaming CCA/DRRM in Local Development Planning and Decision-Making

**Budgetary support.** Although a municipality with very low income, Batuan provided counterpart funds for all the activities initiated by the Project. It allocated 20 percent of its development funds for the adaptation measures taken; absorbed the cost of the professional fees of the local weather monitor; subsidized the operating requirements of the station; and shared the cost of training and IEC activities, among others.

The Batuan LGU also allotted funds to purchase a relocation site for families in high-risk, low-lying areas.

**Policy-Setting.** At the end of the Project, the Royroy village council passed a resolution establishing the new MPA. The Municipal Council gave its assurance that an ordinance declaring the MPA would be passed.

**Stricter enforcement of fishery laws.** Municipal officials say that blast and cyanide fishing stopped when the new administration took office. People say that violators are deterred by the night patrol wardens and the mayor's commitment to law enforcement.

**Avoidance.** The Batuan LGU has stopped the building of new structures within 500 meters of the shoreline, and the expansion of existing ones.

### Box 4.2c

#### Snapshots of Batuan's Strategic Planning for Climate-Resilient Livelihoods, October 2011



From top, from left to right: Participants' outputs—what they wish to achieve as a result of the workshop; a village cluster's vision of their climate-resilient villages; listing of concepts learned; LGU leaders and LGA staff visioning and planning together / Photos by JC Ganibe.

## Capacity building for climate-resilient livelihoods

Toward the Project's end, the village chairpersons, representatives of Batuan's 14 villages, and key officers of the municipal government organized a one-day strategic planning workshop. At the workshop, new ideas on possible enterprises emerged (Box 4.2C). To build on the knowledge and enthusiasm gained from the planning workshop, the Project brought together 15 village LGU leaders and key municipal LGU staff in October 2011 for training in aquasilviculture at the National Brackishwater Fisheries Technology Center on Pagbilao Island in Quezon province. A similar delegation from Gubat and Caramoan also attended the training. A customized three-day training program was developed for the participants.



Wild Bird Club founder Ivan Sarenas showing Royroy residents the birds his team documented in the mangrove forest in Bongsanglay / Photo by PFEC

## Linkages established

The Project linked up with private and public organizations to generate support for the Project objectives. The private broadcast media

group **Net 25** produced video documentation of Batuan (and likewise Gubat and Caramoan) which was shown in its public news program. A senior newscaster visited Batuan and signified her personal commitment to link up Batuan with government agencies (e.g., National Historical Commission for the preservation of the lighthouse) that could provide the needed support. She also linked up the mayor of Batuan (and the mayors of the three other municipalities on Ticao Island) with the newly installed Philippine Navy officer responsible for the area. Ticao Island has been under threat from intrusion by large vessels fishing for sardines.

The Project also elicited the involvement of the **Wild Bird Club of the Philippines**, a volunteer, not-for-profit environmental advocacy group. Wild Bird Club deployed a team to Batuan (and likewise to Gubat and Caramoan) to do an inventory of birds in the mangrove areas.

### 4.3 The Replication Experience of Caramoan

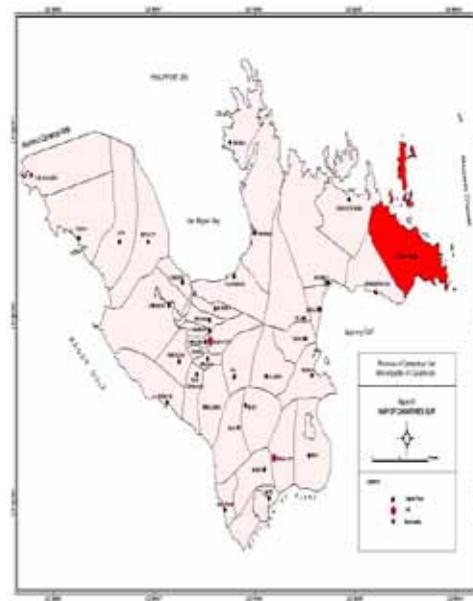
#### Caramoan, Camarines Sur

##### Local context

**Location.** Caramoan is in the northeast of Camarines Sur province. It is bounded on the north by the municipality of Garchitorena and the Pacific Ocean; on the northeast by the island province of Catanduanes; on the south by Lagonoy Gulf; on the east by Maqueda channel; and on the west by the municipality of Presentacion. It has a land area of 277.41 square kilometers and an irregular coastline of 71 kilometers along the ocean, bay, seas, and swamps.

Caramoan can be accessed by land and by sea. The more common means is a two-hour shuttle bus ride from the airport in the provincial capital Pili to the port of Sabang, followed by a two-hour scenic boat ride to Guijalo port in Caramoan. The Guijalo port can also be reached from other ports in Camarines Sur.

**Biodiversity and natural resources.** Proclaimed in 1938, the Caramoan National Park comprising 347<sup>24</sup> hectares of forestland (and mangroves) is home to 13 species of mammals, mostly fruit bats endemic to the Greater Luzon Faunal Region, and 11 species of reptiles, three of which are endemic to the Philippines. It is



MAP 4.3a Map of the province of Camarines Sur, with Caramoan marked in red

<sup>24</sup> An expanded area is being proposed for inclusion in the National Integrated Protected Areas System (NIPAS).

listed on Important Bird Areas of BirdLife International, a global partnership of conservation organizations promoting protection of birds and their habitats. Fifty-eight species of birds from 51 genera and 29 families have been recorded, including the Green Racquet-tail *Prioniturus luconensis*, considered vulnerable under the International Union for Conservation Nature (IUCN) category. The park also hosts 45 plant species from 20 families.

Caramoan's coastal areas are rich in biodiversity, with about 46 species of reef fish from 18 families recorded.

There are towering limestone cliffs, deep gorges, unique rock formations, caves, open and wide white sandy beaches, about 20 islands and islets of varying shapes and sizes.

**Local economy.** Caramoan consists of 49 villages. Four are urban and are where commercial and educational establishments are concentrated: small dry goods stores, a few restaurants, inns and hotels, schools, and a college; new and bigger resorts have recently been established in response to increasing tourist arrivals. Of the other rural villages, 26 are in uplands and plains and 19 are along the coasts. The dominant income sources are cultivation of agro-forest products in the uplands and fishing and seaweed farming in the coastal areas. In some areas that have *nipa* palms (*Distichlis palmeri*) in abundance, some families engage in small-scale distillation of *nipa* sap to produce vinegar and liquor. A few families have turned their homes into home-stays for budget travelers and to accommodate the overflow from hotels during peak tourism months. Fishing boats double as passenger boats to ferry tourists and to take them island hopping.

**Development opportunities and threats.** Little was known of Caramoan beyond Camarines Sur until 2008, when it was made the setting of an edition of *Survivor* France, a franchise of the popular reality TV show based in the United States. Other franchisees of the TV show followed suit: Israel, Turkey, Bulgaria, Serbia, and India. Media attention and aggressive marketing by the provincial government turned the once remote and sleepy town into one of the Philippines' top tourist destinations.



Some of the islands that draw tourists to Caramoan (from top, from left to right): Matukad, Tinago, Hunongan, Gota.

Source: [www.caramoanislands.com](http://www.caramoanislands.com)

But Caramoan is ill-prepared for the influx of tourists and business locators. A number of issues are cropping up. Potential conflicts in resource use have arisen. The provincial government plans to build an airstrip on a rice field where the municipal government has built an irrigation dam. Resorts and other infrastructure are being built without the necessary environmental impact assessment. There is no Comprehensive Land Use Plan (CLUP) and no zoning ordinance, leading to the unregulated construction of varying structures across Caramoan. The physical carrying capacity of areas opened to tourism has yet to be determined and necessary safeguards have yet to be set in place, especially in fragile areas. Potential problem areas are starting to emerge. In the summer of 2011, one island (about seven of 14 islands and islets have been as designated tourism areas) had a water shortage when a horde of local tourists descended at the same time; water had to be collected from a nearby island. The municipal government started to organize boat operators to collect their passengers' solid wastes and bring these to disposal sites in the mainland. However, this is not enough to cope with the growing waste volume, especially in the peak months. Plastic and other solid waste are still visible on beaches and in coves.

**Climate and disaster risks.** Some coastal communities experience tidal flooding. In the event of a rise in sea level, more coastal communities will be at risk. The CLUP and the zoning ordinance that the LGU has yet to pass should disallow human settlements and infrastructure from being built in areas at risk from tidal flooding.

Soil erosion in the uplands is another hazard, especially in the timberland areas. Logging and conversion of forestland for cultivation through the years have contributed to soil erosion. The municipal government estimates the severely eroded area at nearly 19 percent of the land.

Caramoan has so far been spared from direct hits of deadly typhoons that have caused massive destruction in other parts of the province. The strongest typhoon (at 276 km per hour) that hit Caramoan occurred in 1998.<sup>25</sup>

## The Project

### Background

Caramoan was a recipient of the WB-funded Local Government and Finance Development (LOGOFIND) Project of the national government. The loan financed the riverbank protection project at Guijalo port in 2005. Caramoan, in Camarines Sur joined the project as a replication site after a year when the framework developed in Sorsogon and Masbate proved to be trailblazer in their local development planning process. One of the recipients of a World Bank-assisted riverbank protection project, Caramoan's mayor and local government officials signified their willingness to participate in the project in the hope of finding a solution to the devastating floods that repeatedly submerge the town center for several days at a time. The chances for successful adaptation activities were enhanced by promising LGU initiatives—including the creation of a Coastal Resource Management Office as focal unit for climate change—and by a village council head who was very receptive to establishing a “no-take” zone in the coastal waters.

<sup>25</sup> Draft undated Profile of Caramoan

## Building on LGU Initiatives

**A focal LGU unit for climate change.** In 2009, the Coastal Resource Management Office (CRMO) was created through a municipal ordinance. Its primary tasks were to enforce fishery rules and regulations in the municipal waters and to serve as the focal unit for climate change. The unit was headed by a coordinator with a staff of two. It had a budget allocation of Php0.7 million (USD17,000.00) for the first year. Given the magnitude of the task, the military was called upon to help in patrolling its 71-kilometer of irregular coastline. About seven members of a paramilitary group were on call to beef up enforcement. Despite this, illegal practices—blast fishing, use of cyanide, mangrove cutting—remained prevalent, with violators coming from Caramoan and neighboring towns. To address this, the CRMO initiated Information, Education and Communication (IEC) activities to curb illegal fishing in the 19 coastal villages. However, the IEC was silent on the impact of climate change. It was thereafter decided that the integration of CCA into the IEC would be pursued.

**Rice for mangrove reforestation program.** Eleven of Caramoan's coastal villages have extensive mangrove areas. In five of them, residents were mobilized to plant mangroves in denuded patches; in exchange, they received rice supplies.

## Social Engagement

Unlike Gubat and Batuan, no community organizer was deployed in Caramoan. The technical specialists made occasional and intermittent visits to lay the groundwork for the mangrove mapping and survey and for livelihood seminars.

**Teatro Gubat in Caramoan.** To increase public awareness of climate change, the *Teatro Gubat*, composed of children from fisher families, depicted how climate change affects coastal communities and the urgent need to address it. A huge crowd watched the play at the town center.

**Climate change orientation for LGU leaders and staff.** The village heads of Lahuy Island and staff of the LGU (CRMO, Municipal Planning and Development Coordination) attended an orientation seminar on climate change to better understand its impacts. Lahuy Island, to the northeast of mainland Caramoan, has long been under threat from blast fishing, cyanide fishing, and siltation caused by small-scale open-pit mines. Its four villages are totally dependent on fishing and small-scale gold mining.

To deliver a more powerful message, successful groups were invited to share their experience with the MPA. The founder of the Gilutongan Marine Sanctuary on Olango Island in Cebu province, one of the oldest and most successful community-managed marine sanctuaries in the Philippines, shared his group's experience with the residents. He gave a detailed account of how their fishing community increased their fish catch and earned more tourism revenues as a result of the MPA. His account was so convincing that nonbelievers among the community leaders softened their opposition to a no-take zone in their fishing grounds. Educational videos on climate change were also shown at the orientation seminar, where the WB Task Manager provided inputs on the urgency of adaptation to climate change.

## Adaptation Actions

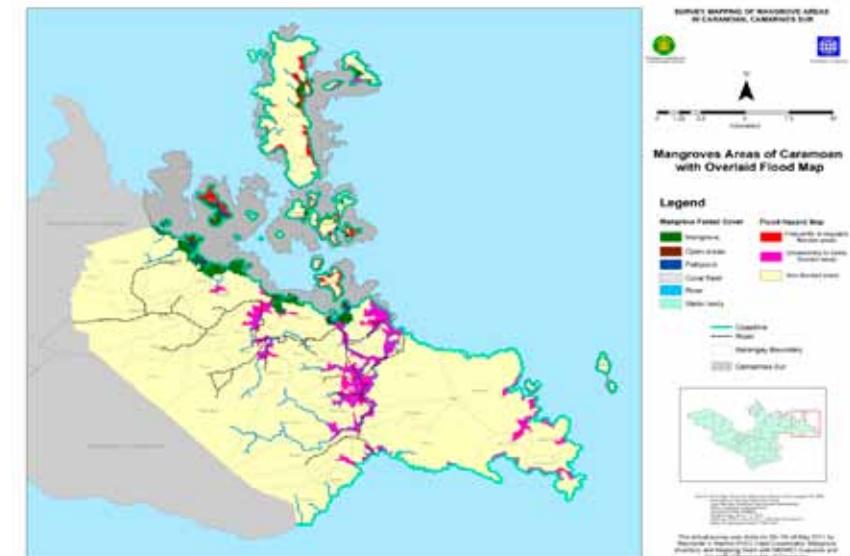
### ▪ Biophysical Measures

**MPA established in Gata.** Following the orientation seminar, the village council chairperson of Gata worked to create a marine protected area in her village (Box 4.3a). In October 2010, an MPA with a 27-hectare “no-take” zone and an 11-hectare buffer was established. The MPA is supported by a village council resolution. The village chairperson recruited three residents who were known blast fishers and cyanide users to serve as wardens who would protect the MPA from intrusion. The village council also took steps to stop illegal fishing, confiscating the fishing gear of those caught, and threatening to bring them to court (an ordinance empowering the village chairperson to mete sanctions has yet to be approved by the municipal government).

**LGU declares seven more MPAs.** After the MPA in Gata was established and word of its reported success spread, other village chairpersons (Oring, Daraga) from Lahuy Island, who had also participated in the orientation seminar, established one in their respective communities. The CRMO’s organizing efforts resulted in five more MPAs. The boundaries of the seven MPAs are being delineated. All the MPAs are to be managed by the village LGUs.

**Mangrove mapping and species inventory to support management and protection.** The Project included a mapping of Caramoan’s mangrove areas and an inventory of existing species to provide concrete information that would support ongoing municipal LGU efforts toward systematic management and protection of the ecosystem. The data would be useful for planning and decision-making purposes, including in the development of a Comprehensive Land Use Plan (CLUP). One eye opener, for instance, was that mangrove areas have been converted to fishponds. Of 592.81 hectares, 76.6 hectares, or 11 percent, had been converted. Yet only two of the 13 fishponds were productive. The abandoned or unproductive areas, therefore, should be targeted for rehabilitation. Another output was a comprehensive mangrove map with a flood map overlay (a detailed map is available for each of the 11 communities mapped), which should be useful in crafting appropriate responses to flooding. The mangrove species inventory and survey (a consultant’s report is available) showed the general health condition of the mangroves, their capacity for natural regeneration, and the corresponding management response needed.

The species inventory and photo documentation would also guide the CRMO when it apprehends violators caught with wood, obviously cut from mangrove trees, especially when they reason that the wood is of another species.



MAP 4.3b. Map of Caramoan showing mangroves and flood-prone areas

**Birds in mangroves inventory.** The Project partnered with the local environmental advocacy group Wild Bird Club. A team of birders from the club did an inventory of mangrove areas in Caramoan. The team observed and photographed different types of resident birds. This information will prove useful as a benchmark of the health condition of the town’s mangrove forests and can serve as an input for IEC and tourism promotion.

### ▪ Local Weather Monitoring and Early Warning

A weather monitoring system similar to those Gubat and Batuan was also installed in Caramoan, at the Office of the Municipal Agriculturist. However, it was not put to good use since the CRMO Coordinator, who was trained and tasked to monitor and maintain the system, did not have time for it in view of his heavy workload.

### ▪ Capacity building for:

**Climate-resilient livelihoods.** The village of Gata recognizes the urgent need to find alternative livelihood opportunities for its residents since the sustainability of its two major income sources has come under question. Fishing has been steadily declining, while small-scale mining has grown increasingly dangerous.

To address this, community members attended a livelihood workshop where they identified livelihood diversification options. The consensus was to focus on seaweed farming, since seaweed was common in Caramoan. The provided inputs on the technology and economics of seaweed farming. This workshop was also conducted in the village of Tabgos, where the community was taking mangrove protection actions.

In October 2011, 15 Caramoan municipal and village leaders, together with leaders from Gubat and Batuan, attended the National Brackishwater Fisheries Technology Center on Pagbilao Island in Quezon province to learn aquasilviculture, an environment-friendly mangrove aquaculture system that promotes the harmonious coexistence between fishery species and mangrove trees in a semi-enclosed system. The participating municipal LGUs and village leaders hope to build on their learning from the three-day field training.

**Local Climate Change Adaptation Planning (LCCAP).** In August 2011, toward the tail-end of the Project, the Caramoan municipal government organized a three-day strategic planning workshop to equip the LGU leaders with the tools and knowledge for integrating climate change adaptation and disaster risk reduction and management into local development planning. The workshop was timely, because the mayor had recently created a team from the various LGU units to oversee the formulation of Caramoan's first CLUP. The planning workshop brought together the mayor, some members of the Municipal Council, chairpersons of all 49 villages, and key staff of the municipal LGU. Project consultants facilitated the workshop and provided inputs. At the end of the workshop, participants shared their vision for Caramoan and ideas on how to make their respective communities climate-resilient. The ideas included zoning of coastal and marine areas and passage of the necessary ordinance to support this action; creation and activation of village DRRM teams; and municipality-wide IEC on climate change. LGU planners and decision makers hope to build on these to craft a CLUP and a Comprehensive Development Plan.



Top, from left: The CLUP Team's vision of Caramoan; its leaders' vision of Mampirao Village and action plan for achieving it. Bottom, from left: The CLUP Team identifying hazards in specific sites and appropriate physical and infrastructure development envisaged; the CRMO Coordinator with the proposed zoning of the municipal waters for a fishery reserve, seaweed production, navigational lanes, and tourism; Mayor Constantino Cordial, Jr. suggesting a review of the Building Code and ways to make it responsive to climate change /Photos by JC Ganibe



From left: A Municipal Councilor participating actively; participants in warm-up exercise between sessions; women community leaders making sure their concerns are heard /Photos by JC Ganibe

### Local Legislation

The Caramoan municipal government has passed a resolution establishing eight MPAs. However, budgetary support for maintaining the MPAs had yet to be drawn as of project closing.

#### Box 4.3a CCA Local Champion

##### Political will at work in Gata

A feisty woman in her mid-50s, Mercy Sueno made known to all on Lahuy Island that she was scared of no one. Upon her election in 2010 as chairperson of the Gata village council, Mercy pledged to solve a problem she had failed to solve in her nine years in that capacity in the late 1980s: blast fishing and cyanide fishing.<sup>26</sup>

##### Opportunity knocked

In October 2010, Gata hosted a one-day orientation workshop on *Climate Change*, her first encounter with the term. Village officials, and leaders and officials of three neighboring villages on Lahuy Island, the staff of the Coastal Resource Management Office of Caramoan, and municipal fish wardens were shown educational videos, *Panahon Na!* and *Sangtwaryo*.<sup>27</sup> Maya Villaluz, the WB Task Manager for the Climate Change Adaptation (CCA) Project explained the impacts of climate change and the need to act with urgency. Timoteo Menguito shared his experiences in establishing and guarding the Gilutongan Marine sanctuary, a diver's paradise and one of the more successful Philippine urban marine protected areas, off the coast of mainland Cebu.

What Mercy heard and saw in the workshop left a deep impression and reinforced her resolve to end illegal fishing and the destruction of coral reefs in her community's coastal waters. Despite opposition from some of her officials and constituents, on November 20, 2010, she led the installation of concrete buoys to mark the site of the marine sanctuary. After much cajoling and arguing, she convinced the Gata

<sup>26</sup> Use of air compressor, a device used for underwater breathing, is considered harmful and therefore banned. But because use of the gear is prevalent, the passage of an ordinance banning it has proven to be difficult.

<sup>27</sup> *Panahon Na!* ("The Time to Act Is Now!") is a documentary on the global signs of climate change and the evidence of it now in the Philippines, as presented by local scientists and observed by ordinary people. *Sangtwaryo* ("Sanctuary") is a short film depicting a family in a coastal community torn between succumbing to the lure of short-term gains from dynamite fishing, and the long-term gain from stopping its use and establishing a marine sanctuary instead.

village council to pass an ordinance designating a 27-hectare core or “no-take” zone and an 11-hectare buffer zone where hook-and-line fishing is allowed and boats can pass.

### Gata Village

One of four villages on Lahuy Island to the northeast of mainland Caramoan, Gata was home to 400 families dependent mainly on fishing. Its fishery grounds had been degraded by many years of dynamite and cyanide use, which resulted in dwindling fish catch. Gold panning along its coasts contributed to the degradation. Siltation from soil erosion in its uplands also affected marine life.

### Transforming cyanide fishers into sanctuary protectors

Despite an ordinance banning it, fishing with cyanide persisted. Mercy monitored 10 of her constituents who were still involved in cyanide fishing. She thought of using another method to stop them. She recruited the 10 as MPA wardens, giving them Php500 (USD12) each as monthly allowance and charging the amount to Gata's Internal Revenue Allocation funds from the national budget. The wardens' main task was to ensure that no one entered the core zone and that only hook-and-line was used in the buffer zone. To see whether the wardens were doing their task, Mercy had someone monitor the wardens' activities secretly. She was not disappointed.

Mercy praised the wardens' work at every village assembly. She called them to the front of the assembly and rewarded them with kilos of rice that she solicited from local politicians. The 10 have since stopped fishing with cyanide. Mercy realized that all it took to change their behavior was to give them a sense of self-worth.

### Benefits, six months after

In May 2011, six months after the demarcation of the boundaries of the sanctuary, the residents were happy. One fisher's gill net caught about 200 kilos of fish near the buffer zone. Mercy's critics in the village council and some of her constituents who had been opposed to the sanctuary now wanted her to declare all of Gata's coastal waters as a sanctuary.

Mercy was also happy about her decision to have the village children watch the educational videos shared by the CCA Project, which she showed at every assembly she called. The children now run to her to report boat incursions into the sanctuary.

### Linking CCA with 4Ps<sup>28</sup>

Gata was the first village in Caramoan to receive the conditional cash from the 4Ps. A total of 175 families, or nearly half of the village population, were beneficiaries of the program. Beneficiaries received Php300 (USD7) for every three- to five-year-old child in daycare or preschool, or six- to 14-year-old in elementary and secondary school, for a maximum of three children. Families with three children in these categories received an additional Php1,000 (USD24) per family.

<sup>28</sup> Pantawid Pamilyang Pilipino Program, or 4Ps, is a poverty reduction and social development strategy of the national government that provides conditional cash grants to extremely poor households to improve their health, nutrition, and education, particularly of children aged 0-14 years. (www.dswd.gov.ph)

Mercy took a seat on the Gata committee monitoring the 4Ps. Seeing an opportunity to educate the beneficiaries on climate change, she used the 4Ps program's mandatory two-hour family development session for beneficiaries to share what she learned about its impacts, and the need for everyone to get involved.

The cash from 4Ps made a significant difference in the beneficiaries' lives, and a threat of forfeiture of the benefit would be an effective deterrent to noncompliance with its conditions. With that in mind, Mercy warned the 4Ps beneficiaries in Gata that she would report not only those misusing the cash benefits to gamble or drink, but also those using cyanide to fish.

### Convincing others

Encouraged by her community's experience, Mercy has taken it upon herself to get leaders of other villages to establish their own marine sanctuaries. She is vice-president of the Caramoan village chairpersons' association. She tirelessly shares Gata's positive MPA experience with the association's 48 members. She invites them to Gata to see the benefits for themselves. She also offers to share the educational videos she obtained from the CCA Project so that the association members can view these with their constituents. However, the response has been lukewarm. Mercy believes this is because most of her colleagues have very limited education, thereby limiting their knowledge of and appreciation of CCA. Most had attended elementary school only and just a few went on to high school.

Mercy lobbied for passage of a municipal ordinance to empower the Gata village council to set rules and regulations on Gata's marine sanctuary and impose sanctions for violations. She submitted the required documentation to the Municipal Council in November 2010.

# Summary of Adaptation Actions and Initial Impacts

Chapter 5 summarizes the adaptation actions in the three sites and the initial impacts of the actions taken as perceived by different project stakeholders.

## 5.1. Biophysical Measures

The Project generated scientific information affirming the protective shield that coral reefs and mangroves provide against strong winds, storms, and tidal surges in Gubat, Batuan, and Caramoan. This prompted their respective LGUs and coastal communities to establish MPAs and strengthen management of mangrove areas.

### ▪ Marine Protected Areas (MPAs) established

Table 5.1 lists the four MPAs that were initially established: two in Gubat and one each in Batuan and Caramoan. Seven villages in Caramoan subsequently established their own MPAs following the perceived success of the village of Gata, which drew strength from the persistence of the village chairperson (Box 4.3a: CCA Champions), and the organizing work of the municipal Coastal Resource Management Office.

MPA Sites	Area in hectares			Mgt Team and Composition	Key MPA Rules and Regulations
	Core	Buffer	Total		
<b>Bagacay, Gubat</b>	15	10	25	VILLAGE COUNCIL, BFARMC	• "No-take," "No access" in core zone
<b>Rizal, Gubat</b>	15	50	65	Fishers' association	• Only hook and line and passage of boats allowed in buffer zone
<b>Gata, Caramoan*</b>	27	11	38	VILLAGE COUNCIL, BFARMC	• PhP1,000 (USD24) penalty for violation (Rizal); PhP5,000 (USD120) for second violation and imprisonment for succeeding violations (Caramoan)
<b>Royroy, Batuan</b>	28	10	38	ROFIA (cooperative)	

\*Seven more MPAs were established in seven other coastal villages by October 2011 in Caramoan.

**Anecdotal accounts of increase in marine species and fish catch.** Six months after the MPAs were established, there were anecdotal accounts of increased fish species and fish catch near the buffer zones of the three<sup>29</sup> sites. In Bagacay in Gubat, a seaweed grower farming outside the MPA noticed a small shark among the seaweeds, an occurrence never observed before. In Rizal, also in Gubat, the fisherfolk association managing the MPA caught fish with a market value of Php5,000 (USD120.00) in one harvest, which had never happened in the past. It used the money to purchase fuel for its patrol boat. As a result, the number of hook-and-line fishers near the buffer zone are said to have increased. In Gata in Caramoan, a local fisher made a onetime catch of 200 kilos of a local species outside the buffer zone.

The LGUs plan to conduct a more scientific assessment and monitoring of impacts of the MPA on fish habitat and fish yield. Toward this end, the LGU of Caramoan is tapping the expertise and resources of the Bureau of Fisheries and Aquatic Resources for benchmarking, monitoring, and evaluation.

**Changed behaviors.** People’s attitudes toward blast and cyanide fishing changed as a result of the Project. In Gata and Royroy, blast fishers and cyanide users became dedicated MPA protectors after the village chairpersons enlisted them as wardens and enjoined them to participate in Project IEC activities. Initially motivated by recognition from the village leaders and by a cash allowance, the former illegal fishers have since acknowledged the impact of their destructive methods and have become ardent protectors of the MPAs.

In addition, schoolchildren who have seen the educational videos at local community assemblies are participating in protection efforts. In Gata, schoolchildren come running to the council head to report the passage of boats near sanctuaries.

▪ **Mangrove Protection and Rehabilitation**

**Information generation and sharing.** The mangrove mapping and inventory carried out by the Project generated information on the extent of mangrove area cover, the species present, and the general health condition of the ecosystem in Batuan and Caramoan. Comprehensive mangrove maps overlaid with flooding maps were produced and disseminated to the municipality and the mapped sites.

The digitized maps of Batuan were shared with the Provincial Agriculture Office of Masbate and the Protected Area Management Board (PAMB) of the Bongsanglay Nature Park in Batuan. A donor-funded Integrated Coastal Resource Management Program will be implemented by the Provincial Agriculture Office, with Batuan as one of the pilot sites. The digitized maps and the inventory output will provide the PAMB of Bongsanglay critical inputs for updating the management plan of the reserve. The maps will also guide the Municipal Agriculture Office and village councils in prioritizing rehabilitation efforts.

The mangrove inventory established the richness of the biodiversity of the project sites. About 20 to 22 species of mangroves were found in Batuan and 24 to 27 in Caramoan. These represent about 2/3 of mangroves found in the Philippines. The century-old *Rafiana*, reputed to be the

<sup>29</sup> The fourth MPAs established in June 2011 in Royroy. As of the writing of this report, it was too early to detect perceptible changes.

oldest and biggest (nearly 400 cm in diameter) in Southeast Asia, is found in the Bongsanglay Nature Reserve in Batuan. The inventory also established that the mangrove forest had “climaxed,” was capable of regenerating on its own, and human intervention (i.e., planting) was unnecessary for as long as protection activities were maintained.

**Community nurseries, mangrove rehabilitation, and protection.** Aside from mapping and inventory, the Project facilitated establishment of community nurseries in three villages in Batuan. A counterpart-contribution scheme was mobilized, wherein the community supplied labor and land for the nursery; the community organizers provided facilitation and technical inputs and plastic bags; and the municipal LGU/LGA provided oversight and post-project support. A memorandum of agreement spelled out the roles of the different stakeholder groups. The nurseries support the continuing mangrove reforestation program of the Batuan LGU. The town’s abandoned fishpond areas have been programmed for rehabilitation.

In Caramoan, the LGU supports the “food for mangrove rehabilitation” program. The municipal CRMO plans to strengthen its IEC activities using the outputs of the mangrove survey and inventory, in order to end or reduce mangrove cutting.

**Table 5.2 Summary of Biophysical Measures Implemented (as of Project End, Sept. 30, 2011)**

Sites	Biophysical Measures
	<b>Realized</b>
<b>Gubat</b>	<ul style="list-style-type: none"> <li>• MPA with sea cucumber ranch in Rizal Village</li> <li>• MPA with seaweed farm in Bagacay Village</li> </ul>
<b>Batuan</b>	<ul style="list-style-type: none"> <li>• Mangrove nurseries established in three communities, with continuing reforestation activities in the villages of Canvanez and Panisihan</li> <li>• Strengthening the protection of Bongsanglay Nature Park</li> </ul>
<b>Caramoan</b>	<ul style="list-style-type: none"> <li>• MPA with seaweed farming in Gata Village</li> <li>• LGU initiated “rice for mangrove reforestation program,” a variant of food-for-work, to rehabilitate denuded mangrove areas. Families are given rice in exchange for planting and maintenance of protected areas.</li> </ul>

**5.2 Early Warning and Community Preparedness**

The local weather monitoring systems installed in the villages have varying degrees of usefulness. They have been most useful in Batuan, which is relatively more remote compared to other towns and lacks access to timely and accurate weather information. The early warnings from the system have proven to be most useful in preparing communities, travelers, fisherfolk, and the LGU for heavy rains and typhoons. The dedication of the local weather monitor in disseminating weather bulletins even beyond Ticao Island and the support given by the Batuan LGU for the system’s maintenance have had concrete benefits on the ground.

In contrast, Gubat’s accessibility to varied information sources and the presence of PAGASA and FAO (rainfall) monitoring devices in the area have limited the usefulness of the local weather monitoring system. In Caramoan, the system’s usefulness was limited by the town’s access to communications centers, the Philippine Coast Guard’s warnings, and lack of staff time to maintain it.

### 5.3 Toward Building Climate-Resilient Livelihoods

During the capacity-building activities, it was emphasized that vulnerable coastal community residents needed to diversify their livelihood options to make them more resilient to the expected impacts of climate change. However, since community livelihood initiatives were undertaken only at the tail end of the Project, the impact of these have not yet been cascaded beyond those who were directly involved in the programs.

In Batuan, the poorest of the three pilot sites, the municipal and village LGU leaders went through a *strategic visioning and business planning workshop*, their first ever, and came up with possible economic enterprises that their respective communities could pursue in the future.

Community leaders and LGU officials of all three municipalities attended a training session on *aquasilviculture technology* at the Bureau of Fisheries and Aquatic Resources training center in a 100-hectare aquaculture farm in Pagbilao Island, Quezon province. All participants, particularly the village chairpersons, were enthusiastic to adopt the technology in their mangrove areas.

In addition, the Project initiated a *value chain study of seaweeds*, as seaweed farming has become an increasingly important alternative to fishing in a number of communities in the projects sites. The study aims to promote value addition in the community's livelihood programs, which is necessary for greater economic resilience.

Project Site	Livelihood Enterprise Established	Status
Gubat	▪ ¼ hectare sea cucumber ranch in Rizal	First harvest expected in Dec 2011 Started Aug 2011; harvest expected in two months
	▪ Seaweed farming in Bagacay	
Batuan	<ul style="list-style-type: none"> <li>▪ All villages together with the municipal LGU, came up with their respective business plans. This led to the establishment of mariculture enterprises.</li> <li>▪ Climate-proofed walkway was constructed through the mangrove forest as part of tourism promotion efforts (initially conceived to provide access to schoolchildren during high tide).</li> </ul>	
Caramoan	▪ The communities of Gata and Tabgos underwent enterprise planning sessions. Existing seaweed farming enterprises were expanded because of advise from the Project. Crab fattening enterprises were also established.	

### 5.4 Science-Based Information for Decision-Making

Table 5.4 lists the outputs of the various studies and assessments undertaken by the Project. In general, the LGUs and the various project stakeholders have yet to use the outputs systematically but have pledged to integrate the information into their development and sector plans.

Project activities	Outputs	Uses of Outputs	Pledged Uses
<b>Vulnerability assessment P3DM</b>	<ul style="list-style-type: none"> <li>▪ Site-specific identification of multiple hazards</li> <li>▪ Multi-hazard maps of Gubat villages</li> </ul>	<ul style="list-style-type: none"> <li>▪ Identification of vulnerable areas and high-risk zones</li> <li>▪ Updating of municipal maps and geo-hazard maps</li> </ul>	<ul style="list-style-type: none"> <li>▪ Input to DRRM/CCA, municipal development and annual investment plans</li> <li>▪ To be incorporated in updating the CLUP of Gubat, and inputs in the development of CLUP and CDPs of Batuan and Caramoan</li> </ul>
<b>Mangrove mapping and species inventory</b>	<ul style="list-style-type: none"> <li>▪ Actual forest cover, health condition, and list of species in mangrove areas in Batuan and Caramoan</li> <li>▪ Comprehensive mangrove maps overlaid with flooding maps</li> </ul>	<ul style="list-style-type: none"> <li>▪ Development of IEC materials, aid to enforcement</li> </ul>	<ul style="list-style-type: none"> <li>▪ Input to protected area management plan for Bongsanglay Nature Reserve in Batuan and LGU/MAO mangrove rehabilitation program</li> <li>▪ In Caramoan, photo documentation of species will counter illegal cutters' alibi that the trees they cut are not mangrove trees.</li> </ul>

### 5.5 Local Policy-Setting, Institutionalization

**Legislation.** At Project end, several legislations were passed supporting adaptation measures, namely: the Provincial Council resolution recognizing the project and supporting the development of a Climate Change Action Plan for the province of Sorsogon, municipal and village council resolutions supporting the development of a Climate Change Action plan and establishing the MPAs. In Caramoan, the Municipal Council passed a resolution in September 2011 declaring establishment of eight MPAs. In Gubat, the Municipal Council subsequently passed an ordinance supporting the establishment of two MPAs and expanding it to more MPAs. In Batuan, an additional MPA was established in Royroy, with a pending passage of an ordinance.

**Focal LGU unit for CCA-DRR.** Before the Project, the municipal government passed an ordinance creating a Coastal Resource Management Office in Caramoan. The CRMO has funds and is at the forefront of implementing the Fisheries Law and ensuring that CCA-DRR is integrated into the management of the town's marine and coastal areas. It has drafted a zoning scheme of these areas. Gubat plans to reactivate a CCA-DRR technical working group consisting of the senior staff of key units of the LGU and the leaders of the village chairpersons' association.

**Integration of CCA in local development planning.** In Gubat, which was the focus of the scientific studies and assessment, efforts have been taken to mainstream CCA in local development planning. It produced digitized hazard maps which the municipal LGU plans to make available to the villages to aid in their development planning. In 2011, the LGU embarked on a Community-Based Monitoring System survey project in which rider questions on climate change impacts and hazards were included in the questionnaire. The information generated from the survey was

used as an input in updating Gubat's Comprehensive Development Plan (CDP). Various thematic maps and other information from the survey also aided the LGU in updating its Comprehensive Land Use Plan (CLUP).

Batuan and Caramoan had no CLUP and CDP into which CCA could be integrated (see discussion in Challenges). However, toward the end of the Project, the Caramoan LGU created a team to develop a CLUP. The LGU made use of inputs on how to integrate DRMM and CCA into the CLUP and CDA from a Project-initiated planning workshop in August 2011. A zoning plan for Caramoan's coastal and marine area was also drafted at the workshop.

**Budgetary support.** Budgetary support and action by local chief executives is crucial in successful adaptation and in sustaining gains. The Batuan LGU allocated 20 percent of its development budget (equivalent to PHP100,000—USD2,400.00—in 2011) for CCA activities. The operation and maintenance of the local weather monitoring system come from this budget. The LGU paid the salary of staff operating the system. In addition, the LGU deployed 12 wardens to patrol the municipal waters and enforce the Fisheries Law; as a result, cyanide use and blast fishing are said to have been eliminated. Moreover, the village councils of Royroy and Gibraltar, hosts to the Bongsanglay Nature Reserve, have deployed their own wardens to patrol the reserve, using their respective Internal Revenue Allocations from the national budget to pay the wardens' allowances. The mayor pledged to provide the same level of budgetary support to CCA throughout his incumbency.

In Gubat, the mayor at the time allotted a budget to acquire two patrol boats to help the MPA management teams in the villages of Rizal and Bagacay enforce their rules and regulations. The Gubat and Caramoan municipal governments also provided counterpart funds to support Project mobilization.

Table 5.5 Summary of Gains Achieved in Legislation and Policy-Setting at the Local Level		
Project Sites	Policy and Budget-Related Actions	
	Realized	LGU Pledges
<b>Gubat</b>	<p><i>Legislation</i></p> <ul style="list-style-type: none"> <li>Village council resolutions establishing MPAs in Rizal and Bagacay</li> <li>Municipal ordinance declaring establishment of the MPAs</li> </ul> <p><i>Budget-related actions</i></p> <ul style="list-style-type: none"> <li>Two patrol boats procured by LGU to beef up enforcement of MPA rules</li> <li>LGU counterpart funds for all adaptation measures initiated by the Project</li> </ul>	<ul style="list-style-type: none"> <li>Multi-hazard maps to be made available to all villages to aid planning</li> <li>CCA technical working group to be reactivated with funding support from ex-Mayor, now Congressman</li> <li>Will mobilize LGU calamity fund for disaster preparedness</li> </ul>

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Table 5.5 Summary of Gains Achieved in Legislation and Policy-Setting at the Local Level		
Project Sites	Policy and Budget-Related Actions	
	Realized	LGU Pledges
<b>Batuan</b>	<p><i>Budget-related actions</i></p> <ul style="list-style-type: none"> <li>20% of development funds allotted for CCA activities (allowance of fish wardens, maintenance of weather station, etc.)</li> <li>Salary of weather monitoring station operator paid by LGU</li> </ul> <p><i>Stricter enforcement of existing laws</i></p> <ul style="list-style-type: none"> <li>Ban on sand and gravel quarrying and coral rock gathering</li> <li>Ban on construction of new structures and expansion of existing ones along shorelines</li> </ul>	<ul style="list-style-type: none"> <li>Mayor's pledge to maintain the same budgetary support throughout his incumbency</li> <li>LGU leaders' guarantee to fund relocation of flood-prone homes; implementation pending agreement of families to be relocated and sale of site</li> <li>Location and design of proposed mini-wharf to be climate-proofed</li> </ul>
<b>Caramoan</b>	<p><i>Legislation</i></p> <ul style="list-style-type: none"> <li>Village council resolution establishing MPA in Gata Village</li> <li>Municipal ordinance creating CRMO as focal unit for Climate Change*</li> <li>Deployment of fish wardens and stronger enforcement of Fisheries Law</li> </ul>	<ul style="list-style-type: none"> <li>CLUP and CDP in process of development; LGU will ensure CCA and DRRM will be integrated into these</li> </ul>

\*Action taken by Municipal LGU prior to CCA project

## 5.6 Partnership Building

The Project brought together private organizations, such as media networks and environmental advocacy groups, with the LGUs and the communities in the pilot sites. Net 25, a nationwide cable network, filmed documentaries on the Project activities in the three sites and aired them on its news and travel shows. The news anchor pledged to link up the Batuan municipal and village governments with resource institutions. The mayors of the four municipalities on Ticao Island were linked up with the Philippine Navy officer in charge of the Bicol Region to address the problem of poaching by large vessels in municipal waters.

A partnership was built with the Wild Bird Club of the Philippines, an NGO conservation group. A team from the club completed an inventory and documentation of birds in the mangrove areas in the three Project sites. Should the three LGUs pursue their nature-tourism plans, the documentation could provide information for the tourism marketing campaigns.

## 5.7 A Cadre of Local Champions

The Project engendered the formation of a cadre of formal and informal local leaders who could sustain the gains achieved, scale up, or replicate the adaptation initiatives. The weather monitor in Batuan, whose term was co-terminus with that of the incumbent Mayor, declared, "Even when I am no longer paid by the LGU, I am prepared to continue volunteering my services. All I need is [prepaid credit] load for my cell phone to text the warnings."<sup>30</sup> Similarly, the Gata village council

<sup>30</sup> Personal communication with Jeffrey Sese, Batuan, July 19, 2011 and Mercy Sueno, Caramoan, May 17, 2011.

head pledged: “I will put an end to all illegal fishing activities in Gata while I am still alive.” Such statements from local residents offer hope that CCA will be similarly accepted and have a positive impact on other vulnerable coastal communities.

## 5.8 Knowledge Sharing

Several educational videos have been produced by the Project. These have been shared with other municipalities, educational institutions, and government agencies. The mayors of Gubat and Batuan have shared their CCA experience with mayors and the general public in various gatherings, such as the National Summit for Mainstreaming Climate Change for Mayors, among others. The Project experience was also shared in various fora, such as a national workshop of KALAHI-CIDDS, which aims to integrate CCA into community-driven development programs. It was also discussed during the national consultations of BFAR regional and provincial officers drafting the BFAR National Investment Plan.

## Chapter 6

# The Lessons Learned and Challenges

Chapter 6 attempts to distill lessons from the Project experience and highlights the facilitating factors that made possible the adaptation actions described in the preceding chapters. Although the Project experience is short and the work is still in progress, there are valuable lessons to be learned to shape future work in climate change adaptation in Philippine coastal communities. The chapter also takes note of the myriad of challenges that LGUs and coastal communities faced in their efforts to adapt to the impacts of climate change.

## 6.1 The Lessons Learned

### ▪ The Leadership Role of Mayors and Village Heads

**The Mayors.** Mayors play a crucial role in climate change adaptation because they can mobilize the municipal government’s resources for adaptation actions and influence policy reforms. In all three pilot sites, having the mayor on board facilitated the Project’s activities and increased the chances of institutionalizing adaptation actions (Box 6a).

Recognition given to these local leaders in national forums (e.g., the mayor of Batuan at the National LGU Summit on Mainstreaming Climate Change in 2010 and the mayor of Gubat at the League of Municipalities of the Philippines’ internal seminars) engenders knowledge-sharing and boosts the mayors’ personal resolve to initiate more actions.

LGU leaders can play a proactive role in pushing climate change adaptation. This was demonstrated by the mayor of Gubat who moved to include information relating to climate and disaster risks to the municipality’s Comprehensive Land Use Plan and Comprehensive Development Plan. Similarly, the mayors of Caramoan and Batuan have taken initial steps toward coastal and marine zoning to prevent the detrimental effects of unplanned development. The Caramoan LGU, on the other hand, created a focal unit in the LGU for climate change despite resource constraints.

**Village Chairpersons.** The village council chairperson’s leadership is as important as the mayor’s. As village chief executive, the chairperson ensures that adaptation actions are supported by the constituents. This was demonstrated by the chairpersons of Bagacay in Gubat, Gata in Caramoan, and Royroy in Batuan. Under their leadership and with the support of their constituents, MPAs were successfully established and other adaptation actions were adopted in the coastal communities.

These local leaders have been instrumental in influencing chairpersons in other villages to take similar action. For instance, Gata's successful MPA initiative drew the attention and interest of other village heads. Gata's MPA proved that fish sanctuaries are beneficial to the community and changed the attitude of community leaders and members. Through the community leaders' leadership and advocacy, seven other villages have since established their own MPAs. The Caramoan municipal government has also passed a resolution in support of this.

### Box 6a: Local CCA Champions

#### A Tale of Two Mayors

##### The Former Mayor of Gubat

Deogracias Ramos was in the last year of his last term as mayor when the Project first came to Gubat in 2009. When shown that a privately owned fishpond had been built at the mouth of a river, blocking the water flow during heavy rains, which resulted in flooding of nearby communities, he had the structure dismantled and gave orders for the fishpond permit never to be re-issued.



Former Mayor Ramos (in yellow) convening LGU leaders for update on progress of CCA measures started during his term/Photo by PFEC

Mayor Ramos funded the purchase of two patrol boats to help strengthen the enforcement of rules and regulations of two newly established MPAs initiated by the CCA Project. He gave instructions to the community organizers to approach him if they needed anything. He enjoined a local cable network to broadcast the climate change educational videos produced by the Project. The local network did so for a whole year, and every hour during the Holy Week. The mayor repeatedly stressed that "climate change is in Gubat", citing a beach resort that was being gradually devoured by wave action in the village of Panganiban.

Now a congressman, Ramos remains a concerned Gubat stakeholder. Informed of the stalled passage of a municipal ordinance declaring the establishment of the town's MPAs, he used his influence to convene the Municipal Council to thresh out the problem. He also made available PHP1.5 million (USD36,000.00) from his congressional Priority Development Assistance Fund (PDAF) for training. He has guaranteed that the funding for the activities of a revitalized Technical Working Group for CCA for Gubat can be sourced from the training fund.

##### The Mayor of Batuan

Three-term Mayor Charlie Yuson had demonstrated his concern for the environment long before the Project came to Batuan. Having come from a family of farmers, he had the uplands and the seas of Batuan as his comfort zones. When he was a village chairperson in the 1990s, he had a fish sanctuary established across the family residence. This marine area remains protected. His wife recalled that when their only child

brought home shells from the sanctuary, the mayor admonished him and told him to return them. No one ventures near the sanctuary although it has no physical demarcation. No inventory of the reef condition has been made so far, but there are anecdotal reports of the presence of small sharks and other species. A fishery staff of the LGU said a harvest of a boatload of fish would be easy—if the mayor allowed it.



Mayor Yuson enjoining his constituents to be prepared for the impacts of climate change /Photo by PFEC

Before becoming mayor, he planted mahogany trees in the uplands, planning to grow them for logs, but as he became more aware of the importance of trees to the town's watershed, he abandoned that plan. In his first term as mayor, he made tree planting in the watershed an annual municipal activity. In 2010, he began what he envisaged to be a tradition of turning Batuan's annual three-day fiesta into a celebration of mangroves.

The community organizers' entry into Batuan was easy, as was mobilizing LGU support and resources in implementing CCA measures. Mayor Yuson is, by nature, shy and a man of few words, but when he gives the go-ahead, everything moves swiftly and smoothly.

The Mayor has allotted 20 percent of the Batuan municipal development budget (equivalent to PHP100,000 (USD2,400.00) in 2011) for climate change adaptation. He intends to do the same every year throughout his incumbency. Maintenance and operating cost of the local weather monitoring station and the salary of the weather monitor are charged to this budget item. To limit exposure of lives and property to storm surges, Mayor Yuson has also disallowed the building of new structures and the expansion of existing ones along the coastlines. He has deployed more than 10 municipal wardens to enforce the Fisheries Law. Disregarding the ire of political allies and relatives, he has banned quarrying of sand and gathering of coral rocks.

#### ▪ The catalyzing role of informal leaders

In the three project sites, there emerged individuals, informal leaders, who made a difference in the success of the adaptation measures. Their personal leadership, especially in situations where formal leaders could not be relied on, was critical to Project success, as was demonstrated in the village of Rizal in Gubat (Box 4.1a).

There were several informal leaders who contributed to the Project's success. One of them was the local weather station monitor in Batuan whose dedication in monitoring and disseminating weather bulletins kept sea travelers safe and helped communities prepare for extreme weather events. A private lawyer in Rizal gave free legal advice to a people's organization (PO) which had difficulties with village councils. There were priests, a pastor, and other private individuals

who lent their voices and authority to help raise awareness and enjoin their followers to help protect their coastal ecosystems. Other civil society actors in and beyond the project sites also contributed to making possible the early gains of the Project.

#### ▪ **Project implementers' responsiveness to stakeholders' needs**

At the beginning of the Project, the technical specialists encountered challenges resulting from stakeholders' very limited awareness and understanding of basic climate change concepts. A revision of strategy and activities became necessary; a separate CC Communication Project evolved and was pursued alongside the CC Adaptation Project.

The project team's ability to detect gaps and to come up with the appropriate responses, alongside the local governments' flexibility in adjusting planned activities, show responsiveness to needs on the ground, resulting in increased stakeholders' acceptance of project inputs.

#### ▪ **Benefits from mobilizing multi-disciplinary and multi-sector expertise**

Understanding the impacts of climate change and crafting the appropriate adaptation response requires expertise in various disciplines—biophysical, social, cultural, and economic, among others—and support from technical experts and practitioners. The Project mobilized expertise in these disciplines and sectors, from government, academe, and civil society from various parts of the Philippines. The exchange of experiences was enriching not only for the LGUs and the communities, but also for the input providers. The biologists and mangrove specialists who carried out the mapping and inventory said that teaching and professional work was enhanced by their interactions with the different stakeholders and by the technical findings. LGU and community leaders were enthusiastic about the new skills and ideas they gained, including new words such as “mind mapping,” “climate-resilient livelihoods,” and practical skills like how to identify birds through bird calls.

#### ▪ **Sharing experiences of successful adaptors facilitates action**

The Project's strategy to draw attention to successful MPAs proved very effective. Residents were easily mobilized after the fisherfolk leader and founder of the Gilutongan Marine Sanctuary on Olango Island, one of the oldest and most successful community-managed MPAs in the country, shared his experience. His experience convinced project site residents who had taken a “wait-and-see” stance to pursue the establishment of an MPA. In Caramoan, the village leaders of Gata who listened to the Gilutongan Marine Sanctuary founder decided in less than a week to establish their sanctuary.<sup>31</sup>

#### ▪ **Using lessons of past development projects to inform project activities**

Costly mistakes of past projects in the sites were avoided in the Project's implementation. In Bagacay in Gubat, the MPA management team and the village council were adamant about

<sup>31</sup> Key informant interviews, Caramoan, June 2011.

having the municipal government recognize their new MPA site. To the community stakeholders, their old MPA site that was supported by a Municipal Ordinance had ceased to be viable because they could not protect it. The old site was far and not visible from the shoreline, whereas the new one was easy to monitor and patrol. The Project carried out underwater assessment of the two sites and found that the old site was covered with silt and plastic objects. The new site was a healthier and more viable option. The Project supported the community's decision.

In a past mangrove reforestation project in Batuan that was funded with a national government loan, mangroves were planted in seagrass beds or were of the wrong species. The result was a very low survival rate. These mistakes were repeated during replanting and were pointed out to the mayor and the village leaders; a repeat is unlikely to be made in the future. The mapping and species inventory by the Project should provide additional information to the LGU and the Municipal Agricultural Office to help them in programming and decision-making.

## 6.2 Challenges in:

#### ▪ **Communicating Climate Risks**

For most community stakeholders, natural disasters are easy enough to understand, having experienced them in the past. However, climate change was not easy to comprehend, as it was a concept that could happen in the distant future. To connect the two—climate change and disaster—and make these understandable, the Project had to undertake an unplanned communication program.

The message, the language, and the medium had to be well crafted to suit the target audience. A survey determined the medium of communication the communities commonly used and identified issues of utmost importance to them. The survey found preference for visual and audio communications, and established that the residents' primary concern was their economic well-being.

The Project produced videos illustrating climate change and its impacts, especially on the livelihood of coastal communities. These videos were done in the local languages and used local persons who were held in authority or were regarded in high esteem. Various means were devised to enliven the audience and get the messages across.

#### ▪ **Sustaining the Biophysical Measures**

To ensure the sustainability of biophysical measures, social and economic issues need to be addressed. These include the lack of livelihood opportunities, dwindling fish catch, need for fuel wood, and the lack of solid waste disposal facilities. At present, there remain occasional intrusions into the “no-take” zone of the MPA in Gubat; cutting of mangroves in Gubat and Caramoan; and use of cyanide and other destructive fishing methods despite the protection measures that have been established. In poor island-communities where the cost of cooking gas is beyond the reach of ordinary families and where there is no land to grow alternative fuel sources, the mangroves and beach forests remain under threat.

- **Disseminating Climate-Resilient Low-cost Technologies to the Communities**

Information dissemination could have prevented the whitening of seaweed, which forced growers in the Project sites to harvest these ahead of schedule, therefore cutting their yields. Residents were not aware that unsuitable water quality and wrong temperatures cause seaweed to whiten. Although the BFAR has developed and field-tested environment-friendly aqua and mariculture technologies, these have not reached the rural communities, as well as local government agencies.

- **Mainstreaming CCA-DRR in Local Development Planning**

The Climate Change Act mandates that local government units should be at the forefront of CCA efforts and should craft their respective local CCA plans. The Project experience indicates that the LGUs will face numerous challenges in meeting their mandate for the following reasons:

- **Limited LGU capacity for development planning.**

Batuan and Caramoan are only starting to develop their CLUP and CDP. They have no experience in developing similar plans and are having difficulty in crafting them. Gubat has these plans but these need to be updated. Only Gubat has the internal capacity to integrate CCA and DRRM into its CLUP and CDP.

The Project initiated the process of local CCA planning in Caramoan and Batuan. It is unrealistic to expect, however, that the three-day orientation workshop adequately equipped them with the necessary skills to formulate their CLUP and CDP and make them responsive to climate and disaster risks.

# Conclusions and Recommendations

Chapter 7 provides conclusions distilled from the Project experience and suggestions to build from lessons learned and gains achieved in climate change adaptation. Some of the suggestions are being contemplated as downstream projects for which the WBOM has taken some initial steps since October 2011.

## 7.1 Conclusions

### **Building coastal communities' adaptive capacity requires strategies addressing poverty**

The need to satisfy basic needs will take precedence over efforts to preserve the environment. Unless these are met, the sustainability of biophysical measures will be threatened. Occasional intrusions into the “no-take” zone of the MPA in Bagacay Village in Gubat, and the persistence of destructive fishing and mangrove cutting in Gubat and Caramoan despite the protection measures put in place, will continue unless hunger, need for fuel wood, and lack of income opportunities are addressed. On top of the biophysical measures it helped to initiate, the Project gave livelihood support to strengthen the MPA management teams, provided training in aquasilviculture technology to representatives of key stakeholder groups, and generated market information on climate-resilient livelihoods as an attempt at building resilient communities.

Multi-stakeholder involvement is essential for successful local adaptation actions

The Project demonstrated that successful adaptation action can be made possible with the support of different stakeholder groups. The local chief executives—provincial governors, town mayors, village chairpersons—with their legislative bodies, can formulate the needed policy actions and supporting budgetary measures. The local-level offices of the national government agencies can implement national programs. Therefore, they need to have the capacity and motivation to deliver technical and logistical support as needed. In addition, the Philippine Navy and the Philippine Coast Guard have had to be engaged more to assist LGUs in monitoring their municipal waters to prevent destructive fishing. The role of the media and the private sector in increasing public awareness and calling for action is likewise critical. Engagement and continued active support of community leaders, formal and informal, will continue to be crucial

in mobilizing communities into action, in making claims on government resources in support of the actions, and in sustaining initiatives.

### **Continuous capacity building for DRRM and CCA for all stakeholder groups is necessary to sustain Project gains**

The Project experience showed that the different stakeholder groups need information, skills, and continuous engagement in order for them to actively participate in planning for and implementing adaptation plans. Aside from training in strategic visioning and adaptation planning, continuous capacity-building is necessary especially in the planning and sector service units of the LGUs and local legislative bodies. The national government agencies (NEDA, DILG, DENR, DA, Climate Change Commission, and (Housing and Land Use Regulatory Board ) HLURB and independent experts should be ready to provide the needed capacity-building support in the future.

## **7.2 Recommendations**

### **Use traditional local knowledge to address climate risks and disasters, resource management, and other adaptation efforts.**

To ensure the success and sustainability of conservation efforts, it is helpful to use indigenous knowledge, local practices, and institutions. This local knowledge will be most helpful in community-based efforts involving climate forecasting that combines scientific prediction with traditional information, promoting the propagation of coral reefs, seagrass, and mangroves; in setting the boundaries of marine protected areas; and in finding engaging ways of effectively enforcing local laws.

### **Cultivate climate-smart agriculture and a livelihood-diversified economy.**

Develop climate-smart agriculture for food security. Diversifying sources of livelihood that are not entirely resource-dependent is critical in building a community and local economy that is not vulnerable to climate change.

### **Increase climate governance, knowledge sharing and community engagement.**

Forge alliances to manage risks and limited resources. Partnerships and alliances can strengthen community efforts. For example, a partnership with the Coast Guard and the Navy, particularly in conducting night patrols, allowed local governments to better enforce local laws.

### **Adopt an ecosystem-based local development.**

The ecosystem should be of foremost consideration in development planning. In view of this, the massive reclamation and conversion of coastal areas into fully developed, concrete zones should be prohibited. Keep natural zones such as tidal flats, flood plains, and river easements naturally flowing and free from any obstructions, including human settlements and business establishments.

### **Build climate-smart infrastructure in buffer zones and restrict resource extraction and development in conservation areas.**

Require cumulative environmental impact assessments of infrastructure to avoid adverse effects on the integrity of coasts that lead to shore erosion and the destruction of natural habitats.

### **Increase adaptation competence of provincial, municipal, and village-level legislators and planners to enable them to craft legislation and development plans that are cognizant of climate change and disaster management.**

This can be achieved by making disaster preparedness training an integral component of adaptation programs, with significant emphasis on prevention prior to rescue and rehabilitation; and by making disaster preparedness training an integral component in the formulation of adaptation policies.

### **Adopt a science-based, adaptation-centered, participatory approach to decision-making at the provincial, municipal, and village government levels.**

Use the local Climate Change Adaptation Framework to guide the preparation of Municipal Comprehensive Land Use Plans, Comprehensive Development Plans, and short-term to long-term Investment Plans. Involve the national government agencies, such as the Department of Interior and Local Government and the Housing and the Land Use Regulatory Board, in overseeing the preparation of these plans, on which the municipal governments will base their budgets and investments.

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The World Bank  
1818 H Street, NW  
Washington, DC 20043 USA  
Internet: [www.worldbank.org](http://www.worldbank.org)

The World Bank Office Manila  
23rd Floor, The Taipan Place  
F. Ortigas Jr. Road, Ortigas Center  
Pasig City, Philippines  
Telephone: (63-2) 637-5855  
Internet: [www.worldbank.org/ph/cas](http://www.worldbank.org/ph/cas)

