

# COMMUNITY-BASED CLIMATE CHANGE ADAPTATION



Public Disclosure Authorized

Public Disclosure Authorized

Public Disclosure Authorized

Public Disclosure Authorized

© 2012  
The World Bank in the Philippines  
Ortigas Center, Pasig City  
Telephone: +63-2-6375855  
Internet: www.worldbank.org/ph

This work is a product of the staff of The World Bank with external contributors. Note that The World Bank does not necessarily own each component of the content included in the work. The World Bank therefore does not warrant that the use of the content contained in the work will not infringe on the rights of third parties. The risk of claims resulting from such infringement rests solely with you.

The findings, interpretations, and conclusions expressed in this work do not necessarily reflect the views of The World Bank, its Board of Executive Directors, or the governments they represent. The World Bank does not guarantee the accuracy of the data included in the work. The boundaries, colors, denominations, and other information shown on any map in this work do not imply any judgment on the part of The World Bank concerning the legal status of any territory or the endorsement or acceptance of such boundaries.

Nothing herein shall constitute or be considered to be a limitation upon or waiver of the privileges and immunities of The World Bank, all of which are specifically reserved.

#### Rights and Permissions



This work is available under the Creative Commons Attribution 3.0 Unported license (CC BY 3.0) <http://creativecommons.org/licenses/by/3.0>. Under the Creative Commons Attribution license, you are free to copy, distribute, transmit, and adapt this work, including for commercial purposes, under the following conditions:

**Attribution**—Please cite the work as follows: Villaluz, Maya Gabriela Q., ed. 2012. *Community-Based Climate Change Adaptation*. Manila, Philippines: World Bank.

License: Creative Commons Attribution CC BY 3.0

**Translations**—If you create a translation of this work, please add the following disclaimer along with the attribution: *This translation was not created by The World Bank and should not be considered an official World Bank translation. The World Bank shall not be liable for any content or error in this translation.*

All queries on rights and licenses should be addressed to the Office of the Publisher, The World Bank, 1818 H Street NW, Washington, DC 20433, USA; fax: 202-522-2625; email: [pubrights@worldbank.org](mailto:pubrights@worldbank.org).

# COMMUNITY-BASED CLIMATE CHANGE ADAPTATION

The World Bank in the Philippines  
Making Growth for the Poor

Norwegian Trust Fund for  
Private Sector and Infrastructure

## Project Rationale and Context

A country of over 7,100 islands in the Pacific Ring of Fire, 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>.

Of the country’s over 1,600 cities and municipalities<sup>3</sup>, 70 percent lie in the country’s coastal areas.

The most vulnerable of its residents are subsistence fisherfolk and farmers whose livelihoods are heavily reliant on natural resources, which, in turn, are highly vulnerable to climate change. In the past few years, coastal communities have reported a significant dwindling of fish catch, major coastal erosion, and massive coral bleaching.

### Brief Profile of the Philippines’ Coasts

- Location: located between Taiwan and Borneo, about 800 km from the Asian mainland
- No. of islands: 7,107 islands
- Land of area: 300,000 sq. km
- Coastal waters: 226,000 sq. km.
- Oceanic waters: 1.93 million sq. km.
- Coastal provinces: 64 out of 79 (81%)
- Coastal municipalities: 832 out of 1,541 (54%)

## Project Objectives

In support of the strategic directions of the Government of the Philippines 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

<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>).

<sup>3</sup> A municipality is a local government unit, akin to a town or a city, that is mandated to provide the following services, according to the Local Government Code of 1991: “Extension and on-site research services and facilities related to agriculture and fishery activities which include dispersal of livestock and poultry, fingerlings, and other seedling materials for aquaculture; palay, corn, and vegetable seed farms; medicinal plant gardens; fruit tree, coconut, and other kinds of seedling nurseries; demonstration farms; quality control of copra and improvement and development of local distribution channels, preferably through cooperatives; inter-barangay irrigation system; water and soil resource utilization and conservation projects; and enforcement of fishery laws in municipal waters including the conservation of mangroves;”

the implementation of the “Climate Change Adaptation in Coastal Communities” Project in the last quarter of 2008 until September 2011.

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

The Project had four major components:

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

## Project Description

### Site selection

The three project sites—Gubat in Sorsogon, Batuan in Masbate, and Caramoan in Camarines Sur—were selected based on the following criteria:

1. Vulnerability to climate change risks and natural disasters;
2. The presence of significant areas of sea grass, mangroves, and coral reefs; and
3. Demonstrated willingness of municipal/barangay LGUs to participate in project processes and to sustain initial gains.

Masbate, Sorsogon, and Camarines Sur provinces in the Bicol Region are among the top 20 provinces in the country considered most vulnerable to climate change. The region is the entry point of 30 percent of the typhoons that enter the Philippine Area of Responsibility each year. National poverty indices ranked the two consistently among the country’s poorest (Table 1).

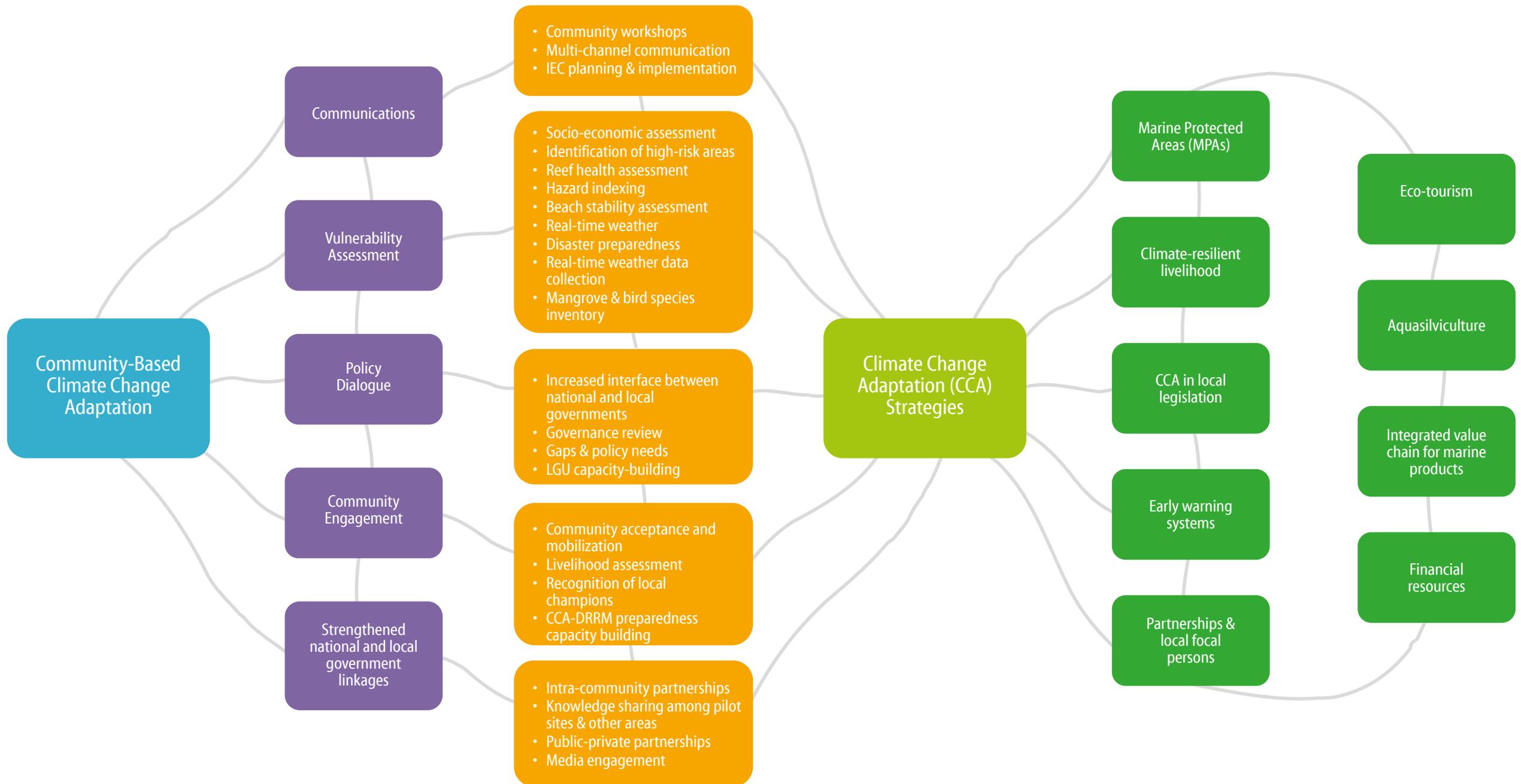
Map 1 shows the location of each project site, while Diagram 1 details the activities done for each phase of the project.

Map 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 1. Community-based Climate Change Adaptation Project Framework and Process**



**Table 1. Profile of Project Sites**

PROJECT SITES	CATEGORY	LAND AREA (HA)	BARANGAYS			POPULATION*
			TOTAL	COASTAL	PERCENT OF TOTAL	
Gubat, Sorsogon	2 <sup>nd</sup> class <sup>4</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

### Project stakeholders

The Project supported the actions of various stakeholders across all levels of Philippine society. Table 2 shows a brief description of all involved parties.

**Table 2. Project Stakeholders**

SECTORS	STAKEHOLDERS	ROLES
<b>National Government Agencies (NGAs)</b>	Department of Environment and Natural Resources (DENR)	The national agency tasked to manage and protect the country's mangrove forests
	Department of Agriculture – Bureau of Fisheries and Aquatic Resources (DA-BFAR)	The agency under the Department of Agriculture tasked to manage and develop the country's fisheries and aquatic resources
	Climate Change Commission	The "sole policy-making body of the government tasked to coordinate, monitor and evaluate the programs and action plans of the government relating to climate change" <sup>5</sup>
	Armed Forces of the Philippines	For this project, the military's assistance was sought to patrol the sanctuaries, especially when the local governments did not have enough resources to do so.

Continued on next page

<sup>4</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.

Continued from page 6

**Table 2. Project Stakeholders**

SECTORS	STAKEHOLDERS	ROLES
<b>Local Government Units</b>	The provincial governments of: <ul style="list-style-type: none"> <li>• Camarines Sur</li> <li>• Masbate</li> <li>• Sorsogon</li> </ul>	The endorsements of the provincial governors were sought to be able to select the project sites and, more importantly, to ensure cooperation and participation of the municipal mayors. 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 municipal governments of: <ul style="list-style-type: none"> <li>• Caramoan, Camarines Sur</li> <li>• Batuan, Masbate</li> <li>• Gubat, Sorsogon</li> </ul>	The municipal mayors and their respective municipal councils (Sangguniang Bayan) have the power to allocate and direct the use of resources and LGU machinery for adaptation measures
	Barangay captains of: <ul style="list-style-type: none"> <li>• Rizal and Bacagay (Gubat)</li> <li>• Panisihan, Gibraltar, Canvañez, Royroy, and Burgos (Batuan)</li> <li>• Gata, Tabgos, Lahuy Island (Caramoan)</li> </ul>	Barangay captains and their respective Barangay Councils have the power to initiate and implement actions at the community level
<b>Pilot communities</b>	Local communities and people's organizations, such as the Fisheries and Aquatic Resources Management Councils (FARMCs) <sup>6</sup>	The key partners and beneficiaries of the Project, whose lives are directly impacted by climate and disaster risks and who are key to effectively implementing community-based climate change adaptation strategies
<b>Private sector</b>	Media	Key partners in communicating and "popularizing" climate change and, in the case of television, in initiating adaptation measures
	Academe, including individual academics and researchers	Engaged to provide expertise and support in implementing project activities
	Civil society leaders	Engaged in information dissemination and as part of the project support group
	Entrepreneurs	Engaged in the start up of a few livelihood activities as part of the value chain

<sup>5</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.

## Case Study #1: Gubat, Sorsogon

### Socio-economic context

Most of Gubat's 243 artisanal fishers living in coastal villages have no access to motorized boats. Some families have turned to seaweed farming to augment their incomes.

### Climate and Disaster Risks

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.



Typhoon-damaged houses

According to a marine geological study, Gubat has lost about 70 meters of its shore land to erosion over the past 50 years. Locals have noted that the coastline is receding.

### Vulnerability Assessment and Risk Monitoring

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 intervention. Adopting the UNDP formula for risk, i.e.,  $\text{Risk} = \text{Hazard} \times \text{Exposure} \times \text{Vulnerability}$ ,<sup>6</sup> the villages of **Bagacay** and **Rizal** ranked highest in the risk index.

Villagers living directly behind the seawall were found to be at highest risk while structures near the wall were also at high risk of flooding.

The state of physical infrastructure in Bagacay and Rizal also posed potential hazards. 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

<sup>6</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.

increase in frequency and intensity of typhoons, inaction would exacerbate flooding in these communities.

### Participatory Communication and Community Networks

Local community leaders helped raise awareness for climate change, for which community awareness and understanding was very low.

In Bagacay and Rizal, educational videos and community theatres (*Teatro Gubat*) helped raise awareness for climate change. The Gubat LGU also 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, over the course of a year.

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

**Budgetary support.** This helped address operational concerns, as demonstrated when the Gubat municipal government funded the procurement of two motorized patrol boats to secure the MPAs, and shared in the cost of putting up floating guardhouses for use in night patrols.

### Key issues

- Gubat faces the Pacific Ocean and lies directly in the path of typhoons. Adopting the UNDP formula for risk, the villages of Bagacay and Rizal were found to rank highest in the risk index.
- Economies like sea cucumber ranching, seaweed farming and aquaculture are seen as a way to diversify livelihoods and making communities climate-resilient.
- Gubat has already taken the initiative to start updating of the municipality's Comprehensive Development Plan and Comprehensive Land Use Plan by conducting a "Community-based Monitoring System," a baseline household survey with rider questions on DRR and climate change.



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

**DRR-CCA Action Team.** These teams will oversee the municipality’s preparedness and response capability. An updated multi-hazard map reflecting scientific information for each village was developed and produced for distribution in the villages.

**CCA and DRR Information Gathering for CDP/CLUP Integration.** In 2011, the Gubat government initiated a baseline household survey to update its Comprehensive Development Plan and Comprehensive Land Use Plan. 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.

### Ecosystem-based Adaptation Measures and Value Chain Models

**Establishment of Marine Protected Areas (MPAs).** After four months of community organizing and capacity building in 2010, Bagacay and Rizal established their respective MPAs (fishery reserve, refuge, and sanctuary). The boundaries of the “no-take” zone were set following consultations with stakeholders, and had legal footing through a village council resolution establishing the MPA and a municipal ordinance that meted out sanctions and penalties on violators.

**Inventory of birds in mangroves.** With the help of the Wild Bird Club, a local environmental advocacy group, a rapid assessment of bird richness and habitat conditions was developed, which would 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.

**Development of climate-resilient livelihood opportunities.** 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 the following enterprises that could be pursued as livelihood alternatives:

1. **Sea Cucumber Ranching.** A ¼-hectare sea cucumber ranch was integrated in Rizal, where 10 sea cucumber species are naturally found. However, the volume of sea cucumber harvests has been on a steady decline in the past few years.
2. **Seaweed Farming.** The Gubat LGU provided access to seedlings, technology, and microfinance while a local cooperative bank and the national government’s Regional Training Center for Seaweeds in nearby Sorsogon City provided micro-lending, marketing support, and technical and extension services. A seed fund of PhP50,000 (USD1,200) was extended to the MPA management team to start the seaweed enterprise.
3. **Aquasilviculture.** Municipal and village leaders, together with community leaders from Batuan and Caramoan, underwent training in aquasilviculture, an environment-friendly mangrove aquaculture system that promotes the harmonious coexistence between fishery species and mangrove trees in a semi-enclosed system. The local government identified potential sites for their constituents to establish pilot systems.

### Key issues

- Agrarian unrest and internal conflict pose security risks that hamper implementation of CCA measures.
- Despite being one of the poorest municipalities, Batuan showed its commitment to CCA and sustainability. It allocated 20 percent of its development funds for the adaptation measures taken. The Batuan LGU also allotted funds to purchase a relocation site for families in high-risk, low-lying areas.
- Local ordinances for the clear demarcation can safeguarding of MPAs should be enforced
- Small-scale tourism is a possible alternative source of income for fisherfolk and another way of establishing climate-resilient economies.

## Case Study #2: Batuan, Masbate

### Socio-economic context

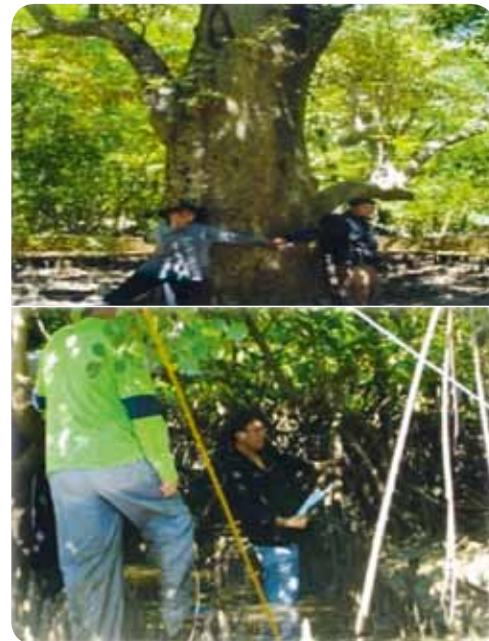
Batuan, one of the poorest municipalities, was once the site of agrarian unrest and conflict. This is seen to have led to the absence of investments in the area. Thus, it is heavily dependent on its Internal Revenue Allotment (IRA) from the national government.

### ***Climate and disaster risks***

Three low-lying communities along Batuan's coasts—Cañares, Gibraltar, and Panisihan—are 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 is at risk of salt water intrusion. The islet village of Matabao on the southern tip becomes isolated during heavy rains. Potential rise in sea level puts at risk the potable water source, the livelihood of farmers, and Batuan's food security.

### Vulnerability Assessment and Risk Monitoring

The original pilot site for Masbate was Famosa, for which a vulnerability assessment had already been conducted. After the LGU decided to withdraw its participation, the Project looked to Batuan, which early on had shown an interest in participating in the Project. The ensuing assessment looked into the coastal geology of the former port of Batuan, in Burgos Village. 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.



From left: Century-old *Avicenia marina* in Bongsanglay Nature Reserve in Royroy; mangrove specialists conducting a species inventory in the reserve / Photos by PFECC

### Participatory Communication and Community Networks

Representatives of the municipal government and its various units, village council heads, and other local leaders participated in the municipality-wide P3DM. Each village identified resource uses and hazards in its area and came up with a draft adaptation plan.

The Project likewise linked up with private organizations to generate support for its objectives. Partnerships were made with the private broadcast media group Net 25 for video documentation and public outreach; with individuals to reach out to other government entities; and with the Wild Bird Club of the Philippines, a volunteer, not-for-profit environmental advocacy group, to conduct an inventory of birds in the mangrove areas.

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

**Budgetary support.** Despite its low income levels, Batuan provided counterpart funds, allocating 20 percent of its development funds to operationalize various adaptation measures. It also allotted funds to purchase a relocation site for families in high-risk, low-lying areas.

**Policy-setting.** 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. The Batuan LGU has likewise stopped building new structures within 500 meters of the shoreline, and expanding existing ones.

**Stricter enforcement of fishery laws.** Municipal officials say that blast and cyanide fishing have stopped, obviously deterred by the night patrol wardens and by the mayor's commitment to law enforcement.

### Ecosystem-based Adaptation Measures and Value Chain Models

**Local weather monitoring and early warning systems.** In 2008, a local weather monitoring system was installed in Burgos, and was operated and maintained by a volunteer. Weather updates are sent through text messaging, which allows for real-time feedback between the volunteer and residents.

**Establishment of MPAs.** Batuan had two pre-existing MPAs that had been declared through a local ordinance—one in Canvañez and another Royroy—but only the Canvanez MPA remained intact after a decade..

In June 2011, after consulting with stakeholders, a new MPA site was chosen and a 28-hectare fish sanctuary was established, supported by a village council resolution and a municipal ordinance.

**Inventory of birds in mangroves.** With the help of the Wild Bird Club, a local environmental advocacy group, a rapid assessment of bird richness and habitat condition was developed, which would 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.

**Development of climate-resilient livelihood opportunities.** Focus group discussions led to ideas for climate-resilient livelihood. Suggestions included the construction of a walkway for ecotourism to benefit Royroy's fishing and tenant community. In October 2011, municipal and village leaders, together with community leaders from Gubat and Caramoan underwent training in aquasilviculture, an environment-friendly mangrove aquaculture system that promotes the harmonious coexistence between fishery species and mangrove trees in a semi-enclosed system.

### Case Study #3: Caramoan, Camarines Sur

#### Socio-economic context

Caramoan's lands and coastal areas are rich in biodiversity. It hosts 45 plant species from 20 families and about 46 species of reef fish from 18 families.

Of Caramoan's 49 villages, four are urbanized; the municipality has become a popular tourist attraction. The dominant income sources are cultivation of agro-forest products in the uplands; fishing and seaweed farming in the coastal areas; small-scale distillation of *nipa* sap to produce vinegar and liquor; and tourism. 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.

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

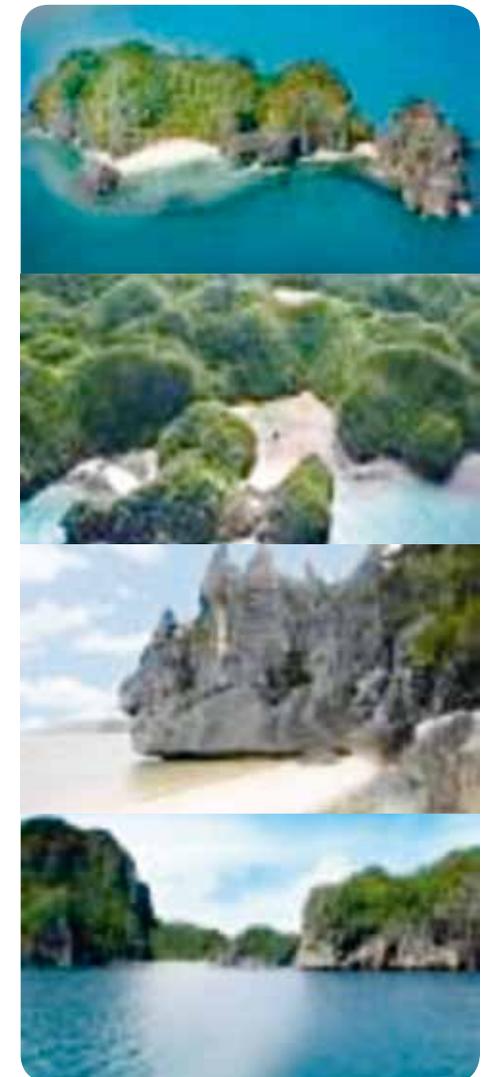
#### Vulnerability Assessment and Risk Monitoring

Caramoan used a participatory approach to the conduct of a coastal and marine resources inventory, with the help of DENR and BFAR, to establish the baseline resources of their municipal waters. This is the first step in the vulnerability assessment.

#### Participatory Communication and Community Networks

**Climate change orientation for LGU leaders and staff.** 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 on small-scale gold mining.

A climate change orientation seminar was conducted for the village heads of Lahuy Island and the staff of the LGU. Here, they learned



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)

from the experience of the Gilutongan Marine Sanctuary on Olango Island, Cebu province, one of the most successful community-managed marine sanctuaries in the Philippines. As a result of this new knowledge, community leaders in Lahuy Island softened their opposition to a no-take zone in their fishing grounds.

***Teatro Gubat in Caramoan.*** As in Gubat and Batuan, *Teatro Gubat* was organized and shown in Caramoan to illustrate how climate change affects coastal communities, and the urgent need to address it. The play attracted a large crowd at the town center.

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

***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 also supported by the military, who helped patrol Caramoan's 71 kilometers of irregular coastline.

***Local Climate Change Adaptation Planning (LCCAP).*** In August 2011, the Caramoan municipal government and the WBOM jointly 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. At the end of the

### **Key issues in Caramoan**

- Main sources of livelihood are on a steady decline; fishing is no longer sustainable and small scale mining is proving to be more dangerous
- Caramoan has not been able to cope with the influx of tourism in the recent years. Plans and implementation of long-term measures to mitigate the impact of tourism on the environment are necessary.
- Initiatives for the protection and species inventory of mangrove as well as aquasilviculture, an environment-friendly mangrove aquaculture system that promotes the harmonious coexistence between fishery species and mangrove trees in a semi-enclosed system should be further explored.

workshop, the participants shared their vision for Caramoan and ideas on how to make their respective communities climate-resilient. LGU planners and decision-makers hope to build on these to craft a CLUP and a Comprehensive Development Plan.

### **Ecosystem-based Adaptation Measures and Value Chain Models**

***MPA established in Gata.*** In October 2010, an MPA with a 27-hectare "no-take" zone and an 11-hectare buffer was established by the village chairperson, supported by a village council resolution. The village council also took steps to stop illegal fishing, confiscating the fishing gear of those caught, and threatening to bring them to court. However, an ordinance empowering the village chairperson to mete out 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 from Lahuy Island established one MPA each in their respective communities. This resulted in five more MPAs, and the boundaries of all seven MPAs are being delineated. All the MPAs are being managed by the village LGUs.

***Mangrove mapping and species inventory to support management and protection.*** This provided concrete information to support municipal LGU efforts toward systematic management and protection of the ecosystem. Another output was a comprehensive mangrove map with a flood map overlay, useful in crafting appropriate responses to flooding. The mangrove species inventory and survey showed the general health condition of the mangroves, their capacity for natural regeneration, and the corresponding management response needed.

***Inventory of birds in mangroves.*** With the help of the Wild Bird Club, a local environmental advocacy group, a rapid assessment of bird richness and habitat condition was developed, which would 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 systems.*** A weather monitoring system was also installed in Caramoan, at the Office of the Municipal Agriculturist. However, because of manpower constraints, use of the weather monitoring system was not maximized.

**Development of climate-resilient livelihood opportunities.** Livelihood workshops have been organized to help community members identify livelihood diversification options, such as seaweed farming and crab fattening. In October 2011, municipal and village leaders, together with community leaders from Gubat and Batuan, underwent training in aquasilviculture, an environment-friendly mangrove aquaculture system that promotes the harmonious coexistence between fishery species and mangrove trees in a semi-enclosed system.

## Project Results, Impact, and Evaluation

### Enabling Climate-Resiliency at the Policy and Governance Level

The Project underscored the importance of securing government buy-in at all levels. Without enabling legislation and tight law enforcement, the country's environmental laws would have no bearing, and current practices that have endangered the environment and jeopardized communities' means of livelihood and sustainability, will continue. Table 4 shows a summary of gains achieved in community-level legislation, policy-setting, and law enforcement.

Table 4. Summary of Gains Achieved in Legislation and Policy-Setting at the Local Level		
Project Sites	Policy Actions 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>

Continued on next page

Continued from page 18

Table 4. Summary of Gains Achieved in Legislation and Policy-Setting at the Local Level		
Project Sites	Policy Actions 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 Fishery 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

### Addressing bio-physical measures and establishing MPAs

An important outcome of the project was the realization of several biophysical measures and the establishment of MPAs in all three municipalities. Tables 5 and 6 list their details.

The Project also noted anecdotal accounts of increased fish species and fish catch near the buffer zones of the three<sup>7</sup> sites. The LGUs plan to conduct a more scientific assessment and monitoring of impacts of the MPA on fish habitat and fish yield.

<sup>7</sup> The fourth MPA was established in June 2011 in Royroy. As of the writing of this report, it was too early to detect perceptible changes.

**Table 5. Summary of Biophysical Measures Implemented (as of Project End, Sept. 30, 2011)**

Sites	Biophysical Measures Realized
<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 Canvañez and Panisihan</li> <li>Strengthening 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>

**Table 6. Profile of MPAs established under the CCA Project**

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	<ul style="list-style-type: none"> <li>“No-take,” “No access” in core zone</li> <li>Only hook and line and passage of boats allowed in buffer zone</li> <li>Php1,000 (USD24) penalty for violation (Rizal); Php5,000 (USD120) for second violation and imprisonment for succeeding violations (Caramoan)</li> </ul>
<b>Rizal, Gubat</b>	15	50	65	Fishers’ association	
<b>Gata, Caramoan*</b>	27	11	38	Village Council, BFARMC	
<b>Royroy, Batuan</b>	28	10	38	ROFIA (cooperative)	

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

Another important outcome was the mapping and inventory of mangroves in all three municipalities, and the establishment of community nurseries. Creative approaches to stakeholder mobilization and community involvement included a “food for mangrove rehabilitation” program in Caramoan.

### ***Developing climate-resilient livelihood opportunities***

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 (see Table 7). 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.

**Table 7. Livelihood Enterprises Initiated in Project Sites**

Project Site	Livelihood Enterprise Established	Status
Gubat	<ul style="list-style-type: none"> <li>¼ hectare sea cucumber ranch in Rizal</li> <li>Seaweed farming in Bagacay</li> </ul>	<p>First harvest expected in Dec 2011</p> <p>Started Aug 2011; harvest expected in two months</p>
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	<ul style="list-style-type: none"> <li>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.</li> </ul>	

### ***Empowering stakeholders***

Another crucial outcome of the Project is how it has empowered community stakeholders to take ownership of Project processes and outcomes, and better manage the coastal resources on which they depend. Through the Project, community members, LGUs, environmental advocacy groups, media networks, and other volunteer organizations came together to produce materials that were used in different phases of the Project (such as multimedia materials and a mangrove inventory). It also 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 Project experience was also shared in various government fora, such as national workshops of the DENR, the National Economic Development Authority (NEDA), the Department of Social Welfare and Development (DSWD) for Kapit-Bisig Laban sa Kahirapan - Comprehensive Delivery of Social Service (KALAHI-CIDSS), and the national consultations of the DA and BFAR regional and provincial officers drafting the BFAR National Investment Plan. This would help to institutionalize gains from the Project and enable other communities and government agencies to learn from the experience of the three municipalities.

### Value Chain Models for resilient livelihoods

A value chain analysis was conducted on the potential livelihood activities focusing on the commodities that the communities commit to produce and sell to the market. The purpose of the analysis is to provide them with a thorough analysis of the viability of their investment plan, looking at the resources needed and the markets to be tapped.

The value chain analysis assesses a business model, including its management of the supply chain. The analysis starts with a detailed examination of the socio-economic data and profiles of the concerned communities as well as the calculation of the costs and services of the business enterprises, with the commodity flows and prices, and profiles of major buyers.

Primary considerations in the determining the viability of the livelihood activities are as follows: 1) 'raw materials', which are necessary inputs in the production cycle activity, have to be abundant and accessible to the communities; 2) technology and techniques that are simple and easy to follow, as well as capacity-building, are available; 3) attractive earning potential; and where financial institutions / partners are willing to partner and invest in the community with appropriate funding.

The value chain analysis also includes a scenario of setting up a trading post wherein LGUs will organize the fishermen and provide training on their basic financial concepts. It will need to enact conservation policies to maintain the best environment for enterprises such as mariculture, aquasilviculture, crab fattening, seaweed farming, and the like. The BFAR has offered to train the fishermen on these processes and to provide technical assistance

during the start-up of the business enterprise. The fishermen will provide the labor needed for construction, production, and monitoring of these various enterprises.

Marketing and coordination with the buyers will be handled by a Supply Chain Management team (SCM) consisting of team members with adequate knowledge on business and enterprise development. The SCM will connect the fishermen's group to the market, and will lead the monitoring and technical assistance to ensure that buyers' specifications and production aspects are followed.

The buyers will provide the specifications and volume requirement for various marine products, and pay the SCM. The SCM will then distribute the income to the fishermen. For its operating expenses, the team would be given a share of the sales proceeds.

The other value chain model is simpler and will be suitable if the production volume could not yet support an SCM. The fishermen, acting as a group would deal directly with the buyers. This would afford the fishermen's group the experience of managing a business enterprise.

### Recommendations for further action

For the local government units and coastal communities, several recommendations could be applied to develop a climate-resilient ecosystem and enable climate change adaptation at the community level:

- **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 implementing 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 legislation 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.



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)

