

**- Making a Difference -**  
**Scientific Capacity Building & Enhancement for Sustainable Development in Developing Countries**

# **Enhancing the Climate Change Adaptation Capacity of Local Government Units and Scientists in the Philippines**

**Final Report for APN CAPaBLE Project:**  
**CBA2008-09NSY-Peñalba**



## **Project Title**

# **ENHANCING THE CLIMATE CHANGE ADAPTATION CAPACITY OF LOCAL GOVERNMENT UNITS AND SCIENTISTS IN THE PHILIPPINES**

**CBA2008-09NSY-Peñalba**

**Final Report submitted to APN**

# Overview of project work and outcomes

## Non-technical summary

This participatory action research project was conceptualized in recognition of the critical role that local government units (LGUs) play in climate risk management, the need to enhance their capacity to respond to climate change impacts and the need to strengthen the alliance between the LGUs and the local state colleges and universities (SCUs) in the furtherance of science-based planning and policymaking.

This project generally aimed to create awareness and develop the capacity of LGUs, communities and regional universities to effectively respond to climate change for sustainable development.

Five vulnerable municipalities in four provinces were chosen as study sites namely: Kawit and Rosario, Cavite, Guagua, Pampanga, San Juan, Batangas and Ilagan, Isabela. Hands-on training on vulnerability assessment and climate change adaptation plan preparation were conducted using data from the most vulnerable barangays within the municipalities. Every learning and alliance building opportunities were maximized through participatory research, coaching and interactive discussion about climate change issues. To further amplify the awareness-raising objectives, vulnerability assessment was done through public consultations. The consultations started with a short lecture on the climate change phenomenon to inform the participants about climate change and the objectives of the project.

The most devastating climate event that was experienced in all sites was typhoon and the consequent flooding that it caused. The hardest hit sectors were the farmers, the fisher folks and the general public particularly those who live on river banks and in houses built of light materials.

Results of this project were communicated to the stakeholders, other LGUs and other climate change initiatives through dissemination forums, scientific conferences and circulation of the Booklet on Climate Change and Municipal Level Adaptation Planning. Some of the lessons that can be learned from this project are: 1) hands-on and output-oriented training can yield significant tangible results; and 2) project-introduced interventions can be institutionalized and sustained.

## Objectives

This project generally aimed to create awareness and develop the capacity of LGUs, communities and regional universities to effectively respond to climate change for sustainable development.

The present project aimed to: 1) study the pattern of climate variability that affected the study sites in the last three decades and assess its social, economic and environmental impacts; 2) conduct awareness raising and capacity-building seminars, lectures, and workshops; 3) assist LGUs in the preparation of indicative climate change adaptation plans and programs; and 4) disseminate the findings of the study to policymakers, civil society organizations (CSOs), other scientists and global change research programmes to contribute to the growing body of knowledge on climate change and the furtherance of science.

## Amount received and number years supported

The Grant awarded to this project was:

- US\$28, 000 for Year1, 2008-2009

## **Work undertaken**

A series of seminar-workshops were undertaken to attain project objectives and generate the expected outputs: 1) awareness-raising seminar highlighted by the signing of memoranda of agreement (MOA) between the LGU-SCU partners and planning workshop to level-off expectations, working arrangements and planned future activities. Seven resource persons discussed various aspects of climate change such as climate science, climate trends, impacts of climate change on agriculture, forestry and coastal zones, adaptation strategies by upland dwellers and the Philippine Task Force on Climate Change (PTFCC) mandates and programs; 2) consultations with residents of the study barangays to determine the extreme climatic events they have experienced in the last three decades and identify the sectors that were adversely affected by these events; validation of consultation results with government records and preparation of the Vulnerability Assessment Report (VAR) led by the SCU partners; 3) presentation of VARs to a panel of experts and lecture and demonstration on the installation and operation of a rain gauge and rainfall data collection; 4) mini-workshops with LGU partners to guide them in the preparation of their respective Indicative Climate Change Adaptation Plan (ICCAP) for each study site. The LGU partners who took the lead in ICCAP preparation were coached on the formulation of appropriate adaptation strategies that will constitute the municipal level adaptation plan based on the vulnerability assessment results; 5) seminar-workshop on the draft ICCAP presentation to solicit experts' comments and suggestions on the feasibility of the recommended adaptation measures to enhance LGUs' and communities' adaptive capacity; lectures on climate forecast application and solid waste management; 6) six dissemination forums with a total of 555 participants including local legislators, other LGU officials from the study sites, other towns and barangays, academicians, students, elementary and high school teachers, civil society organizations and local media representatives and distribution of the preliminary copy of the Booklet on Climate Change and Municipal-level Adaptation Planning to selected forum participants and climate change experts to solicit their comments and suggestions on how to further improve the presentation and technical soundness of its content; and 7) presentation to local chief executives and legislators of policy briefs which contain a summary of climate change issues and impacts as well as the recommended adaptation measures that could enhance their adaptive capacity, for appropriate action.

## **Results**

The Project yielded the following results: 1) better understanding by the LGU and SCU partners of the climate change phenomenon and the need for climate risks preparedness rather than mere relief, rescue and response action; 2) knowledge gained that functional early warning system need not be complicated and can be set-up using affordable and simple technology; 3) partnership between UPLB, other public educational institutions, communities and LGUs towards science-based climate change adaptation planning established; 4) enhanced vulnerability assessment and climate change adaptation planning skills gained as indicated by the vulnerability assessment report and ICCAP prepared by SCU and LGU partners; 5) climate risk management and climate change adaptation plans mainstreamed and integrated into the development plans of the partner LGUs; 6) the elementary and high school teachers who attended the dissemination forum gained additional information and teaching materials on climate change through the lectures delivered and the booklet that was distributed by the project; 7) preparation of a climate change R&D agenda for Region 2 and the engagement of Cagayan Valley Agriculture and Resources Research and Development (CVARRD) member institutions in climate change related research; 8) other LGUs recognized their lack of climate risk preparedness and expressed interest to undertake climate risk preparedness programs; and 9) the participating LGUs learned lessons from each other's

experiences in terms of community mobilization, data and knowledge management and installation of early warning system.

### **Relevance to the APN CAPaBLE Programme and its Objectives**

This project is in line with APN CAPaBLE Programme's emphasis on science-policy interfacing, awareness raising and dissemination activities. Awareness-raising activities focus not only among the LGU officials and the scientific community that prepared and implemented the adaptation plan but also the members of the civil society and local legislative councils whose cooperation and commitment in the adaptation plan implementation is critical for its success and sustainability. Capacity-building targeted LGU officials and partner scientists on data collection and interpretation, situational analysis and the various elements of adaptation programs, policies and strategies. Effective channel of consultation between LGU and the scientific community was established to enhance science-policy link. Project results were disseminated to other LGUs, scientific community and other global change research programmes to contribute to the body of knowledge and the furtherance of science.

### **Self evaluation**

In general, the project greatly achieved its objective of creating among LGUs awareness of the various issues and concerns related to climate change and increasing their appreciation of the need to respond to climate change.

The project, through its participatory and multi-stakeholder approach has also helped generate keen interests and appreciation on climate change related issues/problems and concerns among the participating communities, and regional universities, and to a certain extent, among other government agencies, NGOs, and business sectors which had the chance to participate in the different project activities. LGUs were also equipped with tools and methodologies to plan and formulate responses in order to reduce their communities' vulnerability or increase their resilience to the impacts of climate change specific to their areas and communities.

The project's objective of building a science-policy interface through the university-community alliance was a very effective strategy in building the capacity of LGUs. This facilitated the vulnerability assessment activities and the preparation of the ICCAP. More importantly, this collaboration ensured that the activities were anchored on the knowledge and experiences of the LGU constituents but backed-up by technical expertise of SCU partners.

The project has created a platform for sharing of experiences, learnings, and "best practices" particularly among the participating LGUs and regional universities thereby enhancing their respective capacity to appropriately respond to climate change issues and opportunities.

### **Potential for further work**

The learnings and experiences from this project show the feasibility and potential benefits from this kind of work in the future. Further works can be pursued in two fronts: 1) up and out-scaling of this project's results and 2) new initiatives with greater breadth and depth and focusing on other aspects of climate risk management.

Some of the up and out-scaling activities that can be pursued further are: 1) dissemination of this project's findings to policymakers, civil society organizations, other scientists, other LGUs, and educational institutions to illustrate 'best practices' in science-policy interface on climate change adaptation planning; and 2) scaling-up to the municipal/city and provincial levels, river basins, and ASEAN region in

collaboration with other ASEAN universities.

The new areas for further work are: 1) awareness raising and capacity-building on climate change, early warning system, data and knowledge management, climate forecast application, vulnerability assessment and mapping that employ different quantitative and qualitative tools, methodologies and analytical techniques and measuring effectiveness of adaptation strategies to guide priority setting; 2) studies on quantified climate risk-based adaptation which eventually should be the gold standard in formulating adaptation strategies for future climate hazards; 3) studies that incorporate generation of national climate change scenarios as basis for future vulnerability and adaptation assessment; and 4) downscaling of sound climate change scenarios to the national/local level to provide a more robust climate change vulnerability and adaptation assessments in anticipation of future climate variability and change.

## **Publications**

Peñalba, L.M., Elazegui, D.D., Pulhin, J.M. and R.V.O., Cruz. 2009. Enhancing the Climate Change Adaptation Capacity of Local Government Units and Scientists in the Philippines. Final Report. APN, Japan. July 31, 2009.

Peñalba, L.M., Elazegui, D.D., Pulhin, J.M. and RV. O., Cruz. 2009. Social and Institutional Dimensions of Climate Change Adaptation in the Philippines. Paper prepared for KLIMA/CLIMATE 2009 E-conference to be held on November 2009.

Peñalba, L.M., Elazegui, D.D., Pulhin, J.M., Cruz, R.V.O., and E. C. Esmero. 2009. Booklet on Climate Change and Municipal Level Adaptation Planning.

Peñalba, L.M., 2009. Adaptive Capacity to Climate Change Impacts: The Case of Three Luzon Local Government Units. Paper presented during the National Conferences on Climate Change Adaptation in Natural Resource Management held at Traders' Hotel Manila, Philippines, June 29-30, 2009.

Peñalba, L.M., Elazegui, D.D., Pulhin, J.M. and R.V.O., Cruz. 2009. Compendium of Lectures on Climate Change Adaptation. UPLB-APN- CBA2008-09NSY-Peñalba.

Peñalba, L.M., Elazegui, D.D., Pulhin, J.M. and R.V.O., Cruz. 2009. Challenges to Adaptive Capacity Enhancement of Local Government Units in the Philippines. (Pending Journal Article)

Peñalba, L.M., Elazegui, D.D., Pulhin, J.M., Cruz, R.V.O., and E.H.O. Grande. 2009. Primer on Climate Change Adaptation Planning. (Pending Publication)

## **Acknowledgments**

The Project acknowledges the cooperation and support of the following:

1. SCUs: 1) Dr. Honorio M. Soriano, Jr. (President, Pampanga Agricultural College); 2) Dr. Romeo R. Quilang (President, Isabela State University; and 3) CVARRD Consortium
2. Provincial and municipal government officials and community residents of Ilagan, Isabela; Guagua, Pampanga; Kawit, Cavite; Rosario, Cavite; and San Juan, Batangas.
3. Resource persons: 1) Dr. Flaviana Hilario, Weather Services Chief, Climatology and Agrometeorology Branch, PAGASA; 2) Dr. Felino Lansigan, Professor, INSTAT and Co-Chair, Interdisciplinary Program on Climate Change (IdPCC), UPLB; 3) Dr. Roza T. Perez, Consultant, ADB Project, The Manila Observatory; 4) Prof. Nelson J.V.B. Querijero, Professor, Institute of Development Management and Governance, CPAf, UPLB; 5) Mr. Garrie A. David, Executive Director, PTFCC; 6) Engr. Nieves L. Bonifacio, Chief, Meteorology Office, PAGASA, Agromet Station, UPLB; and 7) Hon. Caesar B. Perez, Municipal Mayor, Los Baños, Laguna.

# Technical Report

## Preface

The project was designed primarily for awareness raising, capacity building and institutional development. The local government units (LGUs) and state colleges and universities (SCUs) partners applied the concepts and methods presented in the awareness raising seminar in assessing vulnerability of the study sites to climate change impacts, the results of which served as basis in preparing the Indicative Climate Change Adaptation Plan (ICCAP).

The project's outcome indicates that: 1) LGU-SCU-community alliance in science-based climate change adaptation planning is feasible; 2) the project interventions can be instituted in local development program; and 3) hands-on and output-oriented interventions can yield tangible results.

## Table of Contents

<b>1. Introduction</b>	6
<b>2. Methodology</b>	7
<b>3. Results &amp; Discussion</b>	10
Vulnerability of Study Sites to Climate Change Impacts	10
Socioeconomic and Geophysical Characteristics of the Study Municipalities	10
Economic Development Path	12
Climatic Events Experienced in the Study Sites in the Last 30 Years	13
Sectors Affected and Nature of Impacts by Climate Events	14
Adaptation Strategies of Communities and Local Government Units	17
The Indicative Climate Change Adaptation Plans	20
<b>4. Conclusions</b>	21
<b>5. Future Directions</b>	23
<b>References</b>	23
<b>Appendices</b>	24
A.1 Program of Activities: Climate Change Awareness Raising	
A.2 List of Participants: Climate Change Awareness Raising	
B.1 Program of Activities: Vulnerability Assessment Workshop	
B.2 List of Participants: Vulnerability Assessment Workshop	
C.1 Program of Activities: Indicative Climate Change Adaptation Plan Presentation	
C.1 List of Participants: Indicative Climate Change Adaptation Plan Presentation	
D Focus Groups Discussion Participants	
E.1 Program of Activities: Climate Change Awareness Raising and Adaptation Seminar (Guagua, Pampanga)	
E.2 List of Participants: Climate Change Awareness Raising and Adaptation Seminar (Guagua, Pampanga)	
F.1 Program of Activities: Climate Change Awareness Raising and Adaptation Seminar (Kawit, Cavite)	
F.2 List of Participants: Climate Change Awareness Raising and Adaptation Seminar (Kawit, Cavite)	
G.1 Program of Activities: Climate Change Awareness Raising and Adaptation Seminar (PAC, Magalang, Pampanga)	
G.2 List of Participants: Climate Change Awareness Raising and Adaptation Seminar (PAC, Magalang, Pampanga)	
H.1 Program of Activities: Climate Change Awareness Raising and Adaptation Seminar (Ilagan, Isabela)	
H.2 List of Participants: Climate Change Awareness Raising and Adaptation Seminar (Ilagan, Isabela)	
I.1 Program of Activities: Climate Change Awareness Raising and Adaptation Seminar (ISU, Echague, Isabela)	
I.2 List of Participants: Climate Change Awareness Raising and Adaptation Seminar (ISU, Echague, Isabela)	

## Funding sources outside the APN

## Glossary of Terms

### 1. Introduction

The Philippines is one of the countries that are highly vulnerable to climate change impacts because: 1) it is located in the Pacific typhoon belt and hence, exposed to physical climate related risk such as tropical cyclones, drought and climate variability; and 2) the population has generally low adaptive capacity. Tropical cyclone is the most common climate change event experienced by the country. On the average, 20 typhoons enter the Philippine Area of Responsibility (PAR) each year (Hilario, 2008).

Records show that these tropical cyclones are becoming more intense especially after the 1990s. For instance, in each of 2004 and 2006, four devastating typhoons hit the country within a 3-month period, causing a total damage of about PhP6-7 billion, many casualties, and thousands of people homeless.

Historical records indicate that there are 13 serious El Nino events that hit the Philippines from 1950 to 1999 (Concepcion, 2004). La Niña events also caused social, economic and environmental damages. Hazard risks often vary even from one micro-region to another. Hence, it becomes essential to use local knowledge for effective prevention measures and to adapt these to local threats and vulnerabilities. Recent observations of the GLOSS show indications of accelerated sea level rise (Jabines and Inventor, 2007). All these climatic events could have significant impacts on people's lives and properties

A number of programs and policies have been set in place and yet, property losses are increasing. Policies and corresponding implementation structures have been set-up from the national to the lowest units of government and yet, efforts to avoid substantial losses and casualties have been unsuccessful and could not cope with intensifying climate change impacts.

In the Philippines, local government units are in the forefront of disaster management including responding to the impacts of climate change. However, many LGUs are not aware of the climate change phenomenon and do not have the capacity to assist the affected communities in preparing climate change adaptation measures. Moreover, adaptation strategies and alternative policy options that have been recommended to LGUs have not yet been institutionalized (Concepcion, 2004). Disaster management should not be the sole responsibility of the government but should be a concerted effort of government, civil society and the scientific community. Local academic institutions have resources (e.g. scientists, students and facilities) that can be capacitated as LGUs' partners to further enhance local climate change adaptation capacity. LGU-scientists partnership can enhance science-policy interfacing to formulate effective climate change response strategies and ensure sustainability of adaptation plan implementation.

### ***Objectives***

This project generally aims to create awareness and develop capacity of LGUs, communities and regional universities to effectively respond to climate change for sustainable development.

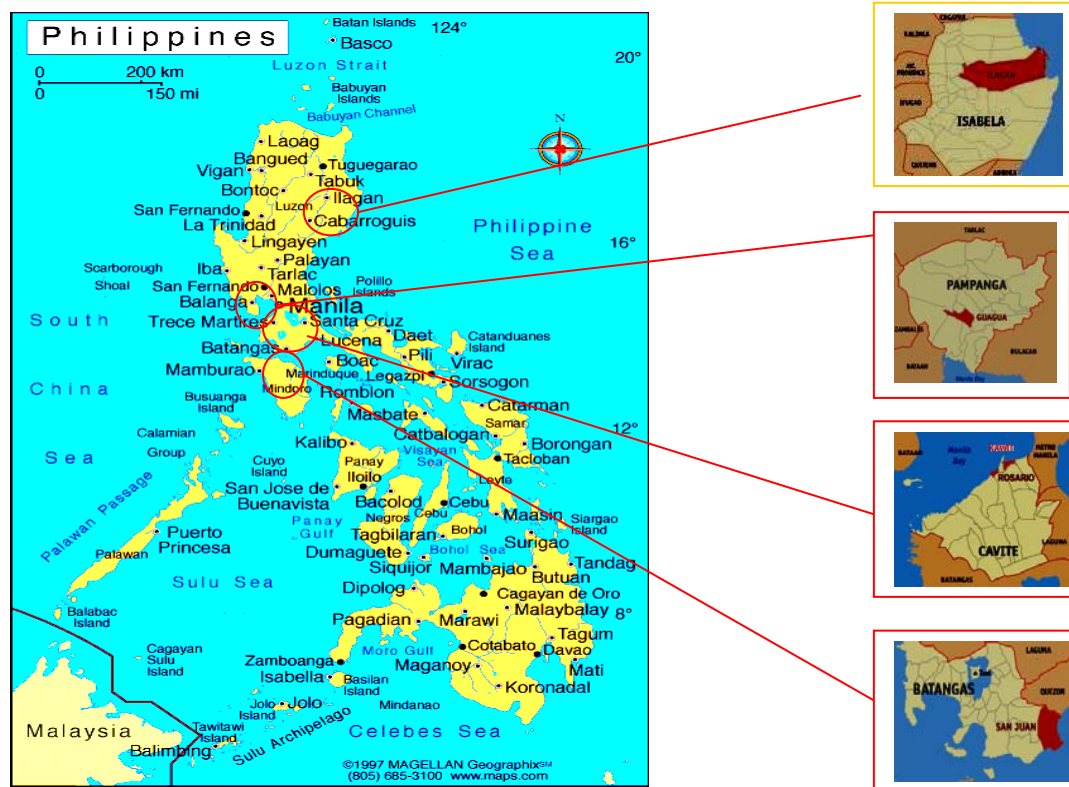
Specifically, this study aims to: 1) study the pattern of climate variability that affected the study sites in the last three decades and assess its social, economic and environmental impacts; 2) conduct awareness raising and capacity-building seminars, lectures, and workshops; 3) assist LGUs in the preparation of indicative climate change adaptation plans and programs; and 4) disseminate the findings of the study to policymakers, civil society organizations, other scientists and global change research programmes to contribute to the growing body of knowledge on climate change and the furtherance of science.

## **2. Methodology**

Five vulnerable municipalities in four provinces were chosen as study sites namely: Kawit and Rosario, Cavite, Guagua, Pampanga, San Juan, Batangas and Ilagan, Isabela (Figure 1). These sites were chosen primarily because: 1) they were classified as high risk provinces in terms of climate change; 2) they are strategically located in the region such that dissemination of project results to benefit the other provinces and municipalities in the region will be facilitated; 3) the local chief executives expressed their commitment to participate in all project activities; and



4) these are big food crop producers such that inaction on climate change adaptation could have significant impact on food security. Within these municipalities, the most vulnerable communities (*barangays*) were chosen as study sites.



Sources: [www.chanrobles.com](http://www.chanrobles.com) and [www.wikipedia.org](http://www.wikipedia.org)

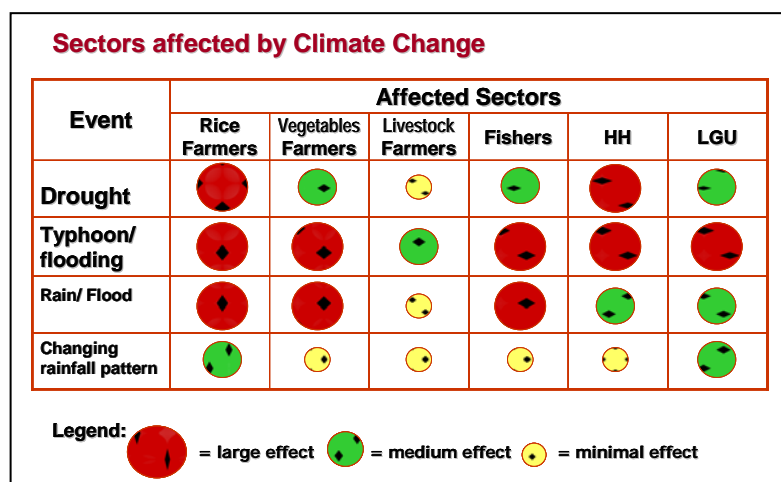
**Figure 1. Map of the Philippines showing the study provinces**

Skills development exercises on vulnerability assessment and climate change adaptation plan preparation were conducted using data from the most vulnerable barangays within the municipalities. Every learning and alliance building opportunities were maximized through participatory research, coaching and interactive discussion about climate change issues. To further amplify the awareness-raising objectives, vulnerability assessment was done through public consultations. The consultations started with a short lecture on the climate change phenomenon to inform the participants about climate change and the objectives of the project.

The focus group discussions (FGDs) employed a combination of participatory techniques such as time line analysis, stakeholder analysis, participatory vulnerability assessment, and community mapping of vulnerable areas. The choice of these techniques was to engage the local stakeholders in the process of assessing their current vulnerability. Time line analysis was used to determine the major natural occurrences experienced by the local communities that reflect climate variability and extremes in the last 30 years. A combination of stakeholder analysis, participatory vulnerability assessment, and community mapping techniques were used to identify the vulnerable sectors in the communities and where they are located, to determine the extent and nature of their vulnerability to climate variability and extremes (Pulhin, et al., 2006).

Vulnerability assessment was done with the participation of the study community residents who were asked to recall the extreme climatic events that affected their community and identify the sectors that were adversely affected by these events. Visual aids were used to help the FGD participants illustrate the varying degrees of impacts of these extreme climatic events on the affected sectors (Figure 2), a methodology developed by Pulhin, et.al (2006). The size of the rings show the

extent of the impacts i.e. the larger the ring, the larger the impact. The FGD participants were also asked to draw the map of their *barangay* showing the vulnerable areas and the factors that made them vulnerable.



**Figure 2. Visual aid showing the sectors affected.**

The losses incurred were estimated and strategies employed to cope with and mitigate the impacts were discussed during the FGD. Key informant interviews (KIIs) with Regional Disaster Coordinating Council (RDCC), Provincial Disaster Coordinating Council (PDCC) and Municipal Disaster Coordinating Council (MDCC) officials were conducted to validate the data obtained from the KIIs with local government officials and FGDs with community residents.

LGU officials were also interviewed to find out their response strategies, the constraints/barriers and facilitating factors encountered. The people's recollection of events was validated with historical records kept by national and local government agencies concerned.

Information gathered through KIIs and FGDs were analyzed and supplemented by secondary data collected from the records kept by the Municipal Planning and Development Office (MPDO), MDCC and PDCC. Some LGUs, however, do not have the data management systems and only keep current data. This constrained quantitative valuation of losses and damage-related to the climatic events experienced.

Climate change adaptation planning exercise was also undertaken by a composite team of scientists, LGU officials and community residents based on the vulnerability assessment results. The planning output, an ICCAP, was then presented to a multi-sectoral group that included local legislators for validation and confirmation. The adaptation plan formulated was only indicative because it covered only a few *barangays*. Partner LGUs are expected to apply the skills they learned in formulating a comprehensive, municipal-wide adaptation plan.

The individual vulnerability assessment report was prepared by the scientist partners while the ICCAP preparation was led by the LGU partners following a report format prepared by the UPLB team. Coaching and close monitoring were found important to ensure that report preparation was given due attention and completed on time.

Vulnerability Assessment results and ICCAP were presented in public forums to validate and disseminate information, solicit reactions and suggestions, create public awareness as well as encourage preparedness to climate change-related events and cooperation in the implementation of planned activities.

### **3. Results & Discussion**

#### ***Vulnerability of Study Sites to Climate Change Impacts***

Vulnerability Assessment was done with the participation of the community residents. Community residents were asked to identify the climate events that they experienced within the last three decades, the sectors affected and the extent of damage/losses incurred. Data and information generated during the public consultation were verified with secondary climatic records gathered and stored by government agencies concerned.

Vulnerability to climate change refers to propensity of human and ecological systems to suffer harm and their ability to respond to stresses imposed as a result of climate change effect. The vulnerability of society is influenced by its development path, physical exposure, distribution of resources, prior stresses and social and government institutions. The marginalized, primary resource-dependent livelihood groups are particularly vulnerable to climate change impacts if their natural resource base is severely stressed and degraded by overuse or if their governance systems are in or near a state of failure and hence not capable of responding effectively (Adger et al., 2007).

Exposure, sensitivity or susceptibility to changes brought by climate-related hazard or risks, and low adaptive capacity make the human and ecological system vulnerable to climate risks. These risks can be classified in terms of losses in (Charveriat, 2000): a) physical integrity: fatalities, injuries, illnesses, psychological distress; b) asset integrity: productive resources, housing; and c) income sources: impacts on the productivity of labor due to death of income-earning members, food insecurity, and health problems.

In the study areas, there are four (4) major climate change-related events to which the communities are highly vulnerable – typhoon, rainfall and seasonal variability, sea level rise and dry spell. All the study sites are vulnerable to typhoon and consequent flooding.

#### ***Socioeconomic and Geophysical Characteristics of the Study Municipalities***

The study covered five municipalities in three regions of Luzon, the northern part of the Philippine Islands. These municipalities are:

1. Ilagan, Isabela in Region 2 (Northern Luzon)
2. Guagua, Pampanga in Region 3 (Central Luzon)
3. Rosario and Kawit in the province of Cavite and San Juan, Batangas in Region 4A (Southern Luzon)

Agriculture was the main source of livelihood in all these municipalities. The average household size in the study areas was almost the same (4.6 to 4.9).

The provinces of Batangas, Cavite, and Pampanga are among the top twenty (20) provinces at risk to a combination of typhoons, climate variability and drought. Their geographical location and geo-physical attributes make them vulnerable to such climate events. One common feature of the study areas is their location along river bodies. Their relatively flat terrain makes them susceptible to flooding as the low gradient/slope contributes to slow water movement and localized water impounding.

Ilagan, Isabela, has a total land area of 116, 626 hectares, 32 percent of which is

devoted to agriculture. A great portion of the municipality is forested and illegally logged which provides livelihood to many residents, a major problem of the provincial and municipal governments. Ilagan has a population density of 1.12 persons per hectare.

It is located in the northeastern part of Luzon adjacent to the Pacific Ocean which is a typhoon belt zone. With no distinct wet and dry seasons, the area is also prone to drought (El Niño) and variable rainfall pattern. Five communities (herein after referred to as C1), located along the tail-end of a 133km long river, were covered by the project. Farming and fishing are the main sources of livelihood in the study community. Rice, which is the major crop, is grown on rainfed farms.

Guagua, Pampanga has a total land area of about 4,857has, about 60 percent of which are classified as agricultural. It has a population density of 23 persons per hectare. The entire town is traversed by a long river that drains into Pampanga Bay onto Manila Bay. The Pampanga delta is extremely vulnerable to even minor changes in local sea level.

The geophysical condition of this municipality is influenced largely by a major volcanic eruption in 1991. Tons of volcanic debris were deposited along the waterways and some settlements in the town which drastically changed the entire landscape. These lahar deposits block the flow of flood waters and contributed heavily to the siltation of waterways. The municipality has observed ground subsidence and saline water intrusion. The town elevation decreased from 1.8m above sea level in 2005 to 1.4m above sea level in 2009. Water quality in many parts of the town has deteriorated and become salty. These conditions prompted the LGU to pass ordinances regulating land use, water extraction and building code.

The study community (herein after referred to as C2) in this municipality covers the central business district along the coast. The main livelihood of settlers in the study community is fishing. The area is inundated particularly during high tide. Due to its low elevation, sea water floods the public market and major parts of the business district during high tide. Inundation of the community was a recent occurrence, which is an indication of the combined effect of ground subsidence and sea level rise, and existing facilities are highly vulnerable to such incident.

Rosario, Cavite, is the smallest of all the study municipalities with a total land area of 593.6ha. It is located along the coast of Manila Bay and a host to several industrial parks but the main source of livelihood for the local residents is fishing and fish processing. Fish processing (e.g. sun drying and smoking) is a major industry in the municipality.

Rosario serves as a catch basin and discharge point of the headwaters of two major river systems originating from the upstream municipalities. To the east, the Maalimango River traverses three barangays and flow onto the Manila Bay. The larger Canas River along the south-western boundary unloads large amounts of sediments making the port area shallow. With low elevation, Rosario also experiences sea level rise and salt water intrusion.

Industrial development in Rosario has grown steadily, as evidenced by the increasing number of requests for the establishment of firms/letters of intent, especially from the Cavite Economic Zone. This is expected to provide employment opportunities (MPDO, 2000), but could also exert pressure on its resources and facilities. As of 2007, it has a population density of 166 persons per hectare.

Industrial and economic development in Rosario has caused some environmental concerns such as solid waste management, drainage and sewerage and industrial waste water disposal that could exacerbate climate change related impacts. Five coastal communities (herein after referred to as C3) of Rosario were covered by the

study. Aquaculture and fish processing are the main sources of livelihood of the people in C3.

Kawit, Cavite, is also a coastal town, with a total land area of 1, 667.2 ha. and a population density of 38 persons per hectare. Its elevation is only over one meter above sea level making it highly vulnerable to sea level rise. It is located in the mouth of two major rivers, Ilang-ilang river and Imus-Bacoor-Binakayan river, that could bring flood waters throughout the area in the event of heavy rains or storm. These rivers and other tributaries empty their sediment load on the municipality's coastline. The hook-shaped configuration of the municipality's coastline hinders flood water and sediment movement towards the deeper part of the bay. It is located along the same coast as C3 and is also a catch basin for the upstream communities.

The study communities (herein after referred to as C4) in Kawit are located along the coast. Aquaculture and saltmaking are the people's main source of livelihood. During the dry season (November to April) about 10 percent of the fishponds are converted to saltponds. Saltmaking provides employment to many of the unskilled workers in and around C4.

San Juan, Batangas, is the largest municipality in terms of land area (27,340 ha.) but has a low population density (3.5 persons per hectare). Eight rivers drain the municipality of San Juan. Agriculture and fishing are the main sources of livelihood in this municipality. Tourism is a major industry and its beautiful beaches attract local and foreign tourists.

The study communities (herein after referred to as C5) here are located in the lowlands and agriculture is the main source of livelihood of most of the people. Rice is the main crop grown by the farmers. Various kinds of vegetables are also grown by some farmers on a small scale. The study villages used to be served by a relatively large irrigation system that enables the farmers to grow 2-3 croppings of rice per year. However, the irrigation dam was destroyed by heavy flood waters brought about by a strong tropical cyclone. To date, farmers plant rice only once a year. Due to lack of irrigation water, farmers only depend on rainfall and therefore, are highly vulnerable to variations in the amount and distribution of rainfall.

### ***Economic Development Path***

The municipalities covered by the study are classified as first class that is, the LGU's average annual income is greater than PhP50 million (US\$1 million). While agriculture and/or fishing remain to be the major sources of livelihood of the populace, there is notably an increasing pace of urbanization in the study areas. Kawit and Rosario of Cavite are already classified as urban municipalities. Rosario hosts the 276 hectare-Cavite Export Processing Zone (CEPZ).

Proximity of the study areas to Metro Manila (except Ilagan, Isabela) as well as the formation of the CALABARZON (Cavite-Laguna-Batangas-Rizal-Quezon) industrial zone in the early 1990s has influenced their rural-urban transformation. The emergence of commercial and industrial activities in these municipalities has even resulted in conversion of some agricultural lands into non-agricultural uses. Commerce and business activities are generally geared to trading, manufacturing, tourism, real estate and service-oriented businesses.

Industrial and economic development has reportedly caused some natural resource and environmental concerns such as solid waste management, drainage and sewerage and land, water and forest degradation. These have aggravated the effects of extreme climate events such as flooding and salt water intrusion.

The development path taken by the municipalities of Ilagan, Guagua and San Juan differs significantly from that of Kawit and Rosario. Guagua's economic development largely caters to the needs for services of its residents and that of the surrounding municipalities. On the other hand, Ilagan being the provincial capital is the seat of regional government offices but because of its large area, development in the town center hardly radiates to the rural villages. Therefore, C1 remains to be rural and uninfluenced by urban development. San Juan capitalized on its natural resource endowments and developed its coastal areas for tourism. However, the economy of inland villages remains agricultural and rural.

### ***Climatic Events Experienced in the Study Sites in the Last 30 Years***

The climatic events discussed here were those experienced by the residents of the study communities, which local authorities identified as the most vulnerable to climate change-induced impacts (Table 1).

Results of the focus group discussions show that all the study communities encountered typhoons, highly variable rainfall pattern and distribution, and long dry spell in the last 30 years. Strong typhoons have been experienced even in the 1970s and 1980s but typhoons have increased frequency and intensity since the 1990s. The people could vividly recall the havoc caused by the major typhoon events they have experienced.

They have likewise experienced more hot days and hot nights which caused greater discomfort due to high humidity level. Moreover, they feel that the heat, particularly in the open fields is more scorching now and less tolerable than before. The community residents also noted the highly variable rainfall pattern and distribution which became more pronounced particularly in the 2000s. They observed that heavy downpour that last for only a few minutes even during sunny days is a common occurrence in the recent years.

Seasonal variability was also observed. In the Philippines, Type 1 climate within which C2 to C5 belong is characterized by distinct wet and dry seasons. Hence, rainfall is expected to be high during rainy season and low during the dry season. In fact, historically, it is not uncommon to have two to three months of dry spell during the dry season and 30 days of continuous rain during the wet season. However, the community residents noted that in the recent years, typhoon would come even during the dry season and dry spell can be experienced even during supposedly rainy season.

It was also observed that rainfall distribution has changed. Historically, rainfall is distributed almost evenly throughout the entire municipality. However, in recent years, there were occasions when it would be raining on some parts of the village but dry and hot in other parts of the village.

In the coastal communities, fisherfolks have observed sea level rise. In C4, fisherfolks uses mangrove trees as sea level gauge. They reported that, in the recent years, sea level during high tide goes beyond the set mark. Sea water now also inundates some areas in C2, C3 and C4 during high tide which were not observed in the past. Flooding due to high tide lasts for three to five hours.

Flooding brought about by different climatic events were experienced in all the study sites. For instance, C1 and C5 experienced flooding caused by typhoons and heavy rainfall. On the other hand, in C2, C3, and C4, flooding was also caused by accelerated sea level rise (ASLR).

It was found that the general description of events as well as the period of occurrence of such events were consistent with government records. These findings indicate that community residents' recollection of climatic changes have a certain degree of reliability and accuracy.

**Table 1: Climatic events experienced in the study communities in the last 30 years**

Community	Event			
	Typhoon	Variable Rainfall	ASLR	Dry-spell
C1: Ilagan, Isabela	✓	✓	-	✓
C2: Guagua, Pampanga	✓	✓	✓	-
C3: Rosario, Cavite	✓	✓	✓	-
C4: Kawit, Cavite	-	-	✓	-
C5: SanJuan, Batangas	-	-	-	✓

### ***Sectors Affected and Nature of Impacts by Climate Events***

The sectors affected and the nature of impacts of the experienced climatic events vary by type of event, the geographic location of affected sectors and their socioeconomic conditions (Tables 2 and 3). Typhoon, which brought strong winds and flooding, is the most devastating climate event because it affected all sectors of society.

### **Agriculture**

The farmers are the ones hardest hit by these climatic events because agriculture, particularly rice crops is very sensitive to water and temperature stress. The farmers were also adversely affected by highly variable rainfall pattern and distribution that were observed to happen more frequently in the recent years. For instance, in C1 and C5, planting calendar usually starts in June. Historically and traditionally, the rainy season is June to November. However, in recent years, there were incidents that dry spell or heavy rainfall sets-in immediately after seedlings have been planted or seeds have been sown causing the planting materials to die due to water or heat stress. These events adversely affected the farmers whose lands are not irrigated and do not have the capability to rent or buy irrigation pumps or the needed technology such as early maturing crop varieties.

The strong winds that come with typhoon can uproot trees or cause fruits to fall. On the other hand, flooding that may be caused by typhoon or heavy rainfall can wash away or flatten crops. All these extreme climatic events could cause decline in harvest and therefore, reduced income for farmers. Natural recovery period for perennials can take long. For instance, in C5, it took one to two years for coconut trees that are damaged by strong winds to regain normal levels of productivity. Farmlands silted by sediments brought by floods also took awhile to recover. One of the farmlands in C5 could no longer be used for growing rice and has remained idle for about three years now because the topsoil was covered by gravel and sand deposited by flood waters.

Also in C5, an irrigation dam was destroyed by strong floods brought by a typhoon. Repair of this dam requires a substantial amount of money beyond the capability of the LGU. This dam which used to serve about 200 ha. of rice land remains unserviceable.

Flooding has a positive effect on some of the farmlands in C1. The sediments brought by the floods from upstream enhance the soil fertility in the river delta and benefited the farmers. However, dry spell which is most common in C1 than in other study communities adversely affected their farming operations.

## **Fishing**

Typhoons, flooding and salt-water intrusion have also significant effects not only in open-sea fishing but also in aquaculture. Fisherfolks could not go out to fish during bad weather condition due to the risk of strong waves and current. Many fishing boats that ventured into the open seas during stormy weather have reportedly capsized that led to loss of lives. A number of fishing boats and gears have also been destroyed because of the strong winds and ocean waves in some parts of C5 brought about by typhoons. Many fish pens and fish cages were also destroyed due to strong currents and strong winds. Saline water intrusion on fish ponds in C2 have adversely affected the growth of fish that led to low income of operators and workers.

The most seriously affected are the artisanal fishers who fish in the so-called municipal waters and depend on daily fish catch for subsistence. Low fish catch and fish harvest means low income for fisherfolks and fishponds/cage operators but the most vulnerable groups in this sector are the helpers who are paid wages based on the volume of fish catch or harvest.

Typhoon, flooding and rainfall variability also affected the fish processing industry in Community 3. The schedule of fish drying activities was disrupted due to rainfall variability and flooding damage the fish smoking facilities.

## **Salt-Making**

Climate change has significant impacts on the salt-making business. C4 belong to type 1 climate with distinct dry season from November to April and rainy season from May to October. This weather pattern enabled the saltmakers to clearly program their activities. Saltpond preparation starts at the onset of dry season in November. Salt naturally crystallizes on the dried ponds and harvesting usually starts in December and January when sufficient amount of salt have accumulated and last up to April or early May. This cycle of operations has been traditionally observed by the saltmakers for decades. Saltmaking is a profitable business that provides employment to unskilled or hired workers. Saltponds are usually located in areas that are not accessible to motorized vehicle. Harvested salt are manually hauled from the pond to the roadside warehouses.

In the recent years, changes in weather condition particularly variability in rainfall pattern disrupted the saltmaking calendar and adversely affected the profitability of the saltmaking business. There were many times in the recent years when heavy rains and even typhoons would come in December to January and wash away or melt the salt crystals that were ready for harvests.

Accelerated sea level rise which in the recent years caused the inundation of erstwhile dried saltponds has also become a problem for the operators.

## **General Public**

Typhoon and flooding caused disruption of basic services, damage to facilities and gave rise to illnesses and water born diseases and constrained the mobility of the general public. Public school buildings are used as evacuation centers or temporary shelter for evacuees. The outbreak of illnesses and water borne diseases, which usually happen in the evacuation centers or in submerged areas was a serious problem. It also poses risks to the school children who will again use these classrooms when the bad weather condition subsided as well as the surrounding communities.

Landslides and flooding brought by typhoons and heavy rainfall have caused serious casualties (i.e. deaths, injuries and damaged houses). Food shortage among



community residents who opted to stay on their houses rather than evacuate during flooding is common in the study areas. Prices of food stuff also increase after typhoon or flooding events making it less affordable particularly to the low income consumers.

A long-term effect of flooding is the decline in the value of real property located in flood prone areas of C2, C3 and C4. For instance, lands that use to fetch a value of \$100 per square meter is now appraised at \$50 per square meter. Land market for such properties have apparently diminished in C3. Properties which were valued at \$70 per square meter is now offered for \$40 per square meter and yet there are no takers.

The strong winds and heavy rainfall that typhoon brings greatly affected the people whose houses are mostly built of light materials and who are illegally squatting on river banks. These situations were observed in C1 and C4 where there are many landless residents. Many of the landless poor families illegally built their houses on riverbanks which are classified as public lands. They are the people who are always at risk during typhoons because of the danger that rushing flood waters will wash away their dwelling units. Many of them could not do autonomous adaptation actions because of lack of response strategies and limited evacuation options. They are, therefore, the subject of evacuation and rescue operation and brought to evacuation centers where they are provided relief assistance such as food, clothing and temporary shelter.

The poor families whose houses are built of light materials are also vulnerable to the impacts of strong winds. There were many instances when rooftops were blown away or the entire house collapsed because it could not stand the strong wind velocity.

### Local Government Units

All these climate events adversely affect the LGUs in three ways: 1) lost/less revenue collection; 2) increased expenditure for relief and rescue operations and rehabilitation; and 3) loss of investments. When commerce and trade are disrupted due to typhoon and flooding, LGUs could not collect taxes and other fees from the affected businessmen. On the other hand, the LGU incur greater costs in terms of providing protection to threatened sectors and relief assistance during and immediately after the event and rehabilitation of damages to public service facilities like school buildings, public markets and roads. Moreover, investments would not flow in areas that are adversely affected by climate-induced events and therefore, adversely affect local development.

These findings indicate the need to review the climate typology of the Philippines and the need to assess the value of losses so that institution of appropriate adaptation measures can be fully appreciated and justified.

**Table 2: Sectors in study communities adversely affected by climatic events**

Sector	Event			
	Typhoon	Variable Rainfall	ASLR	Dry spell
Agriculture	✓	✓	-	✓
Fishery	✓	✓	✓	-
Salt-making	✓	✓	✓	-
Commerce and Industry	✓	✓	✓	-
Tourism	✓	✓	-	-
General Public	✓	✓	-	✓
LGU	✓	-	✓	-

**Table 3. Impacts of major events in study communities.**

<b>Sectors affected</b>	<b>Impacts</b>
Agriculture	<ul style="list-style-type: none"> <li>- Flooding of lowland farms</li> <li>- Heavy siltation and sedimentation of farms</li> <li>- Damaged crops/less harvest/less income</li> <li>- Damaged irrigation facilities/dikes</li> </ul>
Fishing	<ul style="list-style-type: none"> <li>- Heavy siltation and sedimentation of fish ponds</li> <li>- Destruction of fish pens/cages</li> <li>- Less fish catch/income</li> <li>- Destruction of fishing boats and gear</li> <li>- Less income for fish processors/hired workers</li> </ul>
Saltmaking	<ul style="list-style-type: none"> <li>- Destroyed/silted salt ponds</li> <li>- Saltmaking schedule disrupted</li> <li>- Reduced income for salt pond owners</li> <li>- Income loss for workers</li> </ul>
General public	<ul style="list-style-type: none"> <li>- Flooding of urban/lowland areas</li> <li>- Damaged infrastructures (houses, schools, buildings)</li> <li>- Interruption of public services (school, electricity)</li> <li>- Incidence of diseases like flu, fever, diarrhoea and amoebiasis</li> <li>- Injured/dead persons</li> <li>- Food shortage</li> <li>- Decline in value of real property</li> </ul>
Commerce and trade	<ul style="list-style-type: none"> <li>- Reduced/disrupted business activities</li> <li>- Low sales → income</li> </ul>
Local Government Units	<ul style="list-style-type: none"> <li>- Reduced business tax collection</li> <li>- Increased expenditures for relief operations</li> </ul>

### ***Adaptation Strategies of Communities and Local Government Units***

#### **General Public**

Residents of the study communities are generally poor and have limited economic options but their limited aspirations and wants and their positive outlook and attitudes in life enhance their resilience and adaptive capacity, albeit at a low level.

Some of the typhoons and flood victims were fortunate to have received financial assistance from their LGUs to help them start anew. All the LGUs provided starter seeds, loans and grants for house or boat repairs which amount to about \$50 per household. However, only 10 to 20 percent of the victims received such help.

As expected, economically better-off victims have greater resilience. They were able to obtain loans as new capital for the same business, and upgrade their facilities. For instance, the fish processors elevated their fish processing plants beyond the estimated flood water level.

The community residents have basically the same response actions to typhoons. In the rural areas wherein the houses of the focus group discussion participants are made of light materials, the immediate response action is to reinforce their houses by tying their roofs or putting heavy objects such as tires or hollow blocks to prevent the roofing material being blown away by the wind. Sometimes, those are able to hold the roofing materials in place. Others, whose roofing materials have worn-out, use pails to catch the rain waters that gushes through the hole.

Many residents refuse to take precautionary measures and evacuate to safer places despite impending typhoon-induced hazards. They are resistant to leave their

houses and would rather take the chance and hope that the storm will subside or the typhoon will not make a landfall. In many instances, people would rather go up to their rooftop until they are rescued and forcibly brought to evacuation centers.

Strong social cohesion and strong social capital were found to be pervasive in the study communities. Neighbours, regardless of socioeconomic condition, provided food, shelter and even clothes to those in need. Enterprising store owners used improvised amphibious vehicles to sell food stuff to residents whose mobility was restrained by flood waters. In C2, boat owners use their boats for public transportation and served as their source of income in times when they could not go out for fishing. Fisherfolks whose fishponds or fish cages were destroyed by floods or strong current had no other choice but re-seed the pond/cage.

In flood prone areas, residents employed temporary adaptation measures such as placing their appliances and furniture on the second floor of their 2-storey houses or on stilts in anticipation of possible flooding. Households generally prepare alternative lighting materials and cooking fuel at the start of the rainy season because power outage is common during the typhoon period. Candles, lamps with rechargeable batteries and kerosene lamps as well as charcoal-fuelled stove are common adaptation strategies by many households.

Sharing of limited resources is common to Filipino families. A family of six whose damaged house is no longer liveable opted to share a shanty with a relative with five children. Shared poverty is a virtue that many Filipino families possess.

### **Farming and Fishing Communities**

Farmers whose crops have been damaged by either flooding or dry-spell had to wait and hope for favourable weather. There were also instances when farmers had to repeat planting three times because the seed that they had sown were destroyed due to seasonal variability. In other communities, rain did not come, hence, farmers waited for the next planting season. Some farmers planted cash crops but others did not diversify cropping or income sources. In instances where flood or drought occurred in the middle of the cropping season, before flowering stage, farmers could do nothing but wait for the next planting season. Meanwhile, farmers just have to borrow from input/output dealer to survive.

Climate forecast application is a skill that farmers should learn to help them plan their farming activities and avoid such losses. However, most farmers are not aware of the availability and usefulness of climate forecast. Government extension workers should also learn this skill so they can use Philippine Atmospheric Geophysical and Astronomical Services Administration's (PAGASA) climate forecast in helping farmers adjust their planting calendar and advise them to diversify cropping accordingly.

### **Salt-makers**

Saltmakers have the most limited adaptation options and the most vulnerable to climate/rainfall variability. The distinct wet and dry season historically experienced under Type I climate is ideal for salt making. However, the unpredictable weather pattern recently experienced prevented salt makers to plan their operations effectively. Hence, most of them gave-up their operations.

### **Local Government Units**

Climate change adaptation in the Philippines is facilitated by a set of organizational structures from the national to the smallest unit of government and a set of protocols, systems and procedures on disaster risk management (DRM) and disaster risk reduction (DRR) that have been in place and strictly monitored for about 10 years now.

Promotion of DRM and DRR policies were prompted by the several incidents of strong typhoons that hit the country in the last decade and brought losses amounting to PhP6 to 7.8 billion (USD120M to USD150M).

In terms of organizational structures, disaster coordinating council/committee has been set-up at the national, provincial, regional, municipal and barangay (village) levels. LGUs at the provincial and municipal levels are allowed by law to set aside five percent of their regular income as calamity fund which can be used for relief and rescue operation when their province/town is declared as a calamity area. The local legislative council is also mandated by law to declare if their area is in a state of calamity based on the extent of damages incurred.

This mechanism is effective as a short-term response action. However, much is yet to be done in terms of long-term response to climate change impacts. Preparedness by communities and institutions should be emphasized instead of reactive response actions.

The national government through the Department of Interior and Local Government (DILG) has issued Memorandum Circulars (MCs) to alert LGUs about the need for awareness-raising and capacity-building and to empower LGUs in autonomously responding to climate change and preparing their adaptation plans.

Among the national government issuances are: 1) DILG-MC 2008-69 (Encouraging LCEs and Sanggunians to Implement Climate Change Adaptation and Disaster Risk Reduction Measures); 2) DILG-MC 2008-123 (Mobilizing Local Actions to Address the Impacts of Climate Change), 3) DILG-MC No. 2008-161 (November 3, 2008) (Trainor's Training on Mobilizing Actions to Address the Impacts of Climate Change); 4) DILG-MC No. 2009-21 amending MC No. 2008-123 to include the National Movement of Young Legislators as one of the institutional partners in Mobilizing Local Actions to Address the Impacts of Climate Change; and 5) DILG-MC 2009-73 (National Conference on Empowering LGUs to Clean the Air and Address Climate Change Through Partnership).

Under this circular, all LGUs are mandated to undertake an initiative on mobilizing local action to address the impacts of climate change in four phases: Phase 1- Awareness-Raising; Phase 2 – Legislative and Executive Actions; Phase 3- Assessment of Actions and Phase 4- sustaining strategies. However, compliance with these MCs has been slow and limited. For instance, as of April 2009, only four out of 17 regions have complied with these circulars (BLGS, 2009).

In three of the five study communities, the LGUs followed general DRM protocols which include mobilizing the local disaster coordinating council, monitoring the status of the event and affected communities, mobilization of the Calamity Fund, forewarning/informing vulnerable communities of impending event, evacuation, relief and rescue operations. No long-term preparedness plans or actions are yet in place aside from C2 and those contained in the ICCAP that was prepared under the APN funded project.

C2 and C4 have structural and non-structural adaptation strategies on top of the reactive response actions prescribed in the DRM protocol to protect the communities and minimize or mitigate climate change induced impacts. C2 instituted more innovative policies and has long-term plans to safeguard not only the fisherfolks and business sectors that are directly affected by flooding, saline water intrusion and land subsidence, but for the other sector as well.

C2 LGU is the only LGU that has early warning system (EWS) in place with clear procedures that are known to all sectors. Their EWS has three major components such as: 1) the rain gauge, to measure rainfall, 2) flood warning system and 3) information dissemination. This early warning system has been effective in reducing

losses, protecting lives and properties and further aggravating the effects of other environmental problems such as ground subsidence.

### ***The Indicative Climate Change Adaptation Plans***

The partner LGUs' plan to respond to the climate events differ depending on the extent of vulnerability, the sectors affected and their own capabilities. For instance, the ICCAP prepared for C1 puts special emphasis on agriculture, forestry and related sectors which are the main sources of livelihood in the study communities. Structural response strategies include installation of soil and water management facilities and communal irrigation systems while non-structural strategies include establishment of a community-based (barangay level) forest rehabilitation and protection, establishments of cooperatives and microfinance to enhance possible funding for alternative livelihood, creation of sustainable livelihood projects, and installation of pre-disaster warning and monitoring device.

The LGU that covers C2 showed the highest adaptive capacity. They have well trained manpower that may implement the DRM plan and prepare their ICCAP. Among the study municipalities, only this LGU has data and knowledge management system, early warning system and local ordinances (e.g. building code, land use code) to institutionalize adaptation strategies. It is not a rich municipality but it was able to mobilize resources and motivate the people to cooperate with the authorities. Their ICCAP is not elaborate but science-based and achievable given their limited means. C2 showed the capacity for anticipatory adaptation. They prepared long-term plans in anticipation of the possible worsening of flooding, saline water intrusion and ground subsidence to safeguard the sectors that are potentially at risk. The plan includes the redirection of local development towards higher elevation and away from flood prone areas, upgrading of roads to increase its elevation above flood water level and conduct of awareness raising and preparedness exercises throughout the municipality. This outlook may have been honed by their horrible experiences with flood and lahar flow brought about by the Mt. Pinatubo volcanic eruption in 1991. The LGU staff gained knowledge and skills from the programs brought to the town after the catastrophe and have applied such knowledge and skills together with the concepts and skills learned from this project in the ICCAP preparation and DRM planning.

ICCAP of C3 includes vigorous information and education campaigns (IEC), monitoring measures for improved decision making, enhanced compliance of existing laws, adoption of Geographic Information System, and participation of LGUs and stakeholders in the implementation of climate change adaptation plans and programs.

The ICCAP for C4 targets the protection of fishing and saltmaking industries. The planned activities include: a) rehabilitation of fishponds and use of new finfish species as material for aquaculture activities and development of new techniques with the help of experts to sustain fishpond operation; b) construction and reinforcement of mud dikes to protect fishponds and prevent overspill due to sea level rise or flooding and improve aeration to help normalize oxygen supply; c) construction of road dikes as flood control measure and facilitate access to fishponds; and d) building of tidal/flood gates or check dams as mitigating measure against sea level rise which caused flooding during high tide.

Community 5's ICCAP focuses on mobilizing action to address climate change in four (4) phases - awareness building; legislative and executive actions; assessment of actions; and sustaining strategies. Legislative and Executive Action includes environmental and watershed protection. C5 has a strong planning capability because of its trained manpower but greater involvement of the local political leadership is needed to guide, mandate and empower the staff to take the initiatives in climate change adaptation planning.

#### 4. Conclusions

1. This project seems to have kindled the interest of other LGUs and other scientists in climate change issues as evidenced by their attendance and active participation in the project's dissemination forums. During the initial stage of project implementation, potential partners, the LGU officials and scientists were not very keen to join the project. Many of the LCEs were not very receptive of the idea and believe that their DRM is sufficient to meet their needs and that climate change is not felt in the town. Some scientists were likewise not receptive to the invitation. However, upon learning more about this project, some LCEs asked if they could still be included in the project. Moreover, during the dissemination forums, many LGUs showed appreciation of the advantage that participating LGUs gained. Many scientists also expressed their interest to join similar climate change research in the future. This change in attitude may have been influenced by their increased awareness about the climate change phenomenon and appreciation of the skills that their colleagues have learned about vulnerability assessment and climate change adaptation planning.
2. The participatory action research method employed enabled the project to reach a wider audience and meet its climate change awareness-raising and capacity building objectives. The community residents who participated in the vulnerability assessment workshops were able to put into proper context the climate variability and the intense typhoon that they have experienced in the last three decades. People have gotten used to natural calamities and attribute the recent increase in the number and intensity of typhoon to natural or even super natural factors beyond human control that they have to live with. The brief lecture on climate change phenomenon that preceded every public forum provided scientific explanation about the extreme climate events that they have experienced.
3. The vulnerability assessment method employed by the project has limited application and a science-based approach using scientific instruments that will measure the exposure to climate risks as well as aggravating factors such as slope and elevation that would allow the vulnerability map preparation could provide more accurate and scientific basis. The vulnerability assessment that was done by the focus group discussion participants was qualitative and based on recall of previous events. The approach was adopted from Pulhin, et.al (2006), which was found useful for generating community awareness and qualitative assessment. However, quantitative vulnerability assessment would be more useful in prioritizing projects and fund allocation especially for structural adaptation measures.
4. Climate change adaptation plan preparation is an initial indication that all participating LGUs have recognized the importance of preparedness in responding to climate change impacts and that indeed climate change is real and that DRM is not enough if the LGU has to effectively respond to climate change impacts. The project produced only an indicative climate change adaptation plan because it covered only the most vulnerable barangays in the study municipalities and the vulnerability data generated are not sufficient for a municipality-wide adaptation plan. The idea was to imbue the LGU staff and scientists with climate change adaptation planning skills that they can apply to the entire municipality for which they will prepare a comprehensive climate change adaptation plan.

The report/plan that was prepared is only preliminary in nature but its essential elements have been integrated into the so-called annual investment plan (AIP) of the municipalities. The projects included in the AIP are considered priorities and therefore have to be funded. The integration of the identified adaptation measures into the AIP is an indication of the project impact.

5. There are indications that the project partners imbibed climate change concepts

and learned the rudiments of vulnerability assessment and climate change adaptation planning. The vulnerability assessment report and ICCAPs that were prepared have served the purpose but further refinements in the format and presentation are needed. More in-depth training on quantitative vulnerability assessment methods would still be desirable.

6. The dissemination forums reached a broad spectrum of audiences including local legislators, elementary and high school teachers, local media, other LGUs, scientists, civil society groups and farmers and fisherfolks. The project took advantage of those occasions not only to present the project results but also to deliver lectures on the climate change phenomenon and improve people's understanding about climate change. These lectures also helped the audience put the project results into proper contexts for greater appreciation.

Among the interesting feedbacks from the forum participants were: 1) teachers requested for additional background materials or ready to use/packaged teaching materials; 2) requests from some LGUs for assistance in obtaining biophysical and climatological data for their municipality as well as vulnerability assessment and adaptation planning; and 3) community residents advised the LGUs to inform the general public about climate change so that greater community cooperation in adaptation strategy implementation can be easily solicited.

7. There are a number of climate change awareness-raising initiatives that have been recently launched but Project partners noted that hands-on and interactive training can yield more lasting impact/results than one-time lectures. Coaching and close monitoring were also found important to ensure the timely completion of the VAR and ICCAP.
8. The most devastating climate event that was experienced in all sites was typhoon and the consequent flooding that it caused. The hardest hit sectors are the farmers, the fisher folks and the general public particularly those who live on river banks and in houses built of light materials. Greater climate variability and long dry spell have also been observed by the FGD participants. These climate events have significant adverse impacts on farmers and saltmakers whose farming and saltmaking activities were severely disrupted. Accelerated sea level rise also caused damage to fisherfolks, general public, local business operations, and water quality and has caused decline in land value in affected communities.
9. The common response strategies by communities and LGUs are temporary and reactive in nature. Preparedness, community initiated collective action and search for permanent solutions have yet to be initiated.
10. An aspect of adaptation that has not yet been fully explored is climate forecast application. PAGASA is building its climate forecasting capability. Government extension workers should be trained on climate forecast application so that they can help farmers adjust their planting calendar and cropping patterns accordingly. A joint project on climate forecast application along with other skills development efforts is being contemplated.
11. Much is yet to be done to convince institutions and populations at risk to undertake effective response actions and formulate adaptation measures. Beyond awareness-raising, they should know what feasible adaptation options they can choose from and the social and economic implications of each option. Measures to enhance their adaptive capacity should be identified scientifically. Given the resource poor condition of the LGUs and the population at risk, the formidable challenge is to come-up with economically feasible, socially acceptable and effective adaptation options. Collective action, networking with state and non-state actors and the political will, the openness to learn from others' experiences and best practices are critical for the success of this activity. The various ICCAPS contain adaptation strategies that call for structural and institutional interventions. The time frame for the ICCAP implementation varies

from short to long term and in all the municipalities priority measure have been integrated into the comprehensive AIP.

## **Future Directions**

The knowledge and experiences generated by the project shall be shared with various sectors to further amplify its awareness raising and skills development impacts. Dissemination of project results can be done in a number of ways:

1. Experiences generated by this project and the compilation of lectures will be used in designing a training program for LGUs
2. The Booklet on Climate Change and Municipal Level Adaptation Planning will be distributed to LGUs, SCUs, CSOs, media, elementary and high school teachers and other sectors that participated in the dissemination forums.
3. Teaching materials may be developed in coordination with the Department of Education for the benefit of elementary and high school students.
4. Preparation and distribution of a more popular version of the booklet
5. Presentation of project results in scientific conferences to continue dissemination

The project partners can apply the lessons learned to broaden the project impact in their respective sectors, i.e.: 1) local planners can expand their ICCAP and prepare their comprehensive adaptation plan for the entire municipality and can also share their experiences and learning with other LGUs; 2) local scientists can pursue research on climate change adaptation planning in their universities and work with local planners in expanding their local adaptation plan; and 3) UPLB team is committed to extend their services to interested sectors.

## **References**

- Adger, W.N., S. Agrawala, M.M.Q. Mirza, C. Conde, K. O'Brien, J. Pulhin, R. Pulwarty, B. Smit and K. Takahashi (2007), "Assessment of adaptation practices, options, constraints and capacity", in M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson (Eds.), *Climate Change: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge, UK, pp. 717-743.
- BLGS. 2009. Personal communication.
- Charveriat, C. (2000), *Natural Disasters in Latin America and the Caribbean: An Overview of Risk*, Working Paper No. 434. Washington, D.C.: Research Department, Inter-American Development Bank.
- Concepcion, R. 2004. *Gateway to Land and Water Information*. Philippines National Report.
- Hilario, F. P. 2008. *Climate Trends/Change in the Philippines*. Paper presented during the Climate Change Awareness Raising Semina, CPAf, UPLB, August 14-15, 2009
- Jabines, A. and J. Inventor . 2007. *The Philippines: A Climate Hotspot Climate Change Impacts and the Philippines*, Greenpeace Southeast Asia, Climate and Energy Campaign.
- Municipal Planning and Development Office. 2000. *Comprehensive Land Use Plan of Rosario, Cavite (CLUP-Rosario)*
- Pulhin, Juan M., Rose Jane J. Peras, Rex Victor O. Cruz, Rodel D. Lasco, Florencia B. Pulhin, and Maricel A. Tapia. 2006. *Vulnerability of Communities to Climate Variability and Extremes: Pantabangan-Carranglan Watershed in the Philippines*. AIACC Working Paper No. 44, October 2006.



## **APPENDICES**

## APPENDIX A.1

### PROGRAM OF ACTIVITIES: CLIMATE CHANGE AWARENESS-RAISING SEMINAR/WORKSHOP

August 13-15, 2008

College of Public Affairs, University of the Philippines Los Baños

#### PROJECT BRIEF

##### *"Enhancing the Climate Change Adaptation Capacity of Local Government Units and Scientists in the Philippines"*

This project is in line with APN CAPaBLE Programme's emphasis on science-policy interfacing, awareness raising and dissemination activities. In the Philippines, local government units (LGUs) are in the forefront of disaster management including responding to the impacts of climate change. However, many LGUs are not aware of the climate change phenomenon and do not have the capacity to assist the affected communities in preparing climate change adaptation measures. Local state universities have resources (e.g. scientists, students and facilities) that can be capacitated as LGUs' partners to further enhance local climate change adaptation capacity.

LGU-scientists partnership can enhance science-policy interfacing and ensure sustainability of adaptation plan implementation. This project generally aims to develop the capacity of LGUs and local scientists to formulate climate change response strategies.

Specific objectives: 1) study the pattern of climate variability that affected the study sites and assess its social, economic and environmental impacts; 2) conduct awareness raising and capacity-building seminars, lectures, and workshops; 3) assist LGUs in the preparation of indicative climate change adaptation plans and programs; and 4) disseminate the findings of the study to policymakers, civil society organizations, other scientists and global change research programmes to contribute to the growing body of knowledge on climate change and the furtherance of science.

Among the activities that we shall undertake are: 1) awareness raising seminar on the climate change phenomenon for LGU staff and scientists; 2) collect data needed to prepare ICCAP for the study municipalities; 3) workshop and presentation of survey results; and 4) ICCAP preparation and presentation to a panel of reactors.

#### PROJECT TEAM

**Dr. Linda M. Peñalba, UPLB,**  
Project Leader  
**Dr. Rex Victor O. Cruz, UPLB**  
**Dr. Juan M. Pulhin, UPLB**  
**Ms. Dulce D. Elazegui, UPLB**  
**Dr. Januel Floresca, ISU**  
**Dr. Rogelio Cosio, PAC**  
**Dr. David Cero, CvSU**  
**Ms. Enrica Esmero, CvSU**  
**Dr. Edna Vida, CvSU**

**Mr. Danilo Tumamao, PA, Isabela**  
**Mr. Lauro Monzon, GSD, Cavite**  
**Dr. Amante Moog, Batangas**  
**Ms. Rosalia Adonis, PENRO, Pampanga**

#### FUNDING SUPPORT

Asia Pacific Network for Global Change  
Research CAPaBLE Programme, Japan

#### PROJECT'S PRINCIPAL ADDRESS

**Institute of Agrarian and Rurban  
Development Studies**  
College of Public Affairs  
UP Los Baños, Laguna

☎ 63 495362484  
☎ 63 49-5363284  
✉ [Impenalba@yahoo.com](mailto:Impenalba@yahoo.com)  
✉ [Impenalba@gmail.com](mailto:Impenalba@gmail.com)



## CLIMATE CHANGE ADAPTATION AWARENESS- RAISING SEMINAR

August 13-15, 2008  
CPAf Class Rooms 303-304  
College of Public Affairs  
UP Los Baños



# P R O G R A M   O F   A C T I V I T I E S

August 13		August 14		August 15	
8:30	Registration	8:30	Impact of Climate Change on Forestry Sector Dr. Rex Victor O. Cruz Dean, CFNR, UPLB	8:30	Discussion of Urgent Concerns
	Opening Ceremony Welcome Remarks Prof. Wilfredo B. Carada Director, IDMG, UPLB	9:30	Open Forum	9:00	Climate Change Vulnerability and Adaptation Measures Mr. Garrie A. David Executive Director, PTFCC
	Project Overview and Mechanics Dr. Linda M. Peñalba Project Leader	10:00	Break	10:00	Open Forum
	Keynote Address Dr. Luis Rey I. Velasco Chancellor, UPLB	10:15	Climate Science/ Impact on Coastal Dr. Rosa Perez Consultant, ADB Project The Manila Observatory	10:30	Break
	<b>MOA SIGNING CEREMONY</b>	11:15	Open Forum	10:45	Workshop Mechanics Dr. Linda M. Peñalba Project leader
	Short Messages Municipal Mayors SCU President	12:00	Lunch Break		<b>Topics</b>
12:00	Lunch Break		<b>Facilitator: Prof. Wilfredo B. Carada</b>		a. Perceived Climate Change Impacts, Risks and Vulnerabilities of different study sites
	<b>Facilitator: Dr. Ma. Ana Quimbo</b>	1:00	Assessment of Vulnerability and Adaptation Practices of Local Communities to Climate Variability and Extremes in Watershed Areas Dr. Juan M. Pulhin SFFG, CFNR, UPLB		b. Task Ahead
1:00	Climate Trends/Changes in the Philippines Dr. Flaviana D. Hilario Weather Services Chief CAB, PAGASA	2:00	Open Forum		b.1 Role of Collaborators
2:00	Open Forum	3:00	Break		b.2 IOCAP Preparation
2:45	Break	3:15	Promoting Adaptation Planning for Climate Change Prof. Nelson V. Querijero IDMG, CPAF, UPLB		b.3 Collection of data available in the provinces (data gaps, data collection)
3:00	Climate Change Impacts on Agriculture and Food Security at the Local Level: Assessment Methods, Data Requirements, and Science-based Adaptations Dr. Felino P. Lansigan Professor, INSTAT and Co-Chair, IdPOC, UPLB	4:15	Open Forum		b.4 Additional data gathering (KII, FGD)
4:00	Open Forum		<b>Facilitator: Dr. Merlyne M. Paunlagui</b>	12:00	Lunch Break
5:00	Socials				<b>Facilitator: Dr. Josefina T. Dizon</b>
	<b>Facilitator: Prof. Nelson V. Querijero</b>			1:00	Continuation of Workshop and Recap by Collaborators
				2:30	Closing Ceremonies <i>Awarding of Certificate of Attendance</i>
					Closing Remarks Dr. Josefina T. Dizon Coord., GPO, CPAF, UPLB
				3:00	Break
				3:30	Departure of Participants
					<b>Facilitators: Dr. Linda M. Peñalba/ Ms. Dulce D. Elezegui</b>

**APPENDIX A.2**  
**LIST OF PARTICIPANTS**

**CLIMATE CHANGE AWARENESS RAISING SEMINAR/WORKSHOP**

**August 13-15, 2008**  
**College of Public Affairs, University of the Philippines Los Baños**

**PROJECT TEAM**

**DR. LINDA M. PEÑALBA**

Project Leader/Associate Professor  
c/o Institute of Agrarian and Rurban  
Development Studies  
College Of Public Affairs  
University of the Philippines Los Banos  
College, Laguna, Philippines 4031  
Tel. No: +63 49 536-3284/+63 49 536-2484  
Telefax. No: +63 49 536-3284  
Mobile No. +639189304055  
Email: Impenalba@yahoo.com

**DR. JUAN PULHIN**

Co-Researcher/Professor  
c/o Social Forestry and Forest Governance  
College of Forestry and Natural Resources  
College, Laguna, Philippines 4031  
Tel. No: +63 49 536-3493  
Email: jmpulhin@yahoo.com

**MS. DULCE D. ELAZEGUI**

Co-Researcher/University Reseracher  
c/o Institute of Strategic Planning and Policy  
Studies  
College Of Public Affairs  
University of the Philippines Los Banos  
College, Laguna, Philippines 4031  
Tel. No: +63 49 536-3455  
Telefax. No: +63 49 536-3637  
Email: dulceelazagui@yahoo.com

**DR. REX VICTOR CRUZ**

Co-Researcher/Dean  
College of Forestry and Natural Resources  
College, Laguna, Philippines 4031  
Tel. No: +63 49 536-3493  
Email: rexcruz@yahoo.com

**DR. JANUEL P. FLORESCA**

Research Partner/Associate Professor  
Isabela State University  
Ilagan, Isabela  
Mobile No. +639274808605  
Email: januelpf@yahoo.com

**DR. ROGELIO D. COSIO**

Research Partner/Professor  
Pampanga Agricultural College, Magalang  
Pampanga  
Magalang, Pampanga, Philippines  
Telefax. No.: +6345 866-0800  
Mobile No.: +639159770236  
Email: rdcosio@yahoo.com

**DR. DAVID CERO**

Research Partner/Associate Professor  
Department of Agricultural and Food  
Engineering  
College of Engineering and Information  
Technology  
Cavite State University  
Indang, Cavite 4122  
Mobile No. +639063111175  
Email: d\_cero@yahoo.com

**MS. ENRICA ESMERO**

Research Pertner/Instructor/Information  
Service Specialist  
Cavite State Univeristy  
Indang, Cavite 4122  
Telefax. No: +63 46862-0859  
Mobile No. +639175030171  
Email: nickie\_esmero@yahoo.com

**DR. EDNA DA. VIDA**

Director for Research  
Cavite State Univeristy  
Indang, Cavite 4122  
Telefax. No: +63 46862-0859  
Mobile No. +639192823479  
Email: edvida1@yahoo.com

## **LECTURERS**

### **DR. FLAVIANA HILARIO**

Weather Services Chief  
Climatology and Agriometeorology Branch  
Philippine Atmospheric Geophysical and  
Astronomical Services Administration  
Science Garden Complex  
Agham Road, Diliman, Quezon City 1100

### **DR. FELINO LANSIGAN**

Professor, Institute of Statistical Sciences  
and  
Co-Chair, Interdisciplinary Program on  
Climate Change (IdPCC)  
University of the Philippines Los Baños  
College, Laguna

### **DR. REX VICTOR O. CRUZ**

Professor and Dean  
College of Forestry and Natural Resources  
University of the Philippines Los Baños  
College, Laguna

### **PROF. NELSON J.V.B. QUERIJERO**

Professor  
Institute of Development Management and  
Governance  
College of Public Affairs  
University of the Philippines Los Baños  
College, Laguna

### **Dr. JUAN M. PULHIN**

Professor and UP Scientist II  
Dept. of Social Forestry and Forest  
Governance  
College of Forestry and Natural Resources  
University of the Philippines Los Baños  
College, Laguna

### **DR. ROSA T. PEREZ**

Consultant, Asian Development Bank (ADB)  
Project  
The Manila Observatory  
Ateneo de Manila University Campus  
Loyola Heights, Quezon City, Philippines

### **MR. GARRIE A. DAVID**

Executive Director  
Presidential Task Force on Climate Change  
(PTFCC)  
Department of Energy  
Merritt Rd., Fort Bonifacio, Taguig City  
Mobile Phone: +63 9189148631  
Email: [garriedavid@gmail.com](mailto:garriedavid@gmail.com)

## **LOCAL GOVERNMENT UNITS**

### **Cavite**

**MR. LAURO D. MONZON**

Civil Defense Deputized Coordinator  
Cavite Provincial Capitol, Trece Martirez,  
Cavite, Philippines

**MR. ANTONIO C. NAPALAN, JR.**

Executive Assistant  
Kawit, Cavite, Philippines

**MR. RICO J. MEMIJE**

Executive Assistant  
Kawit, Cavite, Philippines

**MS. LUCENDA R. DELAS ALAS**

Planning Officer II  
Provincial Planning Development Office,  
Cavite, Philippines

**MR. GALICANO G. COLUMNNA**

**MS. MA. ROSARIO R. GENIZA**

**MR. TEODULO QUEMUEL**

**MR. EDGARDO E. ENRIQUEZ**

Statistician  
Municipal Planning Development Council  
Rosario, Cavite, Philippines

**MR. FERDINAND C. NUEVA**

Agricultural Technologist  
Office of the Provincial Agriculturist, Cavite,  
Philippines

**ENGR. REGINALDO Q. BROAS**

Municipal Planning Development  
Coordinator  
Rosario, Cavite, Philippines

**MS. JOANNE MICHELLE GONZALEZ**

Municipal Assistant  
Rosario, Cavite, Philippines

**MS. SUSANA C. ALFAFARA**

**MR. OSCAR BALAWAY**

**MR. RODEL B. MEDINA**

### **Isabela**

**MR. DANILO B. TUMAMAO**

Provincial Agriculturist  
Isabela, Philippines  
Province of Isabela, Philippines

**MS. JENITA Z. FERNANDEZ**

Municipal Agriculturist  
Ilagan, Isabela, Philippines  
Ilagan, Isabela

**MR. MOISES C. ALAMO**

Agricultural Technologist  
Office of the Provincial Agriculturist

### **Pampanga**

**HON. RICARDO RIVERA**

Municipal Mayor  
Guagua, Pampanga, Philippines

**ENGR. ROSALIA G. ADONIS**

Municipal Environmental Officer  
Province of Pampanga, Philippines

**MR. RITO T. TONGOL, JR**

Staff, P-ENRO, Pampanga

**NELY M. MANALANG**

Staff, P-ENRO, Pampanga

**MR. ISAIAS M. PANGANIBAN, JR.**

Municipal Administrator  
LGU-Guagua, Pampanga

**MS. PROSPERITA D. PANGILINAN**

Community Affairs Officer III  
Minalin, Pampanga

**MS. GILDA V. MIRANDA**

Staff, P-ENRO, Pampanga

### **Batangas**

**DR. AMANTE A. MOOG**

Provincial Disaster Coordinating  
Council Coordinator  
Batangas Provincial Capitol, Batangas  
City, Batangas, Philippines

**DIOSDADO C. MACALINTAL**

Community Affairs Officer III  
Batangas Provincial Capitol, Batangas  
City, Batangas, Philippines

**MS. ELIZABETH P. DINGLASAN**

Provincial Development Officer  
Provincial Planning Development Office  
Batangas City, Batangas, Philippines

**MR. ROY F. CAGUIMBAL**

Batangas Provincial Capitol, Batangas  
City, Batangas, Philippines

### **CPAF UPLB OFFICIALS, PROFESSORS, STAFF AND STUDENTS**

#### **Officials and Staff**

**DR. MIRIAM R. NGUYEN**

University Research Associate  
Institute of Strategic Planning and Policy  
Studies (ISPPS), College of Public Affairs,  
UP Los Baños

**MS. CRISTETA A. FORONDA**

University Researcher  
ISPPS, College of Public Affairs, UP Los  
Baños

**DR. JOSEFINA T. DIZON**

Associate Professor/Director for  
ICE/Graduate School  
College of Public Affairs, UP Los Baños

**DR. ROGELIO TAGARINO**

Associate Professor and Director  
ISPPS, College of Public Affairs, UP Los  
Baños

**MS. AGNES R. CHUPUNGO**

University Researcher  
ISPPS, College of Public Affairs, UP Los  
Baños

**DR. MERLYNE M. PAUNLAGUI**

University Researcher  
ISPPS, College of Public Affairs, UP Los  
Baños

**MS. MACRINA G. UMALI**

University Research Associate  
ISPPS, College of Public Affairs, UP Los  
Baños

**PROF. WILFREDO B. CARADA**

Associate Professor and Director  
IDMG, College of Public Affairs, UP Los  
Baños

**DR. MA. ANA O. QUIMBO**

Assistant Professor  
ICE, College of Public Affairs, UP Los Baños

#### **Students**

Violeta N. Coronacion

Aurora S. Jose

Cynthia M. Custodio

Pheak Sothea

Aleksannder Gauw

Joylin G. Ammuguan

Rhona G. Gacillo

An nY

Choochat Zanthasoon

Hou Soksam

Prapitpan Anupunt

Wilaiwun Intarachaimas

Aurora Corales

Roberto DV. Revilla

## **SECRETARIAT AND SUPPORT STAFF**

**MS. FLORDELIZA SANCHEZ**

University Research Associate  
Institute of Agrarian and Rurban  
Development Studies (IARDS), CPAf,  
UPLB

**MS. AIDA GRANDE**

University Extension Specialist  
IARDS, CPAf, UPLB

**MS. SARAH LYN PEÑALBA**

University Research Associate  
IARDS, CPAf, UPLB

**MS. ROSEMARIE CORNISTA**

Administrative Assistant  
Office of the Dean, CPAf, UPLB

**MS. DORIS D. AQUINO**

Administrative Officer  
IARDS, CPAf, UPLB

**MR. ORLANDO FELISMINO, JR.**

Administrative Aide  
Office of the Dean, CPAf, UPLB

**MR. ERNESTO L. DEL ROSARIO**

Administrative Aide  
IARDS, CPAf, UPLB

**MS. ELDY MARTINEZ**

University Research Associate  
IARDS, CPAf, UPLB

**MS. SUSAN GUIAYA**

University Research Associate  
IARDS, CPAf, UPLB

**MS. EILEEN MAMINO**

Administrative Aide  
Office of the Dean, CPAf, UPLB

**MR. DANILO REFORMA**

Laboratory Aide  
Office of the Dean, CPAf, UPLB

**MS. ANGELICA JAVIER**

Administrative Aide  
IARDS, CPAf, UPLB

**MR. VICTOR MAAS**

Administrative Aide  
Office of the Dean, CPAf, UPLB



## APPENDIX B.1

### PROGRAM OF ACTIVITIES: VULNERABILITY ASSESSMENT WORKSHOP

December 10-11, 2008

King's Royale, San Fernando, Pampanga

#### ABOUT

##### *"Enhancing the Climate Change Adaptation Capacity of Local Government Units and Scientists in the Philippines"*

This project is in line with APN CAPABLE Programme's emphasis on science-policy interfacing, awareness raising and dissemination activities. In the Philippines, local government units (LGUs) are in the forefront of disaster management including responding to the impacts of climate change. However, many LGUs are not aware of the climate change phenomenon and do not have the capacity to assist the affected communities in preparing climate change adaptation measures. Local state universities have resources (e.g. scientists, students and facilities) that can be capacitated as LGUs partners to further enhance local climate change adaptation capacity.

This project aims to develop the capacity of LGUs and local scientists to formulate climate change response strategies. LGU-scientists partnership can enhance science-policy interfacing and ensure sustainability of adaptation plan implementation.

Specific objectives: 1) study the pattern of climate variability that affected the study sites and assess its social, economic and environmental impacts; 2) conduct awareness raising and capacity-building seminars, lectures, and workshops; 3) assist LGUs in the preparation of indicative climate change adaptation plans and programs; and 4) disseminate the findings of the study to policymakers, civil society organizations, other scientists and global change research programmes to contribute to the growing body of knowledge on climate change and the furtherance of science.

Among the activities that we shall undertake are: 1) awareness raising seminar on the climate change phenomenon for LGU staff and scientists; 2) collect data needed to prepare ICCAP for the study municipalities; 3) workshop and presentation of survey results; and 4) ICCAP preparation and presentation to a panel of reactors.

A joint project of UPLB and selected state colleges and universities, municipal and provincial governments of Cavite, Batangas, Isabela and Pampanga

#### PROJECT TEAM

Dr. Linda M. Peñalba, UPLB,  
Project Leader

Dr. Rex Victor O. Cruz, UPLB  
Ms. Dulce D. Elazegui, UPLB  
Dr. Rogelio Cosio, PAC  
Ms. Enrica Esmero, CvSU

Dr. Juan M. Pulhin, UPLB  
Dr. Januel Floresca, ISU  
Dr. David Cero, CvSU  
Dr. Edna Vida, CvSU

#### PROJECT'S PRINCIPAL ADDRESS

Institute of Agrarian and Rurban Development Studies  
College of Public Affairs, UP Los Baños, Laguna

☎ 63 495362484

☎ 63 49-5363284

✉ lmpenalba@yahoo.com

✉ lmpenalba@gmail.com

### ENHANCING THE CLIMATE CHANGE ADAPTATION CAPACITY OF LOCAL GOVERNMENT UNITS AND SCIENTISTS IN THE PHILIPPINES

## VULNERABILITY ASSESSMENT WORKSHOP

### KING'S ROYAL HOTEL

San Fernando, Pampanga  
December 10-11, 2008

Funded by

Asia-Pacific Network for Global Change Research

# P R O G R A M   O F   A C T I V I T I E S

## Day 1 (December 10, Wednesday)

8:00 – 9:00	Arrival/Registration/Coffee
9:00	Opening Review of Workshop 1 and VAW Mechanics Dr. Linda M. Peñalba, Project Leader
9:10	Paper 1: Guagua, Pampanga Dr. Rogelio D. Cosio, PAC
9:40	Paper Discussion Dr. Amante Moog PGADH, Batangas
9:50	Reaction: Mr. Isaías Panganiban, Jr. MA, Guagua, Pampanga
10:00	Open Forum
10:30	Paper 2: Ilagan, Isabela Dr. Januel Floresca, ISU
11:00	Discussion Engr. Rosalia Adonis, P-ENRO Pampanga
11:10	Reaction: Ms. Jenita Z. Fernandez Municipal Agriculturist, Ilagan, Isabela
11:20	Open Forum
11:30 – 1:00	Lunch Break/Check-in
1:00	Paper 3: Rosario, Cavite Dr. Edna DA. Vida Director for Research, CvSU
1:30	Discussion Mr. Danilo Tumamao Provincial Agriculturist, Isabela
1:40	Reaction: Councilor Manny C. Pueblo Chair, Committee on Environment Municipality of Rosario, Cavite
1:50	Open Forum
2:00	Paper 4: Kawit, Cavite Dr. David Cero, CvSU
2:30	Discussion Prof. Nelson J.V. B. Querijero, UPLB
2:40	Reaction: Mr. Rico Memije Executive Assistant, Kawit, Cavite

2:50	Open Forum
3:00	Break
3:20	Paper 5: IEC Strategies Ms. Enrica Esmero, CvSU
3:50	Discussion Dr. Juan Pulhin, UPLB
4:00	Open Forum
4:10	Comments and Suggestions Dr. John Pulhin Prof. Nelson J.V. B. Querijero
4:40	Open Forum
5:00	Community-Based Flood Early Warning System Engr. Nieves L. Bonifacio Chief, Meteorology Office, PAGASA, Agromet Station, UPLB
5:30	Open Forum
6:30	Dinner

**Facilitators: Ms. Dulce Elazegui and Dr. Linda Penalba**

## Day 2 (December 11, Thursday)

7:00 – 8:00	Breakfast
8:30	Paper 6: San Juan, Batangas Dr. Linda M. Penalba, UPLB
9:00	Discussion Prof. Nelson V. Querijero, UPLB
9:10	Reaction: Ms. Vilma Garcia MPDO, San Juan, Batangas
9:20	Open Forum
9:30	Break
9:50	Discussion of comments, suggested revisions and ICCAP Preparation
11:30	Lunch Break/Check-out
1:00	Trip to Guagua, Pampanga
2:30	Homeward Bound (Von Voyage!)

**Facilitators: Ms. Dulce Elazegui and Dr. Linda Peñalba**

**APPNEDIX B.2  
LIST OF PARTICIPANTS**

**VULNERABILITY ASSESSMENT WORKSHOP**

**December 10-11, 2008  
King's Royal Hotel  
San Fernando, Pampanga**

**PROJECT TEAM**

**DR. LINDA M. PEÑALBA**

Project Leader/Associate Professor  
c/o Institute of Agrarian and Rurban  
Development Studies  
College Of Public Affairs  
University of the Philippines Los Banos  
College, Laguna, Philippines 4031  
Tel. No: +63 49 536-3284/+63 49 536-2484  
Telefax. No: +63 49 536-3284  
Mobile No. +639189304055  
Email: Impenalba@yahoo.com

**DR. JUAN PULHIN**

Co-Researcher/Professor  
c/o Social Forestry and Forest Governance  
College of Forestry and Natural Resources  
College, Laguna, Philippines 4031  
Tel. No: +63 49 536-3493  
Email: jmpulhin@yahoo.com

**MS. DULCE D. ELAZEGUI**

Co-Researcher/University Reseracher  
c/o Institute of Strategic Planning and Policy  
Studies  
College Of Public Affairs  
University of the Philippines Los Banos  
College, Laguna, Philippines 4031  
Tel. No: +63 49 536-3455  
Telefax. No: +63 49 536-3637  
Email: dulceelazagui@yahoo.com

**Dr. Januel P. Floresca**

Research Partner/Associate Professor  
Isabela State University  
Ilagan, Isabela  
Mobile No. +639274808605  
Email: januelpf@yahoo.com

**DR. ROGELIO D. COSIO**

Research Partner/Professor  
Pampanga Agricultural College, Magalang  
Pampanga  
Magalang, Pampanga, Philippines  
Telefax. No.: +6345 866-0800  
Mobile No.: +639159770236  
Email: rdcosio@yahoo.com

**DR. DAVID CERO**

Research Partner/Associate Professor  
Department of Agricultural and Food  
Engineering  
College of Engineering and Information  
Technology  
Cavite State University  
Indang, Cavite 4122  
Mobile No. +639063111175  
Email: d\_cero@yahoo.com

**MS. ENRICA ESMERO**

Research Pertner/Instructor/Information  
Service Specialist  
Cavite State Univeristy  
Indang, Cavite 4122  
Telefax. No: +63 46862-0859  
Mobile No. +639175030171  
Email: nickie\_esmero@yahoo.com

**DR. EDNA DA. VIDA**

Director for Research  
Cavite State Univeristy  
Indang, Cavite 4122  
Telefax. No: +63 46862-0859  
Mobile No. +639192823479  
Email: edvida1@yahoo.com

## **LECTURERS**

### **DR. FLAVIANA HILARIO**

Weather Services Chief  
Climatology and Agrometeorology Branch  
Philippine Atmospheric Geophysical and  
Astronomical Services Administration  
Science Garden Complex  
Agham Road, Diliman, Quezon City 1100

### **HON. CEASAR P. PEREZ**

Municipal Mayor  
Municipality of Los Baños, Laguna

### **MR. LEO PANTERA**

Officer  
Municipal Environment and Natural  
Resources Office  
Municipality of Los Baños, Laguna

## **DISCUSSANTS**

### **PROF. NELSON J.V.B. QUERIJERO**

Professor  
Institute of Development Management and  
Governance  
College of Public Affairs  
University of the Philippines Los Baños  
College, Laguna

### **DR. JUAN PULHIN**

Co-Researcher/Professor  
c/o Social Forestry and Forest Governance  
College of Forestry and Natural Resources  
College, Laguna, Philippines 4031  
Tel. No: +63 49 536-3493  
Email: jmpulhin@yahoo.com

### **DR. REX VICTOR CRUZ**

Co-Researcher/Dean  
College of Forestry and Natural Resources  
College, Laguna, Philippines 4031  
Tel. No: +63 49 536-3493  
Email: rexcruz@yahoo.com

## **LOCAL GOVERNMENT UNITS**

### **Cavite**

#### **HON. ARNEL T. RICASATA**

Municipal Councilor  
Municipality of Rosario, Cavite

#### **MR. ANTONIO C. NAPALAN, JR.**

Executive Assistant  
Kawit, Cavite, Philippines

#### **MR. RICO J. MEMIJE**

Executive Assistant  
Kawit, Cavite, Philippines

#### **MS. JOANNE MICHELLE GONZALEZ**

Municipal Assitant  
Rosario, Cavite, Philippines

#### **HON. MANUEL C. PUEBLO**

Municipal Councilor/  
Chair, Committee on Environment  
Municipality of Rosario, Cavite

#### **HON. CHRISTOPHER P. GO**

Municipal Councilor  
Municipality of Rosario, Cavite

#### **ENGR. REGINALDO Q. BROAS**

Municipal Planning Development  
Coordinator  
Rosario, Cavite, Philippines

### **Isabela**

**MR. DANILO B. TUMAMAO**  
Provincial Agriculturist  
Isabela, Philippines  
Province of Isabela, Philippines

**MS. JENITA Z. FERNANDEZ**  
Municipal Agriculturist  
Ilagan, Isabela, Philippines

**MR. MOISES C. ALAMO**  
Agricultural Technologist  
Office of the Provincial Agriculturist

### **Pampanga**

**MR. ISAIAS M. PANGANIBAN, JR.**  
Municipal Administrator  
LGU-Guagua, Pampanga

**ENGR. ELSA P. PANTINO**  
Municipal Planning Development  
Coordinator  
Municipality of Guagua, Pampanga

**ENGR. ROSALIA G. ADONIS**  
Municipal Environmental Officer  
Province of Pampanga, Philippines

**MS. MARIA RHODORA M. OLAY**  
Staff, P-ENRO  
Province of Pampanga, Philippines

**MR. ALDWIN C. MALLARI**  
Staff, P-ENRO  
Province of Pampanga, Philippines

**MS. GILDA V. MIRANDA**  
Staff, P-ENRO, Pampanga

### **Batangas**

**Dr. Amante A. Moog**  
Provincial Disaster Coordinating  
Council Coordinator  
Batangas Provincial Capitol, Batangas  
City, Batangas, Philippines

**DIOSDADO C. MACALINTAL**  
Community Affairs Officer III  
Batangas Provincial Capitol, Batangas  
City, Batangas, Philippines

### **SECRETARIAT AND SUPPORT STAFF**

**MS. FLORDELIZA SANCHEZ**  
University Research Associate  
Institute of Agrarian and Rurban  
Development Studies (IARDS), CPAf,  
UPLB

**MS. ELDY MARTINEZ**  
University Research Associate  
IARDS, CPAf, UPLB

**MS. AIDA GRANDE**  
University Extension Specialist  
IARDS, CPAf, UPLB

**MS. SUSAN GUIAYA**  
University Research Associate  
IARDS, CPAf, UPLB

## APPENDIX C.1

### PROGRAM OF ACTIVITIES: INDICATIVE CLIMATE CHANGE ADAPTATION PLAN PRESENTATION

March 24-25, 2009

Splash Mountain Resort, Brgy. Lalakay, Los Baños, Laguna

**APPENDIX C.2  
LIST OF PARTICIPANTS**

**INDICATIVE CLIMATE CHANGE ADAPTATION PLAN PRESENTATION**

**March 24-25, 2009  
Splash Mountain Resort  
Brgy. Lalakay, Los Baños, Laguna**

**PROJECT TEAM**

**Dr. Linda M. Peñalba**

Project Leader/Associate Professor  
c/o Institute of Agrarian and Rurban  
Development Studies  
College Of Public Affairs  
University of the Philippines Los Banos  
College, Laguna, Philippines 4031  
Tel. No: +63 49 536-3284/+63 49 536-  
2484  
Telefax. No: +63 49 536-3284  
Mobile No. +639189304055  
Email: Impenalba@yahoo.com

**DR. JUAN PULHIN**

Co-Researcher/Professor  
c/o Social Forestry and Forest Governance  
College of Forestry and Natural Resources  
College, Laguna, Philippines 4031  
Tel. No: +63 49 536-3493  
Email: jmpulhin@yahoo.com

**MS. DULCE D. ELAZEGUI**

Co-Researcher/University Researcher  
c/o Institute of Strategic Planning and  
Policy Studies  
College Of Public Affairs  
University of the Philippines Los Banos  
College, Laguna, Philippines 4031  
Tel. No: +63 49 536-3455  
Telefax. No: +63 49 536-3637  
Email: dulceelazagui@yahoo.com

**DR. JANUEL P. FLORESCA**

Research Partner/Associate Professor  
Isabela State University  
Ilagan, Isabela  
Mobile No. +639274808605  
Email: januelpf@yahoo.com

**DR. REX VICTOR CRUZ**

Co-Researcher/Dean  
College of Forestry and Natural Resources  
College, Laguna, Philippines 4031  
Tel. No: +63 49 536-3493  
Email: rexcruz@yahoo.com

**DR. ROGELIO D. COSIO**

Research Partner/Professor  
Pampanga Agricultural College, Magalang  
Pampanga  
Magalang, Pampanga, Philippines  
Telefax. No.: +6345 866-0800  
Mobile No.: +639159770236  
Email: rdcosio@yahoo.com

**DR. DAVID CERO**

Research Partner/Associate Professor  
Department of Agricultural and Food  
Engineering  
College of Engineering and Information  
Technology  
Cavite State University  
Indang, Cavite 4122  
Mobile No. +639063111175  
Email: d\_cero@yahoo.com

## **LECTURERS**

### **DR. FLAVIANA HILARIO**

Weather Services Chief  
Climatology and Agrometeorology Branch  
Philippine Atmospheric Geophysical and  
Astronomical Services Administration  
Science Garden Complex  
Agham Road, Diliman, Quezon City 1100

### **HON. CEASAR P. PEREZ**

Municipal Mayor  
Municipality of Los Baños, Laguna

### **MR. LEO PANTERA**

Officer  
Municipal Environment and Natural Resources  
Office  
Municipality of Los Baños, Laguna

## **DISCUSSANTS**

### **PROF. NELSON J.V.B. QUERIJERO**

Professor  
Institute of Development Management and  
Governance  
College of Public Affairs  
University of the Philippines Los Baños  
College, Laguna

## **LOCAL GOVERNMENT UNITS**

### **Cavite**

#### **MR. LAURO D. MONZON**

Civil Defense Deputized Coordinator  
Cavite Provincial Capitol, Trece Martirez,  
Cavite, Philippines

#### **MR. EGUARDO ENRIQUEZ**

MPDC Staff  
Municipality of Rosario, Cavite

#### **MR. ANTONIO C. NAPALAN, JR.**

Executive Assistant  
Kawit, Cavite, Philippines

#### **MS. EMMA FIDEL**

Municipal Agriculturist  
Municipality of Rosario, Cavite

#### **MR. RICO J. MEMIJE**

Executive Assistant  
Kawit, Cavite, Philippines

### **Isabela**

#### **MR. DANILO B. TUMAMAO**

Provincial Agriculturist  
Isabela, Philippines  
Province of Isabela, Philippines

#### **MS. JENITA Z. FERNANDEZ**

Municipal Agriculturist  
Ilagan, Isabela, Philippines

#### **MR. MOISES C. ALAMO**

Agricultural Technologist  
Office of the Provincial Agriculturist

I



### **Pampanga**

**MR. ISAIAS M. PANGANIBAN, JR.**

Municipal Administrator  
LGU-Guagua, Pampanga

**ENGR. ELSA P. PANTINO**

Municipal Planning Development  
Coordinator  
Municipality of Guagua, Pampanga

**ENGR. DENNIS C. PAGUIO**

Administrative Assistant  
MPDC  
Municipality of Guagua, Pampanga

### **Batangas**

**DR. AMANTE A. MOOG**

Provincial Disaster Coordinating  
Council Coordinator  
Batangas Provincial Capitol, Batangas  
City, Batangas, Philippines

**DIOSDADO C. MACALINTAL**

Community Affairs Officer III  
Batangas Provincial Capitol, Batangas  
City, Batangas, Philippines

**MS. FE ACOMPAÑADO**

Municipal Agriculturist  
Municipality San Juan, Batangas

**MR. ARNOLD ENRIQUEZ**

Officer  
Municipal Social Welfare Development  
Municipality of San Juan, Batangas

### **SECRETARIAT/SUPPORT STAFF**

**MS. FLORDELIZA SANCHEZ**

University Research Associate  
Institute of Agrarian and Rurban  
Development Studies (IARDS), CPAf, UPLB

**MS. ELDY MARTINEZ**

University Research Associate  
IARDS, CPAf, UPLB

**MS. AIDA GRANDE**

University Extension Specialist  
IARDS, CPAf, UPLB

**MS. SUSAN GUIAYA**

University Research Associate  
IARDS, CPAf, UPLB

**MS. SARAH LYN PEÑALBA**

University Research Associate  
IARDS, CPAf, UPLB

**MR. ERNESTO L. DEL ROSARIO**

Administrative Aide  
IARDS, CPAf, UPLB

## APPENDIX D

### LIST OF FOCUS GROUP DISCUSSION PARTICIPANTS

**A. FGD for Guagua, Pampanga (Guagua, Pampanga Municipal Hall, October 29, 2008)**

NAME	AGENCY/ ADDRESS
1. Linda M. Peñalba	IARDS, CPAf, UPLB
2. Dulce O. Elazegui	ISPPS, CPAf, UPLB
3. Rogelio D. Cosio	PAC, Magalang, Pampanga
4. Maria Rhodora M. Olay	PGENRO, Pampanga
5. Gilda V. Muranda	PGENRO, Pampanga
6. Elsa Patino	MPDC, Guagua, Pampanga
7. Catalina V. Roman	MA, Guagua, Pampanga
8. Raul Naguit	MED, Guagua, Pampanga
9. Aida O. Grande	IARDS, CPAf, UPLB
10. Susan S. Guiaya	IARDS, CPAf, UPLB
11. Sarah Lyn Peñalba	IARDS, CPAf, UPLB
12. Flor A. Sanchez	IARDS, CPAf, UPLB
13. Fresudano Olegario	Brgy. Bancal, Guagua
14. Cecilio Trinidad	Brgy. Bancal, Guagua
15. Armando Pantig	Brgy. Bancal, Guagua
16. Hilario Lejarde	Brgy. Bancal, Guagua
17. Rodel Lejarde	Brgy. Bancal, Guagua
18. Danilo Gordo	Brgy. Bancal, Guagua
19. Rodolfo Dimzon	Brgy. Bancal, Guagua
20. Andres Bonifacio	Brgy. Bancal, Guagua
21. Macario Ocampo	Brgy. Bancal, Guagua
22. Roger Serrano	Brgy. Bancal, Guagua
23. Pablito Manansala	Brgy. Bancal, Guagua
24. Arlene Ocal	Brgy. Bancal, Guagua
25. Nancy Nulud	Brgy. Bancal, Guagua
26. Isaias Panganiban, Jr.	Executive Assistant, Mayor's Office Guagua
27. Liza C. Ocampo	MPDC, Guagua
28. Rosana Pelimco	SBO, Guagua
29. Amelita Pring	Brgy. Chairman, Brgy. Bancal
30. Elaine Baul	SBO, Guagua

**B. FGD for Kawit, Cavite (Aguinaldo Shrine, Kawit, Cavite, November 11, 2008)**

<b>NAME</b>	<b>ADDRESS/AGENCY</b>
Elena Ybadlit	Pob. Kawit, Cavite
Juanita Vales	Pob. Kawit, cavite
Nickie Esmero	Cavite State University
Jing Morelos	Cavite State University
Marianito Pato	Taalong, Kawit, Cavite
Eliseo Tirona	Office of the Mayor Kawit
Antonio Napalan Jr.	Office of the Mayor Kawit
Rico Memije	Office of the Mayor Kawit
David Cero	Cavite State University
Lourdes Nuñez	D.A Gahak, Kawit
Mercedita Barbon	DA Kawit
Lino Ybadlit	Kawit, Cavite
Briggs Santera	Kawit, Cavite
Chit Sambili	Tourism Officer, Kawit
Gina Ayrán	Binakayan, Kawit, Caviote
Sarah Quirong	NHI- CAS
Armando Ayrán	Binakayan, Kawit, Cavite
Eruel Malabanan	Kawit, Cavite
Arnez Santos Jr.	Kawit, Cavite
Epitacio Lopido	Kawit, Cavite
Johnny del Rosario	Office of the Mayor, Kawit
Jun Gabibe	Office of the Mayor, Kawit

**C. FGD for Rosario, Cavite (Rosario, Cavite Municipal Hall, November 12,2008)**

<b>NAME</b>	<b>ADDRESS/AGENCY</b>
Engr. Reginaldo Broas	MPDC, Rosario, Cavite
Felix Rejano Jr.	MPDC, Rosario, Cavite
Edelmira Vidal	Extension Office, Rosario, Cavite
Nenita Dela Cruz	Extension Office, Rosario, Cavite
Marconi Austria	Eng'g Office, Rosario, Cavite
Melinda Roxas	Extension Office, Rosario, Cavite
Ronjie Palompo	Extension Office, Rosario, Cavite
Rudieza Ibiado	Extension Office, Rosario, Cavite
Analiza San Juan	Extension Office, Rosario, Cavite
Arnel Ricasata	Municipal Councilor, Rosario
Manny Pueblo	Municipal Councilor, Rosario
Cris Go	Municipal Councilor, Rosario
Gregorio Guhit	MPDC, Rosario, Cavite
Ernilo Castro	MPDC, Rosario, Cavite
Minerva Paras	MSWD, Rosario
Corazon Nacorda	Ligtong Extension, Rosario
Roland Reyes	Ligtong I, Rosario
Gerry Ramos	Administration, Rosario
Edmund Fidel	Agri, LGU
Joanne Gonzalez	Municipal Assistant, Rosario
Edgardo Enriquez	MPDC, Rosario, Cavite
Rodolfo Alcala	MPDC, Rosario, Cavite
Raul Rcates	Ligtong II, Rosario
Roberto Paloyo	Ligtong II, Rosario
Donna Katon	Ligtong II, Rosario
Leonardo Ibiáz Jr	Ligtong II, Rosario
Eric Fajardo	Ligtong II, Rosario
Ruperto Molina	Ligtong II, Rosario
Reynito Samson	Ligtong II, Rosario
Edgardo Perea	Ligtong II, Rosario
Esteban Barroso	Ligtong II, Rosario
Marissa Ibiáz	Ligtong II, Rosario
Renato Aguilar	Ligtong II, Rosario
Myra de Paz	Ligtong III, Rosario
Celina Luiquez	Ligtong IV, Rosario
Connie Campuspos	Ligtong IV, Rosario
Jojo Crisostomo	Ligtong IV, Rosario
Erlinda Toledo	Ligtong IV, Rosario
David Cero	CvSu, Indang , Cavite
Jing Morelos	CvSu, Indang , Cavite
Nickie Esmero	CvSu, Indang , Cavite
Edna Vida	CvSu, Indang, Cavite

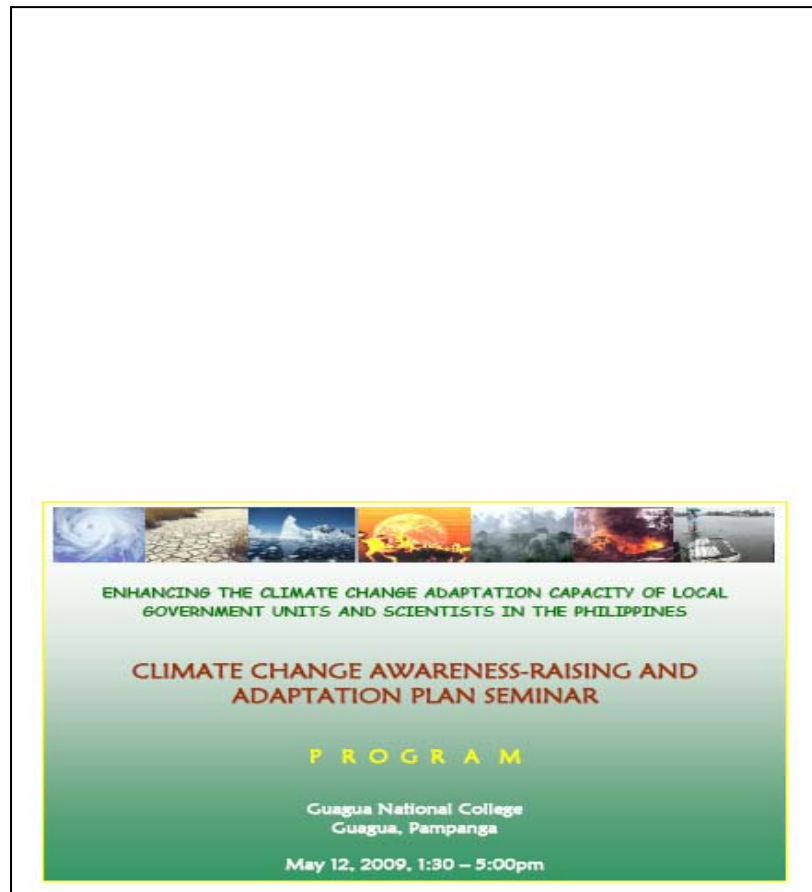
**C. FGD for San Juan, Batangas (San Juan, Batangas Municipal Hall, November 14,2008)**

<b>NAME</b>	<b>ADDRESS/AGENCY</b>
Vilma Garcia	MPDO, San Juan, Batangas
Fe Acompañado	MAO, San Juan, Batangas
Alicia S. Novelles	MAO, San Juan, Batangas
Diosdadao Macalintal	Prov. Gov't of Batangas
Amante A. Moog	Prov. Gov't of Batangas
Maria Rosales	Brgy Janao-Janao
Romeo Ilao	Brgy. Janao-Janao
Restituto Hernandez	Brgy. Janao-Janao
Chedel Beredo	Brgy. Janao-Janao
Miguel Castillo	Brgy. Pinagbayanan
Renato Garcia	Brgy. Balagbag
Manolito Regus	Brgy. Balagbag
Crispin Villabos	Brgy. Balagbag
Vicente Endaya	Brgy. Balagbag
Ofring Sevilla	Brgy. Balagbag
Nemesio Banaag	Brgy Pochtol
Bernardo Gamo	Brgy Pochtol
Ruben Escaro	Brgy Pochtol
Palabyano Pasco	Brgy. Palingowak
Ignacio Yadan	Brgy. Palingowak
Emilio Del Carmen Jr.	Brgy. Palingowak
Alvin Quiñones	Brgy. Palingowak
Domingo Condicho	Brgy. Palingowak
Chrisptoper Carandang	Brgy. Pulong Bato
Romeo Ilagan	Brgy. Pulong Bato
Jacinto Ilagan	Brgy. Pulong Bato

## APPENDIX E. 1

### PROGRAM OF ACTIVITIES: CLIMATE CHANGE AWARENESS-RAISING AND ADAPTATION PLAN SEMINAR

May 12, 2009  
Guagua National College  
Guagua, Pampanga



PROGRAM		
1: 30	Invocation	Hon. Anthony Joseph S. Torres Councilor, Guagua, Pampanga
1: 35	National Anthem	
1: 40	Welcome Address	Atty. Ricardo V. Puno, Jr. CNC President
		Hon. Ricardo Rivera Mayor, Guagua, Pampanga
1: 55	Seminar Overview	Dr. Linda Peñalba Project Leader/UPLB
2: 00	Climate Change Phenomenon	Dr. Rex Victor Cruz Dean, College Of Forestry and Natural Resources, UPLB
2: 30	Climate Change Adaptation Possibilities	Dr. Juan M. Pulhin Professor, UPLB
3:00	Vulnerability Assessment Report	Dr. Rogelio D. Cosio Professor, PAC
3:20	Indicative Climate Change Adaptation Plan	Mr. Isaias Panganiban Jr. MA, Guagua, Pampanga
3:40	Reaction	Hon. Baby Howell Torres Councilor, Guagua, Pampanga
		Hon. Anthony S. Twano Vice Mayor, Guagua, Pampanga
4: 00	Open Forum	
4: 50	Closing Remarks	Mr. Isaias Panganiban Jr.
Emcee/Facilitator: Ms. Elsa Pantino		

## APPENDIX E. 2

### LIST OF PARTICIPANTS

#### CLIMATE CHANGE AWARENESS-RAISING AND ADAPTATION PLAN SEMINAR

March 12, 2009  
Guagua National College  
Guagua, Pampanga

NAME	AGENCY
Ricardo Rivera	Mayor, Guagua
Baby Howell Torres	Councilor Guagua
Anthony Joseph Torres	Councilor Guagua
Isaias Panganiban	Executive Assistant, Guagua
Elsa Patino	MPDO, Guagua
Joseph Morales	Guagua/ Sta Cruz, Dinalupihan
Rodel Evangelista	Guagua/Lambac / Pulong Masle
Noli B. Enriquez	Guagua/ Sasmuan, Pampanga
Susana G. Serrano	Dep. Ed, Pulong Masle H.S.
Jose L. Manganti	Dep. Ed., Guagua East
Cristina T. Santiago	Dep ed. Guagua East
Elvira L. de Leon	Dep. Ed. Guagua East
Alex Sagang	SCG PLUJODA
Cleotilde Alvarado	Dep Ed
Teresita Matic	Dep Ed
Romeo Quizon	Brgy. Sto Niño, Guagua
Imelda Enriquez	Dep. Ed. Guagua East
Roderick Mallying	Brgy. San Vicente Ebus, Guagua
Lourdes Agustin	Brgy. San Pedro, Guagua
Kreil S. David	Guagua Water District
Ronald B. Turla	PLDT, Pampanga
Ethylyne Marciano	Soroptimist
Robert Rivera	Guagua /Bacolor Asso.
Ronnie Tapang	Guagua/ Rorac
Romeo Gaylock	Guagua, Pampanga
Jojo San Pedro	Guagua, Pampanga
Rosana G. Pelimo	SBO
Yolanda Manbatic	SBO
Edna Pangan	SI, Guagua
Fidel Ocampo	Brgy. Captain SAR
Bernadeth Manio	Dep Ed Guagua East
Inday Marcia	Brgy Kagawad
Ana Liza M, Ocampo	LGU, Guagua
Iona G. Banal	LGU, Guagua
Liza Ocampo	LGU, Guagua
Maricel Macaraig	LGU, Guagua
Rey Bagang	LGU, Guagua
Alvin Cruz	LGU, Guagua
Honor B. Serrano	PPC-St James Parish, Betis

Cont...

NAME	POSITION/AGENCY
Jocelyn Llemas	AMA AC Guagua
Raul Naguit	LGU- Guagua
Eric Yap	LGU Guagua
Albert Lim	VLI Guagua
Grace J. De Leon	St. James Parish
Jennifer Miclat	Betis High School
Leila M. Dizon	Dep Ed Guagua East
Annabelle Manalo	Dep. Ed. Guagua East
Ernesto Enriquez	Brgy. Chairman Sta Fe
Pablito Ibarra	Brgy. Chairman Rizal
Ligaya Manansala	San Rafael , Guagua, Pampanga
Benjamin Lim Jr.	JAS, Guagua
Ana Liza Vituz	Dep. Ed. Guagua East
Fernando Salazar	Brgy. Plaza Burgos, Guagua
Carmelita Dayrit	Soroptimist
Josefina Jingco	Soroptimist
Alma Twaño	Soroptimist
Elvira Arambulo	Soroptimist
Eloisa Lusung	Soroptimist
Mario Castro	Brgy Chairman
Rudy Bueno	GWD
Lpourdes Pelagio	Guagua National College
Albert M. Carmen	PLDT
Au Maglaqui	Soroptimist
Micheal Valencia	Barangay Chairman
Antonio Gate	Brgy. Sta Fe
Vicente David	Brgy. San Pedro
Jason Rivera	LGU, Guagua
Daisy Morales	PHMMP
Teresita Navarro	Guagua National College
Dra. Marichu Yabut-Ocampo	Soroptimist
Nancy Malozarte	SI, Guagua
Pepito Rongcal	Brgy. San Antonio
Elvira Roman	Brgy Ascomo
Rosario Marcelo	G.D. Mendoza H.S.
Helen Tantengco	Brgy Plaza Burgos
Dr. Linda M. Peñalba	UPLB
Dr. Juan Pulhin	UPLB
Ms. Flordeliza Sanchez	UPLB
Ms. Aida O. Grande	UPLB



## APPENDIX F. 1

### PROGRAM OF ACTIVITIES: CLIMATE CHANGE AWARENESS-RAISING AND ADAPTATION PLAN SEMINAR

May 15, 2009  
Aguinaldo Shrine  
Kawit, Cavite

- to solicit reactions, comments and suggestions on possible adaptation strategies
  - to present possible actions and adaptation options that may be undertaken by households, communities and local governments to mitigate the impacts and minimize losses that may be caused by climate change-related events
  - to raise people's awareness about the climate change phenomenon and the need to plan and prepare for climate change-related events
- SEMINAR OBJECTIVES**
- Adaptation measures are also necessary because we cannot be sure that all climate change can be mitigated (IPCC WGII, 2001).
  - A number of mitigation interventions can be done but given the level of greenhouse gases already in the atmosphere, climate change is said to be unequivocal and conditions are inevitable such that mitigation measures can only do so much to reduce the impact of climate change.
- WHAT CAN BE DONE TO MINIMIZE CLIMATE CHANGE IMPACT**
- Climate change, also known as global warming is any change in climate over time, whether due to natural variability or as a result of human activity (IPCC) that alters the composition of the global atmosphere (UNFCCC). It is also defined as any long-term significant change in the expected pattern of average weather of a specific region over an appropriate period of time. It reflects anomalous variations to the expected climate within the Earth's atmosphere and subsequent effects on other parts of the Earth, such as in the ice caps over durations ranging from decades to millions of years. (Wikipedia.org)



**ENHANCING THE CLIMATE CHANGE ADAPTATION CAPACITY OF LOCAL GOVERNMENT UNITS AND SCIENTISTS IN THE PHILIPPINES**

**CLIMATE CHANGE AWARENESS-RAISING AND ADAPTATION PLAN SEMINAR**

Aguinaldo Shrine  
Kawit, Cavite

May 15, 2009, 1:30 – 5:00pm

### PROGRAM OF ACTIVITIES

1: 30	Invocation National Anthem	
1: 35	Welcome Address	Hon. Reynaldo Aguinaldo Mayor, Kawit, Cavite
1: 50	Seminar Overview	Dr. Linda Peñalba Project Leader/UPLB
2: 00	Climate Change Phenomenon and Adaptation Strategies	Dr. Juan Pulhin Professor, UPLB
3: 00	Indicative Climate Change Adaptation Plan	Mr. Rico Memije Executive Assistant, Kawit, Cavite
4:00	Reaction	Hon. Emilio Aguinaldo IV Vice Mayor, Kawit, Cavite
4: 15	Open Forum	
4: 50	Closing Remarks	

Emcee/Facilitator: Mr. Antonio Napalan, Jr.

## APPENDIX F. 2

### LIST OF PARTICIPANTS

#### CLIMATE CHANGE AWARENESS-RAISING AND ADAPTATION PLAN SEMINAR

May 15, 2009  
Aguinaldo Shrine  
Kawit, Cavite

NAME	AGENCY
Felix Rodil	Wakas I, Kawit, Cavite
Noemi Lafuir	Aguinaldo E/S
Rhodora Vidal	Wakas. Kawit
Fermin Aguilar	Poctol, Kawit
Ruben Estaño	Tabon I, Kawit
Rafael Conigas	Congbalay-Legaspi
Manny Ilustrisimo	Toclong E/S
Jacinto Ubod Jr.	Kanluran, Kawit
Rey Macario	Kaingin, Kawit
Rod Rista Jr.	Población, Kawit
Arthur Tabon	Bulsuthan, Kawit
Margarito Alba	Kawit
Pro Red	Tramo Bantayan, Kawit
Medel Caimol	Kawit
Otie Arellano	Kawit
Ricardo Esquerre	Kawit
Bong Papa	Manggahan-Lawin, Kawit
Teddy Gandia	Marulas, kawit
Hernando Monzon	Batong Dalia, Kawit
Asunción Atienza	DILG, Kawit
Alfredo Octavio	Tabon III, Kawit
Erlinda Llarena	Toclong, Kawit
Arman Bernal	Kawit
Teresita Victa	Gahak, Kawit
Reynaldo Oñate	Panamitan, Kawit
Nick Caldejon	Samala-Marquez, Kawit
Antonio Napalan Jr.	KGU, Kawit
Gina Ayrán	Aguinaldo Shrine, Kawit
Rico Memije	LGU, Kawit

## APPENDIX G.1

### PROGRAM OF ACTIVITIES: CLIMATE CHANGE AWARENESS-RAISING AND ADAPTATION PLAN SEMINAR

June 4, 2009  
Audio-Visual Center  
PAC, Magalang, Pampanga

#### ENHANCING THE CLIMATE CHANGE ADAPTATION CAPACITY OF LOCAL GOVERNMENT UNITS AND SCIENTISTS IN THE PHILIPPINES

#### CLIMATE CHANGE AWARENESS-RAISING AND ADAPTATION SEMINAR

Audio-Visual Center  
Pampanga Agricultural College (PAC)  
Magalang, Pampanga

June 4, 2009 (Thursday) 1:30pm – 5:00pm

#### PROGRAM

1:30	Invocation	Mr. Dindo C. Bulanadi <i>Staff, IEC Center, PAC</i>
1:35	National Anthem	
1:40	Welcome Address	Dr. Honorio M. Soriano, Jr. <i>President, PAC</i>
2:00	Seminar Overview	Dr. Linda Peñalba <i>Project Leader, UPLB</i>
2:15	Climate Change Phenomenon and Adaptation Possibilities	Dr. Rex Victor Cruz <i>Dean, College of Forestry and Natural Resources, UPLB</i>
3:00	Guagua Vulnerability Assessment Report	Dr. Rogelio D. Cosio <i>Associate Professor, PAC</i>
3:30	Indicative Climate Change Adaptation Plan	Mr. Isaias Panganiban, Jr. <i>Municipal Administrator Guagua, Pampanga</i>
4:00	Open Forum	Dr. Rogelio D. Cosio <i>Moderator</i>
4:40	Closing Remarks	Dr. Emelita C. Kempis <i>Vice-President for Academic and Cultural Affairs, PAC</i>

Ms. Jasmin Villanueva  
*Emcee*

**APPENDIX G.2  
LIST OF PARTICIPANTS**

**CLIMATE CHANGE AWARENESS-RAISING AND  
ADAPTATION PLAN SEMINAR**

**AUDIO-VISUAL CENTER  
Pampanga Agricultural College, Magalang Pampanga**

<b>NAME</b>	<b>POSITION/AGENCY</b>
Nerissa Laguindarer	AT, LGU-Macabebe, Pampanga
Lolita Manese	AT, LGU-Macabebe, Pampanga
Nelia Daculeg	AT, LGU-Macabebe, Pampanga
Leodegardo Dagdag	MA, LGU-Macabebe, Pampanga
Alegria M. Manalac	AT, LGU-Lubao, Pampanga
Lourdes I. Manalac	AT, LGU-Lubao, Pampanga
Anita Pascual	AT, LGU-Lubao, Pampanga
Reynaldo F. Jimenez	AT, LGU-Lubao, Pampanga
Analiza T. Dampil	AT, LGU-Lubao, Pampanga
Elvis V. Velasco	AT, LGU-Lubao, Pampanga
Elsa P. Pantino	MPDC, Guagua, Pampanga
Isaias M. Panganiban, Jr.	Municipal Administrator, Guagua, Pampanga
Rebecca A. Yamzon	AT, Sta. Ana, Pampanga
Jacqueline V. Bajun	Dean, IGS, Pampanga Agricultural College, Magalang Pampanga
Ryan Jay Santiago	Station Manager, DWEE, Pampanga Agricultural College, Magalang Pampanga
Estrella Zabala	Professor, Pampanga Agricultural College, Magalang Pampanga
Filomena K. Reyes	Professor, Pampanga Agricultural College, Magalang Pampanga
Jomar M. Alvarado	AT, Department of Agriculture, Porac, Pampanga
Cesario Punzalan	AT, Department of Agriculture, Porac, Pampanga
Wilfredo Soliman	AT, Department of Agriculture, Porac, Pampanga
Richar Torres	AT, Guagua, Pampanga
Janette C. Buhay	Instructor, Pampanga Agricultural College, Magalang Pampanga
Angelina C. De Jesus	Instructor, Pampanga Agricultural College, Magalang Pampanga
Nila Simpao	AT, Department of Agriculture Guagua, Pampanga
Alicia Mercado	AT, Department of Agriculture Guagua, Pampanga
Juliet Mendoza	AT, Department of Agriculture Guagua, Pampanga
Teresa S. Guinto	AT, Department of Agriculture Guagua, Pampanga
Rodolfo V. Simapao	AT, Department of Agriculture

	Guagua, Pampanga
Carmelita P. Simpao	AT, Department of Agriculture Guagua, Pampanga
Marco S. Dia	AT, Department of Agriculture Mexico, Pampanga
Rodolfo S. Dizon	Municipal Administrator
Rodrigo Baysa	Instructor, Pampanga Agricultural College, Magalang Pampanga
Carmer C. Juice	Instructor, Pampanga Agricultural College, Magalang Pampanga
Jesusa D. Bacrag	Faculty, Pampanga Agricultural College, Magalang Pampanga
Regina C. Cruz	AT, Department of Agriculture, Magalang, Pampanga
Jenita S. Bueno	AT, Department of Agriculture, Magalang, Pampanga
Edmundo D. Medrano	AT/Report Officer,
N.O. Bandista	Instructor, Pampanga Agricultural College, Magalang Pampanga
Alma Quintanar	Pampanga Agricultural College, Magalang Pampanga
Romeo Antonio	DA, Pampanga
Rosenia L. Guzman	Pampanga Agricultural College, Magalang Pampanga
Roigen B. Descalla	Chairman, BAFC, Guagua
Rosalina H. Erese	SR Analyst, Pampanga Agricultural College, Magalang Pampanga
Walter P. Osera	AT, Department of Agriculture, Apalit, Pampanga
Helen C. Yambao	AT, Department of Agriculture, Apalit, Pampanga
Ramela M. Sarmiento	Administrative Aide, Sasmuan, Pampanga
Lilibeth Yambao	Administrative Aide, Sasmuan, Pampanga
Celina G. CLeis	AT, Department of Agriculture, Apalit, Pampanga
Irene Y. Maristela	AT, Department of Agriculture, Apalit, Pampanga
Erlinda C. Dela Paz	AT, Department of Agriculture, Apalit, Pampanga
Shrel S. Apces	FARMC, Department of Agriculture, Apalit, Pampanga
Rafael Rafael	Instructor, Pampanga Agricultural College, Magalang Pampanga
May S. Duned	Instructor, Pampanga Agricultural College, Magalang Pampanga
Teresita Navarang	RA, Pampanga Agricultural College, Magalang Pampanga
Jenifer T. Gamboa	Instructor, Pampanga Agricultural College, Magalang Pampanga
Elma M. Gozum	Instructor, Pampanga Agricultural College, Magalang Pampanga
Jess T. Cabomena	Staff, Department of Agriculture, Sasmuan, Pampanga
Marita R. Ocampo	MAO, Sasmuan, Pampanga

Susana Quinto	AT, Department of Agriculture, Sasmuan, Pampanga
Marilen M. Malabanan	SEMS, San Fernando City, Pampanga
Neelam D. Pangilinan	Inspector, San Fernando City, Pampanga
Natividad P. Laxa	AT, Department of Agriculture, Sasmuan, Pampanga
Reynaldo D. Ocampo	Sasmuan, Pampanga
Reinier L. Tolentino	Assistant of PESO, Sasmuan, Pampanga
Vigilio T. Baguno	Pampanga Agricultural College, Magalang Pampanga
Mica S. Sigua	Pampanga Agricultural College, Magalang Pampanga
Albert B. Leng	Faculty, Pampanga Agricultural College, Magalang Pampanga
Emilio D. Sigua	Associate Professor, Pampanga Agricultural College, Magalang Pampanga
Regina D. Loria	Associate Professor, Pampanga Agricultural College, Magalang Pampanga
Emelyne s. Cortez	AT, Department of Agriculture, Guagua, Pampanga
Aida G. Pecson	AT, MGO, Guagua, Pampanga
Catalina V. Roman	AT, MGO, Guagua, Pampanga
Joel T. Ferrer	AT/LI, Department of Agriculture, Candaba, Pampanga
Ricardo Lising	AT/LI, Department of Agriculture, Candaba, Pampanga
Rodolfo K. Gatchalian	Chairman, MAFC, Arayat, Pampanga
Jesus G. Dayrit	Instructor, Pampanga Agricultural College
Victoria S. Cayao	MA, DA, Apalit, Pampanga
Heraldo Cardin	AT, DA, Apalit, Pampanga
Anicilia Carloy	AT, DA, Apalit, Pampanga
Elena M. Justo	AT, DA, Apalit, Pampanga
Stella R. Sirlunar	OPA, Pampanga

## APPENDIX H

### PROGRAM OF ACTIVITIES: CLIMATE CHANGE AWARENESS-RAISING AND ADAPTATION PLAN SEMINAR

June 10, 2009  
Iligan Municipal Conference Hall  
Iligan, Isabela

<p><b>WHAT IS CLIMATE CHANGE</b></p> <ul style="list-style-type: none"><li>☛ Climate change is any change in climate over time, whether due to natural variability or as a result of human activity (IPCC) that alters the composition of the global atmosphere (UNFCCC).</li><li>☛ It is also defined as any long-term significant change in the expected patterns of average weather of a specific region over an appropriately significant period of time. It reflects abnormal variations to the expected climate within the Earth's atmosphere and subsequent effects on other parts of the Earth, such as in the ice caps over durations ranging from decades to millions of years. (wikipedia.org)</li></ul> <p><b>WHAT CAN BE DONE TO MINIMIZE CLIMATE CHANGE IMPACT</b></p> <ul style="list-style-type: none"><li>☛ A number of mitigation interventions can be done but given the level of greenhouse gases already in the atmosphere, climate change is said to be unequivocal and conditions are irreversible such that mitigation measures can only do so much to reduce the impact of climate change.</li><li>☛ Adaptation measures are also necessary because we cannot be sure that all climate change can be mitigated (IPCC WGI, 2001).</li></ul> <p><b>SEMINAR OBJECTIVES</b></p> <ul style="list-style-type: none"><li>☛ To raise people's awareness about the climate change phenomenon and the need to plan and prepare for climate change-related events</li><li>☛ To present possible response actions and adaptation options that may be undertaken by households, communities and local governments to mitigate the impacts and minimize losses that may be caused by climate change-related events</li><li>☛ To solicit reactions, comments and suggestions on possible adaptation strategies</li></ul>	<p><b>ENHANCING THE CLIMATE CHANGE ADAPTATION CAPACITY OF LOCAL GOVERNMENT UNITS AND SCIENTISTS IN THE PHILIPPINES</b></p> <p><b>CLIMATE CHANGE AWARENESS-RAISING AND ADAPTATION PLAN SEMINAR</b></p> <p><b>Iligan Municipal Conference Hall Iligan, Isabela</b></p> <p><b>June 10, 2009 9:00 AM</b></p>
--	--

## PROGRAM OF ACTIVITIES

8:30	Invocation/ National Anthem	<b>Ms. Aracely T. Asis</b>
	Welcome Address	<b>Hon. Josemarie L. Diaz</b> Municipal Mayor Iligan, Isabela
8:55	Seminar Overview	<b>Dr. Linda Penalba</b> Project Manager
9:00	Climate Change Phenomenon and Adaptation Possibilities	<b>Dr. Rex Victor Cruz</b> Dean CFNR, UPLB
10:00	Vulnerability Assessment	<b>Dr. Januel Floresca</b> ISU Scientist
10:30	Climate Change Adaptation Plan	<b>Ms. Jenita Z. Fernandez</b> MA, Iligan, Isabela
11:00	Reactions	<b>Hon. Kiryll S. Bello</b> and SB Members Iligan, Isabela
11:15	Open Forum	
11:50	Closing Remarks	<b>Mr. Danilo B. Tumamao</b> Provincial Agriculturist Province of Isabela

Emcee/Facilitator: **Moises Alamo**



## APPENDIX I. 1

### PROGRAM OF ACTIVITIES: REGIONAL CLIMATE CHANGE FORUM

June 11, 2009  
De Venecia Hall  
Isabela State University, Ilagan Isabela

TIME	TOPIC/ACTIVITY	SPEAKER/IN-CHARGE
1:40 PM	National S&T Framework on Climate Change in the Agriculture, Forestry & Natural Resources Sectors	Dr. Romulo T. Aggangan Director, Forestry and Environment Research Division (FERD), PCARRD
2:00 PM	OPEN FORUM Moderator:	Mr. Roderick Quintos RTWG Representative, ULS
2:20 PM	Higher Education Action Agenda on Climate Change Mitigation and Adaptation	Dr. William C. Medrano CHED Commissioner
2:40 PM	OPEN FORUM Moderator:	Dr. Reynald Delos Trinos RTWG Representative, NVSU
3:00 PM	Climate Change Vulnerability Assessment and Adaptation in Isabela and Region 02	Dr. Januel P. Floresca ISU Research Partner, APN Climate Change Adaptation Project
3:20 PM	OPEN FORUM Moderator:	Dr. Hermara K. Banciles RTWG Representative, QSC
3:40 PM	Workshop on Formulation of Regional Climate Change Program Group I: Climate Change and Crops Group II: Climate Change and Livestock Group III: Climate Change and Forestry and Natural Resources  Workshop Mechanics	Resource Persons/Facilitators: Dr. Andres Masipiquena, ISU-CVPED Mr. Danilo Tumamao, PAO Mr. Orlando Lorenzana, CVIARC For. Henry Patricio, DENR Dr. Romulo Aggangan, PCARRD Dr. Jonathan Nayga, ISU Dr. Januel P. Floresca, ISU  Dr. Orlando F. Balderama, ISU
4:30 PM	Closing Program  Synthesis of Workshop  Statements of Support  Distribution of Plaques of Appreciation and Souvenirs  Closing Remarks	Emcee: Dr. Rogelio Matalang  Dr. Januel Floresca  Dr. William C. Medrano, CHED Dr. Romulo T. Aggangan, DOST-PCARRD Hon. Ma. Gracia Cielo Padaca, PLGU Isabela  Dr. Romeo R. Quilang Dr. William Medrano Dr. Romulo T. Aggangan  Dr. Edmundo C. Gumpal Consortium Executive Director
5:00 PM	Cocktail/Dinner	

## REGIONAL CLIMATE CHANGE FORUM

June 11, 2009  
De Venecia Hall  
Isabela State University  
Echague, Isabela

Theme:

*"Enhancing climate change adaptation capacity through science-policy interfacing".*

Sponsors:

- Provincial Government of Isabela (PGI)
- Cagayan Valley Agriculture and Resources Research and Development (CVARRD) Consortium
- University of the Philippines Los Baños (UPLB)
- Commission on Higher Education (CHED)
- Isabela State University (ISU)

---

*This serves as an invitation*

## RATIONALE

The ultimate driver of climate change is global warming which is caused by the uncontrolled temperature increase of the greenhouse gases (GHGs) in the atmosphere such as carbon dioxide, methane and nitrous oxides due to anthropogenic activities and increasing population. Indications of climate change in the Philippines include more frequent and stronger typhoons and intensified El Nino – La Nina cycles, among others. Common effects are floods, droughts, deaths and property damages.

The Isabela State University (ISU) which is the base-agency of the Cagayan Valley Agriculture and Resources Research and Development (CVARRD) Consortium comes in the forefront of climate change research and development in the region. One of the University's involvements in addressing Climate Change concerns is through the collaborative project titled "Enhancing the Climate Change Adaptation Capacity of Local Government Units and Scientists in the Philippines." The Project officially started during the Climate Change Awareness Raising Seminar and MOA signing held at UPLB on August 13-15, 2008. The project is collaboratively undertaken by research partners which include three SUCs (CvSU, PAC and ISU) as well as Provincial LGUs of Batangas, Cavite, Pampanga and Isabela and their respective Capital Towns which are vulnerable to the effects of climate variability and extremes.

In order to create awareness and disseminate the project's initial accomplishments and CVARRD to take the lead in developing the capacity of LGUs and communities to effectively respond to climate change for sustainable development, this forum is timely and relevant.

## OBJECTIVES

The general objective of the forum is to create awareness and develop capacity of CVARRD, LGUs, and communities to effectively respond to climate change for sustainable development.

Specific Objectives are:

- 1) To conduct awareness seminars, lectures, and workshops on climate change;
- 2) To assist SUC's, GO's, NGO's, LGUs and communities in the preparation of climate change adaptation plans and programs; and
- 3) To disseminate the findings of climate change researches to policymakers, civil society organizations and other scientists and students to contribute to the growing body of knowledge on climate change and the furtherance of science.

## EXPECTED OUTCOMES

- Improved awareness by scientists, LGU officials, students and civil society on the climate change phenomenon, its social, economic and environmental impacts and the urgency to take action and plan accordingly;
- Improved LGU capacity to prepare science-based plans and policies using scientific climate change forecast issued by government agencies concerned;
- Established social arrangements and institutional linkages between the affected communities, LGUs, local scientific community and government agencies concerned;
- Crafted R&DE Agenda on Climate Change Adaptation in Region 02.

## PROGRAM OF ACTIVITIES

TIME	TOPIC/ACTIVITY	SPEAKER/IN-CHARGE
06:30 AM		Breakfast
07:00 AM	Registration	CVARRD Secretariat
08:30 AM	Opening Ceremonies	Emcee: Dr. Eugenio Matalang RACO Representative, CSU
	Invocation	Engr. Alexander F. Ritas RMS Coordinator
	Pambansang Awit	Prof. Felix A. Pascua Enhancing FITS Coordinator
	Opening and Welcome Remarks	Dr. Romeo E. Quilang RRDCC Chair and President, ISU
	Acknowledgement of Participants	Dr. Fedria N. Medrano Techno-Gabay Coordinator
	Forum Overview & Mechanics	Dr. Linda M. Peñalba Project Leader, APN-UPLB-SUC Climate Change Adaptation Project
	Messages	Hon. Leoncio K. Kint Mayor, Municipality of Echague
		Hon. Ms. Gracia Cielo Padua Governor, Province of Isabela
		Dr. William C. Medrano CHED Commissioner
	Introduction of the Keynote Speaker	Dr. Urdejah Tejada Regional Director, DOST-R02
	Keynote Address	Hon. Heberion T. Alvarez Presidential Advisor on Global Warming and Climate Change
10:30 AM		Coffee Break
11:00 AM	Climate Trends/ Change in the Philippines	Dr. Flaviana Hilario Chief, Weather Services, Climatology & Agrometeorology Branch, PAGASA-DOST
11:30 AM	OPEN FORUM Moderator:	Dr. Jose Guzman RTWG Representative, CSU
12:00 PM		Lunch
1:00 PM	Climate Science and Impacts on Various Ecosystems and Clean Development Mechanism (CDM)	Dr. Rex Victor Cruz Professor and Dean, CFNR, UPLB
1:20 PM	OPEN FORUM Moderator:	Prof. Luana T. Salvador Professor, ISU

## APPENDIX I. 2

### LIST OF PARTICIPANTS

#### REGIONAL CLIMATE CHANGE FORUM

**June 11, 2009  
De Venecia Hall,  
Isabela State University**

NAME	AGENCY	POSITION/DESIGNATION
Reynaldo L. Raymundo	ISU-Santiago	Campus Coordinator
Nenita Rodaria	ISU Echague	Dept. Chair
Benlah Estrede	ISU Echague	Faculty
Rafael Estrada Jr	ISU Echague	COE faculty
Rudy Manzano	ISU Cauyan	Faculty
Charles Babos	ISU Echague	URA
Joel Alcaraz	ISU Echague	URA
Perlita Raymundo	ISU Echague	CA
Editha Dela Cruz	ISU Echague	CA
Norma Dumalig	ISU Anguigan	AP II
Judith Daracan	ISU Anguigan	Faculty
Eduvijos Acierto	ISU Anguigan	Faculty
Lilibeth Gumpal	ISU Anguigan	Prog. Chair
Orlando Nuguid	ISU Anguigan	Prog. Chair
Eugenia Caguinangan	ISU Anguigan	CBAO Coordinator
Quennie Joy Mesa	ISU Echague	IICT, Asso Dean
Christine G. San jose	ISU Echague	Faculty
Florante Balico	ISU Anguigan	C.A.
Dante Aquino	ISU Echague	Director/Prof.
Segunda Anson	ISU Echague	Prof
Ramil Tuppol	PAGASU-DOST	Cmo/WOII
Orlando Balderama	ISU	R & D Director
Lorna Laus	ISU Echague	Asso. Prof.
Florenda Buenafe	ISU Echague	
Billy Terruel	ISU	Prof.
Juanito Banaag	ISU	
Sherwin Hernando	ISU Echague	R.A.
Helen Ramos	ISU Echague	Dean CAS
J. Reyes	ISU Jones	AO
Jose Lorenzana	ISU Cauayan/Echague	Asso. Prof.
Henry Balingao Jr	ISU Echague	Instructor
Agnes Ramos	ISU	Director IAS
Thelma Lanuza		
Romeo Quilang	ISU	President
William Medrano	CHED	Commisioner
Rosalinda Bernardo	ISU Echague	Asso. Prof.
Renjoy Miguel	ISU Echague	Instructor
Jeanette Andres	ISU Echague	Instructor
Jayson Gayagon	ISU Echague	Instructor

Cont...

NAME	ADDRESS	POSITION/DESIGNATION
Louwella R. Andres	ISU Echague	Instructor
Elsa Pinzon	ISU Echague	Asst. Prof.
Maryflor De Vibal	ISU Echague	Asst. Prof.
Carmelita Sadan	ISU Echague	Asst. Prof.
Gilbert Eustaguio	ISU Echague	Asst. Prof.
Aurea Feliciano	ISU Echague	
R. Perez	ISU Echague	Dean
V. Villegas -Carrido	ISU Echague	NACD Coordinator
Edmund Obiña	ISU Echague	Asso. Prof.
Sabas Lazaro	ISU Echague	COE-Rep
Emanuel Santos	ISU Echague	COE
Emelita Valdon	ISU Echague	
Oliva Gaffud	ISU Echague	
Nicanor Baquiran	ISU Echague	
Dr. Juanito Rossini	ISU Echague	
Rufino Calpatura	ISU Echague	
Narcisa Perez	ISU Echague	
Luzon Salud	ISU R	
Maricon Perez	ISU Cauayan	
Joy Donol	ISU Echague	
Karina Marie Nicolas	ISU Echague	
Manuel Galang	ISU Echague	
Jonathan Nayga	ISU Echague	
Jeoffrey Lloyd Bareng	ISU Cauyan	
Eliza Dela Cruz	ISU Echague	
Dante Gozo	ISU Cauayan	
Joanci Duque	ISU Echague	
Pinky Melanie Dela Cruz		
Jaime dela Peña	ISU Echague	
Glenn Batoon		
Ricardo Alarcon		
P.S. Gatmen Hr.	ISU Echague	
Eva C. Sanchez	ISU Echague	
Corsenie dela Peña	ISU Echague	
Arceli Lorenzo	ISU Echague	
Ric Azarcon	ISU	Research
Antonia Bartolome	ISU	Research
Emma Santos	ISU	BAPA
Danilo Pineria	ISU	CA
Violeta Sabio	ISU	CA
Luisa Lucero	ISU	
Adoracion Saberla	ISU Echague	
C.M. Rodalgo	ISU Echague	
J.A. Uy	ISU Echague	
Natividad Calpatura	ISU Echague	
Estefania Salvador	ISU Echague	
Ernesto Bacorongan	Roxas	
Ramon Oliveros Jr.	Roxas	
Myrno Bueno	ISU Echague	
Christine Bartolome	ISU Echague	
Jocelyn Perez	ISU Echague	

Cont...

NAME	ADDRESS	POSITION/DESIGNATION
Cai Sevilleja	LGU	MA
Dolores Sagin	ULS	Asst. Prof.
Linda Peñalba	UPLB	Asso. Prof
Flor A. Sanchez	UPLB	URA
Dulce Elazegui	UPLB	Researcher
Flaviana Hilario	PAGASA/DOST	Weather Service Chief
Rex Cruz	UPLB	Dean CFNR
Aida Grande	UPLB	UES
Maxima Peligman	NUSU-BAM	RACO
Marlina basilio	ULS	Instructor
Ciara Corpuz	ULS	Instructor
Rhodora Balunsai	ULS	Intern Coordinator
Melissa Bacena	ULS	Math Chair
Marijane Acosta	ULS	English Chair
Brendalie Gerardo	ULS	Instructor
Joeffrey Bautista	NIA	Chief Agriculturist
Romulo Aggangan	PCARRD-Forestry	Director
Com. Dannyson Sy	ULS	Educ

## Funding Sources Outside the APN

Amount contributed by co-sponsors of the Regional Climate Change Forum held in Isabela State University, Echague, Isabela, 11 June 2009.

Sponsors	Amount Contributed	
	In Local Currency (PhP)	In US\$
Provincial Government of Isabela	30, 000	623.78
Isabela State University	40, 000	832.04
CVARRD Consortium	15, 000	312.01
Commission on Higher Education	10, 000	208.03
<b>Total</b>	<b>95, 000</b>	<b>1975.86</b>

## **Glossary of Terms**

ASLR	Accelerated Sea Level Rise
CALABARZON	Cavite-Laguna-Batangas-Rizal-Quezon
CEPZ	Cavite Export Processing Zone
CSOs	Civil Society Organizations
CVARRD	Cagayan Valley Agriculture and Resources Research and Development
EWS	Early Warning System
FGDs	Focus Groups Discussions
IEC	Information and Education Campaign
ICCAP	Indicative Climate Change Adaptation Plan
KIIs	Key Informant Interviews
LGUs	Local Government Units
MOAs	Memoranda of Agreement
SCUs	State Colleges and Universities
PTFCC	Philippine Task Force on Climate Change
VAR	Vulnerability Assessment Report