



NATIONAL ENVIRONMENTAL, ECONOMIC
AND DEVELOPMENT STUDY (NEEDS)
FOR CLIMATE CHANGE

Submitted by:



RECS

Resources, Environment and Economics

Center for Studies, Inc.

March 18, 2010

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ACRONYMS USED

A&M	Adaptation and Mitigation
A/RCDM	Afforestation/Reforestation Clean Development Mechanism
ABI	Alternative Budget Initiative
ACC-BIO	Adaptation to Climate Change & Conservation of Biodiversity
ADB	Asian Development Bank
AFNR	Agriculture, Forestry and Natural Resources
ALGAS	Asia Least Cost Greenhouse Gas Abatement Strategy
ARMM	Autonomous Region of Muslim Mindanao
AusAid	Australian Agency for International Development
BAR ATI	Bureau of Agricultural Research – Agricultural Training Institute
BCA	Biodiversity Conservation Areas
BFO	Barangay Forestry Organization
BNPP	Bataan Nuclear Power Plant
BOI	Board of Incentives
BPI	Bank of the Philippine Islands
BSWM	Bureau of Soils and Water Management
CAR	Cordillera Autonomous Region
CBFM	Community-Based Forest Management
CC	Climate Change
CCA	Climate Change Adaptation
CDP	Center for Disaster Preparedness
CEP	Coastal Environment Program
CFP	Community Forestry Program
CIF	Climate Investment Funds
CLUP	Comprehensive Land Use Plan
CO ₂	Carbon Dioxide
CRM	Coastal Resources Management
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSR	Corporate Social Responsibility
CT	Coral Triangle
CTI	Coral Triangle Initiative
DA	Department of Agriculture
DAR	Department of Agrarian Reform
DBP	Development Bank of the Philippines
DECS	Department of Education, Culture and Sports
DENR	Department of Environmental and Natural Resources
DepEd	Department of Education
DFA	Department of Foreign Affairs
DILG	Department of Interior and Local Government
DMAF	Disaster Management Assistance Fund
DOE	Department of Energy

DOLE	Department of Labor & Employment
DOST	Department of Science & Technology
DPWH	Department of Public Works & Highways
DRR	Disaster Risk Reduction
DRRM	Disaster Risk Reduction & Management
DTI	Department of Trade & Industry
EC	European Commission
EWS	Early Warning System
FDC	Freedom from Debt Coalition
FIP	Forest Investment Program
FMU	Forest Management Unit
FPA	Forest Production Areas
GDP	Gross Domestic Product
GEF	Global Environment Facility
Gg	Gigagrams
GHG	Greenhouse Gas
GHGI	Greenhouse Gas Inventory
GNP	Gross National Product
GOCCs	Government Owned & Controlled Corporations
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit GmbH (German society for technical cooperation)
HDI	Human Development Index
HFA	Hyogo Framework for Action
HWP	Harvested Wood Products
IACC	Inter-Agency Committee on Climate Change
IAEA	International Atomic Energy Agency
IEC	Information, Education & Communication
INC	Initial National Communication
IPCC	Intergovernmental Panel on Climate Change
IPRA	Indigenous People’s Rights Act
ISF	Integrated Social Forest
IWRM	Integrated Water and Resources Management
JICA	Japan International Cooperation Agency
KwH	Kilowatt Hour
LCF	League of Corporate Foundations
LGU	Local Government Unit
LLDA	Laguna Lake Development Authority
LUCF	Land Use Change and Forestry
M & E	Monitoring & Evaluation
MAC curve	Marginal Abatement Cost Curve
MASIPAG	Magsasaka at Siyentista Tungo sa Pag-unlad ng Agrikultura
MDB	Multilateral Development Banks
MESSAGE	Model for Energy Supply Strategy Alternatives and their Environmental

	Impacts
MIROC NIES	Model for Interdisciplinary Research On Climate - National Institute for Environmental Studies
MTPDP	Medium-Term Philippine Development Plan
NCSA	National Capacity Self-Assessment
NDCC	National Disaster Coordinating Council
NEDA	National Economic Development Authority
NEEDS	National Environmental, Economic and Development Study
NGO	Non-Government Organization
NIA	National Irrigation Administration
NIPAS	National Integrated Protected Areas System
NPP	Nuclear Power Plant
NWRB	National Water Resources Board
ODA	Official Development Assistance
PA	Protected Area
PAGASA	Philippine Atmospheric, Geophysical and Astronomical Services
PAR	Philippine Area of Responsibility
PBSP	Philippine Business for Social Progress
PCAA	Philippine Clean Air Act
PD	Presidential Decree
PEIS	Philippine Environmental Impact Statement
PHILVOLCS	Philippine Institute of Volcanology & Seismology
PPFP	Provincial Physical Framework Plan
PRECIS	Providing Regional Climates for Impacts Studies
PRRM	Philippine Rural Reconstruction Movement
RD & E	Research Development & Evaluation
RE	Renewable Energy
REDD	Reducing Emissions from Deforestation and Degradation
REECS	Resources, Environment and Economics Center for Studies, Inc.
RFU	Regional Field Units
RPOA	Regional Plan of Action
S & T	Science & Technology
SAFDZ	Strategic Agriculture and Fisheries Development Zone
SDU	Social Development Unit
SEMP	Sustainable Environmental Management Project
SIFMP	Socialized Industrial Forest Management Program
SLR	Sea Level Rise
SNC	Second National Communication
SRES	Special Report on Emissions Scenarios
TPES	Total Primary Energy Supply
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
WB	World Bank

WPA

Watershed Protection Areas

EXECUTIVE SUMMARY

The NEEDS for Climate Change study in the Philippines assesses the country's existing legal policy framework for addressing CC, and discusses its efforts in vulnerability and adaptation assessments and the implementation of mitigation and adaptation measures. The study also assesses the country's financing needs and constraints to implement mitigation and adaptation measures at the national, sector and local levels. These study objectives entail the following: 1) an evaluation of existing laws, policies and programs to address climate change; 2) a documentation and critique of existing vulnerability and adaptation assessments; 3) analysis of the available internal and external financial resources, their adequacy for the implementation of mitigation and adaptation measures, and the prospects for generating more resources; and 4) discussion of the other constraints to implementing a national strategy for effective adaptation.

With respect to existing legal-policy framework, the country does not lack the necessary laws that aim to address CC and provide both CC mitigation and adaptation measures. The Climate Change Act of 2009 already provides a comprehensive law that addresses climate change, and it complements a number of laws and programs. These are being implemented either as mitigation or adaptation measures on the ground, and thereby gradually mainstreaming CC actions in some sectors and local sites.

The Second National Communication (SNC) on Climate Change provides the latest inventory of GHG emissions, together with a comprehensive vulnerability and adaptation assessment of some economic sectors. The inventory of GHG identifies the priority sectors for mitigation, while the DOE addresses these priority sectors, like energy and waste in its present mitigation programs. The DOE's preferred option for the reference scenario rests on its least-cost feature and contribution to reduction to GHG emissions. Technical and financial assistance is however necessary to establish the cost viability of alternative biomass and wind energy. With regards to the object of overall emissions reduction, the possible underestimation or overestimation of the LUCF sector's net sequestration capacity baseline needs to be resolved in order to establish and justify the country's urgent need for Reducing Emissions from Deforestation and Degradation (REDD). And with regards to the waste sector, the extent to which multilateral or bilateral projects for CC and the environment sector have addressed the GHG emissions from the sector must be assessed.

With regards to the availability of external financial resources, the flows for CCA and mitigation have been limited because of the following reasons. One, greater amounts of total grants and loans over the entire period (1992-2019) have flowed to projects indirectly related to climate change adaptation and mitigation compared to projects directly related to climate change action. This differential flow suggests that the country's donors and creditors apparently prefer such projects than those that are directly related to CCA and mitigation. Moreover, while most of the indirect grant flows and loan funds have gone to indirectly-related adaptation projects, the fund sources tend to prefer differing funding mechanism. Bilateral donors and the GEF, for instance, have given more grants than loans, while multilaterals prefer to lend than give grants.

Two, the direct loans and grants of multilaterals and bilaterals flow to broad sectors that address only a particular CC impact or the problem it may aggravate. In other words, not all the significant impacts of CC may be addressed, with effective amounts. Moreover, given the limited flows for a particular sector, project scale or its limited spatial coverage is restricted.

Three, the scale of direct loan projects are more restricted compared to the scale of direct grant projects, thereby suggesting the creditor's assessment of the limited capacity to pay of the local or national government. The country's limited borrowing capacity thus implies that the needed funds for CCA would have to come more from external multilateral, bilateral grants, and GEF, apart from local financial resources.

Four, the bilateral flows from particular country donors have been inadequate for meeting their climate financing commitments. Over the period 2001 to 2007, the available ODA data for the United States, Australia, Japan, and Germany show that they have not been able to meet the minimum 0.5 to 1% of GNP or the estimated required amount of resources to support adaptation, mitigation and technology transfer.

Five, the low involvement of the GEF in grant provision prior to 2004 and its subsequent lower grant flows compared to the bilateral and multilateral donations imply that the latter donors have more greatly influenced the direction of climate change adaptation work in the country compared to the GEF. The limited funds from the UNFCCC delivery vehicles suggest that the criteria of predictability and adequacy of financing required under the Convention from the developed countries cannot immediately be ascertained.

External flows from both bilateral and multilateral sources for direct and indirect climate change adaptation and mitigation, moreover, are limited when compared to the budgetary appropriations by the national government for climate change. Over the period from 2004 – 2008, the Philippine government appropriated greater budgetary resources for related climate change programs in various sectors than grants and loans of multilateral and bilateral sources.

The budgetary resources set aside by the Philippine government for climate change, however, may need to be increased to make a significant dent. They amount to only 0.9 to 1.9% of the country's total budget, and on particular years, the share has even dropped. Agriculture is one sector severely affected over the period. The increase in the budgetary share of disaster management, while commendable may not sufficiently represent proactive efforts to mitigate the expected damages and risks from natural disasters. Moreover, the budgetary appropriations do not include particular priority actions that would climate-proof critical socio-economic activities, and shield the most vulnerable/ poor groups from current and future climate risks. Lastly, the budget appropriations may be improved to include the strategic activities for promoting sustainable development and meeting the requirements for CCA.

In accounting for the costs of CCA and mitigation in the country and setting the national adaptation strategy and the priority measures, an initial listing of priority measures must be systematized and compared with activities that are already in place and being funded by external, governmental or local financial sources. This comparative exercise would indicate which activities or requirements are being undertaken but are inadequately funded, on one hand, and those that have not been implemented or hardly funded, on the other. Existing project expenditures for particular activities may in turn provide an estimate of the cost of increasing the scope or coverage, or scaling-up a potential priority measure.

Potential funds may be drawn at the global level from new commitments, potential international levies on airfares or capital transfers from Annex 1 countries. At the national level, government may also enunciate public finance measures to generate funds for CCA, like a commitment of 0.5% to 1% of GDP as a challenge to bilateral donors among the Annex 1 countries. And it may also set levies on GHG

emitters, road and port users, airline and shipping services. These revenue-generating actions at the national level would also require the establishment of a General Fund for CCA and mitigation.

With adequate funding resources from external sources, and the capacity of the national government to generate internal resources through various financial instruments and to obtain access to additional external financial resources, the work of the Climate Change Commission and the initiative of various public and private agencies can be supported. The low capacity levels of the regulatory and oversight agencies, including some implementing agencies, however, must be raised to support the work of the Commission, as it carries out its functions to formulate and implement a national adaptation strategy, mainstream climate risk reduction into national, sector and local development plans and programs, recommend policies and key development investments in climate-sensitive sectors, and undertake the work of vulnerability assessments and capacity building.

NATIONAL ENVIRONMENTAL, ECONOMIC AND DEVELOPMENT STUDY (NEEDS) FOR CLIMATE CHANGE

OVERVIEW

The manifestations of climate change (CC), in the form of rising temperature, variability of precipitation, frequency and intensity of typhoons, sea level rise, and the risks of more droughts, floods, heat waves, and forest and grassland fires have impacts on the economy, environment and communities. Given its geographical location, archipelagic formation in the tropical Pacific, and population distribution, the Philippines is greatly vulnerable to the impacts of climate change, and has already experienced noticeable adverse effects in recent years. Without concerted global and local action, the challenges the country will face as a result of CC are expected to intensify in the medium or long term. In response to the adverse impacts and risks posed by CC on major sectors and locations, such as agriculture and fishery, water supply, food security, human health, forest and coastal ecosystems and resources, biodiversity, and infrastructure, the National Economic and Environmental Development Study (NEEDS) for Climate Change seeks to provide an assessment of the financing needs of State parties to implement mitigation and adaptation measures at the national and sector level.

There have already been some initiatives to address climate change and its adverse impacts and risks on the economy, environment, and population. As early as May 1991, the Inter-Agency Committee on Climate Change (IACCC), comprising of 15 national agencies and non-governmental organizations, provided technical support on matters concerning climate change, like ways to mitigate or limit greenhouse gas (GHG) emissions. With the inception of the Initial Communication to the UN Framework Convention on Climate Change (UNFCCC) in 1999 the government also began its review of mitigation strategies, and has incorporated mitigation measures in the Medium Term Philippine Development Plan and various sector plans. The latest version of the Medium Term Philippine Development Plan (MTPDP) for 2004-2010 mentions the climate change adaptation and mitigation measures in various areas, like agribusiness, science and technology, and foreign policy. It further recognizes the crucial role of the environment and natural resources sector in reducing climate change impacts and local efforts to adapt to current climate variability, particularly in strengthening policies and programs in forestry management, pollution and hazard control, energy independence and in protected areas and wildlife management.

The Philippine government has also passed executive orders and laws, reflecting its commitment to both GHG emissions reduction and sustainable development, such as the Philippine Clean Air Act (PCAA) of 1999, PD 1442 or the Act to promote the Exploration and Development of Geothermal Resources, Electrical Power Industry Reform Act of 2001, the Investment Priorities Act (2001), Biofuels Act of 2007, and the Renewable Energy (RE) Act of 2008. The PCAA mandates the DENR to prepare and implement national plans that are in accordance with the UNFCCC and other international agreements, conventions and protocols on reducing GHG emissions. It also mandates the DENR not only to monitor meteorological factors affecting ozone depletion and GHGs but also to set standards. The Biofuels Act seeks to reduce GHG emissions by mandating the blend of biofuels on diesel and gasoline sold in the country, while the RE Act of 2008 aims to accelerate the exploration and development of renewable energy sources, such as biomass, solar, wind, hydro, geothermal, ocean energy and hybrid systems.

Even before the formal adoption of a Climate Change Act (October 2009), national and regional development planning has slowly mainstreamed climate change into some sector and spatial components. Capacity assessment of some national and local government units has also been undertaken. Noteworthy are three projects that address such objectives. First, a European Union project entitled “Mainstreaming Disaster Risk Management in Sub-national Development and Physical Planning in the Philippines is being implemented by the National Economic and Development Authority (NEDA). Long-term physical framework plans are being updated to introduce natural risk hazard analysis in regional planning, identify areas at risk to natural hazards, ensure proper siting of development, and identify appropriate mitigation measures. Second, an AUSAID project implemented by NEDA seeks to integrate disaster risk reduction and climate change adaptation (DRR/CCA) into local development planning and decision making processes. Finally, at the national level NEDA is also implementing a three-year project to mainstream climate risk reduction into national development plans and processes by enhancing national and local capacity to develop, manage and administer plans, programs and projects addressing CC risks.

With the finalization of the Second National Communication (SNC) on Climate Change, the latest inventory of greenhouse gas emissions would be available, together with a comprehensive vulnerability and adaptation assessment of the country’s economic sectors. Through all these initiatives, the government has begun to address the challenges posed by CC. The recently approved Climate Change Act caps its formal response. The law provides a policy framework; it establishes an organizational administrative structure, the Climate Change Commission, and allocates budgetary resources for its important functions. These functions include the formulation of a framework strategy and program, the mainstreaming of climate risk reduction into national, sector and local development plans and programs, the recommendations of policies and key development investments in climate-sensitive sectors, and undertaking the work of vulnerability assessments and capacity building. All past efforts and existing initiatives will help substantiate the components of the country’s framework strategy and program for CC.

The work of the Commission and the initiative of various public and private agencies, however, need to be supported and sustained with adequate funding resources from both internal and external sources. The opportunities and extent by which the government can strategically promote and finance priority mitigation and adaptation measures depend on its capacity to generate internal resources through various financial instruments and to obtain access to additional external financial resources. What are the existing and available internal and external financial resources is thus a relevant empirical question in monitoring current national and global efforts to address CC. What are the prospects and conditions for generating more resources must be resolved at the national and global level.

At the global level, State Parties attending the Bali Conference in 2007 agreed to formalize an international response to CC in Copenhagen. In turn, the secretariat of the UN Framework Convention on Climate Change (UNFCCC) launched the National Economic and Environmental Development Study (NEEDS) project¹. As a strategic action to complement national initiatives, the project provides an opportunity to document and assess the adequacy or limitations of the existing flow of funds for financing mitigation and adaptation measures. Given its broader perspective on the emerging financial needs of climate change and the knowledge of available strategic external funding opportunities, the project further enables developing countries to determine the costs of both mitigation of greenhouse

¹ The NEEDS for Climate Change project is piloted in nine countries: Costa Rica, Egypt, Ghana, Indonesia, Lebanon, Mali, Nigeria, Pakistan and the Philippines.

gas emissions and adaptation to CC impacts, and thereby identify in general the priority funding requirements or the unmet required actions to achieve mitigation and adaptation objectives.

The options the government has considered in mitigating GHG emissions and their cost are discussed in the next section. It also discusses the highlights of the SNC in order to set the stage for the discussion on mitigation and adaptation measures and financial and policy instruments for addressing climate change.

CURRENT STATUS OF GHG EMISSIONS²

In compliance with the submission of the country's National Communications to the United Nations Framework Convention on Climate Change (UNFCCC), two national inventories of greenhouse gas emissions (GHGI) have been conducted, one in 2000 and the second in 2009. The inventory covers five (5) key sectors that contribute to the increasing amount of greenhouse gases in the atmosphere, namely Agriculture, Energy, Land Use Change and Forestry (LUCF), Industry, and Waste, using the 1996 IPCC guidelines in accounting for the emissions from these sectors.

With 1994 as the baseline year for the first inventory, the Philippines Initial National Communication (INC) to the UNFCCC Secretariat reported that the country emitted approximately 100,865 kt of CO₂ equivalent or gigagrams CO₂^e from the four non-LUCF sectors. The Energy sector was the most significant sector accounting for 49% of total emissions, followed closely by the Agriculture sector with 33%, and Industry and Waste respectively with 11% and 7%.

With year 2000 as the baseline, the Second National Communication (SNC) noted two main results. One, with overall emissions from non-LUCF sectors amounting to 126,878.78 Gg CO₂^e (Table 1), the share of GHG emissions from the four non-LUCF sectors, in comparison with the first inventory, specifically Energy and Waste sectors, has increased respectively to 55% and 9% while the share of Agriculture and Industry declined respectively to 29% and 7%. This finding suggests that Energy and Waste are the two priority sectors for mitigation.

Two, overall GHG emissions from the 5 sectors apparently decreased. Comparing the 1994 INC and the 2000 GHG Inventory for the SNC, the decrease in GHG emissions by as much as 81% is mainly due to the increase in the emissions sequestered by the LUCF sector (Table 2). This positive finding, however, does not suggest non-action because if the LUCF sector is not taken into account, the country's total emissions has in fact increased by 26%, with the increased emissions from the waste sector, energy and agriculture. Moreover, the impressive increase in the net sequestration of the LUCF sector from only 126 Gg in 1994 to as much as 107,387.67 Gg CO₂^e needs to be verified. The extent in which the sector's net sequestration capacity baseline is underestimated or overestimated is critical in establishing the urgency of Reducing Emissions from Deforestation and Degradation (REDD) for the country.

² Both inventories were undertaken by the Manila Observatory. The second inventory results are in Manila Observatory, September 2009. Final Report: Philippine Greenhouse Gas Inventory for the Year 2000. Ateneo de Manila University, Loyola Heights, Quezon City, Philippines. GEF / UNDP PROJECT ID 00037339

Table 1 Overall 2000 GHG Emissions per Sector (in Gg CO₂-e)

Overall 2000 GHG Emissions Per Sector						
Sector	A	b	C	D	E	F
	CO ₂ (in Gg)	CH ₄ (in Gg)	CH ₄ GW Potential	N ₂ O (in Gg)	N ₂ O GW Potential	CO ₂ e Emission in Gg A+(b*c)+(d*e)
Energy	62,499.10	304.14	21	2.52	310	69,667.24
Industrial Processes	8,604.74	0.24	21	-		8,609.78
Agriculture	-	1,209.79	21	37.41	310	37,002.69
LUCF	(106,216.99)	(50.58)	21	(0.35)	310	(107,387.67)
Waste	-	500.67	21	3.50	310	11,599.07
Totals	(35,113.15)	1,954.26		43.08		19,491.11

Table 2 INC vs SNC Emissions (in Gg CO₂^e)

Overall Result INC vs. SNC				
Sectors	CO ₂ ^e Emission in Gg (INC)	CO ₂ ^e Emission in Gg (SNC)	Increase/ (Decrease)	% of increase (decrease)
Energy	50,038.00	69,667.24	19,629.24	39%
Industrial Processes	10,603.00	8,609.78	(1,993.22)	-19%
Agriculture	33,130.00	37,002.69	3,872.69	12%
LUCF	(126.00)	(107,387.67)	(107,261.67)	85128%
Waste	7,094.00	11,599.07	4,505.07	64%
Totals	100,739.00	19,491.11	(81,247.89)	-81%

CLIMATE CHANGE PROJECTIONS³

Changes in temperature and precipitation over the Philippines would indicate the potential hotspots or vulnerable areas that must be prioritized in any climate change action plan. With the use of regional climate model developed by the Hadley Center known as PRECIS, local climate changes, in terms of surface air temperature and rainfall have been projected over two time-slices of the 21st century by comparing future simulations with that of the 20th century (1971 to 2000). The model results indicate that significant warming will occur over Mindanao in the middle of the next century, with the largest warming occurring in the third quarter (June, July, August) and second quarter (March, April, May). The country-averaged annual mean temperature is projected to increase by 0.9°C -1.4°C by 2020 and 1.7°C - 2.4°C by 2050. While generally higher temperatures are simulated in all regions of the country by 2050, with an average mean minimum rise in minimum temperature of about 2 °C, the rate of temperature increase by 2050 will generally double the rate of increase simulated for 2020, with the highest seasonal increase in maximum temperature in the island of Mindanao for the 2nd and 3rd quarters. Specifically, a significant increase of 3 °C by the 3rd quarter of 2050 will take place in CARAGA. Other parts of

³ Philippine Rural Reconstruction Movement (PRRM), October 2009. Second National Communication on Climate Change: Philippine SNC Project, Vulnerability and Adaptation Assessment Component. Quezon City, Philippines. GEF / UNDP PROJECT ID 00037339

Mindanao will also see a notable rise in temperature in the same periods. Apart from CARAGA, the southern part of the Philippines (Regions 9,10,11,12, and ARMM) will be warmer compared to other parts of the country.

The model also projected a change in annual precipitation from (-0.5 to 17.4 %) in 2020 and -2.4 to 16.4 % in 2050, with large seasonal differences in the amount of rainfall in all the seasons. Projected seasons temporal rainfall variation is less (-0.5% to 25%) during the seasons of December, January, February and September, October, November. Region wise, there will be a much stronger and more active southwest monsoon on Luzon and the Visayas, given the projected significant increases of seasonal rainfall in the third quarter. Increases in rainfall will particularly be evident in these regions while Mindanao is projected to undergo a drying trend. The highest increase in rainfall during southwest monsoon season (JJA) will likely be in Region 1 (44%), CAR (29%), Region 3 (34%), Region 4 (24%) and Region 5 (24%) in 2050. The drier seasons of March-April-May will become drier, while the wet seasons of June-August and September-November will become wetter.⁴

Two other models, namely the CSIRO Australian model (A2) and the MIROC-NIES (B1) Japan model were also used to predict local climate changes, and they provide slightly different spatial projections. Both models show a general warming trend moving to the years 2020 and 2050. Rainfall projections show either negative or positive tendencies for the different regions in the Philippines. With an A2 scenario, on one hand, rainfall will continue to decrease from 2020 to 2050 projecting very dry average conditions for the Philippines, in the range of -0.3 to 2.0 mm per day. The MIROC-NIES model, on the other hand, projects a mixed result for rainfall patterns. Parts of the Visayas and the whole of Mindanao in 2020 will experience increased rainfall ranging from 0.1 to 2.0 mm per day from the normal amounts, while Luzon and other parts of Visayas will have drier conditions. By 2050, Luzon will slightly shift to a positive change in rainfall, with Mindanao having decreased rainfall but still more than the usual for the current climatology (1961 to 1990). The Visayas will remain consistently drier in that period.

VULNERABILITY ASSESSMENTS AND SCENARIOS⁵

Apart from the GHG emissions inventory, the other component of the Second National Communication to the UNFCCC is the country vulnerability and adaptation assessment. This shall be the basis of adaptation strategies for identified priority economic sectors and areas. In turn, the strategies as formulated will express how a policy for adaptation to CC can be integrated into national sustainable development plans and programs.

The vulnerability assessment for the SNC was prepared by the Philippine Rural Reconstruction Movement (PRRM) component in October 2009. It covered the following economic sectors: agriculture and food security, watersheds (i.e. water resources, forestry and biodiversity), coastal resources and human health, and undertook pilot area studies in Albay, Bohol and Surigao del Norte, given their geographical location, pre-disposition to current climate-related risks, and availability of current climatic data and other environmental information. Local assessments were then scaled up to the national level for three time frames, i.e. current or baseline, 2020 and 2050.

BASELINE SCENARIO

⁴ Yumul, N. and N. Servando, October 2009. Observed Trends and Climate Change Scenarios for the Philippines. Paper presented at the NATIONAL CONFERENCE ON CLIMATE CHANGE ADAPTATION + 2, October 26-27, 2009, Diamond Hotel, Manila, Philippines.

⁵ Philippine Rural Reconstruction Movement (PRRM), October 2009. Second National Communication on Climate Change: Philippine SNC Project, Vulnerability and Adaptation Assessment Component. Quezon City, Philippines. GEF / UNDP PROJECT ID 00037339

The assessment initially noted the changing climate conditions historically observed in the country, i.e. the increase in annual average mean temperature by 0.62⁰C in the last fifty six years, the frequency of hot days and warm nights, and amount and intensity of rainfall. Economic conditions were also discussed, such as the economy's stagnant performance over the past decades, the effect of limited productive employment opportunities on overseas migration, the high rural poverty incidence and dependence of the rural poor on agriculture and natural resources, and their vulnerability to climate change. Moreover, the occurrence of climate related disasters have caused increasing economic impacts, estimated at an average of USD 300 million (PhP 15 billion) a year over the past 36 years, according to the World Bank and the National Disaster Coordinating Council (NDCC). The cost of damages from typhoons alone estimated at 0.5% of the country's GDP has not been matched by calamity fund appropriations.

SOCIO-ECONOMIC PROJECTIONS

Economy-wide projections were made for the four scenarios used in the Special Report on Emissions Scenarios (SRES) published by the IPCC in 2000. The SRES scenarios were constructed to explore future developments in the global environment with special reference to the production of greenhouse gases and aerosol precursor emissions. Four narrative storylines were developed, each one representing different demographic, social, economic technological and environmental developments that diverge in increasingly irreversible ways:

1. A1 storyline and scenario family: a future world of very rapid economic growth, global population that peaks in mid-century and declines thereafter, and rapid introduction of new and more efficient technologies.
2. A2 storyline and scenario family: a very heterogeneous world with continuously increasing global population and regionally oriented economic growth that is more fragmented and slower than in other storylines.
3. B1 storyline and scenario family: a convergent world with the same global population as in the A1 storyline but with rapid changes in economic structures toward a service and information economy, with reductions in material intensity, and the introduction of clean and resource-efficient technologies.
4. B2 storyline and scenario family: a world in which the emphasis is on local solutions to economic, social, and environmental sustainability, with continuously increasing population (lower than A2) and intermediate economic development

The PRRM Report provides a detailed description of the projections that were based on quantitative projections of major driving variables, such as population and economic development. Integrated assessment models were used, resulting in families of scenarios for each storyline. There were no assigned probabilities of occurrence for the six groups of resulting scenarios: one each for the A2, B1 and B2 storylines, and 3 for A1, representing alternative developments of energy technologies. The following table attempts to summarize the economy-wide projections contained in the SNC:

Table 3 Economy-Wide Projections with Climate Change, Using 4 SRES Scenarios

Scenario/ Indicator	A1	A2	B1	B2
Population	Increasing births over deaths up to 2010	Increasing births over deaths up to 2025	Increasing births over deaths up to 2010	Increasing births over deaths up to 2015
	2 nd largest population in the region by 2050	2 nd largest population in the region by 2050, highest population growth rate		
Population density	421 persons per sq.km. in 2050	559 persons per sq.km. in 2050	421 persons per sq.km. in 2050	487 persons per sq.km. in 2050
Urbanization: NCR population (nth most populous urban agglomeration in the world)		10.7 M 2005 (19 th) 11.1 M 2007 (17 th) 12.6 M 2015 (16 th) 14.8 M 2025 (14 th)		
Age Structure	% of people under 15 continually declining until 2050 Working aged adults continually increasing Elderly population steadily growing			
Dependency Ratio	Level of dependency of elderly will start to increase from 2005 Potential support ratio: 5.2 in '70, 4.8 in '00, 3.6 in '20			
GDP	3.796% in 2009 5.5% in 2013			
Displacement due to 100 cm SLR	2 million people from 28 cities and municipalities			

SECTORAL VULNERABILITIES TO CLIMATE CHANGE

The following sectors were identified to be most vulnerable: agriculture, forestry, water, and the coastal areas.

The agricultural sector has mixed projections on the local impacts of climate change for particular crops. In the case of rice, negative impacts dominate the projections. On the whole, because of the increasing frequency and intensity of extreme climate events, and changes in rainfall patterns, climate change is seen to adversely affect food production.

In the forestry sector, the vulnerability of watersheds to climate change is methodologically determined by a number of variables: area sensitivity (e.g. topography, geological hazards), degree of exposure to climate change, vulnerability of natural resources, and the adaptive capacity based on HDI and density of the population. Watersheds are already exhibiting high variability in annual temperatures and maximum temperatures are continuously rising. Increased rainfall will also potentially lead to watershed disasters such as landslides and floods. Water shortages in dry seasons and sudden flooding and mudslides during rainy seasons are already affecting biodiversity in these areas. While Philippine forests are likely not to disappear due to climate change (Lasco et al, 2004), wet and rain forests will significantly expand as dry and moist forests become wetter. However, certain forests are at risk with increased rainfall because of the lack of a distinct dry season, while some forested areas with its

biodiversity will likely be reduced as more forest lands are opened with the upland migration of poor lowland households.

With regards to the water sector, changes in rainfall patterns, longer periods of drought, and saltwater intrusion into freshwater reserves are most likely going to negatively affect drinking water supply. According to an earlier study on climate change (PINC 1999), a 2 to 3°C increase in annual temperature would constrain domestic water consumption. Moreover, with increased crop activity due to enhanced solar radiation, water demand in the agricultural sector would also increase. Lastly, global warming will affect industrial use of water. Even without considering climate change impacts, the National Water Resources Board (NWRB) had already projected a potential water supply deficit by 2025 in twelve water resources regions of the country. It may be noted that Angat Dam, which supplies Metro Manila, will have the largest water deficit. Thus with climate change, more severe deficits may be expected.

The coastal sector is one of the most vulnerable areas to climate change - the Philippines being ranked as one of the ten countries most vulnerable to sea level rise in terms of population exposure. The warming of the ocean will also lead to widespread coral bleaching and a decrease in planktons that will diminish fish catch. Sea level rise may also cause salinity intrusion, as well as add up to storm surge, tsunami damages, and land subsidence impacts. Moreover, arable coastal lands may be lost, affecting people's livelihoods and income. Mangroves will also not be spared and low-lying tide dependent fish and shrimp ponds may get flooded, thereby subjecting fisheries and aquaculture to increased pressure. Subsistence and small-scale fisherfolk who lack options will suffer disproportionately from these changes in marine and coastal ecosystems. Moreover, the dangers posed by ocean acidification will consist of a disruption in reef and bone formation of marine organisms. Slower reproduction will thus reduce abundance, and affect marine biodiversity on the whole. Finally, the impacts of extreme weather events will lead to either more floods or droughts, and cause the displacement of more people in low-lying coastal areas.

The SNC's VA component has produced a manual for conducting vulnerability assessments which may prove highly useful for future exercises of assessment and adaptation planning. As the country gears towards a changing climate, it will be imperative to incorporate these new planning tools in the government's regular planning and implementation programs.

COSTS OF IMPLEMENTING PRIORITY MITIGATION AND ADAPTATION MEASURES

REDUCING GHG EMISSIONS⁶

Given the SNC finding on the increased GHG emissions share of the energy sector, the Department of Energy plays a critical role in addressing this development, specifically in defining the government's mitigation strategy and identifying the priority mitigation programs/ projects. At the moment, the government's response is reflected in the MTPDP goal of sustainable energy development that is anchored on energy independence and power sector reforms, thereby addressing the growing energy security issue (MTPDP 2005). Specifically, it is focused on attaining a 60% energy self-sufficiency target by 2010.

One of the six strategic directions set by the Department of Energy in 2007 specifically addresses the problem of climate change⁷ -- that of promoting green and clean energy alternatives and technologies that will mitigate the long-term effects of energy development to global warming. In line with its energy independence and security goals, the DOE has defined its mitigation strategy in terms of the following measures:

1. Aggressive development and utilization of renewable energy (RE) resources;
2. Development and use of alternative fuels and technologies; and
3. Implementation of massive and comprehensive efficiency and conservation programs.

In order to formulate its sustainable energy development strategy, the DOE's commissioned study employed an International Atomic Energy Agency (IAEA) model for Energy Supply Strategy Alternatives and their Environmental Impacts (MESSAGE) in 2007 to 2009. Using 2007 as the base year, with due consideration of the country's various reserve resources (coal, oil, gas and bio-fuels feedstock, like sugar and coconut), as well as the primary, secondary and final levels of energy forms for the end-consumers, the study evaluated four investment options for the period 2008 to 2030. The options provide a costing of potential mitigation strategies, and they consist of the following scenarios.

1. Reference Scenario, which includes all existing policies of the government mentioned above.
2. Maximum RE Scenario, which assumes doubling the REPP capacity within the first 10 years of the model starting in 2009.
3. Nuclear Scenario, which assesses the prospect of rehabilitating the 620-MW Bataan Nuclear Power Plant (BNPP) in three periods, i.e. 2015, 2020 and 2025, along with the entry of a new 100-MW NPP.

⁶ This section is largely based on the following document: Department of Energy, Philippine Nuclear Research Institute, National Power Corporation, National Electrification Administration, National Economic and Development Authority, and Philippine Council for Industry and Energy Research and Development, April 2009. Formulation of Sustainable Energy Development Strategies in the Context of Climate Change for the Philippines (RAS/O/045). Regional Cooperation Agreement, Project International Atomic Energy Agency.

⁷ The five strategic directions consist of the following: 1) to ensure comprehensive, integrated, responsive and consistent energy policy that will take into consideration the needs and requirements of other sectors in the economy such as transportation and communication, public works such as sea and air ports, highways and information technology; 2) to identify and achieve the optimal energy mix that will ensure stable, secure, sustainable, environment-friendly and reasonably priced energy given the successful implementation of planned policy and program interventions; 3) to continue the implementation of social mobilization and monitoring mechanisms in the local and regional levels that will harness the cooperation of all key stakeholders in carrying out energy programs considering that energy development impacts on all sectors; 4) to establish a research and development program for energy that will be supportive of the foregoing strategic directions; and 5) to develop human resource capacity that will look into the professional and technical skills requirements of energy development particularly in areas such as nuclear, natural gas, climate change and energy service companies.

4. CO₂ Reduction Scenario, which is based on the climate change mitigation plan of the country that was submitted to the UNFCCC, and which further targets a CO₂ emission limit through the reduction target of 5% of the 1990 CO₂ level starting in 2012.

REFERENCE SCENARIO

In this scenario, the CC mitigating measures consist of the use of hydropower, biomass, wind and solar power. Hydropower will grow at 5%, faster than geothermal, and will contribute 23.6% to total energy mix. Biomass will have an average share of 11%. Finally, wind and solar power plants are seen to contribute 0.1% to total generation mix, since no additional plants were assumed to be put up due to their high investment costs.

Oil however will remain as the dominant fuel, mainly because of the transport sector demand. The share of coal will increase and will grow fastest as it will fuel most of the electricity requirements in the last decade, despite an increase in the utilization of geothermal energy. The share of geothermal to total energy supply is expected to decrease because of increasing steam price and investment costs (an average of 19.6% over the model period). Malampaya reserves will continue to supply energy until 2022, after which the country will have to import its natural gas requirements to keep its share of total energy mix at an average of 27%.

The simulation results of the above scenario (Table 4) show that total primary energy supply (TPES) will grow by more than 52% between 2007 and 2030, and the required investments would amount to US\$28.74 billion.

Table 4 Investment Requirements in Electricity Generation Using Reference Scenario, 2008-2030, 10% Discount Rate

Resource	Amount, in USD Billion	% to Total	Capacity
Coal	16.9	58.8	10 GW
Gas	3.7	12.9	3.6 GW
Hydropower	7.8	27.1	3.1 GW
Geothermal	0.203	0.7	70 MW
Wind	0.139	0.5	8.25 MW
TOTAL	28.74	100	16.7 GW

Given the above CC mitigating measures, implementation of these measures is expected to reduce the 2005 emissions level by 5.8% in 2010. This suggests that for this 5-year period, a 1% decrease in GHG would require an investment of US\$4.95 billion.

However, more investments may apparently be necessary because the projected growth in energy demand will increase CO₂ emissions by an average of 3.2% annually henceforth, reaching 163.6 MtCO₂ in 2030. Hence, CO₂ emission per unit of TPES will continue to increase at an annual rate of 0.7%. CO₂ emission per unit of GDP, however, may decrease, as the economy operates with a larger service sector and less energy intensive industries.

MAXIMUM RE SCENARIO

In this scenario, RE's share in electricity generation is projected to reach 35% of TPES for the first ten years of the timeframe. This will come mainly from geothermal and hydropower sources, displacing a

portion of fossil fuels relative to the previous scenario. Energy self-sufficiency will reach 60% between 2009 and 2020, but this will decrease due to increasing energy demand and lack of potential capacity to follow suit thereafter. The scenario is expected to reduce CO₂ emissions by a total of 188.3 MtCO₂ from 2009 to 2030. CO₂ emission per capita will likewise decrease by 8.4% in 2010, and 4.3% in 2030.

Table 5 Investment Requirements in Electricity Generation Using Maximum RE Scenario, 2008-2030, 10% Discount Rate

Resource	Amount, in USD Billion	% to Total	Capacity
Coal	18.6	61	8.8 GW
Gas			3.6 GW
Hydropower	7.7	25.2	3.1 GW
Geothermal	3.1	10.2	1.1 GW
Wind	0.7	2.3	400 MW
Solar	0.13	0.4	16 MW
Ocean	0.28	0.9	120 MW
TOTAL	30.51	100	16.7 GW

The above Table shows the required investments (US\$ 30.51 billion) which is higher by almost 8% compared to the reference scenario. The emission reduction benefit from the investments suggests that a 1% decrease in per capita emission over the period will require an investment of US\$ 7.1 billion. The difference of around US\$2 B is the implicit result of a 10% displacement of fossil fuels by renewable energy sources, and this will entail higher electricity prices.

NUCLEAR SCENARIO

This scenario considers the rehabilitation of the Bataan nuclear power plant (BNPP), and simulates 3 possible launching periods, i.e. 2015, 2020, and 2025. For comparison purposes across scenarios, only the 2015 rehabilitation scenario at 10% will be presented. The use of nuclear energy will result in the displacement of coal, and to some extent reduction in the share of hydro and gas in TPES relative to the reference scenario. A significant reduction in GHG emissions is expected, with CO₂ emission decreasing by 60 MtCO₂, or around 3% of TPES over the period. Apart from reducing GHG emissions, the nuclear scenario will also result in lower generation costs. The required investments will amount to around USD 615,400,000 (Php 30.77 billion), almost equal to the maximum RE scenario.

Though this scenario provides the most reliable source of base-load power, public acceptability of the BNPP seems to be low. The cost of a proper disposal of highly toxic and hazardous wastes, as well as the safety of the plant's location needs to be addressed.

Table 6 Investment Requirements in Electricity Generation Using Nuclear Scenario, 2008-2030, 2015 BNPP Rehabilitation Period, 10% Discount Rate

Resource	Amount, in USD Billion	% to Total	Capacity
Coal	14.07	45.7	
Gas	3.72	12.1	

Hydropower	7.75	25.2	
Geothermal	0.20	0.6	
Wind	0.01	0.03	
Nuclear	5.02	16.3	7.9 GW
TOTAL	30.77	100	16.7 GW

CLIMATE CHANGE MITIGATION SCENARIO

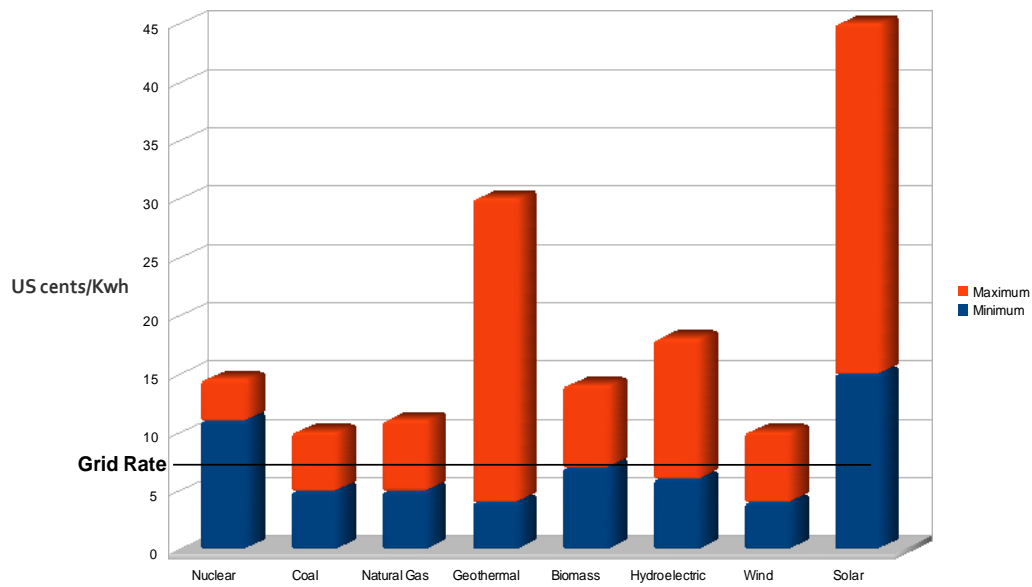
The last scenario simulated by the MESSAGE model was the reduction of CO₂ emissions by 5% below 1990 levels, equal to a reduction to 41.1 MtCO₂. This scenario would entail a substantial decrease in the use of coal, and its replacement by gas, geothermal, hydropower and nuclear energy sources, thereby further diversifying electricity generation. Gas, coal, and hydropower will almost be equally distributed with an average share of at least 25% of total electricity generation. Geothermal energy's share will be about 17%, while other RE sources will account for 0.9% and nuclear energy the rest. However, upon plotting projected emission levels in this scenario, CO₂ emission levels will still continue to increase, despite all the mitigating measures and the use of the cap and trade approach. The 5% reduction based on 1990 levels is thus deemed to be unattainable by this supposed CC scenario.

In summary, the reference scenario with its US\$ 29 B investment requirement comes out as the least cost option, and the government shall pursue it in the medium and long-term. This least-cost strategy will result in a reduction of GHG emissions, albeit at lower levels than the other scenarios. With coal as the significant energy source in this strategy, the study recommends the following mitigation actions: 1) the application of clean coal technologies; 2) carbon capture and storage activities; and 3) reforestation of plant vicinities to serve as carbon sinks. Though reduction of the dependence on imported coal is not a mitigation measure, the study recommends the construction of coal-fired power plants specifically designed to accommodate domestic coal for cost effectiveness measure. The cost of these additional investments, however, needs to be considered in the above calculations.

As a more effective CC mitigation measure, the maximum RE scenario will reduce GHG emissions and provide the longest sustained and highest level of energy self-sufficiency. But its substantially higher generation costs due to high upfront costs make it less feasible to pursue. This constraint may be addressed by the incentives in the current RE Law (e.g. seven years of income tax holidays, duty-free importation of machinery for the first 10 years, and other special tax rates on equipment and machinery) that may lower investment and operating costs, but there is no guarantee that these will translate into lower electricity prices for the end consumer without corresponding government regulation.

A simple comparison of existing renewable energy operating costs on a per kwh basis with the current grid rate (Figure 1 below) may indicate that the cost of energy from nuclear and solar is prohibitive without more government support. But it also shows there may be more positive opportunities for RE that the above scenarios may tap in the areas of wind and biomass, sources that have not yet figured significantly in the current energy mix of the country.

Comparative Cost



Slide 3

Challenges of Renewable Energy
9 September 2009



Source: Aboitiz, M. *Challenges of Renewable Energy*, Powertech Business Forum Sept 2009, WTC, Manila.

Figure 1 Comparative Costs of Renewable and Non-Renewable Energy Sources

ADAPTING TO CLIMATE CHANGE

ADAPTATION MEASURES

Despite the lack of a national framework, the country has begun the process of coming up with its list of adaptation strategies in the various relevant sectors for addressing climate change. The planning process is conducted at the sectoral level, each with varying substance and degree of completeness. All of these will eventually be consolidated and integrated. The objectives of each set of sector strategies are: (1) to reduce the ecological and economic impacts of climate change on economic activities; and (2) establish and enhance technologies and measures that promote productivity in the context of CC, or at least mitigate its impacts. Following is a summary of emerging priorities resulting from various consultations and validation work at the national, regional and local levels, as well as by a host of government and non-government stakeholders.

SCIENCE AND TECHNOLOGY SECTOR⁸

The general objective of building CCA strategies in the science and technology sector is to sustain productivity and competitiveness of the agriculture, forestry and natural resources sectors, based on each of their vulnerability assessments to climate change. The conduct of vulnerability assessments (VA) has, therefore, been considered a priority action in the immediate term before adaptation strategies are formulated. The sector has drafted a long research agenda that would conduct proper vulnerability assessments and propose appropriate adaptation strategies and technologies for the identified sectors. The VA manual produced by the SNC may prove highly useful in this regard, and it is recommended that the proposed VA strategies below be harmonized with the SNC's VA manual when actual sectoral and/or geographical VAs will be conducted.

Table 7 CCA S & T Strategies, Crops and Soils

	Knowledge & Technology Generation	R & D Utilization	Capacity Building & Governance
Vulnerability Assessment	Identification of vulnerable areas (e.g. drought-prone areas, flood-prone areas, and salinity-prone areas) through GIS or remote sensing technology; – to determine what type of crop to plant and the appropriate land use	Modelling the impacts of climate change on major crops based on the IPCC emission scenarios or SRES (IPCC, 2000); using the IPCC SRES emission scenarios will promote consistency in assumptions and will allow comparison of results)	Strengthening the use of weather and climate-related information (weather forecasting) to improve risk preparedness and to safeguard and maximize agricultural production in the country
	Identification of the critical climate thresholds and evaluation of the impacts of extreme weather events on agriculture such as the impacts of drought, flooding, diseases and insect pests; and sea level rise;		Establishment and maintenance of observation facilities for the collection and compilation of climatic, social and biophysical data in support of climate change studies;
	Effects of elevated CO ₂ and increasing temperature on		Improvement of information-sharing and data

⁸ Villar, E. October 2009. Philippine Climate Change S & T Agenda in Agriculture, Forestry and Natural Resources Sectors. Paper Presented at the NATIONAL CONFERENCE ON CLIMATE CHANGE ADAPTATION + 2, October 26-27, 2009, Diamond Hotel, Manila, Philippines.

	the yield of major crops		networking on climate change in the Philippines
	Effects of elevated CO2 and increasing temperature on insect pest and diseases of major crops		Awareness campaign, education and training on the impacts of climate change and vulnerability of major crops.
Adaptation	Adaptation researches concerning agro-technology and water resources management	Development of package of adaptation technologies for vulnerable areas (e.g. adaptation technologies for drought-prone areas, flood-prone areas, saline areas)	Improvement of agricultural facilities and infrastructure in support of developing and promoting adaptation technologies
	Evaluation of new varieties for heat/drought tolerance, submergence tolerance, soil salinity tolerance, and resistance to insect pests and diseases		Increase awareness on the availability and utilization of potential adaptation technologies in agriculture (e.g. new rice varieties for salt tolerance, etc.)
	Development of new philosophy in farming practices and improvement of existing farming practices to combat climate change		
	Evaluation of different planting dates in major crops for optimum yield		
Sector Mitigation	Development of marginal abatement cost curve (MAC curve) for potential mitigation options in agriculture	Development of package of mitigation technologies for agriculture which consider the technical and economic mitigation potential	Increase awareness on the benefits of implementing mitigation practices in agriculture
	Study on efficient use of N fertilizer (precision farming) and practices that reduce N application (and thus N2O emissions) which enhance crop productivity and environmental quality		
	Study on the economics of recycling agricultural residues for bioenergy and the economics of growing energy crops		
	Development of a crop-livestock-forestry integration systems as an effective and sustainable approach to reduce GHG emissions		

Table 8 CCA S & T Strategies, Livestock and Poultry

Knowledge and Technology Generation	
Vulnerability Assessment	GIS-assisted identification and evaluation of vulnerable areas for feed grains, pasture crops against drought, salinity, water logging, and shading
	Trend analysis of livestock productivity by year and season
	Assessing the impact of climate change on the etiology and virulence of pathogenic organisms on livestock
Adaptation	Trend analysis of occurrence of climate sensitive animal diseases
	Identification and economic valuation of the different effects of climate change on livestock and poultry productivity
	Improving heat tolerance through breeding
	Molecular identification of genetic markers for heat tolerance and disease resistance
	Establishing favourable microclimatic conditions for better housing management
	Development of vaccines for common and emerging animal diseases
	Improved nutritional management schemes or feeding strategies adapted to extreme climatic conditions
Mitigation	Physical modification of the environment tailor fit to different production systems
	Development of breeding management interventions attuned to the changing climatic conditions
	Identification and conservation of indigenous animal genetic resources adapted to extreme climatic conditions
	Improvement of digestibility of both conventional and unconventional feeds
	Revisit crop-animal integration for efficient use of resource and conservation and use of biodiversity
	Study on nutritional intervention to minimize enteric gas emission
	Study on more efficient and economical means of animal waste management

Table 9 CCA S & T Strategies, Forestry Sector

	Problem Areas/Relevant ISP Targets	Research and Development	Expected Outputs
Mitigation	Inadequate biomass equations/rates of carbon sequestration (site/species specific)	Biomass equation studies for specific sites/species	Site/species specific biomass equations
	Lack of info on carbon footprints of forest-based industries	Studies on C footprints of forest-based industries	C footprints of forest-based industries
	Unknown fate of harvested wood products (HWP)	Assessment of the fate of wood from the forest to the end-use; link to IPCC issue on HWPs	Proportion of wood that end up in long-term Carbon storage
	Lack of information on REDD and A/R CDM in the Philippines in the context of UNFCCC	Assessment of potential of the Philippines for REDD and A/R CDM Carbon credits	Potential mechanisms to obtain C credits from REDD and A/R CDM
	Lack of economic analysis on mitigation activities in forestry - Valuation studies on environmental services	Economic analysis of mitigation activities in forestry a) Valuation studies on environmental services	Economic analysis of mitigation activities in forestry

		b) BCA of mitigation activities	
	Lack of mitigation strategies in forest-based industries	a) Utilization of cellulosic waste for bioethanol production b) Enzyme discovery for bioethanol production c) Paper mill sludge for algal production for energy	Alternative energy/ Biofuels
Adaptation	Inadequate CC impact and vulnerability studies on various forest types and other environmental services (i.e. water) by elevation •Mangrove/ Beach •Terrestrial •Agroforestry •Urban •Plantation	CC impact and vulnerability studies on various forest types and other environmental services (i.e. water) by elevation •Mangrove/ Beach •Terrestrial •Agroforestry •Urban •Plantation	Vulnerability assessments of various Ecosystems
	No monitoring of impacts •Phenology •Cropping patterns/systems •Insect infestation	Monitoring of CC impacts on: •Phenology •Cropping patterns/systems •Insect infestation	Observed impacts of CC to forests
	Lack of information on carrying capacity of and impacts (sea level rise and other climate extreme events) on small island ecosystems (Priority on the Eastern board)	Assessment of carrying capacity of and CC impacts on small island ecosystem	Carrying capacity
	Lack of database on: •coping mechanisms of people •Biophysical characteristics (i.e. flora and fauna, soil, climate) •Socio-economics	Gather information and develop database for: •coping mechanisms of people •Biophysical characteristics (i.e. flora and fauna, soil, climate) •Socio-economics	CC Database
	Lack of information on how forest ecosystems help upland/local communities adapt to CC (coping mechanisms)	Documentation & assessment of local practices, knowledge, research results on the use of forest resources to enhance resilience of local communities to CC	Best practices for adaptation using forest resources
	Lack of information on adaptation strategies by ecosystems: • Urban • Mangrove/ Beach • Terrestrial • Plantation • Agroforestry	Assessment & documentation of Adaptation strategies by ecosystems: • Urban • Mangrove/ Beach • Terrestrial • Plantation • Agroforestry	Adaptation strategies and measures for terrestrial and other ecosystems
	Lack of economic analysis on Adaptation activities in forestry • Valuation studies on environmental services	Economic analysis of adaptation activities in forestry • Valuation studies on environmental services • BCA of adaptation activities	Economic analysis of Adaptation activities in forestry

Table 10 CCA S & T Strategies, Hydrology and Water Resources

Key Area	Research Agenda
Vulnerability Assessment	<ol style="list-style-type: none"> 1. Studies on downscaling climate scenarios and projections at national level. 2. Evaluation of effects of climate change on hydrologic variability including extreme events. 3. Assessment of dependability of water supply from different major watersheds in the country as well as in the different geographical areas has to be evaluated in the light of significant land use and land cover changes. 4. Evaluation of impacts of climate change on water resources scarcity for different uses based on annual and monthly demand and supply. 5. Coupled climate and land-use modeling to account for feedbacks between land use and climate change. 6. Development of indicators of climate change impacts on freshwater for assessment and monitoring. 7. Consideration of “green water” (soil water originating from rainfall) and “blue water”(surface and groundwater) in water resources assessment. 8. Development of techniques and procedures to communicate the results of probabilistic approaches for risk analysis for use by end-users. 9. Exploring applicability of weather index-based adaptation measures.
Adaptation	<ol style="list-style-type: none"> 1. Early warning system (EWS) is an effective strategy to adapt to the impacts of climate change particularly the water resources related processes and hydrologic variables such rainfall, stream flows, floodwaters, etc. 2. Use of reliable seasonal climate forecasts downscaled to a province is useful information for making appropriate adaptation measures at the local level. 3. Adoption of water-efficient technologies and good practices e.g. improving water-use efficiency and water-demand management, are no regrets options to address climate change. 4. Science-based operational policy for hydropower dams and reservoirs are needed to manage and operate the water resources system control structures incorporating climate change risks, and considering the multiple uses of such structures. 5. Wastewater management and water reuse need to be further studied and quantified in the context of water scarcity assessment. 6. Improving irrigation and fertilization strategies in agricultural crop production systems may reduce CO₂ emissions from energy systems to deliver the irrigation water, and nitrous oxide emissions through proper timing and dosage of inputs.
Cross Cutting Concerns	<ol style="list-style-type: none"> 1. Development of the Philippine Information Base which include updating of water resources meta-database of current information sources about water resources systems in the country, new indicators to include ecological status of water resources systems, and mapping and assessing the current state of water resources systems. 2. Development of integrated watershed models that depict the linkages and feedbacks among the various key components (e.g. hydrology, biodiversity, water use) which can then be coupled with downscaled local climate scenarios to study future states of water resources systems. 3. Capacity building to reach out to larger community of stakeholders and the society-at-large through collaborative research, training programs, scientific workshops, and many other educational activities.
IEC Program	<ol style="list-style-type: none"> 1. Seminars on climate effects and impacts and building resilience should be conducted at local level. 2. Communities, families and individuals should be educated on climate risks and natural

Finally, regarding institutional and policy concerns for the S & T sector, the research agenda consisted of a number of capacity assessment and capacity-building strategies:

Table 11 CCA S & T Strategies, Institutional and Policy Concerns

Key Area	Research Agenda
Capacity Assessment	<ol style="list-style-type: none"> 1. Examine the role of local institutions and their interaction in CRM, and defining their strengths and limitations; 2. Assess institutional capacity, e.g., human resources, skills and performance, management capacity (mandates, availability of financial resources, management practices and processes), level of participation, authority, stability/adaptability of the institution. 3. Determine the extent to which climate risk management measures are institutionalised and streamlined within local government systems; and examine legal and regulatory environments that would reduce vulnerability among the population.
Capacity Building	<ol style="list-style-type: none"> 1. For adaptation, develop tools and approaches for mainstreaming CC into local agriculture and natural resources development and investment plans. 2. Study feasibility of CC risk insurance mechanisms and products for private sector, and household level; as well as for farming communities. The weather index insurance can also be an alternative or can complement the crop insurance scheme now in use. 3. Clarify roles, mandates, functions and tasks of existing CC institutions. 4. Local institutions should be strengthened and inter- local linkages built. 5. Study the collaboration between managers of weather data, water resources, farmers and policy makers and strengthen extension services.
Cross-Cutting Concerns	<ol style="list-style-type: none"> 1. Formulate a consistent strategic climate change framework and national action plan for the AFNR sectors. There is need to assess sector level policies that can address climate change issues; but it is also important to study and analyze inter-sectoral policy contradictions. 2. There must be a strong political will and advocacy for legislative measures on land use conversion and irrigation systems development to attain food security under episodes of climate risks

AGRICULTURE SECTOR

The agriculture sector's set of strategies is premised on the framework that "The knowledge of CC science is within the scientists' domain, (but) the knowledge of response of ecosystems and their resources to CC can be provided by farmers"⁹.

As coordinated and consolidated by the Bureau of Soils and Water Management (BSWM) of the Department of Agriculture (DA), and through the GTZ-funded ACC-BIO project, the following matrix provides the various outcomes, strategies and outputs that the agricultural sector intends to pursue in adapting to CC:

⁹ Tejada, S. October 2009. Agriculture Sector Climate Change Adaptation Strategy within the Context of the Devolution. BSWM-DA. Paper Presented at the NATIONAL CONFERENCE ON CLIMATE CHANGE ADAPTATION + 2, October 26-27, 2009, Diamond Hotel, Manila, Philippines.

Table 12 Priority Policies and CC Adaptation Actions, Agriculture Sector¹⁰

Strategy	Objective	Outputs	Implementers
Outcome 1: Enriched Climate Change Risk Data Base and Establishment of Climate Change Informed Stakeholders			
Operationalization & Integration of Weather- Based SAFDZ and Climate Risks Adaptation Strategies in CLUP Process	To develop local capacity for the generation, analysis, and integration of climate related risks, land use and resources at risks and appropriate adaptation measures into the disaster risk management and local land use planning processes	<ul style="list-style-type: none"> • SAFDZ-CLUP Map • Data base on climate risks • Land Use Plan and Planning Process that integrates climate change adaptation with disaster risk mitigation 	DA, DA-BSWM, DENR, DILG, DAR, LGUs, Farmer Association, NGOs, Academe, Private Sectors
Farmer-Scientist Partnership for Climate Change Intelligence Network / For Monitoring C	To establish science enhanced local knowledge on agriculture and ecosystem responses to impacts of microclimate changes needed for real-time spatial and temporal changes in micro-climate in the agro-ecosystem specific CC warning systems	<ul style="list-style-type: none"> • Participatory Early Warning Systems and Vulnerability Maps and Information • Network of well informed local CC champions and science validated Biological Indicators of CC as ground truths for identifying communities and areas at risk to CC 	DA, Farmer Scientists (GAWAD Saka Awardees), DENR, Academe, PAGASA/DOST, NGOs, LGUs
R, D and E Agenda for CC Adaptation for Coastal Areas, Small Islands Areas with Active Volcanisms, and Sequestration and Emission Capacity/ Potential of Agriculture	To establish a dedicated National Budgetary Program for Climate RD and E Agenda for Climate Change Adaptation	<ul style="list-style-type: none"> • National Experts Consortium on RD and E on Climate Related Risks adaptation measures; • National Agenda and Priority Research and Technology Development priority crops, livestock and aqua-culture 	DA, DA-RFU, DA-BAR-ATI, Academe
Outcome 2: Climate Resilient Agriculture, Agro-biodiversity and Self Reliant Communities			
National Pilot Program Support To Replication and Up-scaling of Climate Based Conservation Farming and Conservation of Agro-biodiversity	To establish national program for pilots in selected areas for replication and up scaling of best farmer initiated practices and technologies on conservation farming	<ul style="list-style-type: none"> • CC- Well informed farming communities; • Climate resilient farming systems that produce create self reliance and ensure safe and nutritious food that are less dependent on imported fertilizers and other farm inputs. 	DA, DA-RFU, DENR, DAR, Academe, LGUs Farmers association, NGOs, private institutions (PRRM, MASIPAG, etc)
Integrating Production, Supply Management and Restoration of Lowland Ecosystems Functions for Flood Water Control & Management & Agro-Biodiversity Enhancement	To establish policy support and pilots to demonstrate integrated irrigated and rain fed rice production program that reduce risks of loss in production, income and restore productivity of lowland Ecosystems	Rice production adaptation program agreed and implemented to reduce risk of farming communities from crop losses attributed to extreme climate disasters and income losses caused by oversupply and reduced farm gate prices	DA, DA-RFU, NIA, DAR, Farmers/Irrigators Association, NGOs, LGUs
Enhancing National Support	To improve national support	Community-based Network	DA, DA-RFU,

¹⁰ Tejada, S. October 2009. Agriculture Sector Climate Change Adaptation Strategy within the Context of the Devolution. BSWM-DA. Paper Presented at the NATIONAL CONFERENCE ON CLIMATE CHANGE ADAPTATION + 2, October 26-27, 2009, Diamond Hotel, Manila, Philippines.

to Community-based Rain and Flood Water Management for Upland Ecosystems Restoration and Productivity Improvement	program for community-based small water reservoir systems as front line CC adaptation measures with complimentary function for agrobiodiversity and disaster risk reduction	of Water Detention Systems for flood mitigation and improved rain fed and upland crop diversification in the country	NIA, LGU, DAR
Urban Agriculture and Home-based Indigenous and Local Food Processing and Livelihood	To enhance the implementation of urban agriculture and develop capacity of women and youth in the basic food processing, packaging and marketing and other skills with immediate market demand	Food self sufficient and climate resilient Urban dwellers with women and youth sector capacity for basic food processing, packaging and marketing home produced food, herbal plants and food related products	DA, DA-RFU, DENR, LGU, DECS, DOST, DTI, DAR, Academe, Private sector, LGUs

BIODIVERSITY SECTOR¹¹

Biodiversity is defined as the “common thread that makes the living fabric of forest and coastal/marine ecosystems stable and resilient”. Hence, conserving biodiversity ensures that ecosystems are more functional in providing us material goods and life support services as well as giving them a higher degree of adapting to CC. There are quite a number of issues and gaps that need to be addressed in order to allow the biodiversity sector to contribute to adapting to CC. Information, data and knowledge gaps on CC impacts on biodiversity still need to be refined to come up with sound predictions and research and monitoring plans, and there are still very limited vulnerability assessment studies done on critically endangered species and fragile ecosystems. Current biodiversity conservation programs are poorly funded, fragmented and uncoordinated, and are not yet properly monitored due to the absence of national baselines, standards and indicators. Worse, they are not even properly integrated in development planning especially in the development of human settlements. Some policies and strategies run into conflict with each other, such as the promotion of mariculture and mining which in some places aggravate the effects of CC. Native species of forests are being displaced due to the expansion of plantation forests. In the fisheries sector, the absence of population management programs has resulted in unsustainable patterns of production (such as the use of destructive fishing practices) and consumption within coastal areas thus lowering the capacity of the sector to adapt to CC. Finally, institutional concerns include non-complementation of existing management structures, resulting in weak coordination among them.

Strategies to address these concerns in the biodiversity sector include the following:

Table 13 Priority Strategies for CCA, Biodiversity Sector

Key Area	Strategies
Knowledge Management	<ol style="list-style-type: none"> 1. Develop understanding on climate change impacts on biodiversity, forest and coastal/marine ecosystems; 2. Develop research agenda and monitoring systems on the impacts of CC on highly

¹¹ Lim, M. October 2009. Biodiversity, Coastal and Marine, and Forestry Sectors. PAWB-DENR. Paper Presented at the NATIONAL CONFERENCE ON CLIMATE CHANGE ADAPTATION + 2, October 26-27, 2009, Diamond Hotel, Manila, Philippines.

Vulnerability Assessment	<ul style="list-style-type: none"> vulnerable and threatened species and ecosystems; 3. Conduct research, knowledge management and knowledge transfer on CC and biodiversity and forest and coastal/marine ecosystems; 4. Encourage leading universities to institute in their degree programs (undergraduate and graduate degree programs on science-related courses) subjects on biodiversity conservation and management 5. Develop a data base and networking system to share information on biodiversity, forest & coastal/marine adaptation measures and conservation strategies.
	<ul style="list-style-type: none"> 1. Develop vulnerability and risk assessment models on climate change impacts on biodiversity 2. Assess vulnerability of species and ecosystems and preparing adaptation plans and programs; 3. Identify, delineate and map climate vulnerable species and ecosystems;
Institutional and Capacity Building	<ul style="list-style-type: none"> 1. Develop and disseminate to concerned organizations the tools and models for vulnerability assessment, climate change impact prediction and adaptation measures determination; 2. Build capacities of implementing organizations/agencies on biodiversity, forest and coastal/marine ecosystem management; 3. Bring down the efforts to address climate change at the local level through the involvement of LGUs and local organizations; 4. Provide the enabling conditions in terms of policy and institutional development to ensure the implementation of adaptation measures on biodiversity, forest and coastal/marine conservation;
Adaptation	<ul style="list-style-type: none"> 1. Manage PA's, enforce zoning and establish wildlife corridors; 2. Develop and adopt sustainable financing mechanisms (e.g., biodiversity heritage trading, payment for ecosystem services) 3. Promote ex situ conservation of highly vulnerable species; 4. Formulate a national strategic plan for biodiversity, forest & coastal/marine adaptation to climate change impacts;
Monitoring and Evaluation	<ul style="list-style-type: none"> 1. Monitor climate change impacts on highly vulnerable species and ecosystems 2. Conduct CC M&E system at national and local levels;
Cross-cutting Concerns	<ul style="list-style-type: none"> 1. Integrate biodiversity adaptation strategies in development policies, plans, programs and projects; 2. Integrate biodiversity, forest & coastal/marine ecosystem adaptation measures in disaster risk management plans and action programs 3. Formulate urban development designs that are supportive of ecosystem diversity; 4. Integrate biodiversity, forest and coastal/marine conservation in local development plans (CLUP, CDPs, PFP) and master plans for tourism and infrastructure development

For the forestry sector in particular, the main adaptation strategy is keeping forest ecosystems intact by protecting these from being destroyed or degraded. Other adaptation strategies are secondary and operational in nature, such as siting safe places for human settlements, or selecting CC-resilient tree species for forest rehabilitation. The approach to protecting forest ecosystems is by active management in all forest lands. There should be no open access areas. Forest stewards given appropriate forestland tenure should practice sustainable forest management, which requires the following activities:

1. Partitioning of all forest lands into Sustainable Development Units:
 - a) Biodiversity Conservation Areas
 - b) Watershed Protection Areas, and

c) Forest Production Areas

2. Zoning all BCA, WPA, and FPA into strict protection zones and controlled-use zones, and formulating a Management Framework Plan for each and every SDU.
3. Dividing all SDUs into barangay cluster or barangay based Forest Management Units (FMU) for effective management.
4. Establishing a barangay cluster or barangay forestry organization (BFO) to manage each FMU, providing them with permanent tenure.
5. Formulating and implementing a Forest Management Plan for each FMU by the BFO supported by LGUs and other stakeholders and monitored by the DENR.
6. Realignment of roles of all stakeholders.
7. Motivating, capacitating, and supporting on-ground forest managers.
8. Removing institutional constraints to sustainable management practices.
9. Applying strict monitoring and control measures, like forest certification.

For the coastal and marine sector, some strategies that have been identified to allow the sector to adapt to climate change include the following:

1. Relocate people on low, small islands to higher ground;
2. Set up marine reserve networks with refugia as source of coral/fish larvae to replenish degraded reefs; refugia in deeper, cooler water near upwellings;
3. Prepare IEC programs on links between ecosystems and biophysical stresses to enable affected communities to understand climate change
4. Develop programs that emphasize the synergistic interactions of mangroves, seagrass beds and coral reefs in a given area;
5. Implement programs that protect coastal areas from storm surges, tsunamis and minimize, prevent human-related stresses;
6. Strengthen capacities of coastal communities, including stabilization of coastal populations

INFRASTRUCTURE SECTOR¹²

Current standards in the infrastructure sector are generally based on historical climate patterns with shorter or inadequate records. Most infrastructure facilities are not yet designed to take CC into account, and there is very little evidence that shows that climate change is factored into infrastructure development decisions. As such, damages to infrastructure brought about by CC can result in inefficient operations, displacement of vulnerable groups, disruption of delivery of basic services, inaccessibility of damaged areas, all of which may result in decreases in total economic output and threats to national security. Key issues and gaps have been identified, as composed of the following:

¹² Navida, C. October 2009. Adaptation to Climate Change and Conservation of Biodiversity in the Philippines (ACCBio) Project: Adaptation Strategies, Infrastructure Sector. Paper Presented at the NATIONAL CONFERENCE ON CLIMATE CHANGE ADAPTATION + 2, October 26-27, 2009, Diamond Hotel, Manila, Philippines.

Table 14 Key Issues and Gaps for CCA in the Infrastructure Sector

Key Issues	Gaps
Assessing risks – vulnerability check	Reliable baseline hydrological, meteorological information and forecasting
	Vulnerability maps specific to project location
	Analytical tools, methods and models
Managing Risks	Climate change adaptation strategies not in place
	Knowledge of decision makers, investors, government agencies, private sector and academe
	Readiness of inputs from other sectors
	Outdated codes, standards and specifications
Practicalities of reducing risks	Funding
	Cross-cutting issues with other sectors

Strategies in the immediate term are thus composed of the following:

1. Sustainable meteorological and hydrological baseline data collection;
2. Collaboration between engineers/planners with CC scientists on regional development scenarios and the data needed to analyze the impacts; and
3. Conduct inventory of existing infrastructure that may be at-risk from the effects of climate change.

In the medium-term, the following strategies need to be conducted:

1. Develop coordinated adaptation plans to secure these assets based on specific climate change projections on the regions;
2. Review of existing building codes, specifications and standards; and
3. Draft design guidelines for new infrastructure that take into account anticipated CC impacts.

Finally, long-term plans for the sector include:

1. Identify adaptation strategies for further study that are beyond the scope of individual stakeholders. i.e. technology, financing, land use patterns and economy;
2. Institutional Capacity Building/Integration to curriculum; and
3. Goals and efforts across sectors need to be harmonized.

WATER SECTOR¹³

The country's water sector currently faces a lot of problems which global warming and the local CC impacts will further aggravate. For instance, nine major cities are already at risk of water shortage, and many areas are experiencing water supply shortages during the dry season. Only a third of the country's river systems are classified as sources of public water supply and 50 (12%) of the country's rivers are considered biologically dead (World Bank's Philippine Environment Monitor, 2003). As much as 58% of groundwater sampled is already contaminated with coli-form and needs treatment.

¹³ Penaranda, I. October 2009. Proposed Adaptation Strategies: Water Sector. Paper Presented at the NATIONAL CONFERENCE ON CLIMATE CHANGE ADAPTATION + 2, October 26-27, 2009, Diamond Hotel, Manila, Philippines.

The Table below identifies some of the key issues and gaps in the water sector and the accompanying capacity requirements it needs for CC adaptation.

Table 15 Key Issues and Gaps for CCA in the Water Sector

Key Issues	Gaps
Inadequate national and local capacity on CC adaptation and IWRM as an adaptation strategy	•Capacity assessment
Lack of updated scientific water resources information	•Research on water resources (supply and availability) •Regular monitoring of water quality •CC scenarios for water resources at local / river basin level
Lack of coherence in and conflicting water resources policies and plans at the national and local levels	•Harmonization of policies and development plans •Mainstreaming of water resources plans and CCA-DRRM
Ineffective water resources regulatory policy	•Harmonization of regulatory and oversight functions of various government agencies
Inadequate public awareness of CC and water use consumption efficiency	•IEC on CC and impacts on water resources
Inadequate knowledge on and access to CC adaptation technologies in the water sector	•Research and development •Technology transfer •IEC on low cost technologies
Inadequate water sector financing for CCA and DRRM	•Diversification and mobilization of financing sources •Innovative financing schemes •Incentive schemes

To address the issues and gaps, the following strategies have been formulated:

1. Building understanding and adaptive capacity on IWRM for CC adaptation at the national and local levels
 - a. Strengthen the technical capacity of key national and local institutions on CCA and IWRM
 - b. Build the capacity of communities and all sectors on CC adaptation and DRRM
 - c. Build capacity for knowledge management
 - d. Ensure access to knowledge systems on CC-IWRM
 - e. Increase general public awareness on CC impact on water and potential CCA-DRRM measures
2. Reducing national and local vulnerability to climate change through no regret, low regret CCA measures
 - a. Formulate alternative management mechanism of existing water supply
 - i. small water impoundments vs. large dams
 - ii. river basin / small island water resources mgt
 - b. Adopt no regret, low regret options
3. Mainstreaming CC adaptation in water resources policies, plans and programs
4. Ensure sustainable water sector financing for CCA
 - a. Encourage public-private sector partnership in IWRM and CC adaptation technologies
 - b. Design NG-LG financing framework to encourage LGU investment in IWRM-CCA measures
 - c. Mobilize and diversify financing sources
 - d. Design appropriate incentive systems to encourage investments in CCA measures

Policy studies are needed for amending the Water Code and the Local Government Code for these laws to better address CCA strategies. Furthermore, a system of incentives for CCA has to be set up, guided by proper valuation of scarce water resources to guide the water pricing structure. The incentive scheme can encourage investments and mobilize financing in CCA technologies.

DISASTER RISK REDUCTION: LOCAL LEVEL ADAPTATION¹⁴¹⁵¹⁶¹⁷

There are several successful local level adaptation practices that are being implemented in various parts of the country. In the Bicol region, agricultural and coastal livelihood projects have been introduced simultaneous with proper solid waste management to address the problems that CC has caused on the local economy. In Iloilo, adaptation was tackled first by rooting out economic activities and community practices that were seen to exacerbate climate change impacts, then developing agricultural techniques that allowed farming to adjust to climate changes.

What is common among all of these local examples is the emphasis on several fundamental steps to adapt to CC: 1) reducing risks through early warning systems and improving disaster response and; 2) improved infrastructure such as bridges, roads, shelter, seed banks, warehouses, food storage, etc.; 3) introducing livelihood activities that are not as susceptible to CC impacts; 4) proper solid waste management; and 5) continuing efforts to raise community awareness on global warming, climate change and vulnerability assessments at the community level.

FINDINGS: STATE OF ADAPTATION STRATEGY

A nascent, evolving national framework for CC adaptation is already in place. There have been consultations, some general vulnerability assessments, and a growing list of concrete adaptation measures. Apparently, consensus is emerging on the identified needs for CCA and mitigation, such as information systems, sector research agendas, policy changes, institution and capacity building, sector programs and infrastructure. The lessons learned from local adaptation experiences also identify the following: 1) the need for local early warning systems and higher community awareness; 2) enhanced capacities to identify areas of climate risks to reduce and measures to improve disaster response; 3) local direct adaptation actions, such as climate-proofing existing livelihoods or introducing new livelihoods less susceptible to CC impacts, and investment in infrastructures and facilities; 4) programs indirectly related to CC impacts, or preventive of adverse secondary impacts of CC, such as the impact of floods and lack of solid waste management on health conditions.

Given the above country list or inventory of activities and requirements for CCA and mitigation, these measures, researches, information systems, policy studies, strategies, agency programs, capacity-building and investment requirements all entail financial resources. Moreover, because of limited funds,

¹⁴ Binoya, C. October 2009. Camarines Sur: Adaptation to Climate Change of Agriculture and Coastal Communities. Paper Presented at the NATIONAL CONFERENCE ON CLIMATE CHANGE ADAPTATION + 2, October 26-27, 2009, Diamond Hotel, Manila, Philippines.

¹⁵ Coastal Core, Inc. October 2009. DRR and Climate Change Adaptation in Coastal Communities Exposed to Climate Risks. Paper Presented at the NATIONAL CONFERENCE ON CLIMATE CHANGE ADAPTATION + 2, October 26-27, 2009, Diamond Hotel, Manila, Philippines.

¹⁶ Golez, R. October 2009. Climate Forecast Application in the Municipality of Dumagas, Iloilo. Paper Presented at the NATIONAL CONFERENCE ON CLIMATE CHANGE ADAPTATION + 2, October 26-27, 2009, Diamond Hotel, Manila, Philippines.

¹⁷ Tionko, A. October 2009. Adapting to a Changing Climate: Agricultural Community. Paper Presented at the NATIONAL CONFERENCE ON CLIMATE CHANGE ADAPTATION + 2, October 26-27, 2009, Diamond Hotel, Manila, Philippines.

they need to be further systematized, and the priorities have to be set. These are the initial steps in accounting for the costs of CCA and mitigation in the country.

The initial systematic, qualitative listing of priority measures can then be compared with activities that are already in place and being funded by external, governmental or local financial sources. In turn, this would indicate which activities or requirements are being undertaken but are inadequately funded, on one hand, and those that have not been implemented or hardly funded, on the other. Existing project expenditures for particular activities may provide an estimate of the cost of increasing the scope or coverage, or scaling-up a potential priority measure. The DOE study, for instance, gives an estimate of the investment requirements for a 1% reduction of GHG emissions within a given period.

The existing financial flows for CCA and mitigation from external and internal fund sources provide information on the costs of particular CC-related actions, the relative distribution of funds for particular activities or requirements, or the preferences of different fund sources. This may then be compared with the more desirable flow and allocation of funds. With the given or available activity costs, the total amount of desirable funds for CCA and mitigation can then be estimated.

In sum, estimating the costs for CCA can be undertaken through the following steps:

1. Systematize and prioritize the list of adaptation measures for the country
2. Compare the list of priority measures with existing programs and projects that directly and indirectly address climate change adaptation
3. Determine which areas are inadequately funded based on the comparison of ideal and actual CCA measures
4. Use existing project expenditures to provide an estimate of the cost of increasing the scope or coverage, or scaling up of a potential priority measure
 - a. Determine the relative distribution of funds for particular activities or requirements
 - b. Determine preferences of different fund sources
 - c. Estimate desirable flow and allocation of funds based on best available information
 - d. Compare actual project costs with the desirable flow and allocation of funds
5. Estimate total amount of desirable funds for CCA

FINANCIAL AND POLICY INSTRUMENTS FOR ADDRESSING CLIMATE CHANGE

EXISTING FINANCIAL INSTRUMENTS

In general, the documented financial flows that directly meet the challenges of climate change have taken the form of external grants and loans, government counterpart to external flows, and budgetary appropriations and disbursements. External grants have come from the following sources: 1) multilateral agencies like the World Bank, the Asian Development Bank, United Nations and the European Community; 2) bilateral or country donor sources; 3) the Global Environment Facility (GEF); and 4) foreign NGOs and foreign and local private foundations. External funds for relief from natural disasters may also be considered an external flow related to climate change impacts. External loan funds are accounted as an external flow, even if they will have to be paid with internally provisioned resources in the future because they provide a fresh supply of funds that are not locally available to address present climate change concerns. Government counterpart funds are locally raised resources to augment external funds and are drawn from budgetary appropriations.

The coverage period of external grants and loans extend from 1992 to the present. Projects being supported by such funds this year and those planned to be undertaken within the 2009 to 2018 period are included. These external grants and loans have been classified as either directly addressing CC mitigation or adaptation or only indirectly related to CC adaptation or mitigation (A&M). The latter measures fund projects that address existing livelihood, health or current resource/ environmental management concerns, and they neither explicitly intend to bring GHG emissions down nor anticipate the impacts CC may bring for a particular sector or location. These flows are included because they may have the potential of being re-conceptualized and redirected to more direct adaptation or mitigation measures.

There are a total of 558 grants and loan projects from the above sources that have come within the coverage period, consisting of 130 direct A&M projects and 428 indirect A&M (see Table 16). Bilaterals and multilaterals respectively have a total of 228 and 208 projects; majority of which are indirect A&M. The Table also shows the projects coming from the GEF (64), the GEF together with multilaterals (18), private foundations (24), and NGOs (16). If the 267 projects for relief from natural disasters are considered part of external flows, then the total number of projects is 825.

**Table 16 Number of ODA-funded Climate Change Related Projects, by Funding Category
1992-2018**

	Direct	Indirect	Relief	Grand Total
Bilateral	46	182	154	382
GEF	17	47		64
Multilateral	50	158	54	262
Multilateral-GEF	10	8		18
NGOs	5	11	51	67
Private/Foundations	2	22	8	32
Grand Total	130	428	267	825

ON EXTERNAL GRANTS

About \$1.09 billion in grants for direct climate change mitigation and adaptation projects have flowed into the country. In Appendix 1, the list of adaptation or mitigation projects gives a profile of the type of CC measures being implemented in the country. Over the entire period, a greater amount of grants have gone to mitigation projects (636 million) compared to adaptation projects (370 million) (Table 17). And these grants for mitigation have come mainly from multilateral agencies (544 million), compared to bilateral sources (71.6 million). Most of the multilateral grants for mitigation flowed during the initial 1992-2003 period.

Table 17 Comparative Flows of Total Direct Grants & Loans by Major Measure, by Funding Category, 1992-2018

	Grants	Loans	Grand Total
Adaptation	369,847,995	586,592,639	956,440,634
Bilateral	59,636,121	378,988,524	438,624,645
GEF	254,500	-	254,500
Multilateral	157,255,460	41,500,000	198,755,460
Multilateral-GEF	152,169,088	166,104,115	318,273,203
NGOs	185,000	-	185,000
Private/Foundations	347,826	-	347,826
Aid/Relief	2,418,874	-	2,418,874
Bilateral	378,450	-	378,450
Multilateral	2,040,424	-	2,040,424
NGOs	-	-	-
Private/Foundations	-	-	-
Both	83,448,507	9,344,512	92,793,019
Bilateral	22,705,528	9,344,512	32,050,040
Multilateral	41,742,979	-	41,742,979
NGOs	-	-	-
Private/Foundations	19,000,000	-	19,000,000
Mitigation	636,385,385	491,635,179	1,128,020,564
Bilateral	71,617,180	110,522,125	182,139,305
GEF	3,580,105	-	3,580,105
Multilateral	544,160,302	329,427,855	873,588,157
Multilateral-GEF	11,965,000	51,685,199	63,650,199
NGOs	62,798	-	62,798
Private/Foundations	5,000,000	-	5,000,000
Grand Total	1,092,100,761	1,087,572,329	2,179,673,090

Multilateral agencies by themselves, and together with the GEF, have also respectively provided grants (amounting to 157 million and 152 million) for climate change adaptation projects, compared to

bilateral contributions (59.6 million). While bilateral grants for adaptation declined from the 1992-2003 period to the 2004-2008 period, multilaterals grants together with GEF grew and comprised the greater portion (279.8 million) of the total grants for adaptation (369.8 million). Multilateral grants for adaptation from 2004 onwards grew, exceeding those for mitigation in the same period, and further widened the gap in the current 2009-2018 period, as grants for mitigation declined.

In contrast to the multilateral and bilateral donors who account for at least 84.8% of total direct grants, the GEF or UN agencies (together with NGOs and private foundations) have played a minor grant-provisioning role. The low involvement of the GEF in grant provision prior to 2004 and its subsequent lower grant flows (Figure 2) compared to the bilateral and multilateral donations imply that the latter donors have more greatly influenced the direction of climate change adaptation work in the country compared to the GEF. The limited funds from the UNFCCC delivery vehicles, like the GEF, suggest that the criteria of predictability and adequacy of financing required under the Convention from the developed countries cannot immediately be ascertained.

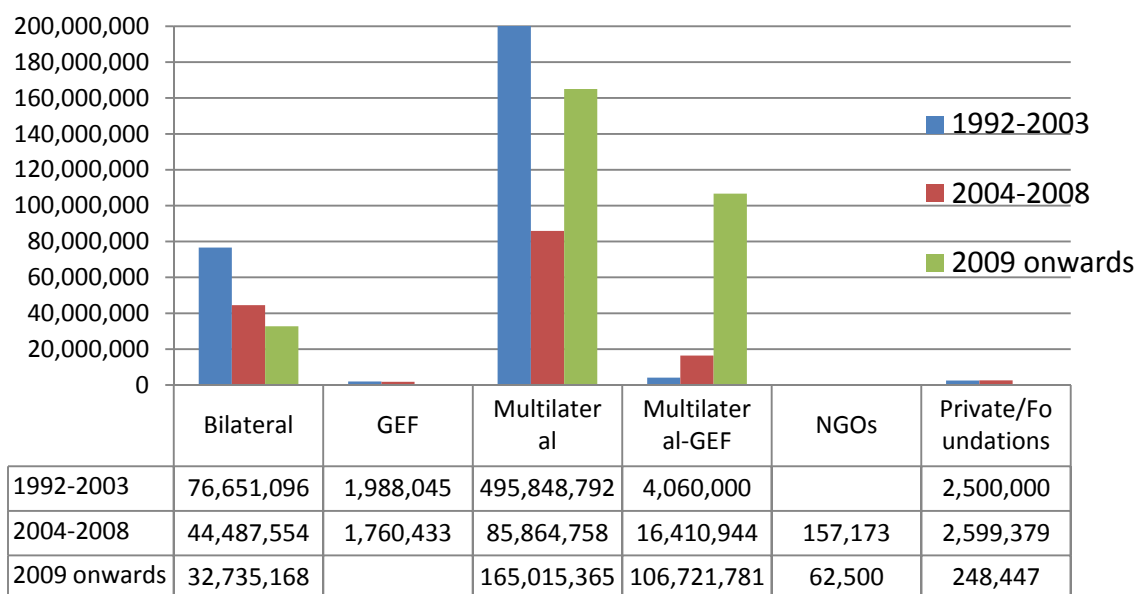


Figure 2 Direct Grants for Mitigation and Adaptation, by Funding Category, by Period

Within the same coverage period, another source of free funds has emerged separate from the adaptation or mitigation grants. Specifically to meet some of the disastrous impacts of natural disasters (floods, landslides, earthquake, etc.), about \$120.5 million of direct grants for relief and assistance have flowed from bilateral and multilateral sources, together with NGOs and private foundations, to the victims of natural disasters. This trend in the provision of such grants is expected to increase over time.

Table 18 Funds for Direct Aid/Relief for Victims of Natural Disasters by Funding Category, by Period

Period	Amount, USD
Bilateral	85,222,368
1992-2003	1,272,594
2004-2008	70,558,340
2009-onwards	13,391,434
Multilateral	22,980,499
1992-2003	1,032,676
2004-2008	16,397,823
2009-onwards	5,550,000
NGOs	4,697,089
1992-2003	1,379,151
2004-2008	2,797,938
2009-onwards	520,000
Private/Foundations	7,636,441
1992-2003	-
2004-2008	1,075,650
2009-onwards	6,560,791
Grand Total	120,536,397

ON EXTERNAL LOANS

Apart from providing grants (1.09 billion) for direct climate change adaptation or mitigation projects, multilateral agencies and foreign governments creditors have also supplied total loan funds (1.09 billion) for direct CC adaptation and mitigation projects. A slightly larger amount has been lent for direct adaptation projects (587 million) while loans for direct mitigation projects amounted to 492 million. While most of total credits for mitigation have come from both multilateral agencies and creditor countries, the total loan funds for adaptation have come mainly from bilateral donors (379 million) and multilateral-GEF (166 million) (Table 17).

EXTERNAL GRANTS AND LOANS INDIRECTLY RELATED TO CC A&M

External financial flows also include project funds that finance actions that are indirectly related to climate change adaptation or mitigation. For instance, such indirect measures include projects on biodiversity/ environmental conservation, resource (fishery, forestry, watershed, coastal resource environmental, water quality) management, ecotourism, river rehabilitation, irrigation or water supply development, solid waste management, health and community development, etc. In other words, these projects address existing economic/ livelihood or resource/ environmental conditions, and they neither explicitly intend to bring GHG emissions down nor anticipate the impacts climate change may bring for a particular sector or location. While these development or environmental projects undoubtedly bring additional external funds into the country, these flows may potentially be tapped for climate change action if bilateral donors and multilateral creditors were to reorient their grants and loan objectives for adaptation or mitigation. Given the greater amount of external funds that have flowed in for indirect climate change actions, there is indeed much potential.

Over the entire period (1992-2018), total grants (1.9 billion dollars), as well as total loans (1.6 billion) have flowed in greater amounts to projects indirectly related to climate change adaptation and mitigation (see Table 19) than to projects directly related to climate change action. Given this differential flow of both grants and loans to projects indirectly related to climate change adaptation compared to the projects that directly promote adaptation, it may be inferred that the country's donors and creditors apparently favor the former type of indirect-adaptation projects.

Table 19 Comparative Flows of Total Indirect Grants & Loans Loans by Major Measure, by Funding Category, 1992-2018

	Grants	Loans	Grand Total
Adaptation	1,725,544,098	1,266,686,965	2,992,231,063
Bilateral	850,945,776	99,493,889	950,439,665
GEF	108,461,864		142,463,516
Multilateral	646,036,070	1,059,791,424	1,705,827,494
Multilateral-GEF	101,684,900	107,401,652	175,084,900
NGOs	2,706,903	-	2,706,903
Private/Foundations	15,708,585	-	15,708,585
Aid/Relief	-	-	-
Bilateral	-	-	-
Multilateral	-	-	-
NGOs	-	-	-
Private/Foundations	-	-	-
Both	185,093,121	333,860,779	518,953,900
Bilateral	62,004,130	60,777,780	122,781,910
Multilateral	123,008,991	273,082,999	396,091,990
NGOs	80,000	-	80,000
Private/Foundations	-	-	-
Mitigation	3,792,000	-	3,792,000
Bilateral	3,792,000	-	3,792,000
GEF	-	-	-
Multilateral	-	-	-
Multilateral-GEF	-	-	-
NGOs	-	-	-
Private/Foundations	-	-	-
Grand Total	1,914,429,219	1,600,547,744	3,514,976,963

Moreover, while most of the indirect grant flows (1.71 billion) and loan funds (1.38 billion) have gone to indirectly-related adaptation projects, the fund sources tend to prefer differing funding mechanisms. Bilateral donors and the GEF, for instance, have given more grants than loans, and they account for a greater portion (56.2%) of total indirect grants, compared to the specific share of multilaterals (37.8%). On the other hand, multilaterals by themselves and with the GEF have preferred to extend more loans

than grants, and they account for a greater portion (85%) of total indirect loans, compared to the bilateral and GEF (15%).

It may be noted that it is with these indirect grants and loans that government provides counterpart funds. Out of the total indirect flows (3.75 billion), government counterpart funds amounted to US\$ 238 million. Government funds consisted mainly of contributions to bilateral (110 million) and GEF flows (45 million), and a small portion (19.5 million) to multilateral with GEF flows (Table 20).

Table 20 Total Funds for Indirect CC A & M, by Funding Category, in USD

	Grants	Loans	GEF Grants	Government Counterpart	Grand Total
Bilateral	916,741,906	160,271,669	-	118,245,297	1,195,258,872
GEF	97,129,453		11,332,412	45,134,140	153,596,004
Multilateral	769,045,061	1,332,874,423	-	55,341,462	2,157,260,946
NGOs	2,786,903	-	-	-	2,786,903
Multilateral-GEF	94,684,900	107,401,652	7,000,000	19,520,000	228,606,552
Private/Foundations	15,708,585	-	-	267,000	15,975,585
Grand Total	1,896,096,807	1,600,547,744	18,332,412	238,507,899	3,753,484,862

USE OF FUNDS

To what sectors have the current flows gone? And are they adequate? In general, direct grants for mitigation which have mainly come from multilaterals have gone to energy and climate change. Grants to energy, for instance, have funded energy and lighting efficiency, development of wind energy, hydropower and non-conventional energy. Grants to climate change have funded GHG emissions inventory, solar energy, renewable energy, investment fund for pollution, biogas production and emission reduction, vehicle emission and methane reduction, capacity building and development of RE, and reforestation for carbon sequestration.

Direct grants for adaptation which have come mainly from multilaterals and GEF have gone to climate change, disaster management, environment, agriculture, and water supply and sanitation. Specifically, the grants for CCA were for coral triangle bio-diversity protection, local government capacity building, and strengthening institutional capacity and watershed resilience to CC, vulnerability and risk assessment. Grants for disaster management were directed towards preparedness, early warning and monitoring, volcano and earthquake monitoring, hazard mapping, integrating risk reduction in local planning, research and communication, and hazard mitigation. Grants for the environment went, for instance, to environmental governance, private sector participation, research, and infrastructure. In turn the grants for agriculture supported renewable energy and livelihood development. Enabling activities at the national level were supported by UN grants such as drafting of National Communications, National Capacity Self-Assessment (NCSA), and the Asia Least-Cost Greenhouse Gas Abatement Strategy (ALGAS). Noteworthy is the absence of direct grants for mitigation measures.

The direct loans for adaptation which came mainly from bilaterals went to climate change, environment and disaster management. Loans for CC, for instance, supported research on risk reduction in key sectors, adaptation policy coordination, and flood control.

Direct loans for mitigation which came mainly from multilaterals and bilaterals went to energy. These funded the establishment of a wind farm, urban air quality improvement, renewable energy rehabilitation, sustainable energy finance, industrial energy efficiency, electric cooperatives, and the rehabilitation of a coal-fired power plant.

Indirect grants for adaptation have come mainly from bilaterals and GEF, and they have funded the environment, forestry, land use management, and water and sanitation, fisheries and marine resources. Grants to the environment for indirectly-related CC activities have supported IEC, research on environmental management, accounting, policy support, solid waste management, ecotourism, reducing health care waste, and river and bay rehabilitation. Indirect grants to forestry have gone to natural resource management project, biodiversity conservation, protected area management, and topographic mapping. Grants for land use management went to remote sensing, mapping, policy and institutional support. Indirect grants to the water sector have gone to watershed and waste water management, and capacity building. Indirect grants to fisheries and marine resources have gone to natural resource management, sustainable aquaculture, coastal and marine resource development.

Indirect loans for adaptation have come mainly from multilateral and GEF to support environmental management, river rehabilitation, forest development, irrigation system development, regional rural and community development, regulation of water providers, and integrated river basin management.

While grants are allocated to broad sector categories, they address a particular CC impact or a problem it may aggravate. In the present period (2009-2019), for instance, grants to the environment, agriculture, biodiversity, energy, climate change, health, and water supply and sanitation in that order respectively address only a given problem or requirement, like solid waste management, resource conservation, production constraints, biodiversity loss, GHG emissions, institutional capacity, outbreak of infectious diseases, and water shortages (Table 21).

Table 21 Ongoing and Proposed Grants by Impact Addressed, by Sector

Grants + GEF Grants	Biodiversity Loss	Constrained agricultural production	Damage to property	GHG emissions	Institutional capacity	Outbreaks of infectious diseases	Resource Conservation & Management	Waste management	Water shortage, water quality	Grand Total
Row Labels										
Agriculture	-	145,207,363	-	-	-	-	-	-	-	145,207,363
Biodiversity	80,977,966	-	-	-	-	-	4,896,000	-	-	85,873,966
Climate Change	-	5,783,000	-	30,000,000	32,094,429	-	-	-	-	67,877,429
Disaster Management	-	-	30,290,506	-	2,020,000	-	-	-	-	32,310,506
Energy	-	-	-	79,993,557	-	-	-	-	-	79,993,557
Environment	-	-	-	-	-	-	194,340,340	6,177,436	-	200,517,776
Fisheries, Coastal & Marine Resources	-	925,000	-	-	-	-	57,011,436	-	-	57,936,436
Forestry	7,360,000	-	-	-	477,890	-	7,214,887	-	-	15,052,777
Health	-	-	-	-	-	67,363,540	-	-	-	67,363,540
Land Use	-	-	-	-	-	-	19,972,200	-	-	19,972,200
Science and Technology	-	-	35,635,676	-	-	-	629,870	-	-	36,265,546
Water Supply and Sanitation	-	1,000,000	-	-	-	-	40,280,725	6,400,000	11,200,000	58,880,725
Grand Total	88,337,966	152,915,363	65,926,182	109,993,557	34,592,319	67,363,540	324,345,458	12,577,436	11,200,000	867,251,821

The limited objective of such grants is also reflected in the limited grant amount and the resulting project scale. The restricted scale, for instance, can be seen in an integrated area project that would cover at most only 2 cities/ municipalities; a provincial project involving only 2 inter-cities or municipalities; a regional project of 3 provinces; a watershed/ ecosystem project for only 1 province or 2 municipalities; or a nationwide project restricted to either only 6 to 7 provinces or 4 interregional areas, if not 10 inter-cities or municipalities (Table 22). The limited geographical coverage of grant projects would thus simply result in project benefits being confined to particular area niches. Interestingly, the limits set on the spatial coverage of projects are a consequence of the limited funds, a project piloting mode of introducing change, and the turfing among country donors and multilateral agencies.

Table 22 Number of CC-Related Projects by Scale

	Grants	Loans	GEF Grants	Grand Total
Agency/internal	7			7
Barangay/s	10		1	11
City/Municipality	28	7		35
Integrated Area	11	1		12
InterCity/Municipality	30	12		42
InterProvincial	76	33	4	113
Interregional	37	6	1	44
Nationwide	437	24	9	470
Provincial	64	9	2	75
Regional	59	6		65
Watershed/ Ecosystem	47	9	5	61
Grand Total	806	107	22	935

With regards to loans, the flows differ from those of grants in terms of the ranking of the sectors, but the sector flows from both sources confine themselves to a particular impact or problem. For instance, the loans for the following broad sectors, i.e. energy, agriculture, environment, water supply and sanitation, disaster management, and fisheries respectively address particular impacts, like GHG emissions, constraints to production, resource conservation, water shortage and quality, and damage to property. Furthermore, the object of these loans is to effect technology transfer or provide financing (Table 23). Like the grants, the scale of loan projects seems to be more restricted, if not differing only in degree. A province or regional project may only be confined to one inter-city or municipality, while a nation-wide project covers either 3 provinces or 3 interregional ones. The much more limited scale of a loan project, compared to a grant, may suggest the creditor's assessment of the limited capacity of the local or national government to pay.

Table 23 Ongoing and Proposed Loans by Impact Addressed, by Sector

Loans	Biodiversity Loss	Constrained agricultural production	Damage to property	GHG emissions	Institutional capacity	Outbreaks of infectious diseases	Resource Conservation & Management	Waste management	Water shortage, water quality	Grand Total
Agriculture	-	206,733,854	-	-	41,500,000	-	-	-	-	248,233,854
Biodiversity	-	-	-	-	-	-	-	-	-	-
Climate Change	-	-	-	-	-	-	-	-	-	-
Disaster Management	-	-	79,835,000	-	-	-	-	-	-	79,835,000
Energy	-	-	-	380,504,054	-	-	-	-	-	380,504,054
Environment	-	-	-	-	-	-	192,633,600	-	-	192,633,600
Fisheries, Coastal & Marine Resources	-	-	-	-	-	-	66,988,052	-	-	66,988,052
Forestry	-	-	-	-	-	-	5,777,780	-	-	5,777,780
Health	-	-	-	-	-	-	-	-	-	-
Land Use	-	-	-	-	-	-	18,995,300	-	-	18,995,300
Science and Technology	-	-	-	-	-	-	-	-	-	-
Water Supply and Sanitation	-	-	350,935	-	-	-	52,049,275	-	68,834,304	121,234,514
Grand Total	-	206,733,854	80,185,935	380,504,054	41,500,000	-	336,444,007	-	68,834,304	1,114,202,154

If the country has limited borrowing capacity, the needed funds for CCA may only come from external multilateral and bilateral grants, apart from local financial resources. Are the external flows for CC then adequate? In general, the answer is an unequivocal no. The external financial flows are generally limited as reflected in the ratio of the direct and indirect flows for climate change in a donor country's ODA and the ratio of its ODA to GNP. Based on available data, the ratio of climate change flows to ODA from Australia, the United States, Japan, and Germany ranges from 11.5 to 28.5 percent. Multiplied by their respective ODA-GNP ratio which fails to meet the target commitment of 0.7% of GNP, the resulting ratio of climate change flows to GNP would indicate if these donor countries would be able to meet the minimum 0.5 to 1% of GNP or the estimated required amount of resources to support adaptation, mitigation and technology transfer (South Centre, 2009). Over the period 2001 to 2007, the ratios obtained for the United States (0.01 – 0.03%), Australia (0.03 - 0.036%), Japan (0.04 – 0.05%), and Germany (0.04 – 0.05%) show that the bilateral flows from these country donors have been inadequate for meeting their climate financing commitments (Table 24).

Table 24 Direct and Indirect Climate Change Flows over GNP (2003-2008)

Donor Country	Direct & Indirect Flows for CC / ODA (in %)	ODA / GNP	CC Flows / GNP (Proposed = 0.5 % - 1%) (in %)
Australia	11.5	0.25 – 0.32	0.03 – 0.036
US	15.1	0.11 – 0.22	0.01 – 0.03
Japan	20.1	0.2 – 0.28	0.04 – 0.05
Germany	28.5	0.27 – 0.36	0.07 – 0.1

In the particular case of the Philippines, external flows from both bilateral and multilateral sources for direct and indirect climate change adaptation and mitigation may be adjudged limited when compared to the budgetary appropriations by the national government for climate change. Over the period from 2004 – 2009 (see Table 25), the Philippine government appropriated US\$1.576 billion dollars for direct and indirect climate change programs in various sectors while the external multilateral and bilateral sources gave US\$0.509 billion dollars in (direct and indirect) grants and US\$0.354 billion in (direct and indirect) loans. One may even argue that the figures on the Philippine end may actually be bigger since loans are actually internally provisioned resources because they will have to be paid at some future time.

Table 25 National Government Budget Allocations for Climate Change, in USD

	2003/2004	2005/2006	2007	2008	2009
Agriculture	111,499,114	73,230,418	162,317,397	27,653,476	2,809,630
Biodiversity	7,569,465	8,998,284	14,558,654	10,495,298	17,903,435
Climate Change	22,380	24,309	40,675	278,065	1,074,457
Disaster Management	27,370,923	108,797,145	212,052,315	120,982,587	39,560,304
Energy	2,180,018	12,258,564	18,354,608	5,824,319	4,722,783
Environment	18,558,100	32,475,436	32,131,740	9,452,328	38,315,848
Fisheries, Coastal & Marine Resources	32,094,041	8,066,836	5,921,398	18,371,834	12,472,826
Forestry	23,409,317	24,169,309	39,509,587	52,622,452	78,824,022
Land Use	12,356,882	36,364	36,846	10,270,101	5,691,065
Science and Technology	33,210	22,844,818	17,192,125	1,410,011	18,438,326
Water Supply and Sanitation	130,443	32,727	38,944	23,847	4,645,391
TOTAL	235,223,893 (1.59%)	290,934,212 (1.76%)	502,154,288 (1.96%)	257,384,319 (0.93%)	224,458,087 (0.7%)

While significant vis-à-vis external funds, the budgetary resources set aside by the Philippine government for climate change may have not been adequate. First of all, they amount to only 0.9 to 1.9% of the country's total budget. Second, while the total budget for climate change increased from 2004 to 2007, it dropped almost by half in 2008—all this time, the budgetary share of agriculture also declined from 47% to only 2%. Third, while the increase in the budgetary share of disaster management from 2003 to 2008 is most notable, it funded the necessary post-disaster relief and rehabilitation efforts. Fourth, while the only other sector share that has increased from 2007 to the present is forestry, it is not apparent how these budgetary allocations were used. Fifth, the budgetary appropriations do not include particular priority actions that would climate-proof critical socio-economic activities, and shield the most vulnerable/ poor groups from current and future climate risks.

To date, there is no assessment of whether the priority projects supported by external grants cover all, if not most of the strategic action areas for mitigating the adverse impacts of climate change and enabling adaptation to them. It may be worthwhile to consider the proposed activities for promoting sustainable development and meeting the challenges of climate change proposed by the Alternative Budget Initiative (ABI) of NGOs and civil society. Estimates of the required additional budget in these proposed activities have also been made.

For instance, the ABI proposes the following actions in the public land sector: (1) survey and delineate foreshore reservations, ancestral lands, geologically hazardous areas; (2) arrest the decline of forest cover and the loss, if not degradation of critical habitats and watersheds; and (3) close the open dumpsites and establish sanitary landfills in the 114 noncompliant municipalities. In the health and water sectors, some of the critical actions that should be undertaken would include intensification of epidemiology and disease surveillance, control of infectious diseases, local production of vaccines, prevention if not remediation of polluted groundwater sources, establishment of water impounding systems, and direct intervention in the unfunded critical water bodies of the Visayas and Mindanao. Other direct adaptation and mitigation strategies are currently being formulated both at the sub-national and national levels of government and some local governments have gone forward and started the process of integrating CC into their respective development plans.

These concrete strategic actions among the proposed activities may comprise the priority needs for a climate change program against which the potential impact of externally funded projects in advancing the country's climate change-related agenda might be assessed. It must, however, be noted that in undertaking these initial priority actions, follow-through activities requiring greater political will and resources are imperative to realize the strategic goals for adapting to CC in the long-run.

POTENTIAL FINANCIAL INSTRUMENTS

As presented in the earlier sections, current allocations for addressing CC are sorely lacking and are barely scratching the surface as far as the required funds for both mitigation and adaptation are concerned. There are, however, some initiatives that are underway that are worth noting.

FOREIGN FINANCING

There are a number of upcoming Funds that specifically deal with climate change mitigation and adaptation. One is the Cool Earth Partnership funded by Japan which aims to fund up to US\$ 8 billion for assistance in climate change mitigation, and up to US\$ 2 billion for grants, aid and technical assistance for countries switching to clean energy¹⁸. For the loan component, preferential interest rates will be provided (0.2 – 0.6%) for projects that deal with either climate change mitigation or adaptation. The Iloilo Flood Control Project, for instance, is an adaptation project that has been funded through this facility, to enable the province to withstand floods within a 20-year return period¹⁹.

Another upcoming fund is the Climate Investment Fund (CIF) where Multi-lateral Development Banks (MDBs) have pledged at least US\$6.1 billion. Managed by the World Bank and implemented jointly with the Regional Development Banks, i.e. the African Development Bank, the Asian Development Bank, the European Bank for Reconstruction and Development, and the Inter-American Development Bank, the CIF is an interim measure to scale up assistance to developing countries and strengthen the knowledge base in the development community.

Another newly-approved program is the US\$350 M Forest Investment Program (FIP) which will hopefully provide “much-needed upfront investment to developing countries and forest-dependent communities to help them prepare for and benefit from financial flows for the sustainable management of forests”. Under the program, degraded forests will be restored and managed on a sustainable basis, and investments will be made both within and outside the forest sector to reduce the pressure on the resource base.²⁰

Another approved program under the CIF is the Clean Technology Fund (CTF) for which the Philippines’ Investment Plan has been recently approved. This Clean Technology Fund Investment Plan for the Philippines proposes CTF co-financing of \$250 million to support Philippines’ efforts to transform the energy sector through scaled-up distributed generation with renewable energy resources to match the country’s archipelago configuration and address transmission constraints through demand side management. The Investment Plan will also implement the Government’s National Environmentally Sustainable Transport Strategy (NESTS), which aims to reduce energy consumption in the transport sector. Specifically, the Investment Plan proposes CTF co-financing for (i) catalyzing private sector investment in distributed generation through renewable resources and increasing the number of viable off-takers (Electric Cooperatives) for such renewable energy (RE); (ii) investment support and risk mitigation for the private sector’s entry into energy efficiency and cleaner production sectors; (iii) solar generation with net metering; and, (iv) introduction of Bus Rapid Systems in Cebu and Metro Manila. The CTF investments will mobilize financing of about \$2.5 billion from the government, multilateral development banks, carbon finance and the private sector.²¹

Another potential source is the Coral Triangle Initiative (CTI) Program where the pledged funds have not been fully committed. Covering six countries in the Asia Pacific Region, it is one of the largest programs for CCA in the coastal and marine sector²². The GEF and the ADB are joining together to support the preservation of Asia’s Coral Triangle, with the GEF committing \$63 million to fund conservation of “the

¹⁸ http://www.weforum.org/en/media/Latest%20Press%20Releases/PR_26jan_Japan

¹⁹ <http://www.wamis.org/agm/meetings/rsama08/S606-Noda-JBIC.pdf>

²⁰ World Bank, November 2009. <http://beta.worldbank.org/climatechange/node/4964>

²¹ http://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/ctf_investment_plan_philippines_final_keydoc_122309.pdf

²² The six countries that make up the Coral Triangle (CT) are composed of Indonesia, Malaysia, Papua New Guinea, Philippines, the Solomon Islands and Timor Leste. All six governments have committed to implementing the RPOA. In the Philippines, the government has officially adopted the Plan as the overarching framework in dealing with marine and coastal conservation and management.

Amazon of the seas.” An objective of CTI ten-year Regional Plan of Action (RPOA) is to sustain and conserve dwindling and severely degraded marine resources, and undertake CC adaptation. A series of vulnerability assessments will be conducted and priority CCA steps implemented in the short-term period, even with the scientific uncertainties of future climate change impacts. Also, a range of management scales and frameworks, such as trans-boundary seascape management plans, integrated coastal zone management plans, and Marine Protected Area Network Plans will be established at the regional or country level.

Other potential sources of funds being discussed at the international level include the assessed contributions of developed countries, such as 0.5% of their GDP commitment, the carbon market and private investments, share of proceeds from “flexibility mechanisms”, potential international levy on airfares, a 2% levy on capital transfers in Annex 1 countries, and fines on non-compliance of Annex 1 parties to upcoming agreements in Copenhagen.

SETTLEMENT OF CLIMATE DEBT²³

The concept of climate debt is one solution being proposed by some NGO actors in the CC negotiations. Based on this argument, the most developed countries, i.e. the so-called Annex 1 countries are said to be mainly responsible for CC because of their carbon-intensive industrialization strategy for development. With less than 20% of the world population, developed countries account for more than 70% of historical emissions since 1850. Having consumed more than their fair share of environmental space, which has denied an equivalent level of development to developing countries, they owe the latter “Emission Debts”. They are also said to be accountable for the adverse impacts to poor communities and countries, i.e. their “adaptation debt” which may be measured by the sector losses and damages of the affected countries.

Whether the government will take on this claim or tack as a threat or a means to generate more external funds through debt renegotiation or outright withdrawal of debt service payments for CCA and mitigation is a policy issue or option that the new Congress or cabinet may seriously deliberate upon in the future.

LOCAL FINANCING

The Climate Change Act of 2009 (details of which are discussed more lengthily in the next sections) provides for an initial budget allocation for the operations of the Climate Change office and the Climate Change Commission in the amount of \$1M. Unutilized funds allocated to the former Presidential Task Force on Climate Change and the Office of the Presidential Adviser on Global Warming and Climate Change, sourced from the President’s contingent fund, shall likewise be turned over to the Commission. All relevant government agencies and LGUs are likewise mandated to allocate from their annual appropriations adequate funds for the formulation, development and implementation of their respective climate change programs and plans.

Apart from the fiscal/ tax incentives provided to Board of Incentives (BOI)-registered firms, government financial institutions have set up local facilities that cater to programs that directly address climate change. The Department of Finance has established the Disaster Management Assistance Fund (DMAF), a lending facility to LGUs whose objectives are to provide timely financial support to disaster risk and damage management initiatives of LUGs, enhance community resilience to natural hazards, promote

²³ Freedom from Debt Coalition, October 2009. *Debt Cancellation and Repudiation can and must finance Climate Adaptation and Disaster Recovery Measures*. FDC Position Paper, 11 Matimpiin Street Barangay Pinyahan Quezon City.

economic growth through disaster risk management, and attract supplemental funding from local and international donors. Eligible proposals for lending include disaster prevention and mitigation projects, response and relief related projects, and recovery and rehabilitation projects, all offered at very low interest rates between 3 and 5%. Other Fund features include concessional terms, no commitment charge, no pre-termination charge upon early payment, option for full cost financing and free technical assistance for project development.

Similarly, the Development Bank of the Philippines (DBP) has set up funding windows for reconstruction and rehabilitation programs, mitigation programs that cover energy efficiency, solid waste management, pollution prevention and control and the DBP forest program, and a third program they have entitled “adaptation” that caters to renewable energy technologies, water resources, and the clean development mechanism. LGUs and Government Owned & Controlled Corporations (GOCCs) are eligible for these funding windows.

Government may also enunciate public finance measures to generate funds for CCA. It may commit 0.5% to 1% of GDP, also as a challenge to bilateral donors among the Annex 1 countries. While it may also set levies on GHG emitters, road and port users, airline and shipping services, the legislature must amend the transfer of such tax revenues to the General Fund.

Finally, the private sector is slowly emerging as a source of additional funding for CC A&M through their Corporate Social Responsibility (CSR) funds. In 2008 alone, the League of Corporate Foundations, which is made up of 70 operating and grant-making corporate foundations and corporations, together with the Philippine Business for Social Progress (PBSP) reported CSR contributions of USD 32 M (PHP 1.6 Billion) for environmental and sustainable development projects²⁴, all of which contribute to CC A&M objectives. 1.2 billion pesos were reported by BPI Foundation under their Sustainable Energy Financing Program. The rest of the amount consists of tree planting and reforestation initiatives of about 13,000 hectares, energy efficiency, coastal clean-ups, watershed rehabilitation projects, eco-tourism and advocacy. Comparing CSR contribution with ODA loans and grants and government budgetary allocation in 2008, private sector financing represented 6% of total funds allocated to address direct and indirect adaptation and mitigation measures (Figure 3). The private sector can thus be encouraged to continue with such CSR programs, and hopefully the country can experience an increasing trend of CSR CC-related investments during the years to come as climate change impacts intensify and become more imminent.

²⁴ League of Corporate Foundations, 2009. Social Investments Report: 2008. <http://www.lcf.org.ph/>

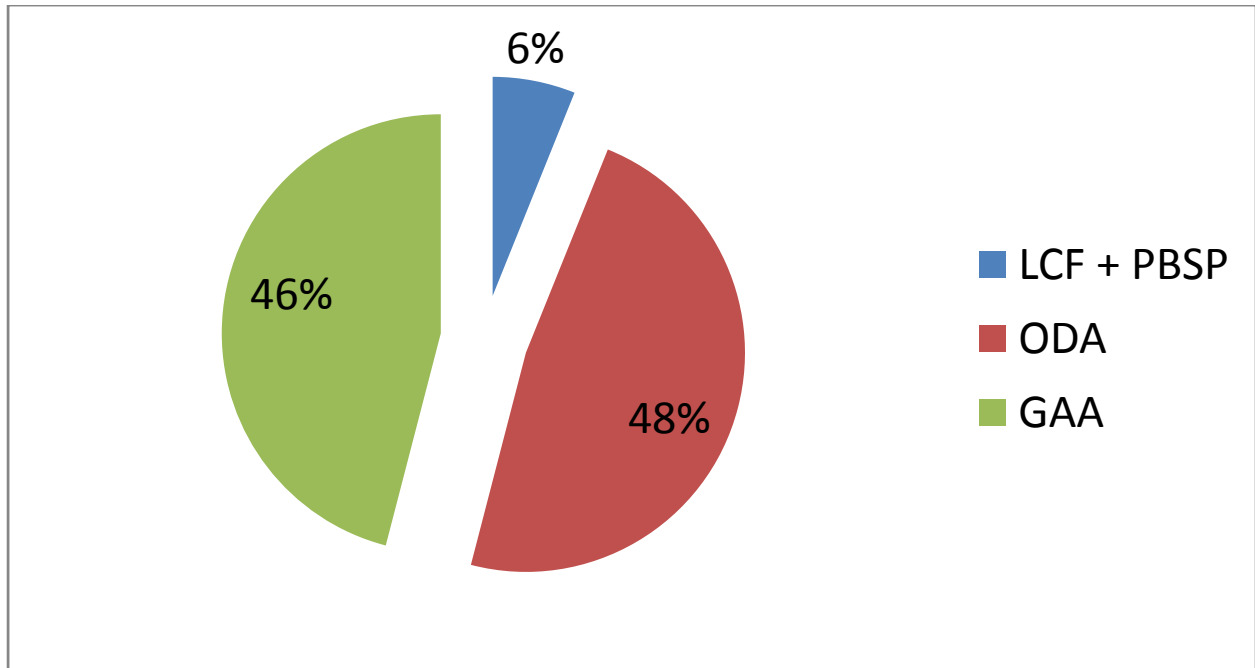


Figure 3 Comparison of Funds for CC Related Programs, 2008

POLICY INSTRUMENTS

POLICIES ADDRESSING MITIGATION

In terms of policy, the country does not lack the necessary laws that aim to address both mitigation and adaptation measures to address climate change. The Climate Change Act (CCA) already provides a comprehensive law that addresses climate change. This complements the many existing policies discussed in the Overview. In the energy sector, the necessary policy framework to mitigate climate change impacts seems to be in place, consisting of the following: PD 1151 in 1977 known as the Philippine Environment Policy which was followed by PD 1586 in 1978 or the Philippine Environmental Impact Statement (PEIS), the Philippine Clean Air Act (PCAA) in 1999, the Biofuels Act in 2007, and the Renewable Energy Act in 2008. Other relevant laws relating to emissions include the Solid Waste Management Act, the Toxic Substances & Hazardous & Nuclear Wastes Control Act of 1990, and the Marine Pollution Decree of 1976.

POLICIES ADDRESSING ADAPTATION

There are also many significant existing policies that may be related to CC adaptation measures, such as the Philippine Environment Code, Revised Forestry Code of the Philippines, Republic Act 8435 or the Agriculture and Fisheries Modernization Act of 1997, the National Integrated Protected Areas System (NIPAS) Act of 1992, the Philippine Mining Act of 1995, the Indigenous People’s Rights (IPRA) of 1997, the Fisheries Code of 1998, the Comprehensive Agrarian Reform Law, Environmental Impact Statement System, Water Code of the Philippines, and various administrative orders issued by individual government departments such as the DENR.

Some policies may be site-specific, but they are comprehensive in nature to deal with CC-related problems, such as the Strategic Environmental Plan for Palawan Act (SEMP), the creation of the Laguna Lake Development Authority, and the Subic Watershed Forest Reserve Law. Furthermore, numerous watersheds have been designated all throughout the country as reserves either for strict protection or

for limited resource use. Other relevant programs that deal with forest and natural resources management outside protected areas include the Integrated Social Forestry (ISF) Program, the Community-Based Forest Management (CBFM) Program, the Ancestral Domains Program, Coastal Environment Program (CEP), Forest Land Management Program, Community Forestry Program (CFP) and the Socialized Industrial Forest Management Program (SIFMP). The CBFM is considered to be the national strategy for sustainable forest management and social justice, referring to all organized efforts of the government to work with local communities in and adjacent to public forestlands. It is seen as a key forestry program that can meet the challenges of climate change since its activities can alter the social and production system in the uplands, thus leading to either positive or negative impacts on the environment²⁵.

Another supportive policy is a pending bill in Congress that aims to address disaster risk reduction and management, called the DRRM Bill. The bill proposes the adoption of principles and strategies consistent with the international standards set by the *Hyogo Framework for Action (HFA)*²⁶ - a comprehensive, action-oriented response to international concern about the growing impacts of disasters on individuals, communities and national development. It encourages the government to shift its focus to disaster prevention and risk reduction by putting more emphasis on strengthening the communities' and people's capacity to anticipate, cope with, and recover from disasters, as an integral part of development programs. Mainstreaming disaster risk reduction in the country's policies, programs, and plans therefore lies at the very heart of the DRRM Bill.

²⁵ Philippine Rural Reconstruction Movement (PRRM), October 2009. Second National Communication on Climate Change: Philippine SNC Project, Vulnerability and Adaptation Assessment Component. Quezon City, Philippines. GEF / UNDP PROJECT ID 00037339

²⁶ The HFA was formulated and adopted by 168 governments at the World Conference on Disaster Reduction held in Kobe, Hyogo Prefecture, Japan in 2005.

Center for Disaster Preparedness, Oct. 11, 2009. <http://www.cdp.org.ph/features/drrm-bill/>

INSTITUTIONAL FRAMEWORK

The multi-sectoral character of climate change necessitates a concerted effort among most government agencies in addressing both adaptation and mitigation. In effect, they all have a role to play in planning, implementation, monitoring and budgeting. With their mandates, the DENR and DOE have been the de facto lead agencies. Prior to the passage of the Climate Change Act, national government agencies involved in addressing climate change were subjected to a capacity assessment in dealing with climate change. Agencies were grouped according to the following roles:

1. Service agencies, composed of: DA, DepEd, DOH, DILG, DOLE, DND, DPWH, PAGASA, and PHILVOLCS
2. Technical service agencies
3. Regulatory agencies
4. Implementing agencies
5. Oversight agency, i.e. NEDA
6. Organizations for stakeholder mobilization, research and education

Surveys were conducted to identify the agencies' areas of capacities to: (1) engage multi-stakeholder dialogues; (2) assess a situation and create a vision and mandate; (3) formulate policies and strategies; (4) budget, manage and implement; and (5) monitor and evaluate. On a score of 1 to 5, agencies ranked highest in terms of engaging multi-stakeholder dialogues (with a mean score of 2.69). Capacity to assess a situation and create a vision and mandate scored almost equally with formulating policy and strategy (2.6 and 2.59, respectively). The agencies ranked lowest with respect to budgeting, managing and implementing the policies and strategies, as well as in monitoring and evaluation (2.46 and 2.49, respectively). Overall mean score was 2.57. According to the rating system, a score of 2.00 means "capacity, strategy, or approach exists" but presumably has to be developed.

Technical service agencies were considered as the most equipped, with an overall mean score of 2.97, followed by the sixth category of agencies at 2.75. Regulatory agencies were lowest with 2.09, followed by the oversight agency at 2.15. Finally, service agencies and implementing agencies were near the mean, at 2.61 and 2.34, respectively.

The DENR is the main regulatory agency tasked to deal with climate change adaptation. In its own assessment, it admits there is still a lack of capacity in formulating policies mainly due to the lack of a national climate change framework, adaptation plan and strategy, as well as the absence of mainstreaming climate change adaptation in plans, programs and budgets. This, however, is true for all other agencies, according to the survey. There is not much experience yet in implementing CCA activities. Nevertheless, the increasing number of CCA projects in the department over the past 2 years underscores the recognition of the urgency to adapt to climate change. Furthermore, the designation of an Undersecretary for CC concerns within the department raises hopes that a major policy shift within can be expected soon.

The low capacity levels of the regulatory and oversight agencies, and including some implementing agencies, however, may constrain the performance of the Climate Change Commission, while it is also expected to address many of the concerns enumerated in the capacity assessment.

Under the Climate Change Act, the Commission is tasked to formulate the country's framework strategy which shall serve as the basis for a program for climate change planning, research and development,

extension, and monitoring of activities to protect vulnerable communities from the adverse effects of climate change. As the overall agency that will ensure the mainstreaming of climate change into national, sectoral and local development plans and programs and that all climate change programs of national government agencies are coordinated and synchronized, the leadership of the Commission and its synergy with the regulatory, oversight, technical, service and implementing agencies will be critical, as well as the support of experts and critical stakeholders.

Assisting the Commission and the advisory board is a panel of experts that will be made up of practitioners in disciplines that are related to climate change, including disaster risk reduction. The Panel shall provide advice to the Commission in climate science, technologies, and best practices for risk assessment and enhancement of adaptive capacity of vulnerable human settlements to potential impacts of climate change.

Local government units will also play a major role in CC adaptation and mitigation. LGUs constitute the frontline agencies in the formulation, planning and implementation of climate change action plans in their respective areas. Barangays (villages) shall be directly involved with municipal and city governments in prioritizing climate change issues and in identifying and implementing best practices and other solutions. Mandated to carry out CCA as one of their regular functions, provincial governments must have technical capacity, enforcement and information management to support the municipalities and cities in their CC change action plans. In turn, the national government must have the technical and financial resources to assist the LGUs in the formulation and implementation of local CC action plans.

The following specific roles of national government agencies suggest the capacity requirements they must possess:

1. DepEd shall integrate climate change into the primary and secondary education curricula
2. DILG and Local Government Academy shall facilitate the development and provision of a training program for LGUs in climate change
3. DENR shall oversee the establishment and maintenance of a CC information management system and network, including climate change risks, activities and investments
4. DFA shall review international agreements related to climate change and make the necessary recommendation/s for ratification and compliance by the government
5. Philippine Information Agency shall disseminate information on climate change, local vulnerabilities and risk, relevant laws, and protocols for adaptation and mitigation measures
6. Government financial institutions shall provide preferential financial packages for climate change-related projects

Particularly for planning and implementing climate change adaptation strategies and programs, the Commission must thus avail and use the results of the Capacity Assessment Study conducted by the NEDA. The Assessment has come up with detailed action areas that aim to improve capacities of government agencies to deal with climate change, all of which can speed up the work of the Commission and make the institutions more efficient and effective in the long-run.

LESSONS LEARNED

With the onset of the international climate change framework through the UNFCCC in 1992, the country has had a number of initiatives in translating the framework into national programs and policies, along with the identification of institutions that will carry these programs and policies out.

The Climate Change Act already provides a comprehensive law that addresses climate change. The Act complements the many existing policies that address both climate change mitigation and adaptation. It also creates a Commission that is tasked to formulate the country's framework strategy which shall serve as the basis for a program for climate change planning, research and development, extension, and monitoring of activities to protect vulnerable communities from the adverse effects of climate change. As the overall agency that will ensure the mainstreaming of climate change into national, sectoral and local development plans and programs and that all climate change programs of national government agencies are coordinated and synchronized, the leadership of the Commission and its synergy with the regulatory, oversight, technical, service and implementing agencies will be critical, as well as the support of experts and critical stakeholders.

A nascent, evolving national framework for CC adaptation is already in place. There have been consultations, some general vulnerability assessments, and a growing list of concrete adaptation measures. Apparently, consensus is emerging on the identified needs for CCA and mitigation, such as information systems, sector research agendas, policy changes, institution and capacity building, sector programs and infrastructure. The lessons learned from local adaptation experiences also identify the following: 1) the need for local early warning systems and higher community awareness; 2) enhanced capacities to identify areas of climate risks to reduce and measures to improve disaster response; 3) local direct adaptation actions, such as climate-proofing existing livelihoods or introducing new livelihoods less susceptible to CC impacts, and investment in infrastructures and facilities; 4) programs indirectly related to CC impacts, or preventive of adverse secondary impacts of CC, such as the impact of floods and lack of solid waste management on health conditions.

Given the inventory of activities and requirements for CCA and mitigation, these measures, researches, information systems, policy studies, strategies, agency programs, capacity-building and investment requirements all entail financial resources. Needless to say, existing sources are definitely not enough to fund all these identified measures to enable the country to meet the challenges of climate change. At the local level, while significant vis-à-vis external funds, more government budgetary resources may be set aside for climate change and directed for the priority actions. The external financial flows are also generally limited as reflected in the ratio of the direct and indirect flows for climate change in a donor country's ODA and the ratio of its ODA to GNP. Moreover, because of limited funds, A&M strategies need to be further systematized, and the priorities have to be set.

Existing ODA investments can provide an indication of which sectors are already being funded, and which ones sorely lack financing. The initial systematic, qualitative listing of priority measures can be compared with activities that are already in place and being funded by external, governmental or local financial sources. In turn, this would indicate which activities or requirements are being undertaken but are inadequately funded, on one hand, and those that have not been implemented or hardly funded, on the other. Existing project expenditures for particular activities may provide an estimate of the cost of increasing the scope or coverage, or scaling-up a potential priority measure.

ODA investments are still seen to be the major source of financing CC A&M measures. The Cool Earth Partnership, CIF and CTI Programs are potential sources of CC funds, but one has to bear in mind that these funds will come in the form of loans which the country will have to settle at a certain point in the future. If the country has limited borrowing capacity, the needed funds for CCA may only come from external multilateral and bilateral grants, apart from local financial resources. Through appeals for a common humanity or the moral responsibility of Annex 1 countries, if not the possibility of debt cancellation, more external resources may be raised climate adaptation and mitigation needs. Finally, the report strongly recommends supporting measures being discussed at the international level which include assessed contributions of developed countries, such as 0.5% of their GDP commitment, the carbon market and private investments, share of proceeds from “flexibility mechanisms”, potential international levy on airfares, a 2% levy on capital transfers in Annex 1 countries, and fines on non-compliance of Annex 1 parties to upcoming agreements in Copenhagen.

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APPENDIX 1: LIST OF ODA PROJECTS ADDRESSING CLIMATE CHANGE

Direct Adaptation

Project Description	Project Cost (USD)	Funding Source
INREM	100,000	ADB
Livelihood Development Project	1,978,089	ADB
Integrated Water Resources Management Project	76,075,000	ADB
Natural Resources and Environmental Management	105,530,000	ADB
Coastal and Marine Resources Management	86,310,000	ADB
Adapting to Climate Change		ADB, UN
Coral Triangle Initiative	442,837,500	ADB, USAID, UN
Disaster Preparedness and Emergency Response	5,530,231	AusAID
Vulnerability Assessment	125,000	CI
Tropical Forest and Climate Change Adaptation	728,710	EC
Climate Change and Conservation	4,838,890	GTZ
Air Quality Improvement	307,630,000	JICA
Agno River Flood Control Project (Phase II)	73,128,088	JICA
Flood Control	30,287,234	JICA
Flood Control and Drainage System	96,964,761	JICA
Disaster Prevention and Reconstruction		JICA
Flood Control	46,261,606	JICA
Earthquake and Volcano Monitoring	14,920,000	JICA
Flood Control	68,512,787	JICA
Flood Mitigation	2,845,737	JICA
Strengthening Flood Management		JICA
Environmental Improvement for Economic Sustainability	4,500,000	Netherlands
Climate, Community and Biodiversity	347,826	Toyota
Climate Change and Rural Development	540,000	UK
Media Forum and Reporting Workshop	23,831,000	UK
Institutional Capacity to Adapt to Climate Change	8,000,000	UN
Maintenance and Enhancement of National Capacities	254,000	UN
First National Communication Program on Climate Change	260,000	UN
Hazard Mapping and Assessment	1,960,000	UN
Integrating Disaster Risk Reduction and Climate Change Adaptation in Local Development Planning	2,020,000	UN
Private Sector Participation in Managing the Environment	1,400,000	UN
Self-Assessment Exercise for Climate Change Enabling Activity	439,000	UN

Institutional Capacity	8,000,000	UN
current marine current exploitation technology	350,000	UN
Capacities for Climate Change	-	UN
Interagency Committee on Climate Change UACC	154,500	UNDP
Mainstreaming Disaster Risk Reduction		UNDP, EC
Maintenance and Enhancement of National Capacities	254,500	UNDP-GEF
Integrated Risk Assessment and Monitoring Project-Awareness	in-kind	UNEP
Enhanced Management of Renewable Natural Resources	4,800,000	USAID
Klima Climate Change project	409,073	USAID
Volunteers in Environmental Governance	250,000	USAID
Coral Triangle Support Program	130,000	USAID
PhilGARP		USAID
Philippine Climate Change Adaptation Program	7,170,000	WB
Environment and Natural Resources Management	50,000,000	WB
Climate Change Adaptation Phase 1: improve coordination of adaptation policy by DENR	1,500,000	WB
Implementing climate risk reduction	40,000,000	WB
Climate Change Adaptation	283,000	WB
Rural Development	130,963,000	WB
Phil. Climate Change Adaptation	283,000	WB/GEF

Direct Mitigation Projects

Project Description	Project Cost (USD)	Funding Source
WIND FARM DEVELOPMENT	200,000	ADB
Energy Efficiency	32,600,000	ADB
Renewable Energy	450,000	ADB
Renewable Energy	1,978,089	ADB
Rural Electric Cooperatives Development	550,000	ADB
Development of the Natural Gas Industry	800,000	ADB
Rehabilitation of the Masinloc Coal Fired Thermal Power Plant	200,000,000	ADB
Decentralized renewable energy systems	23,962	AECID
Municipal Solar Infrastructure	30,687,125	AusAID
Reforestation project	60,000	CI
10% Staff Salary	3,563	CI
Co-generation	1,166,585	EC
ECOPROFIT	728,710	EC
Policy Support	5,838,139	EC
Switch Asia	7,299,134	EC
Renewable Energy	72,998,855	EC
Quirino Carbon Project Phase 2	31,110	GEC/MRI

Reducing methane emission	462,000,000	IRRI
Hazard Mitigation	79,835,000	JICA
Renewable Energy		JICA
Monitoring System	1,000,000	KOICA
Quirino Protected Landscape Carbon Project	28,125	RDP-People, PAs & Conservation
renewable energy development	6,143,000	UN
New and Renewable Energy	2,550,000	UN
Phase out of CFCs-11	190,000	UN
PELMATP	2,318,644	UN
Biogas Production	5,767	UN
Micro-Hydropower	1,999	UN
Biodiversity Conservation and Micro Hydropower	49,875	UN
Promotion and Development of Non-Conventional Energy	20,988	UN
Community-Based Watershed Management and Micro Hydropower	36,484	UN
Alternative Source of Energy	49,511	UN
Community-Based Renewable Energy	2,000	UN
Micro-Hydropower	41,131	UN
Renewable Energy	38,783	UN
Renewable Energy	4,032	UN
Renewable Energy Training	2,000	UN
Micro Hydropower	8,142	UN
Micro-Hydropower	49,642	UN
ALGAS	8,137,000	UN
Accelerated Renewable Energy		USAID
AMORE I	8,000,000	USAID
AMORE II	15,254,996	USAID
ECAP	8,948,810	USAID
Global Climate Change Mitigation	24,000,000	USAID
Philippine Climate Change Mitigation	8,500,000	USAID
PEPP		USAID
Philippine Renewable Energy		USAID
Reduced Emission of Greenhouse Gases	3,400,000	USAID
SEDP	8,183,464	USAID
SEDP Clean Cities Project	8,183,464	USAID
Vehicle Emission Reduction	894,000	USAID
Vehicle Emission Control	400,000	USAID
TA on the National Forestation	139,000	USAID
Photovoltaic Demonstration	5,800,000	WB
Investments in Energy Efficient Chillers	50,747,895	WB
Monitoring and Verification	1,525,000	WB

Technical Assistance Activities	84,000	WB
Project management	1,513,304	WB
Laguna de Bay Community Carbon Finance	358,450	WB
Geothermal Power Plant	700,000	WB
Northwind	42,000,000	WB
Ozone Depleting Substances Phaseout	2,700,000	WB
Philippines Sustainable Energy Finance	25,300,000	WB
Rural Power Project	500,000	WB
Ethanol plant wastewater biogas project	19,328,000	WB
Geothermal Power Plant	35,500,000	WB

Indirect Adaptation Projects

Project Description	Project Cost (USD)	Funding Source
Pasig River Environment Management and Rehabilitation	1,941,000	ADB
Low Income Upland Communities	36,000,000	ADB
Integrated Coastal Resources Management	62,320,000	ADB
Irrigation System Efficiency Improvement	1,000,000	ADB
Environment Management & Rehabilitation Sector	63,000,000	ADB
Environmental Management and Rehabilitation	800,000	ADB
Sustainable aquaculture	573,000	ADB
Water District Development Sector Project	1,500,000	ADB
Health Sector Development	13,000,000	ADB
Credit for Better Health Care	50,000,000	ADB
Water District Development Sector Project	50,000,000	ADB
Irrigation Sector	60,000,000	ADB
Irrigation Sector	3,149,014	ADB
Forestry Sector Project	55,000,000	ADB
Biodiversity Conservation and National Integrated Protected Areas Systems	600,000	ADB
Integrated Coastal Resource Management Project - TA	930,000	ADB
Fisheries Sector Program Loan - DENR Component	9,988,250	ADB
Formulation of Environmental Quality Criteria and Standards in the Philippines	625,000	ADB
Improving the Implementation of Environment Impact Assessment Project, Philippines	in-kind	ADB
TA for Evaluation on Environmental Standards for Selected Industry Subsector	540,000	ADB
Environmental Management and Rehabilitation	930,000	ADB
Irrigation Sector Proj	1,633,000	ADB
Low-Income Upland Communities Project	34,353,000	ADB

Management, Supervision and Institutional Support to the IFP Program(Piggy-backed to the IFP)	728,000	ADB
Philippine Forestry Development Project in Ilocos Norte (PFDPIN)	32,300,000	ADB
Tree Improvement in Industrial Forest Plantation	580,000	ADB
Program Loan for the Forestry Sector	120,000,000	ADB
Integrated Area Development	2,455,000	ADB
Agusan River Basin Development	1,390,000	ADB
Advisory Technical Assistance on Environmental Impact Assessment	300,000	ADB
Study on Rationalization of Water Tariffs for Private Utilities Phase 1		ADB
Preparation of the Forestry Master Plan	1,200,000	ADB/FINNIDA
Municipal Waste Management	19,200	AECID
Advanced seminar on aquaculture	24,000	AECID
Agriculture, Social Support, and Environment Facilities	1,680,000	AECID
Integrated solid waste management	170,048	AECID
Integrated Solid Waste Management		AECID
Improvement of agricultural techniques	280,264	AECID
Strengthening Environmental Impact Assessment	968,000	AIDAB
Natural Resources Management and Development	20,150,000	AIDAB
RP-Australian Remote Sensing Project	9,405,000	AIDAB
Environmental Quality Criteria	in-kind	ASEAN-Canada
Development of Dessication and Moisture Standards for Selected Mangrove Species	5,000	ASEAN-CANADA Tree Seed Prog.
Local Sustainability Program	33,823,320	AusAID
FMD Eradication Project, Phase 2	9,200,000	AusAID
International Agricultural Research	3,800,000	AusAID
WHO Roll Back Malaria Project	3,000,000	AusAID
Coastal Zone Environmental and Resource Management Project	100,000	AusAid
Philippines-Australia Human Resources Development	5,010,990	AusAID
Regional Office Environment	1,987,000	AUSAID
PAHRDF		AusAID
Integrated Agrarian Reform	9,600,000	Belgium
IBAT for Marine Outcomes	24,420	CELB- Business Practices
Adopt-a-Species Program	31,889	CEMEX
Human Well-being	100,000	CEPF
Eastern Mindanao Corridor Facilitation	290,000	CEPF
PhilSCAT	7,000,000	China
hydrological processes in defining the bounds of management	23,030	CI
Integrated Site-Corridor Monitoring Project	15,000	CI

CTI	8,000	CI
Tropical Marine PA Networks	34,723	CI
Building Local Capacity in Environmental Economics	2,018,945	CIDA
Environmental Security and Management	760,000	CIDA
Environment and Economic Management	8,640,000	CIDA
Urban Environmental Management	9,964,649	CIDA
Multiple Data Set Environmental Information System and Planning	551,000	CIDA
ASEAN Forest Tree Centre	14,500,000	CIDA
TYDAC-SPANS GIS Training	-	CIDA
International Provenance Trial of Casuarina Equisetifolia	3,000	CSIRO
Pasig River Rehabilitation Program	79,550,000	DANIDA
Improvement of EMB Laboratory	1,020,000	DANIDA
Pasig River Rehabilitation Program	2,623,480	DANIDA
Project Component-River Rehabilitation Secretariat	5,329,920	DANIDA
Watershed Management Improvement Component	1,090,000	DANIDA
Effects of Land Titling	698,000	DRDAP
ARCBC	10,362,600	EC
ACB	728,710	EC
Building Forest Corridors	707,256	EC
Agricultural Development	9,420,200	EC
Agricultural Programme	16,169,000	EC
Community Forest Management	1,391,940	EC
Integrating Forest with Local Governance	1,712,573	EC
NIPAP	31,440,000	EC
Sharing and Promotion of Awareness	1,427,144	EC
Urban Environmental Resources Management and Food Security	344,470	EC
National Park Biodiversity Conservation	927,644	EC
utilization of plant genetic resources	294,916	EC
Cultural and Environmental Information Exchange	589,737	EC
International Scientific Cooperation	1,098,673	EC
Agroforestry and Watershed Management	442,360	EC
Philippine Rural Institutional Strengthening Programs(PRISP)	6,008,000	EC
EC-ASEAN Geodynamics Projects	89,000	EC
Toxic Chemicals and Hazardous Wastes Management	950,000	EEC
RP-ERSDAC	291,780	ERSDAC
National Integrated Protected Area Project	15,142,000	EU
Forest Resources Assessment Project	204,000	FAO
Forest Fire Management Project	393,000	FAO
Production of Superior Seeds and Propagules of Priority Tree Plantation Species	53,000	FAO
Sustainable Forest Management, Poverty Alleviation and Food Security in Upland Communities	165,000	FAO

APAN - Philippine Secretariat	5,020,000	FAO
Globally Important Agricultural Heritage System (GIAHS)	2,000,000	FAO/GEF
Restoration/Rehabilitation of Waterways	434,783	Finland
DENR-Upland Development	533,000	Ford Foundation
NAMRIA/SCOT CONSEIL	6,737,000	France
Methodology and Training and Monitoring of Deforestation Using Satellites	630,000	France
National Cartographic Center Project	5,734,000	FRG/GTZ
Mt. Mantalingahan	491,771	GCF
Establishment of the Mt. Mantalingahan Protected Landscape protected area	155,000	GCF
Technical assistance for developing sustainable financing mechanism	25,000	GCF
Globally Important Agricultural Heritage System	15,000	GEF-FAO
Community Forestry Project in Quirino	7,563,000	GTZ
EnRD	8,350,800	GTZ
Integrated solid waste management	2,559,726	GTZ
sustainable management of natural resources		GTZ
sustainable management of natural resources		GTZ
Protection of Water Catchment Areas	1,675,636	GTZ
Integrated Resource Management	3,560,000	GTZ
solid waste management	1,950,000	GTZ
Coastal Resources and Fisheries Management	2,010,000	GTZ
Program for Applied Tropical Ecology	1,630,000	GTZ
Water supply and waste water management		GTZ
Water supply and waste water management		GTZ
Water supply and waste water management		GTZ
Water supply and waste water management	3,473,054	GTZ
Water supply and waste water management	4,694,032	GTZ
integrated management rehabilitation	5,291,180	GTZ
multi-stakeholder partnerships	1,831,680	GTZ
project management	1,800,365	GTZ
Support to the Implementation of Executive Order No. 247	80,000	GTZ
Visayan Sea Coastal Res. & Fisheries Mgt.	120,370	GTZ
Advisory Support to the ENR Sector - TA	1,951,000	GTZ
Sustainable Management of Natural Resources	6,279,430	GTZ
Price Policy for Public Goods, Philippines (Study on Raw Water Pricing)		GTZ
Development of Knowledge Management Portal for Water Supply and Sanitation		GTZ
Development of the Water Supply Sector Roadmap		GTZ
Strengthening of Verde Passage enforcement	7,500	Henry Foundation
Verde Passage	7,500	Henry Foundation

Ulot Watershed Model Forest	28,150	IDRC-Canada thru IMFNS
Agricultural Resource Mgt.	5,875,620	IFAD
Documentation support	8,000	ITPI
Corridor Learning Initiative	5,625	ITPI
Production and Utilization Technologies for Rattan Sustainable Development	899,870	ITTO
Adoption and Implementation of the Forestry Information System (FIS) in the Philippines	707,890	ITTO
Adoption and Implementation of an Appropriate System of Criteria and Indicators (C & I) for the Philippines	620,080	ITTO
Forestry Statistics Information System	425,280	ITTO
Developing Tropical Forest Resources Through CBFM	858,520	ITTO
Pre-Project Proposal on the Development of the Forestry Statistics Information System	71,000	ITTO
Critical Habitat Management, EMBC, Philippine eagle	116,060	IUCN-Netherlands
Economic Valuation of Impacts of Environmental Degradation	90,000	Jap. Grant Fac.,CTF of Korea,WB
Economic Incentives to Promote Water Pollution Prevention and Abatement	150,000	Japan TA Grant
Training and Information, Education and Communications (IEC) Plan for Industrial Efficiency and Pollution Control	85,000	Japan TA Grant
Preparation of Industrial Common Treatment Facilities and Waste Abatement for Individual Enterprises	320,000	Japan TA Grant
Preparation of Regional Resource Management Studies	1,432,000	Japanese grant thru WB
Ecological Solid Waste Management Plan	in-kind	JBIC
Integrated Coastal Zone Mgt.	30,340,160	JICA
Special Economic Zones Environment Mgt.	4,910,000	JICA
Environmental Management	10,920,000	JICA
After-care Cooperation Forestry Development	825,240	JICA
Capacity Development	5,011,640	JICA
Community-Based Forest Management		JICA
Local Governance and Community Empowerment		JICA
Toxic Red Tide		JICA
Solid Waste Management		JICA
Pasig Marikina River Channel Improvement	92,306,022	JICA
Sustainable Environmental Management	22,088,288	JICA
Water Revolving Fund	17,391,304	JICA
Technology Development for Electronic Navigational Chart (ENC) in the Philippines	476,000	JICA
Rural Environmental Sanitation	7,700,000	JICA
Project for the Enhancement of CBFM Program in the Philippines	3,840,000	JICA

National Database System for Watershed Information & Dev't. of Guidelines	in-kind	JICA
Master Plan Study for Integrated Watershed Management	in-kind	JICA
Marikina Watershed Development Project, FS	1,473,000	JICA
Agroforestry Scheme for Profit and Conservation	6,061,000	JICA
Mapping Policy and Topographic Mapping	4,690,000	JICA
Enhancement of Hydrographic Capabilities	70,000	JICA
Mapping & Land Cover Assessment of Mangrove Areas	1,810,000	JICA
Acquisition of Magnetic Observation Equipment	in-kind	JICA
Technical Cooperation in Hydrographic Surveying and Nautical Charting	in-kind	JICA
Improvement of the Meteorological Radar System	35,635,676	JICA
Short Term Expert on IWRM		JICA
Study on IWRM for Poverty Alleviation and Economic Development for the Pampanga River Basin		JICA
Community-Based Forest & Mangrove Mgt. Project in Panay & Negros - FS	236,000	KFW
Research on Philippine Eagle	21,182	KNCF
Phil Eagle	22,523	KNCF
Safety and Control of Toxic Chemical and Hazardous Wastes	612,000	Korea, Sing., China, Malaysia. Phils.
Field Methodology for Tarsier Research	5,000	Margot Marsh
Tarsier action planning workshop	25,000	Margot Marsh
Triple Benefit Type CDM Feasibility Study	33,610	Mitsubishin Research Institute
Assessment of the Marine Resources of Tikling Island - A Proposed Marine Park/Reserve	-	NAGAO
EX-SITU Genebank for Philippine Teak	6,000	NAGAO, Nat. Env. Foundat'n Jap
Land use analysis and boundary delineation in Quirino	15,000	National Philanthropic Trust
Sustainable Development of Laguna de Bay Environment	1,690,000	Netherlands
Marine Environmental Masterplan for the Philippines	346,000	Netherlands
TA on the Waste Management Plan for Cebu	607,000	Netherlands
Sustainable Integrated Rural Development	228,970	New Zealand
Industrial Plantation Project	18,613,140	New Zealand
Inter-Institutional Linkages	5,000,000	New Zealand Government
Verde Passage Enforcement Work	59,612	NFWF
Support to Philippine Maritime Claims under UNCLOS	285,000	NORAD
Bioecological, Social and Economic Assessment of Assisted Natural Regeneration (ANR) as an Approach to Forest Cover Restoration	43,630	NRMP/USAID

Forest Concept In Critical Watersheds and Forest Reserve Areas	76,320	NRMP/USAID
Coastal Resources Management	2,174,880	NZAID
National Eco Tourism Plan	112,000	NZAID
PNOC Social Forestry Project	1,340,000	NZAID
National Ecotourism Programme – Phase II Project	847,220	NZAID
Enhancing Natural Resources Management through Enterprise Development	302,400	NZAID
Tubbataha Reefs National Marine Park and World Heritage Site 1	385,777	Packard
Support for the 3rd National PHE Conference	28,582	Population Reference Bureau
SMBC	20,682	Ricoh Foundation
Conservation of KBAs	159,839	RNHP-Australian Government
Quirino PDD	28,125	RPD/PPC
Potential NTFP	7,500	SANREM/USAID
Asset Engineering and Management		SIDA
Credit Facility	10,000,000	SIDA
ENVIRONMENTAL MANAGEMENT FOR SUSTAINABLE DEVELOPMENT		SIDA
Municipal Environmental Protection and Solid Waste Management		SIDA
Project Micropolis Solid Waste Management	410,000	SIDA
Solid Waste Management		SIDA
Solid Waste Management and Sanitary Landfill		SIDA
Modernizing Environmental Management		SIDA
International Coral Reef Initiative Project	2,426,830	SIDA
Establishment of an ISO 14001-based EMS at the DENR	238,000	SIDA
Industrial Restructuring Program	in-kind	SIDA
Industrial Restructuring Program: Environment Component	400,000	SIDA
Leachate Pollution from Open Dumping Sites in Metro Manila	950,000	SIDA
Develop GIS for Local Government Units - TA	400,000	SIDA
RWATERSHED AND BIODIVERSITY CONSERVATION	1,478,261	Toyota
Joint Research & Monitoring	150,000	Toyota
Large Marine Ecosystem and Adjacent Area Sustainable Fisheries	6,310,000	UN
Oceanic Fisheries Management	333,333	UN
Fisheries Bycatch Management	9,700,000	UN
Accelerating the Response to Malaria	11,828,587	UN
Advancing Malaria Control Towards Elimination By 2020	4,563,148	UN
malaria control	14,340,684	UN
Malaria Control	12,800,392	UN
Capacity Building Needs for Biodiversity Conservation and	197,000	UN

Management		
environmental assessment	256,350	UN
CHM support via add-on modules	36,300	UN
implementation of measures for in-situ and ex-situ conservation for sustainable use	30,450	UN
initial assessment and monitoring programs, including taxonomy	33,800	UN
Assessment of Capacity Building Needs for Biodiversity Conservation and Management in the Philippines: conservation and sustainable use of biodiversity important for agriculture	25,400	UN
preservation/maintenance of biodiversity related knowledge of indigenous and local communities	27,150	UN
consultations for the 2nd National Report	13,500	UN
Assessment of Capacity Building Needs for Biodiversity Conservation and Management in the Philippines: country-driven project for participation in CHM	27,050	UN
Bantay Dagat	2,120,000	UN
Biodiversity Conservation and Management of the Bohol Islands Marine Triangle	1,380,000	UN
environmental protection and management of East Asian seas	28,545,000	UN
Community-Based Ecological Solid Waste Management	426,000	UN
Tubbataha Reefs National Marine Park and World Heritage Site	749,714	UN
Public-Private Partnerships in Environmental Investments	1,808,000	UN
Sustainable Development of Ancestral Domain	10,000	UN
Sustainable Agriculture Towards Poverty Reduction	370,000	UN
Environment and Natural Resources CORE Programme	111,000	UN
Environment and Natural Resources CORE Programme II	1,264,000	UN
Environmental Justice Project	1,309,607	UN
Sustainable Livelihood Component	770,000	UN
Expanding and diversifying the national system of terrestrial protected areas	7,360,000	UN
multi-stakeholder mechanisms to promote global environmental priorities	750,000	UN
SDS-SEA	44,250,736	UN
Sustainable Development of the Ancestral Domain	43,712	UN
NCSA	299,960	UN
Mainstreaming in local agricultural landscapes	2,500,000	UN
Institutional capacities for decentralized governance	2,300,000	UN
Mainstreaming key ecosystems	7,850,000	UN
Mainstreaming key ecosystems	950,000	UN
PEMSEA		UN

Biodiversity	12,882,890	UN
Biodiversity	1,680,000	UN
Local Environmental Planning and Management	2,584,000	UN
Sustainable Fisheries Management	185,000	UN
Support to Fisheries Resource Management	2,048,000	UN
SUMMIT	2,230,000	UN
monitoring and data enhancement	1,152,333	UN
policy, institutional strengthening and fishery management	1,677,333	UN
project management	295,333	UN
Community-Based Resource Management	43,911	UN
Community-Based Watershed Management	42,412	UN
Greenwell, Landcare and Biodiversity Project	49,646	UN
Indigenous Resource Management System	1,587	UN
Sustainable Development Program	7,658	UN
Sustainable Management of Coastal Resources and Seaweed Production	35,739	UN
Reef Monitoring and Evaluation	46,384	UN
Coastal Marine Reserve Management and Development	49,902	UN
Coastal Resource Development and Management	34,005	UN
Coastal Resource Management Initiatives	39,412	UN
Gaynawaan Project	38,783	UN
Integrated Resource Restoration System	38,783	UN
Community-Based Resource Management	28,182	UN
Integrated Coastal Enhancement Resource Management	36,188	UN
Community Resource Development	27,713	UN
Biodiversity Conservation and Policy Formulation	41,543	UN
Global reduction of environmental impact from tropical shrimp trawling	8,700,000	UN
Reversing degradation trends in the South China Sea	35,684,000	UN
Strategies for Fisheries Bycatch Management	9,521,330	UN
policy and decision framework	1,323,585	UN
development and demonstration	2,650,205	UN
monitoring and evaluation	976,520	UN
roll-out of bycatch management reduction	1,973,585	UN
communication awareness	1,667,715	UN
project management	92,390	UN
Environmental Management for Industry Competitiveness (EPIC) Project	-	UN
Enhancing Access to and Provision of Water Services with the Active Participation of the Poor		UN
integrated coastal management policy framework	300,000	UNDP
PRIME	1,743,000	UNDP
Convergence for Solid Waste Co-Governance	173,300	UNDP

Environmental Improvement Study	250,000	UNDP
Improved Productivity of Man-made Forest	78,000	UNDP
Sustainable Forest Management, Poverty Alleviation and Food Security in Upland Communities	165,000	UNDP
UNDP/FAO Bamboo Research and Development Project	1,666,000	UNDP
Environment and Natural Resources Capacity and Operations Enhancement	1,333,740	UNDP
ENR-SHELL Program	851,700	UNDP
Empowerment of IPs for Sustainable Management of Ancestral Domains	70,000	UNDP
Human Resources Development in Environmental Planning and Management	693,000	UNDP
Integrated Environmental Management for Sustainable Development	4,526,000	UNDP
Landuse and Land Cover Using Remote Sensing and Geographic Information System	124,000	UNDP
MEIP	4,600,000	UNDP & other multi-bilateral
UNDP-FAO Strengthening of the ISF Programme	1,733,680	UNDP/FAO
Manila Bay Environment Management Project	2,639,000	UNDP/GEF
Strengthening Coordination for Effective Environmental Management	990,000	UNDP/GEF
Master Plan on Water Resources Management		UNDP-ENRCORE
Economic Valuation of Groundwater in Metro Manila Project		UNDP-ENRCORE
Biodiversity Project	350,000	UNDP-GEF
Prevention and Management of Marine Pollution	8,000,000	UNDP-GEF
National Capacity Self-Assessment	200,000	UNDP-GEF
Environmental Management in Pulp and Paper Industry	in-kind	UNEP
Network for Industrial Environment Management	14,700	UNEP
Preparation of the National Integrated Water Resources Management (IWRM) Plan Framework		UNEP
Reversing Environmental Degradation Trends	335,630	UNEP/GEF
Review of the Water Code of the Philippines for Possible Amendments		UNEP/NAST/DOST
National Biosafety Framework for the Philippines	275,790	UNEP-GEF
Integrated Water Resources Management		UNESCAP
Coastal Environmental Management Plan		UN-ESCAP
Population-Environment IEC Programme	982,000	UNFPA
Coastal Resource Management Project	18,249,000	USAID
Coastal Resource Management Support	470,000	USAID
Coastal Resources and Fisheries Conservation	2,800,000	USAID
FISH	1,400,000	USAID
Legal Assistance to Coastal Based Natural Resources Management	250,000	USAID

Mapping of Conservation Demographics	480,000	USAID
Natural Resource Management	255,700,000	USAID
PBC	544,800	USAID
PSA	1,400,000	USAID
Commercial Biotechnology Application	2,000,000	USAID
Water Revolving Fund Support	5,000,000	USAID
Volunteers for Environmental Governance	325,000	USAID
Healthy Families, Healthy Forests	321,000	USAID
US-Asian Environmental Partnership (US-AEP)	28,000	USAID
IEMP	20,000,000	USAID
Local Development Assistance Program	153,580	USAID
Livelihood Project for the On-Going Community Forestry Program	6,000	USAID
Environmental and Natural Resources Accounting Project	815,000	USAID
Environmental and Natural Resources Accounting Project	1,611,000	USAID
Enhancement of Processing Water Permit Application, Billing and other Related Information System		USAID
Water Resources Regional Council		USAID
Strengthening of Water Sector Regulation		USAID
Coastal Resources Fisheries Conservation (CRFC)	950,000	USAID
Coastal Resource Management Project (CRMP)	18,249,000	USAID
Transforming the Marine Aquarium Trade (TMAT)	821,000	USAID
Natural Resources Management Program	164,487,000	USAID
Environmental and Natural Resources Accounting Project	473,000	USAID-TRP
Environmental and Natural Resources Accounting Project	669,000	USAID-TRP
TRP on the Conceptualization and Design of Selected IEC Materials for ISF/Production of Radio Drama in Support of ISF Program	120,000	USAID-TRP
Feasibility Study on the Industrial Air Emission Source Project	337,000	USTDA
Sulu-Sulawesi Seascape	9,287,497	Walton Family Foundation
Improving Biodiversity Conservation in Protected Areas	1,500,000	WB
Water Resources Dev. Project - Watershed Management Improvement Component	8,400,000	WB
Environment and Natural Resources Sectoral Adjustment Loan Program	101,800,000	WB
LAMP II	41,252,400	WB
LAMP	10,587,800	WB
Community-Based Resource Mgt. Project	1,000,000	WB
Governance & NRM Sector Study - TA	50,000	WB
Performance Improvement and Benchmarking of Small Towns Water Utilities		WB
Expansion of Benchmarking of Towns Water Utilities in the Philippines		WB

Registration and Regulation of Water Providers		WB
Strengthening the Environmental Performance Monitoring and Evaluation System	250,000	WB – IBRD – IDF
Manila Third Sewerage Project (MTSP)	5,000,000	WB/GEF
Manila Third Sewerage Project (MTSP) - TA	350,000	WB/GEF
Environment and Natural Resources Management Project	57,000,000	WB/GEF
Integrated Protected Areas System for the Philippines	2,900,000	WB/OECF
Biodiversity Cons.	350,000	WB-GEF
Coastal & Marine Biodiversity Component	1,700,000	WB-GEF
NPS-ENRM	615,000	WB-GEF/PHRD GRANT
Manila Bay Monitoring Program	104,000	WB-IBRD
Community-Based Resource Management	35,520,000	World Bank
Environmental and Natural Resources Sector Adjustment	158,000,000	World Bank
Asian Conservation Foundation	21,290,000	World Bank
conservation management	630,000	World Bank
conservation enforcement	1,140,000	World Bank
information, education, communication	970,000	World Bank
sustainable livelihood strategies	420,000	World Bank
institutional and financial stability	420,000	World Bank
biodiversity research and monitoring	630,000	World Bank
Conservation of Priority Protected Areas	22,870,000	World Bank
Environment Monitoring	40,000	World Bank
Pollution Reduction in the Large Marine Ecosystems	12,040,000	World Bank
Community Watershed Rehabilitation	2,955,000	World Bank
Environment and Watershed Management	1,760,000	World Bank
Marine Aquarium Market Transformation initiative	1,000,000	World Bank
Coastal and Marine Ecosystem Conservation	55,000,000	World Bank
Rural Infrastructure		World Bank
Community Funds for Agricultural Development		World Bank
Institutional Building and Capacity Development		World Bank
Coastal and Marine Biodiversity Conservation	41,250,000	World Bank
Environment and Natural Resources Management	4,400,000	World Bank
Policy, planning monitoring and evaluation	84,000,000	World Bank
Integrated ecosystem management	32,000,000	World Bank
Environmental Management and Enforcement	10,500,000	World Bank
Expenditure planning and management	57,300,000	World Bank
Operationalizing RD/NRM PMI System	4,600,000	World Bank
Participatory Irrigation Development	107,000,000	World Bank
PHRD-Capacity Building	408,000	World Bank
PHRD-Capacity Building in Social and Environmental Assessments	158,596,000	World Bank
PHRD-Strengthening Environmental Enforcement	38,000,000	World Bank

River Basin and Watershed Management Project	25,300,000	World Bank
Subic Bay Water	37,000	World Bank
TA for Improving Biodiversity Conservation	259,000	World Bank
Urban Water and Sanitation	502,000	World Bank
Urban Water and Sanitation	48,356,000	World Bank
Urban Water and Sanitation	30,000	World Bank
Urban Water and Sanitation	3,500,000	World Bank
Urban Water and Sanitation	19,840,000	World Bank
Urban Water and Sanitation	1,670,000	World Bank
Institutional Strengthening and Community Participation	12,200,000	World Bank
co-managed micro-watershed environmental interventions	1,650,000	World Bank
capacity-building of stakeholders at micro-watersheds	4,000,000	World Bank
project coordination support	2,600,000	World Bank
LAMP 2	84,460,000	World Bank, AusAID
Tubbataha Reefs National Marine Park and World Heritage Site 3	453,340	WWF
Debt for Nature Swap Program	2,000,000	WWF

Indirect Mitigation Projects

Project Description	Project Cost (USD)	Funding Source
Philippine Green Buildings/Resorts Project		USAID
Restructuring and Privatization Program		USAID
RP-German Industrial Pollution Control - Cebu Project	4,500,000	FRG/GTZ-BMZ
USDOE PASA	5,000,000	USAID

APPENDIX 2: LIST OF PEOPLE INTERVIEWED

NAME	POSITION	OFFICE	CONTACT DETAILS	DATE OF INTERVIEW
Agoncillo, Oliver	Natural Resources Policy Advisor, Office of Energy and Environment	US Agency for International Development	552-9828 oagoncillo@usaid.gov	10/26/09
Baskinas, Luz	Vice President, Project Development	World Wide Fund For Nature - Philippines	lbaskinas@wwf.org.ph	
Callanta, John	OIC Chief Economic Development Specialist	National Economic Development Authority	631-3707 loc. 701 JCCALLANTA@neda.gov.ph	
Chan, Florida	Senior Program Officer, Poverty Reduction Section	Japan International Cooperation Agency	f-chan@jbic.go.jp	10/23/09
Dacanay, Minerva	In-House Consultant	Japan International Cooperation Agency	minerva@jica.org.ph	10/23/09
Daclan, Marion Antonette		Conservation International-Philippines	mndaclan@conservation.org	10/20/09
Echanove, Juan	Project Officer	European Commission	Juan- Jose.ECHANOVE@ec.europa.eu	9/7/09
Micko, Aurelia	Deputy Chief, Office of Energy and Environment	US Agency for International Development	552-9892 aumicko@usaid.gov	10/26/09
Planta, Roderick	Director IV	National Economic Development Authority	631-3707 loc. 700 rmplanta@neda.gov.ph	
Santiago, Cristina	Climate Change Dept	Japan International Cooperation Agency	CristinaSantiago.pp@jica.go.jp	10/23/09
Sorkin, Lauren	Climate Change Coordination Unit	Asian Development Bank	l.sorkin@adb.org	9/18/09
Tungpalan, Rolando	Deputy Director-General	National Economic Development Authority	rgtungpalan@neda.gov.ph	10/20/09

APPENDIX 3: VALIDATION WORKSHOP

Workshop Program

National Economic and Environmental Development Study (NEEDS) Consultation Workshop

October 13, 2009

Torre Venezia Hotel

No. 62 Scout Santiago St. Cor. Timog Avenue, Quezon City

Programme

Morning		
8:30 – 9:00	Registration	
9:00 – 9:10	Welcome Remarks	Manila Observatory
9:10 – 9:30	Messages	Usec. Mary Anne Lucille Sering (DENR)
		Mr. Yolando Velasco (UNFCCC)
9:30 – 9:45	Introduction of Participants	Ms. Rina Rosales (REECS)
Break		
10:00 – 12:00	The NEEDS for Climate Change Project	
	<i>Introduction</i>	Ms. Joyceline Goco (EMB)
	<i>Presentation of Results</i>	Dr. Germelino Bautista (REECS)
Lunch Break		
1:30 – 2:30	Situation Assessment of CCA and Mitigation Capacity in the Philippines	Facilitator: REECS

	<i>Small Group Discussion #1: CC SWOT Analysis and Formulation of Objectives</i> <i>Plenary Discussion: CC Issues and Needs</i>	
2:30 – 3:30	Development of Objectives and Strategy Options	Facilitator: REECS
	<i>Small Group Discussion #2: Identifying Strategic Actions</i>	
3:30 – 4:00	Prioritizing Objectives and Strategic Actions	
	<i>Multi-criteria analysis of Strategic Actions: Value-based and Technical Analysis of Alternatives</i>	
4:00- 4:30	Synthesis	
CLOSING PROGRAM	Closing Remarks	DENR

List of Participants

NAME	POSITION	OFFICE
Abdulrahman, Thelma		Department of Interior and Local Government
Adelia, Mahallah		ICLEI-SEA
Aljecera, Gina	Officer in Charge	National Economic Development Agency
Amaro, Marcial Jr.		Department of Environment & Natural Resources
Amon, Rog		CEC
Aquino, Albert	Director	PCARRD-SERD
Baladad, Elvira	Cluster Head	Pambansang Koalisyon ng Kababaihan sa Kanayunan
Balibea, Luz	DMO	Project Development Service - DA
Baluca, Hydie		MWSS - CO
Bangsang, Estrellita		Department of Budget and Management
Baron, Ares		OUSC - DENR
Basug, Elenida	Chief	Environmental Management Bureau - DENR
Bonga, Dan		PEMSEA
Briola, Jerbert		Freedom from Debt Coalition
Calanog, Lope	Asst. Director	Ecosystems Research and Development Bureau - DENR
Camba, Jo-Nex	CDM Manager	PhilBio
Cantos, Johnjoe		World Wide Fund for Nature
Carpio, Noemi	Engineer III	Department of Agriculture
Cleofas, Bobby	Deputy Administrator	Metropolitan Waterworks and Sewerage System
Daclan, Marion	Executive Assistant	Conservation International
David, Glenda	Senior EMS	Department of Transportation and Communication
David, Laura	Professor	UP-MSI
Dimalanta, Carla	Associate Professor	UP-NIGS
Domingo, Ma. Ana	Assistant Vice-President	Development Bank of the Philippines
Eser, Kay	SD Project Officer	Shell
Estoesta, Nestor	Chief PDS	Department of Agriculture
Ferolino, Ana	Environmental Officer	Land Bank of the Philippines
Ferrancullo, Eric	K - 6	Philippine Coconut Authority
Flores, Jojie		Land Bank of the Philippines
Gabito, Lorna	Stat IV	Bureau of Agricultural Statistics - DA
Ibay, Gia	Climate Change Attache	British Embassy
Juanillo, Edna		PAGASA-DOST
Jupe, Mila	CTO	Seed Link
Magturo, Cecile		Department of Health
Majid, Swi	M - 6	Philippine Coast Guard

Manaro, M.	Senior Associate	ASOE
Meriel, Hailey	EDS II	NEDA-ROCS
Merilo, Gigi	Senior EMS	Environmental Management Bureau - DENR
Natividad, Mayumi	CFMS	Forest Management bureau - DENR
Olay, Emma		Project Manager
Omega, Margot	CDM Adept	PhilBio
Pacpaco, Karen	MPS III	Environmental Education & Information Office - EMBDENR
Panga, Dennis	Investment Specialist	Board of Investments
Reyes, Charmion	Project TS	SNCPMI-EMB
Roque, Drexel		League of Municipalities of the Philippines
Santos, N.C.		National Water Resources Board
Segayo, Maria		Forest Management Bureau - DENR
Sering, Lucille	Under-Secretary	Department of Environment & Natural Resources
Soriano, Isagani	President	Philippine Rural Reconstruction Movement
Subradil, Helen	Consultant	Geosphere Tech. Inc.
Tamang, Jesus	Director	Department of Energy
Tanchuling, Milo		Freedom from Debt Coalition
Tesorero, Lucila		Land Bank of the Philippines
Victorio, Vernice		Department of Environment & Natural Resources
Villegas, Jason		Department of Energy
Yu, Khelvin	Support Staff	FDC/Climex