



Realizing Challenges, Exploring Opportunities

Proceedings of the
International Conference-Workshop on
Biodiversity and Climate Change
in Southeast Asia: Adaptation and Mitigation

19-20 February 2008
Sofitel Philippine Plaza Hotel
CCP Complex, Pasay City, Philippines



Published by the Southeast Asian Regional Center for Graduate Study and Research
in Agriculture (SEARCA) through the Philippine-Netherlands Biodiversity
Research Programme (BRP) for Development in Mindanao: Focus on Mt. Malindang
and its Environs funded by the Netherlands government

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Reviewers: Arsenio M. Balisacan, Percy E. Sajise, and Gil C. Saguiguit Jr.

Editors: Mariliza V. Ticsay and Leah P. Arboleda

Compiler, Cover Layout, and Desktop Artist: Leah P. Arboleda

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Acronyms

| | |
|-----------------|--|
| A&D | - alienable and disposable |
| A/R CDM | - Afforestation/Reforestation Clean Development Mechanism |
| ACB | - ASEAN Centre for Biodiversity |
| ADB | - Asian Development Bank |
| AGR | - animal genetic resource |
| AMP | - Aquatic Ecosystems Master Project |
| ARCBC | - ASEAN Regional Center for Biodiversity Conservation |
| ASEAN | - Association of Southeast Asian Nations |
| BRP | - Philippine-Netherlands Biodiversity Research Programme (BRP) for Development in Mindanao: Focus on Mt. Malindang and its Environs |
| BVOCS | - Biogenic Volatile Organic Compounds |
| CBD | - Convention on Biological Diversity |
| CBFM | - community-based forest management |
| CDM | - Clean Development Mechanism |
| CGIAR | - Consultative Group on International Agricultural Research |
| CH ₄ | - methane |
| CO ₂ | - carbon dioxide |
| CTI | - Coral Triangle Initiative |
| DGIS | - Netherlands Ministry of Development Cooperation |
| ENRTP | - Environment and Sustainable Management of Natural Resources Programme |
| ENSO | - El Niño Southern Oscillation |
| EU | - European Union |
| GEF | - Global Environment Facility |
| GHG/s | - greenhouse gas/gasses |
| GTZ | - Deutsche Gesellschaft für Technische Zusammenarbeit |
| ha | - hectares |
| HDI | - human development index |
| ICRAF | - World Agroforestry Centre (formerly the International Centre for Research in Agroforestry) |
| IEC | - information, education and communication |
| IOD | - Indian Ocean Dipole |
| IPCC | - Intergovernmental Panel on Climate Change |
| IPGRI | - International Plant Genetic Resources Institute (now Bioversity International) |
| IPR | - intellectual property rights |
| IUCN | - International Union for the Conservation of Nature |
| kph | - kilometers per hour |

| | |
|---------|--|
| m | - meters |
| MAP M&E | - Marine Protected Areas Monitoring and Evaluation |
| MDGs | - Millennium Development Goals |
| MinCBio | - Mindanao Consortium for Biodiversity |
| NIPAS | - National Integrated Protected Areas System |
| PAGASA | - Philippine Atmospheric, Geophysical and Astronomical Services Administration |
| PRA | - Participatory (Rapid) Rural Appraisal |
| RA | - Republic Act |
| RAWOO | - Netherlands Development Research Advisory Council |
| REDD | - Reducing Emissions from Deforestation and Forest Degradation |
| SEA | - Southeast Asia |
| SEAMEO | - Southeast Asian Ministers of Education Organization |
| SEARCA | - Southeast Asian Regional Center for Graduate Study and Research in Agriculture |
| SEC | - Socioeconomic and Cultural Studies |
| SGP | - Small Grants Programme |
| SGP PTF | - UNDP Small Grants Program for Tropical Forests for South and Southeast |
| START | - Southeast Asia Regional Vulnerability to Changing Water Resource and Extreme Hydrological Events Due to Climate Change |
| SU | - Silliman University |
| TEMP | - Terrestrial Ecosystems Master Project |
| UK | - United Kingdom |
| UN | - United Nations |
| UNCCD | - UN Convention to Combat Desertification |
| UNDP | - United Nations Development Programme |
| UNESCAP | - United Nations Economic and Social Commission for Asia and the Pacific |
| UNFCCC | - United Nations Forum on Climate Change |
| USAID | - United States Agency for International Development |

Overview

Background and Rationale

The Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA) has completed the implementation of the Philippine-Netherlands Biodiversity Research Programme (BRP) for Development in Mindanao: Focus on Mt. Malindang and its Environs funded by the Netherlands government. This was an effort that started six years ago in line with the Center's Five-Year Development Plan.

Results of the program revealed the complex interactions between ecosystems that have bearing on biodiversity. It also unraveled, but not addressed, the other factors that affected biodiversity conservation.

Capitalizing on the BRP initiatives, including the lessons learned and the experiences gained, SEARCA endeavored to respond to the emerging regional concerns and other global developments pertaining to the environment and natural resources management by helping to address the issues on climate change.

Climate change is one of the serious threats to sustainable development. It poses adverse impacts on human health, food security, the environment, economic activities, and physical infrastructure. Among the possible consequences include lower agricultural yields, growing water stress, flooding of low-lying areas, and spread of infectious diseases to new and warmer areas. These changes in the natural ecosystems threaten biological species thereby adding pressure to the terrestrial and marine ecosystems that are already stressed by land use change, pollution, over-harvesting, and introduction of alien species.

Although the projected impacts of climate change on biodiversity have been articulated by many, the contributions of biological resources to reduce the impacts of climate change on people and food production have not been fully appreciated. The link between biodiversity and climate change is not one-way. As climate change alters the state of biodiversity, changes in biodiversity can likewise affect the world's climate. Biodiversity resources and biodiversity conservation strategies may thus offer adaptation and mitigating measures to climate change.



Objectives

The two-day conference-workshop aimed at providing the venue for an international discussion of opportunities for adapting to and mitigating climate change, while enhancing biodiversity conservation in the region. The discussions during the conference-workshop were specifically aimed at:



- Presenting research results on the impacts of climate change to biodiversity in the Southeast Asian (SEA) region;
- Presenting adaptation policies, measures, and strategies and/or best practices on climate change for biodiversity conservation;
- Presenting research results on mitigating climate change through biodiversity conservation in the region;
- Identifying the elements of a feasible regional research-for-development program on biodiversity and climate change by identifying governance, institutional issues, and research gaps related to biodiversity conservation and climate change in SEA; and
- Drawing the interest and commitment of participating experts and potential partners in crafting the program, marketing it to possible donors, and possibly getting involved in its future implementation.



Methodologies

Lecture-Discussions: A keynote paper presented the regional and global perspectives on biodiversity conservation and climate change, and their relation to the Millennium Development Goals (MDGs).

Two thematic papers introduced and set the tone of each session of the conference, namely:

- Biodiversity: Impacts, Vulnerability and Adaptations to Climate Change; and
- The Role of Biodiversity in Mitigating Climate Change.

Discussion papers presented particular cases or examples of best practices in each participating country along the two themes. The donors' perspectives, in supporting research and development efforts on biodiversity and climate change in the region, were shared by representatives of the donor community.

Plenary-Workshops: Using the paper presentations as reference points, country representatives and other experts were grouped together to discuss the emerging issues and other concerns regarding policies, strategies, and measures undertaken. They were also tasked to identify the research gaps that need to be addressed by future studies on biodiversity and climate change. Highlights of each group discussion were presented during the plenary sessions.



End Products

This conference-workshop aimed to come up with the following:

- Policy recommendations and other possible researchable areas on the interface of biodiversity and climate change;
- A network of experts and cooperators who could assist in developing and implementing the regional program;
- A concept note for a Regional Program on Biodiversity Conservation and Climate Change in SEA; and
- Conference proceedings and other publications.

Organizers



SEARCA is one of the 15 regional centers of the Southeast Asian Ministers of Education Organization (SEAMEO), an intergovernmental body founded in 1965 to promote cooperation in education, science, and culture.

SEARCA served as the overall coordinator of the conference and oversaw both the technical and logistical requirements in the implementation of the conference.



The **ASEAN Centre for Biodiversity (ACB)** is an intergovernmental and international regional centre of excellence of the Association of Southeast Asian Nations (ASEAN). ACB aims to create, promote, and develop links with the public, private sector, civil society, international development institutions, and donor community for the sustainable use of biodiversity.



The **World Agroforestry Centre** (formerly the International Centre for Research in Agroforestry or **ICRAF**) is the international leader in the science and practice of integrating “working trees” on small farms in rural landscapes. ICRAF combines excellence in scientific research with innovative developmental partnerships to address poverty, hunger, and environmental problems throughout the tropics.



The **Bioversity International** (formerly the International Plant Genetic Resources Institute or IPGRI) is an independent international scientific organization that seeks to improve the well-being of present and future generations by enhancing the conservation and the deployment of agricultural biodiversity on farms and in forests.

It is one of the 15 centers supported by the Consultative Group on International Agricultural Research (CGIAR). CGIAR is an association of public and private members who support efforts to mobilize cutting-edge science to reduce hunger and poverty, improve human nutrition and health, and protect the environment.



Silliman University (SU) is a leading Christian institution in the Philippines that is committed to total human development for the well-being of society and environment. Silliman University is located in Dumaguete City, Negros Oriental, Philippines.

Synthesis of the Opening Program

Welcome Remarks

Dr. Arsenio M. Balisacan

Director, Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA), College, Laguna, Philippines and Professor of Economics, School of Economics, University of the Philippines Diliman, Quezon City, Philippines

Dr. Balisacan welcomed the participants to the Philippines. He informed them of the exciting and productive discussions that would commence during the conference-workshop.

As an overview, Dr. Balisacan discussed the vulnerability of the tropics to climate change. This can be seen in the media headlines mostly because former US Vice-President Al Gore emphasized this in his climate change expose' "The Inconvenient Truth." He also cited that the contributions of biological resources to mitigate climate change have not been fully explored, hence the conference-workshop.

In addition, Dr. Balisacan stressed the need for parallel efforts in biodiversity conservation. This may include the development of a regional program that could help address the challenges and opportunities in climate change adaptation and mitigation, and biodiversity conservation. He cited the efforts of the Biodiversity Research Programme for Development in Mindanao (BRP) which could serve as the basis for the development of this regional program. BRP was funded by the Dutch government through the Netherlands Ministry of Development Cooperation (DGIS). Program results have shown that problems of biodiversity conservation must not be taken in isolation from climate change, as well as overarching problems of poverty, government policies and regulations, etc.

He emphasized that this activity is a follow through of BRP, as remaining funds were used to implement the conference-workshop. Outputs from the conference-workshop would be developed into various publications and information materials for reference of students and policy makers.



Message

HE Robert G. Brinks

Ambassador, Embassy of the Netherlands

Manila, Philippines



Ambassador Brinks expressed his honor and pleasure of speaking before the participants as a layman on the subjects of climate change and biodiversity conservation. He stressed his awareness on the enormous challenges of climate change – rising sea levels brought by global warming, threats for economically developing countries, and many more. He cited the role of industrialized countries, including The Netherlands, on the global warming phenomenon.

He then discussed BRP which The Netherlands government funded. BRP realized the concept of a demand-driven research program that provided the opportunity for local and Dutch researchers to work together. With SEARCA as the lead implementing agency, BRP was implemented with focus on ownership and inputs of both local and Dutch researchers. It used the following principles as guide for implementation: location-derived and development need-oriented, systems-oriented and interdisciplinary, promotion of multistakeholder participation, and implementation of an integrated systems approach. The second-generation research, which BRP implemented, meanwhile, deepened the knowledge on biodiversity.

According to Ambassador Brinks, BRP advanced the introduction of innovative biodiversity research strategies. Research results showed that communities could experience the actual effects of climate change that have consequent implications on development initiatives.

Ambassador Brinks then cited the focus of the conference-workshop – the effects of climate change on biodiversity. He discussed the efforts of the Netherlands government in developing policies to address the consequences of climate change, and at the same time achieve the Millennium Development Goals (MDGs). Among the focus of these policies were mitigation measures, especially on lowering carbon dioxide (CO₂) emissions, which can slow down global warming. He cited that the European Union agreed to reduce CO₂ emissions by 20%. However, mitigation alone is not enough. There is a need to undertake adaptation measures to address the consequences of climate change in a holistic manner.

For its part, The Netherlands government has initiated adaptation and mitigation efforts to cope with the effects of climate change. Ambassador Brinks identified the government's efforts to strengthen the coastlines, develop plans to cope with increased heat waves, and many more. Through these efforts, he stressed the capability of The Netherlands government to implement adaptation measures which, in reality, many countries cannot afford to do so.

He then stressed the links between development cooperation and the effects of climate change. He cited that 300 M people in developing countries are affected by climate change, and 600 M people are experiencing malnutrition due to drought. Because of the effects of climate change, specifically global warming, on the development opportunities of people, it is difficult to achieve the MDGs by 2015. Ambassador Brinks stressed the need to make politicians aware that it is not too late to reverse the trends or the consequences of climate change and biodiversity conservation. There is a “need to repair what we have taken away.”

Keynote Address

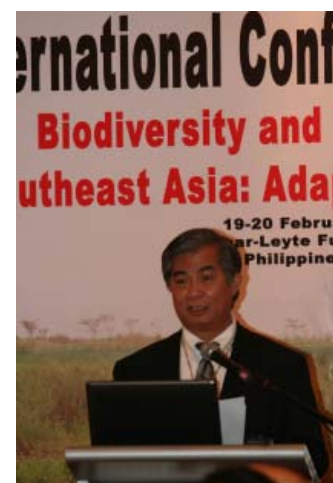
Dr. Delfin J. Ganapin Jr.

**Global Manager, UNDP GEF Small Grants Programme,
New York, USA (Representing Dr. Ahmed Djoghlaf, Executive
Secretary, Convention on Biological Diversity, Montreal, Canada)**

Dr. Ganapin read the prepared speech of Dr. Ahmed Djoghlaf, Executive Secretary of the Convention on Biological Diversity (CBD). In the speech, Dr. Ganapin informed of the shared commitment of CBD and the Global Environment Facility's (GEF) Small Grants Programme (SGP) in assisting the poor and vulnerable communities who would bear the impacts of biodiversity loss and climate change. He cited the drastic changes caused by biodiversity loss and climate change. Global warming can drastically change the extent of extinction of endangered and other threatened species.

He cited some of the findings of the Intergovernmental Panel on Climate Change (IPCC) – temperature increase by 1.5°C, risk of animal extinction by 20%, and risk of extinction of 1 M species due to climate change, among others. He stressed that climate change impacts every ecosystem, including the health of biodiversity in the surrounding systems. Because of these changes, 88% of reefs in Asia may be lost in the next 30 years. There may also be 1,522 plant species in China and 2,835 plants in Burma that could become extinct. Elevated CO₂ levels may adversely affect livestock health, especially on low-temperature environments. In Indonesia, climate change may increase the chance of delaying monsoon rains by 30 days.

Developing countries would be mostly affected by climate change. Dr. Ganapin cited that even if greenhouse gas (GHG) emissions would decrease significantly tomorrow, people would still experience the effects of climate change for a hundred years. It is thus important to include biodiversity conservation as a component of climate change mitigation measures. He stressed the capabilities of healthy forests and wetland ecosystems to absorb CO₂ emissions. Likewise, biodiversity conservation can help reduce CO₂ emissions. There is also a need for the sustainable management of grazing lands.



Because of the emerging role of biodiversity conservation in mitigating climate change, Dr. Ganapin assured the participants of the commitment of CBD to serve as a major partner in the development and implementation of initiatives that address this concern. With 190 parties, CBD has a near universal participation of countries that are committed at preserving life on earth. In fact, this is the focus of CBD's Target 7, which aims to maintain and enhance the resilience of the different components of biodiversity to enable it to adapt to climate change. Moreover, CBD implements the ecosystem approach for the comprehensive resolution of issues at all levels. It hopes to promote collaborative actions to help reduce GHG emissions from developed countries. CBD works with the Canadian government and the UN Convention to Combat Desertification (UNCCD).

In conclusion, Dr. Ganapin cited the significant contribution of the conference-workshop in the works of CBD and UNCCD. SEARCA's BRP had shown the link between biodiversity conservation, climate change, and poverty alleviation. CBD's role in this conference-workshop was to help develop the roadmap to ensure that a regional program on biodiversity and climate change could get off the ground. Dr. Ganapin wished SEARCA and the participants a fruitful event – "one that would bind us together across sectors, across agencies, and across countries."

Conference Overview, Objectives, Framework, and End Products

Dr. Rodel D. Lasco
Philippine Programme Coordinator
World Agroforestry Centre (ICRAF)-Philippines
Laguna, Philippines



As a prelude to the objectives, framework, and outputs of the conference-workshop, Dr. Lasco cited some of the findings of the IPCC report: the unprecedented concentrations of GHGs and their rates of change, the dramatic increase of GHGs after the industrial revolution, and the evidences of global warming from the 1850s to the present (e.g. increase in the global average of air and ocean temperatures, widespread melting of snow and ice, rising global mean sea level, etc.). He stressed the severe vulnerability of people and animals to the specific impacts of climate change.

In addition, Dr. Lasco said that climate change is likely to affect forest expansion and migration, and at the same time exacerbate threats to the survival of the ecosystems. He cited two major issues – the need to avoid deforestation, and maintain carbon stocks in forests.

He illustrated the framework of the conference-workshop as a two-way link between climate change and biodiversity. Climate change affects biodiversity, and biodiversity loss contributes to climate change.



He then proceeded to enumerate the objectives of the conference-workshop, and outlined the different outputs that were expected – policy recommendations, possible research areas on the interface of biodiversity and climate change, establishment of a network of experts and cooperators, concept note for a regional program on biodiversity conservation and climate change in SEA, and conference proceedings and related publications.

Pre-Conference Paper

“Coastal Biodiversity – Implications of the BRP Research on the Impacts, Vulnerability, and Adaptation to Climate Change”

Dr. Wilfredo H. Uy

Professor and Dean, Institute of Fisheries

Research and Development

Mindanao State University (MSU)-Naawan

Misamis Oriental, Philippines

Dr. Uy discussed BRP – a five-year (2000-2005) program which envisioned “economically and culturally prosperous community living harmoniously in a sustainable environment where biodiversity conservation is founded on an integrative and participatory research model.” BRP aimed at “contributing to the conservation, management and sustainable use of biological resources; building and strengthening the capacity for biodiversity research; and promoting research cooperation on equal footing among north and south researchers.”

The implementation of BRP used these guiding principles:

- Location-derived and development-oriented;
- Promotion of multistakeholder participation;
- Systems-oriented and interdisciplinary; and
- Use of the landscape approach.

He presented a brief history of the development of BRP. It was initiated by The Netherlands Development Assistance Research Council (RAWOO) in 1996. SEARCA was identified as the lead coordinator for the Philippine Working Group (PWG). The pre-implementation phase of BRP was done from 1997-2000 where participatory rural appraisal (PRA) studies were conducted for the coastal, lowland, and the upland ecosystems of Mt. Malindang.

Mt. Malindang was selected as the study site as it has been identified as a biodiversity hotspot. It was declared a national park in 1971 (through Republic Act or RA 6266), under the National Integrated Protected Areas System (NIPAS) Act of 1992 (RA 7586). Through RA 9304 (Mt. Malindang Act), Mt. Malindang was declared a protected area.

At the time of program implementation, Mt. Malindang was at the stage where changes were needed (through research) to prevent the total depletion of natural resources. Mt. Malindang was also viewed



as a “possible springboard from which similar biodiversity conservation initiatives throughout the country could be launched.”

BRP was implemented in two phases – Phase 1 (2000-2003) implemented the First-Generation Studies, and Phase 2 (2003-2005) implemented the Second-Generation Studies. Phase 1 focused on the development of participatory methods for the inventory and assessment of flora and faunal resources in the different ecosystems of Mt. Malindang – montane forest, Lake Duminagat, riverine, riparian, and coastal areas. Phase 2, meanwhile, implemented the Terrestrial Ecosystem Master Project (TEMP), the Aquatic Ecosystem Master Project (AMP), the Socioeconomic and Cultural Studies (SEC), and the Open Research projects, as well as provided thesis support for deserving students of Mindanao institutions.

According to Dr. Uy, BRP findings revealed high species richness in Mt. Malindang’s forest resources. These, however, continue to be threatened. Agriculture was the major land use of the people in Mt. Malindang. The freshwater resources, meanwhile, provided for the water needs of households, and irrigation and quarrying for sand and gravel. However, sedimentation and coliform contamination were also found to be increasing. In the marine and coastal areas, there was poor fish stock due to over fishing. Environmental pollution also contributed to low water quality.

Dr. Uy outlined the different outputs derived from BRP – monographs, databases, papers, trainings programs, IEC materials, expansion of local research, and the formation of the Mindanao Consortium for Biodiversity (MinCBio). He also described the vulnerability of Mt. Malindang’s coastal ecosystems, coral reefs, seagrass beds, mangroves, and plankton population.

Some of the interventions he discussed that could help mitigate climate change included consultative workshops at all levels, long-term ecological studies of coastal ecosystems in some areas of the country, and monitoring and evaluation of marine protected areas (MPA M&E), and other networking initiatives. He also added the need to implement large-scale ocean nourishment project in the Sulu Sea to sequester excess CO₂, rehabilitate mangroves and seagrass beds, implement seaweed farming, and promote MPA networking.

Some of the future actions that could be made as a result of BRP initiatives included coral bleaching watch, permanent plots for long-term ecological research, public awareness programs, and continued species inventory.

In summary, Dr. Uy described the uniqueness of BRP in terms of process (participatory, consultative, and promoted integrative natural and social science research), focus (biodiversity in upland, lowland, and coastal landscapes), and outputs (generated knowledge for scientific purposes, community-based biodiversity management and conservation, and strengthened institutions, partners, and researchers).



Synthesis of Theme 1

Biodiversity: Impacts, Vulnerability, and Adaptation to Climate Change

Thematic Paper 1

“How ‘Dangerous’ is Dangerous Climate Change?”

Dr. Pak Sum Low

Consultant, Environment and Sustainable Development

UN Economic and Social Commission for Asia and the Pacific (UNESCAP)-Bangkok Bangkok, Thailand

Dr. Low cited the importance of having updated data because “science moves every minute.”

For him, biodiversity and ecosystem services are priceless as they contribute to the survival of people and help regulate the climate.

Dr. Low described the link between biodiversity loss and climate change. He stated that 50% of Asia’s total biodiversity, at present, is at risk. Global average air temperature has warmed by 0.74°C. As a result, changes in the microclimate affect the natural selection capacity of the different species. The melting of glaciers may decrease freshwater availability. Precipitation may have implications on water supply as more floods may occur in some places. Increased occurrences of El Niño may cause massive crop failures, water shortages, and forest fires. Dr. Low shared the experiences of Indonesia where forest fires have threatened 19 of its biodiversity-rich areas.

Moreover, climate change has increased the occurrences of tropical cyclones, and typhoons. Warm nights are increasing, while cold nights are decreasing. Heat waves are becoming prevalent. For marine life, coral reefs, which are often referred to as the “rainforests of the sea,” are affected by ocean acidification.

These various impacts have shown that biodiversity is more vulnerable than humans. Humans can find ways to cope with climate change, whereas biodiversity’s survival is directly at risk from the changes caused by climate change. However, humans who are most vulnerable to climate change are those who are highly dependent on biodiversity as stressed by Dr. Low.



In SEA, Dr. Low cited the increased occurrence of coral reef bleaching due to increased water temperature. According to him, the 1998 El Niño phenomenon destroyed 80% of corals in the central Indian Ocean. This is very critical as SEA only has 5% healthy corals, the lowest as compared to other parts of Asia.

He proceeded to describe the ecological consequences of climate change:

- Shift in phenology (study of times of recurring natural phenomenon);
- Impacts of global warming in the last few decades on the life cycles of many species (e.g. leafing dates of oak);
- Changing species through shifting habitats;
- Changing life cycles (e.g. mismatch in the life cycles of the Pied Flycatcher and its food source – the moth);
- Development of new physical traits;
- Changes in migration routes (“climate refugees”);
- Changes in feeding habits;
- Changes in breeding, nesting, and reproduction processes; and
- Resting and incidence of diseases and feminization.

Dr. Low provided more examples on the effects of climate change on biodiversity. There may be changes in insect outbreaks, lengthening of the growing season, changes in the pole-ward and upward migration of plants, and changes in the temperature tolerance of insects and animals (e.g. insects enjoying warmer UK climate). He also said that climate change is the cause of the decline in the body weight of polar bears. Climate change is also threatening to redraw the world’s wine producing map, and the effects are already being seen in earlier harvests and coarser wines.



In addition, more GHG emissions could accompany more warming. Chances are that 20-30% of higher plants and animals could face extinction if temperature increases by 1.5-2.5 °C. This temperature change could likewise affect ocean circulations.

According to Dr. Low, different biodiversity species may have different levels of tolerance. Hence, a single temperature parameter threshold may be inappropriate. He emphasized that it is more practical if the issues are addressed in terms of ecosystem and not by species.

Climate change is one of the major drivers of biodiversity. Hence, Dr. Low stressed the need for multidimensional threshold levels. According to him, this is important if “we want to assess, identify, and capture the factors that cause the climate change impacts.”

Efforts are being made to reduce the current rate of biodiversity loss at all levels, and at the same time protect and restore habitats and natural systems by 2010. According to Dr. Low, this is not realistic as this is difficult to achieve in countries that are most vulnerable to



climate change. He described the risks in terms of hazards and vulnerability:

- Risk = Hazard (natural or human induced) x Vulnerability (social, economic, political factors)
- Risk = Hazard (climate change) x Vulnerability (depends on both biodiversity and human factors such as deforestation, pollution, biological adaptation and natural selection capacity)

Country Paper: Singapore

“Anticipated Impacts of Climate Change on Marine Biodiversity based on Field Situations Simulating Climate Change Scenarios in Singapore”

Dr. Chou Loke Ming

Professor, Department of Biological Sciences

National University of Singapore

Science Drive, Singapore

Professor Loke Ming cited IPCC (2007) data proving that climate change affects natural systems and causes significant impacts on biodiversity. Some of these impacts include elevated sea temperature, ocean acidification, changes in salinity, and dissolved oxygen, among others. Natural colonization of newly formed habitats, heavy sedimentation, and salinity depression are also occurring.

Professor Loke Ming described the experience of Singapore in reclaiming the reef flats of a few southern offshore islands, including the island of Pulau Hantu. Originally, this island is comprised of two small islands. Upon reclamation, the island of Pulau Hantu has increased its combined area from 2.4 ha to 12.2 ha.

The reef flats in between the islands were converted into sandy lagoons. The presence of benthic organisms provides life cover in the deeper portions. Hard coral recolonization was well-distributed, but low in abundance, and commonly associated with rocks. The main recolonizers were macroalgae, seagrass, and sponges. As a result, the community structure was similar to natural reef flats.

Transects that ran across the lagoon revealed 5.6-19% live coral cover, with the hard corals at 5.8%. After 17 years of natural colonization, there were 5.6-19% coral cover.

Professor Loke Ming cited sedimentation as a major problem in the past decades. This has increased due to reclamation. The reef slopes were found to be more vulnerable to sedimentation.

Mass spawning was first reported in 2002 and found to occur in the higher latitudes. Professor Loke Ming cited that the reef flats and lower slopes were most affected. The reef crest and upper slope (to 6 m deep) still supports vigorous growth of corals.





Sedimentation caused the steady but gradual decline in live coral cover. Although there has been no significant loss of hard coral diversity (250 species with 1 species extinct), at the time of the study, sedimentation affected coral abundance but not biodiversity. However, temporal variation in diversity of benthic communities were considered as indicators of environmental change.

Salinity depression was also seen as one of the impacts of climate change. The heavy rainfall that occurred over Southern Johor was the heaviest in many decades. The sedentary organisms in Chek Jawa suffered a lot because freshwater pushed into their bodies. Some marine organisms, however, were not affected by salinity depression as they can regulate the concentration of their body fluid.

Meanwhile, the 1998 El Niño Southern Oscillation (ENSO) caused the widespread bleaching of corals at an unprecedented scale. Recovery occurred as SST returned to normal. There was 20% mortality because warm temperature lasted for two to three weeks.

In conclusion, Professor Loke Ming stressed the direct and indirect impacts of climate change. For biodiversity, changes can be seen in terms of species, communities, and habitats. It is thus necessary to enhance ecosystem resilience through the effective management of natural habitats, and innovative techniques and approaches. Being proactive rather than reactive is also important in implementing strategies to cope with the impacts of climate change and biodiversity loss.

SEA, according to Professor Loke Ming, is considered as the marine global center of biodiversity. Many areas are considered biodiversity hotspots as it contains the largest concentration of marine biodiversity. As people continue to enjoy the services of marine ecosystems, it is thus imperative that such ecosystems are preserved and protected from the impacts of climate change.

Country Paper: Cambodia

“Animal Genetic Resource Conservation and Climate Change

Dr. Vathana Sann

Program Coordinator, Graduate School of Agriculture and

Professor, Royal University of Agriculture

Phnom Penh, Cambodia

Professor Vathana cited that agriculture is the most important sector of the Cambodian economy. Farmers practice mixed farming systems integrated with rainfed crop production.

Animal genetic resource (AGR) conservation has always been integrated in farming activities in the case of Cambodia. However, Professor Vathana stressed that there is no defined conservation scheme yet in Cambodia.

Unknown to many, livestock production is also a major source of GHG emissions. The gasses methane (CH₄) and CO₂ are being emitted from extensive livestock production systems.

Methane is created from storing livestock wastes. It is a by-product of anaerobic fermentation of rumen, also known as “hydrogen sink.” There are two types of rumen fermentation, according to Professor Vathana, cellulolytic (acetic acid and its end products) and amylolytic (propionic acid). Methane is a major contributor to global warming. It contributes to 4-10% loss of energy intake. It is thus necessary to reduce methane emissions from livestock production systems.

Research revealed that low quality animal feed leads to the huge production of CO₂ and CH₄. The use of high fiber diets produced more acetate and methane as compared to high grain diet.

Moreover, changes made to intensify livestock production may threaten AGR and alleviate GHG emissions.

Other sources of GHG emissions, according to Professor Vathana, were Cambodia’s industrial revolution that has happened in the last two decades, and the practice of monoculture.

Professor Vathana said that 48.1% of GHG emissions in Cambodia came from domestic livestock production. It was estimated that GHG emissions from agricultural activities would increase by 27.5% by 2020.

With these estimates, Professor Vathana cited implications to research:

- Find ways to improve livestock diet because inefficient rumen fermentation will maximize methane production;
- Try to minimize methane production by using high energy diets to intensify ruminant production; and
- Encourage intensive farming to maximize output per unit of land.

When global warming is at stake, Professor Vathana suggested that all should “take the risk, take the lead” in implementing ways to reduce GHG emissions.

Country Paper: Philippines

“Climate Change and Biodiversity in the Philippines: Potential Impacts and Adaptation Strategies”

Dr. Florencia B. Pulhin

Researcher, College of Forestry and Natural Resources

University of the Philippines Los Baños

Laguna, Philippines

Dr. Pulhin presented a brief overview of the Philippines. The country has a total land area of 30 M ha which are equally divided



between forests and alienable and disposable (A&D) lands. Forests occupy 7.2 M ha. The county experiences four climate types. Mean annual rainfall range is 965-4,064 mm with relative humidity of 85% in September.

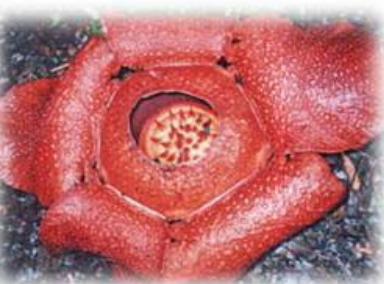
Like the other countries in SEA, the Philippines experience the impacts of climate change. In 1995-2006, the country experiences rise in temperatures. ENSO occurs every five years. Occurrences of typhoons with speed of more than 185 kph are increasing. There is also increasing annual mean sea level in Manila since the 1970s.

These impacts have decreased agricultural production especially during extreme droughts (El Niño). Increasing speed of typhoons has caused lives and damage to properties that are worth millions. Dr. Pulhin also cited a 2-3°C increase in temperature for most regions, with a 4°C rise in temperature in Eastern Mindanao.

The country's biodiversity, meanwhile, is very rich. In fact, the Philippines ranks 17th in terms of biodiversity, and 15th in terms of endemism. IUCN even ranked the Philippines as one of the 17 megadiversity areas in the world. However, Dr. Pulhin cited that 60% of the country's endemic flora and 35% of endemic bird species are now extinct. There are also three species of reptiles that are threatened and endangered.



Dr. Pulhin discussed the situation of the Filipinos. Most are poor and have limited access to livelihood opportunities. These are the reasons for most of them to migrate to forested areas. The forests are thus cleared to give way to settlements, economic activities, and development of transportation infrastructure. As a result, many species are threatened to extinction, and diversity of ecosystems is reduced.



Dr. Pulhin shared the results of her research, which estimated the impacts of climate change using the Holdridge Life Zone. This is an ecological classification system based on precipitation, heat (biotemperature), and humidity (potential evapotranspiration ratio). It used three climate scenarios: +25% precipitation, +50% precipitation, and +100% precipitation.



At +25% precipitation, temperature will increase by 1.5°C, and dry forests will disappear. Dry forests are most vulnerable to climate change. They disappear when rainfall increases by 25%. At +50% precipitation, wet forests will increase. At +100% precipitation, rainforests will increase while wet forests will decrease. She further stated that climate change could reduce forest areas because of migration of lowland farmers to the uplands. There will also be increased occurrences of pests and diseases. Climate change may even create changes in their composition and structure.

Some of the adaptation strategies that Dr. Pulhin discussed include:

- The implementation of risk and vulnerability assessments to identify ecosystems and species that are at risk;
- Improved biodiversity management to reduce risk and vulnerability (e.g. protection of the country's remaining forests, rehabilitation of degraded forestlands, improved harvesting technologies, etc.);
- Implementation of consultative workshops at local and national levels;
- Effective implementation of policies; and
- Integration of policies in the major curricula of students.

Highlights of the Open Forum

Director Rodrigo U. Fuentes

Executive Director

ASEAN Center for Biodiversity (ACB)

Laguna, Philippines

Assessment of climate change impacts. There is a strong missing link when it comes to assessing the impacts of climate change. The interconnectedness of ecosystems at all levels requires an assessment that uses the systems approach. Some of the methodologies or approaches that can be used to address this missing link may be sourced from the following:

- UNFCC's online methodologies (e.g. vulnerability assessment methodologies);
- Integrated assessment methodologies that can determine the impacts and vulnerabilities to climate change (e.g. methods that can assess impacts on water, lowland agriculture, and forests, etc.); and
- Integrated assessment modeling methodologies, which are usually the best means of assessing all aspects and levels of climate change impacts and vulnerability.

Biodiversity conservation. This serves as an insurance against climate change. We need to conserve, properly deploy, and encourage exchanges in germplasm. For its part, CBD can become more responsive to climate change by:

- Making databases, methodologies, and information free of charge so that this can be easily accessed by everyone, even students;
- Helping to facilitate meetings and conventions that aim to address the issue of international ownership; and
- Going to the different CBD parties to advocate changes including the sharing of information, intellectual property rights (IPR), knowledge management, etc.



Vulnerability assessments. Vulnerability assessments need to be brought up to the different zones, and down to the species level. We can ensure that the sources of genetic materials of animals can be conserved by:

- Evaluating the changes caused by climate change on community structure and species dominance - this will enable us to devise ways to adapt to these changes;
- Learning from the experiences of implementing adaptation or coping strategies - there is a need for a proper and enlightened kind of management; and
- Formulating good policies to ensure the safety of both people and biodiversity - policies that can change human behavior and socioeconomic factors should be considered and included aside from changing the physical aspect.

Public awareness campaigns. There is a need to intensify public awareness on climate change. Some of the recommendations include:

- Integration of climate change adaptation strategies in the farm plans of farmer beneficiaries - this has already been initiated on climate change projects in Lantapan, Mindanao, Philippines;
- Increased public awareness campaigns at the community level instead of at the national level on the concepts and impacts of climate change since they experience first-hand the impacts of climate change;
- Improved understanding and internationalization on the value of climate change mitigation and biodiversity conservation; and
- Improved education and public awareness initiatives on ways to mitigate climate change at the community level and among policy makers, even in small ways – e.g. saving energy.

Once they know more about climate change, these people can help develop and implement policies. However, good policies come first.

Ecological resilience. There is a need to enhance ecological resilience or adaptation. Training should be done at all levels so that there will be more people who specializes on climate change.

Estimation models. There is a need to search for other estimation models that can include other factors (e.g. poverty), aside from precipitation, to determine what happens to our forests. The model discussed in one paper presentation used only climatic factors. The challenge is to have a model that can include socioeconomic factors to have a true grasp on the impacts of climate change. Poverty is a major factor that helps ensure forest protection. For the estimation model to be credible, it should consider poverty.

Vulnerability of biodiversity than humans. In clarification of the statements “Biodiversity is more vulnerable than humans,” and “Climate change is dangerous to both humans and biodiversity,” Dr. Low stated that:



- Biodiversity is part of ecosystems diversity, and is linked to humans. Biodiversity is also linked to social development. Humans are part of the whole ecosystem.
- Biodiversity is more vulnerable than humans because they suffer the direct impacts of human activities and changes in nature. They have difficulty to immediately cope with the direct impacts of climate change. Whereas, humans can immediately find ways to cope with the impacts of climate change.

Monitoring systems. There is a need for a reliable monitoring system and a policy-climate change sign interface. Ways to transfer strategies at the landscape level are also needed.

IPCC can help address this need by helping to develop the policy-sign interface. However, there is a need to publish the results as soon as possible and explore other ways of gathering information from scientists in countries that cannot speak English.

In the Philippines, consultative workshops at the local and national levels will greatly help in the transfer and sharing of technologies.

Policy formulation is easier as compared to policy implementation. Policy implementation can be improved by integrating the policies themselves in the major curriculum of students.

Policies at the local, national, and global levels are connected. This means that national policies respond to the problems and constraints experienced at the national level. These are usually different from the policies developed at the global level. There is a need to develop policies on climate change that can help address the different development concerns. This is critical because there is no one solution that can address different problems. Moreover, problems are site-specific, so solutions may likewise be site-specific.

Increased focus on climate change. Not many countries are paying attention to climate change because they are more focused on livelihood for survival. They have more pressing and more immediate needs. Climate change concerns require people to think 100 years from now.

National situations have different receptiveness with regards to the concept of climate change because of each country's experiences.

Mainstream development initiatives into environmental conservation efforts. There is a need to explore ways of mainstreaming development initiatives into environmental conservation efforts or vice versa. Development and environmental protection initiatives should be equally supportive. Mitigation and adaptation should also be supportive. All these should be integrated into one entity.



Synthesis of Theme 2

The Role of Biodiversity in Mitigating Climate Change

Thematic Paper 2

“Climate Change, Biodiversity, and Sustainability”

Dr. Meine van Noordwijk

Regional Coordinator

World Agroforestry Centre (ICRAF)-SEA Programme

Bogor, Indonesia

According to Dr. van Noordwijk, SEA is one of the most densely populated areas in the world in terms of diverse flora and fauna. However, it is also in this region where GHG emissions are considered high. In fact, Indonesia is recognized as the world’s third emitter of GHGs.



Vulnerability to climate change depends on geography. People in areas with low biodiversity are more vulnerable to climate change.

According to Dr. van Noordwijk, a person’s ecological footprint and the Millennium Development Goals could be likened to the supply and demand relationship in economics. With continuous increase in population, consumption or the ecological footprint per person is doubled.

The deliberate use of trees on landscapes has a lot to do with mitigating climate change. Dr. van Noordwijk stressed that climate change mitigation/adaptation has a direct relationship with agroforestry.



Dr. van Noordwijk said that there is a need to maximize the production of one area, hence the use of trees in agricultural landscapes. This increases the area’s bioproductivity. In addition, he added that there is gradual decrease in agrobiodiversity because the initial use of resources results to degradation. Although rehabilitation efforts may be done, there is still critical loss of ecological functions.

The species’ genetic diversity is a form of adaptation to the changing environment. Migration keeps up with shifting habitats. However, Dr. van Noordwijk said that there are limits to adaptation and these limits should be mapped. These limits may include the ability to predict the direction and size of change so that

adjustments can be planned, uncertainties in the direction of greater variability, and focusing on what really makes sense.

Loss of biodiversity, meanwhile, is very evident in terms of producing different products. On the other hand, there is increase in diversity at the consumer side (e.g. multiple kinds of food to choose from). Urban consumers consume more products. Loss of biodiversity is related to increase in consumption.

Dr. van Noordwijk said that there is a gap between Afforestation/ Reforestation Clean Development Mechanism (A/R CDM) and Reducing Emissions from Deforestation and Forest Degradation (REDD) that result to market and ecological failures. These failures could be avoided if carbon markets were functioning. At the same time, political + economic + ecological failure could be avoided if direct benefits were provided. He cited Indonesia as an example wherein emissions contribute economically - e.g., Jambi peatlands in the carbon market costs US\$5 for every ton of CO₂.

He presented the agrodiversity graph that showed relative ecological functions and relative agricultural functions. The graph showed that an increase in agricultural use could be linked with a decrease of ecological function. The graph showed a point wherein a win-win solution could be attained when both ecological and agricultural functions increased.

The graph on intermediate vulnerability, meanwhile, showed the response based on local, underexploited resources, and response based on new technology and resources. The most vulnerable people in the agricultural sector are those in between, and those without resources and technology.

Dr. van Noordwijk explained the concept of sustainability in comparison with a new concept - 'sustainagility.' He said, "The climate change soup won't be eaten as hot as it is being served." Agility is the ability to adapt to change (for the agricultural sector), while resilience is the ability of the system to return back to its former state after certain stresses. Agility is more than resilience.

Sustainagility for humans is how they change and modify themselves in response to a changing environment. An example that Dr. van Noordwijk provided was the agility or ability of farmers to change to cope with the changing environment. Sustainagility is the means to sustain this agility or ability of farmers to change. Sustainagility for flora and fauna, meanwhile, is explained when species richness in a rubber plantation is as close as that of the natural forest. There is also sustainability if pioneer species can adapt to environment/landscapes.

He emphasized that sustainability, within the context of the Brundtland Commission, could be translated into having sustainable livelihoods, sustainable farming systems, sustainable crops, etc.



There is an option for people to move out of agriculture. Sustainability asks how many options we have.

Dr. van Noordwijk distinguished between 'planned diversity' and 'diversity of plans.' He also posed the question – "how much diversity do we need?" – to explain functional diversity. He added that direct experiments could be implemented to test the importance of diversity for ecosystem functions.

In conclusion, Dr. van Noordwijk said, "Only when people lose something from the landscape will they appreciate its value." He further emphasized that mitigation measures require comprehensive carbon accounting rather than using the piece-meal approach. The argument for generic agrobiodiversity, as part of climate change adaptation, is still conceptual rather than empirically supported.

He cautioned that planned diversity redounds to enhanced complementation between and within groups. Diversity of plans, meanwhile, tends to balance efficiency and fairness. Hence, "don't trust your leader, so we need to prepare for diversity of plans."

Country Paper: Malaysia

"Malaysia's Current Policy and Research Initiatives toward Climate Change: Impacts to Biodiversity"

Ms. Alona C. Linatoc

Researcher, Institute for Tropical Biology and Conservation

Universiti Malaysia Sabah

Kota Kinabalu Sabah, Malaysia

Malaysia has a total land area of 330 km² where 60% of its land mass is in Borneo. Forest cover is at 60%. Malaysia is earning US\$4.4 B from the forestry sector.

Biodiversity is considered rich with 15,000 species of flowering plants, 1,500 species of terrestrial vertebrates, and 150,000 species of invertebrates.

According to Ms. Linatoc, Malaysia is serious in its implementation of improved conservation and management practices. In fact, some of these initiatives aimed to improve the skills and capacities, research and development, cooperation in regional and global conservation efforts, and participation in multilateral agreements. They were also into the implementation of short- and long-term development plans.

Malaysia is committed to implementing climate change mitigation and adaptation measures. According to Ms. Linatoc, it is implementing the Clean Development Mechanism (CDM) with focus on the potential of degraded areas and their carbon capacities. Lobbying to international markets is also part of CDM activities.



Malaysia is involved in the marketing of biodiversity credits aimed at protecting 34,000 ha of the Malua Forest Reserve. Ms. Linatoc added that the Malaysian government avoided deforestation in Sabah. It designated conservation areas, and implemented carbon sequestration programs in areas where important species of plants and animals were located.

Ms. Linatoc cited some of Malaysia's conservation projects:

- In Danum Valley, enrichment planting was undertaken to rehabilitate 25,000 ha of degraded forests. A reduced impact logging project was initiated to reduce the incidental damage of logging to soil and other vegetation by 50% to increase carbon sequestration.
- The Sabah Biodiversity Project used enrichment planting to rehabilitate the rainforests. Sixteen species of dipterocarps were planted in the rainforests. The project also examined how the diversity of replanted tropical forests affected timber production, carbon storage, and ecosystem processes.
- The Bornean Biodiversity and Ecosystem Conservation Programme aimed at conserving biodiversity and ecosystems in Sabah through public awareness, among other components.

Ms. Linatoc also explained the Biogenic Volatile Organic Compounds (BVOCS). These are carbon-containing compounds or non-methane volatile organic compounds that are produced in many different plant tissues through various physiological processes. Plants release hormones and accidentally release BVOCs.

The VOC emissions from plants help stabilize and protect photosynthetic membranes from high temperatures and excessive light. This also represents a metabolic safety valve, which prevents unnecessary sequestration of phosphates.

BVOCs are produced and emitted by plants when they are attacked by herbivores. Plants emitting VOCs serve as warning or means of communication between plants. They act as insect aggregation and disaggregation pheromones. The release of BVOCs also demonstrates the allelopathic relationship between plants.

Ms. Linatoc explained that BVOCs are hydrocarbons that do not stay in the air for long. Its chemical lifetime is 2-3 hrs. The plants' emission of BVOCs fills the gaps to achieve carbon balance, which is eventually linked to climate change.

Areas for research, according to Ms. Linatoc, included plants' assimilated carbon, the influence of biotic and abiotic factors on natural processes, and the plant's physiology. She also discussed the OP3-Danum-08 Project, which studied the oxidant and particle photochemical processes above a SEA tropical rainforest.



In conclusion, Ms. Linatoc emphasized that environmental sustainability remained the top agenda of the Malaysian government. Malaysia's commitment to climate change mitigation and adaptation, and biodiversity conservation could be in its active participation in the Coral Triangle Initiative (CTI), and conservation projects. It even included the palm oil sector in acquiring biodiversity credits.

Country Paper: Vietnam

"The Role of Biodiversity in Climate Change Mitigation in Vietnam: The Red River Estuary-Balat Case Study"

Dr. Nguyen Huu Ninh

*Chairman, Center for Environmental Research, Education and Development; Senior Lecturer, Vietnam National University; and Coordinator, Indochina Global Change Network
Hanoi, Vietnam*

Vietnam is prone to frequent natural disasters. According to Dr. Huu Ninh, climate change will definitely cause rise in temperatures, sea level rise, and increase in the duration, strength and frequency of El Niño and La Niña events. There will also be increased intensity of tropical cyclones, storm surges, precipitation, flooding, droughts, and heat waves.

Dr. Huu Ninh shared their experiences in implementing a biodiversity conservation project in the Balat Estuary located in Red River. Red River is the largest river in northern Vietnam, with an alluvium of 117 M tons, and a fertile land for agriculture.

The Balat Estuary, meanwhile, has an area of 26,397 ha. It was declared a Ramsar Site in 1989. The estuary absorbs CO₂, facilitates groundwater recharge and discharge, ensures freshwater supply, helps regulate the climate, facilitates biomass export, helps protect against floods, helps prevent waves and storms, controls shoreline erosion, stabilizes the coastline, and helps maintain biodiversity. There are 971 species of major terrestrial and aquatic flora and fauna groups in the area.

Dikes have been established worth US\$0.7-1.0 to 2.0-2.5 M per kilometer. After the strong typhoons in 2005, stronger sea dikes were constructed costing cost US\$7-10 M per kilometer. Sea dikes were constructed instead of establishing mangrove forests. Indirectly, these dikes indirectly served as climate change mitigation costing an estimated US\$5-6 M per kilometer.

According to Dr. Huu Ninh, natural resources management policies in Vietnam focused on policy interventions to increase social resilience. The government also prioritized poverty reduction through the creation of local employment.



The government's policies on biodiversity conservation were embodied in the National Conservation Strategy (1991), National Action Plan on Biodiversity up to 2010, and Orientation toward 2020 for the Implementation of the Convention on Biodiversity and the Cartagena Protocol on Biosafety (2007). Dr. Huu Ninh stressed that for these action plans to be effective, the legal framework must be formulated and completed, and people's perception on climate change should be changed at all levels.

He added that mangrove preservation is a key strategy in biodiversity protection. Dr. Huu Ninh stressed that 60-70% of mangroves should be protected. Other mangrove areas must be rehabilitated and developed. However, in reality, mangrove ecosystems in Vietnam were being improperly managed. Legal documents are not enough to institutionalize management strategies.

Other constraints that Dr. Huu Ninh discussed were the lack of policy tools guiding the fishery and economic sectors in the use of mangroves. In fact, most of the managers, communities, and local people only have a vague perception as to the importance and value of mangrove ecosystems. There was also lack of sound and empowered intersectoral land-use planning system, and comprehensive and detailed planning. It is thereby important to address the research gaps in mangrove ecosystem studies. Research results could help manage and sustainably use mangrove ecosystems.

Country Paper: Thailand

"Research Initiatives in Thailand on Climate Change Impacts and Adaptation"

Dr. Amnat Chidthaisong

Assistant Professor, Joint Graduate School of Energy and Environment

King Mongkut University of Technology Thonburi Bangkok, Thailand

Dr. Chidthaisong described the climate change situation in Thailand. There was rapid increase in the minimum than the maximum temperatures, and Thailand experienced warm climates in the recent five years since 1961. Precipitation was decreasing. There was also a decreasing trend in the occurrences of tropical storms. The Phuket Station also experienced sea level rise equivalent to a 10-year increase of 7.2 mm per year.

The paper also described some of the results of various climate change studies that have been conducted – the US study in 1996 and the Southeast Asia Regional Vulnerability to Changing Water Resource and Extreme Hydrological Events Due to Climate Change (START) project. Results showed that the composition of forest species in the subtropical life zone decreased from 50% to 12-20% in the South. The area had become a little bit drier. There were also



changes in the shorelines of Bangkok. He compared the 1987 and 2002 data on shorelines wherein mangrove forests have been cleared to give way to urban expansion and agricultural areas. Efforts have been initiated to rehabilitate the mangrove forests.

Dr. Chidthaisong cited the need to do more research on the impacts of seawater intrusions, coastal erosions, mangrove ecosystems, and coastal community status. He added that physical assessments might look into models, emission scenarios, global datasets, downscale techniques, and resolutions. He said that 2010-2090 maps showed hotter temperatures. Although carbon was being sequestered, there was simultaneous emission of CO₂ from different land uses. Dr. Chidthaisong cited the debates between crop yields and model simulation.

Ongoing research activities were being done, according to Dr. Chidthaisong. These studies focused on the assessment of physical climate change using regional climate modeling, assessment of climate change impacts on Thailand's ecosystems (agriculture, forestry, coastal systems, etc.), development of tools and methodologies for socioeconomic impact assessments, and policy research. There were also plans to undertake impact assessments by sectors/ecosystems, socioeconomic assessments, vulnerability assessments, and adaptation strategies.

In conclusion, Dr. Chidthaisong cited that researches done on capacity building might be used in undertaking impact and adaptation studies. Research results on physical changes (temperature and precipitation), meanwhile, are so far consistent with global trends. These data highlight the roles of the forest ecosystems in sequestering atmospheric carbon. However, more research is needed that focus on the impacts of these changes to biodiversity. Preliminary data, according to Dr. Chidthaisong, suggested high vulnerability of various ecosystems to climate change/variability.

Highlights of Open Forum

Director Rodrigo U. Fuentes

Executive Director

ASEAN Center for Biodiversity (ACB)

Laguna, Philippines



Research funding. There were four areas of concern on climate change and loss of biodiversity that seemed to require a lot of funding: research, knowledge management, capacity building/development, and policy recommendations/development. Thailand and Indonesia have limited funds for these activities. Thailand tries to recruit students (undergraduate to postgraduate) to undertake research on climate change and biodiversity loss. Indonesia, meanwhile, still largely draws on external funds. Malaysia has two sources of funding for these activities: 1) government funds for

research, and scholarships; and 2) international funding for research projects. Vietnam has increasing economic investments and part of this should go to the environment

Climate change initiatives on critical ecosystems. So far, there have been few reports on initiatives on climate change for critical ecosystems such as mangroves and beaches. Mangroves and beaches are considered critical ecosystems. Beaches, especially, are more vulnerable to climate change because they do not have coping mechanisms as compared to mangroves. So far, Thailand does not have such coping mechanisms. In Indonesia, focus was made on mangroves and their rehabilitation due to the tsunami crisis in Aceh. In Vietnam, studies were initiated regarding mangrove rehabilitation.

Networking of experts. After the conference, experts need to be linked through a network to effectively coordinate the generation of data needed for climate change and biodiversity proofing.

Research on rents, benefits, and incentives. There is lack of research on rents, benefits, and incentives, which should be addressed equally.

In Vietnam, the ecosystem resilience of five provinces had been studied. The government did not immediately invest on climate change initiatives. The challenge, therefore, was the integration of sociocultural aspects specific to the indigenous peoples, particularly on biodiversity conservation.

In Malaysia, there were already data generated and policies put in place. However, education of people on climate change and biodiversity needs to be intensified. Universiti of Malaysia Sabah's efforts toward this end were through road shows/tours and expert visits with communities to educate people about climate change and biodiversity.

In Indonesia, there was poor interaction observed between institutions and people. There was an initial study on benefit-sharing schemes with the local people.

In Thailand, two groups were disagreeing on how to assess climate change impacts. The economic impacts of climate change were being assessed both by economic and climate change experts who were working together. The other side consisted of the local people that defined projects according to the area (area-specific). They did not focus on the concepts but used the holistic approach.

New concepts. Different concepts were introduced during the paper presentations from the participating countries - sustainability, socio-sustainability, economic sustainability, and environmental sustainability.



In Malaysia, environmental sustainability means utilizing what nature is giving without compromising the environment for future generations.

The seventh of the MDGs implies lack of clarity with regards to targets. The ecological footprint versus the human development index (HDI) show that countries with low HDI use more resources. There is a need for lifestyles that would have affordable ecological footprint versus high HDI.

People's attitude and understanding of climate change. Many issues have come up during the discussions with regards to people's attitude toward and understanding of climate change. There is a need to understand people's attitude toward and understanding of climate change because it is so abstract.

Media plays an important role in popularizing issues on biodiversity and climate change as well as sensationalizing them.

Indonesia tries to change people's attitude and enhance their understanding on climate change by describing an extreme situation as the cause (e.g. deforestation, climate change), and also the consequent extreme scenario/impact.

Sensationalism on the issues and impacts of climate change is fine as long as it discourages people from doing destructive activities. However, it was also warned that media tend to oversimplify the issues, which removes the important information on the complexities of climate change, and biodiversity loss which the public should know.

Education is the key in helping people understand climate change better. It might even be more effective if climate change issues are integrated in the basic education curriculum. Since climate change takes time, so does educating the people about it.

Research focus. More research is needed with regards to climate change. However, there is the tendency to shift the attention to the causes of biodiversity loss. If climate change research is undertaken, there should be more focus on it as the consequence of biodiversity loss. If you address biodiversity issues, this could also serve as mitigation measures against climate change.

Use of models for estimates. There is danger in basing plans and policies on models since the results are often simplified. They do not reflect the complexities of climate change impacts. Models tend to simplify variables to make it more manageable. Also, the use of models is just one approach in coming with estimates on climate change impacts. There is still the need to diversify estimation tools and one model is not enough.



Adaptation and mitigation. University of Malaysia-Sabah, meanwhile, had spent money and time on research but had expressed the need to learn more about climate change adaptation and mitigation. Studying about adaptation and mitigation will be very expensive but necessary to stop activities that contribute to climate change.

Implementing adaptation measures relies on action and the identification of mechanisms to institutionalize these measures locally.

A question was posed for reflection - "Is it more acceptable and efficient to let the government dictate to local communities what they should do or is it better if initiatives would come from the communities themselves?"



Recapitulation and Commentary

Dr. Angel C. Alcala
Director, Silliman University Angelo King Center for Resources and Environmental Management, and Former Secretary of the Department of Environment and Natural Resources (DENR) of the Republic of the Philippines



Dr. Alcala summarized the number of paper presentations during the first day of the conference-workshop – 1 keynote paper, 1 pre-conference paper, 2 thematic papers, and 6 country papers.

On the messages and overview. He also cited the key points in the messages of Dr. Arsenio Balisacan and HE The Netherlands Ambassador Robert Brinks - for all to be aware of climate change impacts on biodiversity, people, and the economy. The messages also discussed BRP in Mt. Malindang as an example of an integrated ecosystem approach.

Dr. Alcala noted the statistics and impacts on climate change given by Dr. Rodel Lasco as part of the conference overview. Dr. Lasco stressed that climate change is caused by the release of large amounts of GHGs especially CO₂.

On the keynote address. In the keynote address, Dr. Alcala summarized the key points made by Dr. Delfin Ganapin Jr. Dr. Ganapin reviewed the actual and potential impacts of climatic change on biodiversity and the environment. He also urged the need to develop an operational strategy and action programs at the local and regional levels to alleviate poverty and achieve the MDGs. Three key words that Dr. Alcala cited from Dr. Ganapin's message were - biodiversity loss, climatic change, and extinction.

On the pre-conference paper. Meanwhile, Dr. Wilfredo Uy, in his pre-conference paper presentation, showed the approaches used by the BRP: location-derived and development-oriented, multi-stakeholder participation, systems-oriented and interdisciplinary, and the landscape approach. According to Dr. Alcala, Dr. Uy revealed the threatened biodiversity resources from the mountain to the sea. This demonstrated the interconnectivity of the different ecosystems. He also emphasized that mitigation measures should achieve both short- and long-term results through combined social and physical mechanisms. He likewise described other social infrastructures that must be developed to sustain the mitigations.



At this point, Dr. Alcala commented that animals are becoming extinct in Mt. Malindang based on studies made from 1950-2000. However, the extinction of animals may not be solely due to climate change. He cited as examples the low fish biomass in Bohol Sea, which is mainly due to human factors. Dr. Alcala stressed that loss of biodiversity in Mt. Malindang is due to both climate change and non-climate change stressors. Hence, baseline studies are important to determine if changes in biodiversity are really due to climate change.

On thematic paper 1. Dr. Alcala summarized the paper presented by Dr. Pak Sum Low for Theme 1. Dr. Low emphasized the value of biodiversity and ecosystems services to humans. Dr. Alcala noted that the paper stated that climate-induced changes and events have created impacts on both humans and ecosystems. Biodiversity is more vulnerable to climate change because of other human-induced activities. Dr. Low posed the questions – “To what or whom is climate change dangerous? To human beings, biodiversity or both?”

Dr. Alcala agreed with Dr. Low’s analysis that multi-dimensional threshold evaluation is needed to measure the impacts of climate change. Risk has to be measured by factoring in hazard (climate change) and vulnerability (both biodiversity and human factors). He also agreed with Dr. Low that people who are most dependent on biodiversity are those who are also most vulnerable. In addition, Dr. Alcala commented that climate change impact oceanographic processes (e.g. upwellings, mixed layer, where productivity occurs, fish behavior) with dire consequences to fish production.

Dr. Low further clarified that humans are more capable of coping with climate change impacts than animals. For the same impacts on climate change applied to animal and plant biodiversity, during or after the climate change event, humans can still eat the animals and plants. Humans can adapt to the impacts, but animals and plants will have difficulty adapting to it. “Biodiversity is more vulnerable because of the human factors,” stressed to Dr. Low.

On Singapore’s country paper. Dr. Chou Loke Ming’s presentation focused on the anticipated impacts of climate change on marine biodiversity based on field situations that simulate climate change scenarios in Singapore. The presentation demonstrated that climate change impacts are varied. It also emphasized the need to improve the resilience of ecosystems to ensure the effectiveness of mechanisms against the impacts of climate change. He agreed with Dr. Loke Ming’s recommendations of looking into innovative technologies; being proactive rather than reactive when dealing with climate change problems; developing more effective management of natural habitats; and making sure that responses cover the range of species and habitats.



Dr. Alcala commented that the case study of Singapore showed coral resilience, but implied the need to determine vulnerability. He added that disturbances made by human beings are difficult to control. Hence, marine protected areas must demonstrate effective management of habitats.

On Cambodia's country paper. In the paper presentation of Professor Vathana Sann from Cambodia, Dr. Alcala noted that the paper focused on the release of 48% GHGs from domestic livestock production, as compared to rice production. The paper emphasized that low quality feed leads to the production of CO₂ and CH₄.

The paper also stressed that high fiber diet produces more methane in contrast to high grain diet. It was also interesting to note that wild ruminants (local species) and other herbivores were more efficient than raising imported cattle as the latter was found to produce more CH₄.

Dr. Alcala agreed that it is better to change the feeding regimen of livestock in Cambodia to mixed feed types to reduce the release of GHGs.

On the Philippines' country paper. Meanwhile, the paper presentation of Dr. Florencia Pulhin from the Philippines showed the causes of biodiversity loss, further threats to biodiversity, and adaptation strategies. Dr. Alcala noted that the paper cited the effects of overpopulation, which forced people to migrate to the forestlands to expand settlements, and establish infrastructure. He noted that the paper also discussed the forestry policies, which allowed the conversion of forestlands for the landless, and the implementation of timber license agreements and pasture lease agreements. This pressure on forest resources and climate change are considered threats to biodiversity.

Dr. Alcala agreed that there is a need to sustain financing projects on climate change mitigation, and undertake adaptation strategies. These strategies may include assessment of risk and vulnerability, improved biodiversity management to reduce risk and vulnerability, mainstreaming of climate change to biodiversity management, and sustainable finance mechanisms.

On thematic paper 2. For Theme 2, Dr. Meine van Noordwijk's presentation showed the sequence in the loss of agrobiodiversity – from initial use, to degradation, rehabilitation, and critical loss of ecological functions. Dr. Alcala noted the new concepts that Dr. van Noordwijk introduced - sustainagility along with sustainability.

Sustainagility is the ability of the system to stay and adapt to climate change. Dr. van Noordwijk also defined functional diversity and posed the question – “how diverse is an ecosystem to be considered good?”



The paper stressed that generic agrobiodiversity is part of climate change adaptation but this is still at the conceptual stage. It also resolved the issue of planned diversity and the need to prepare for diversity of plans.

In his comments, Dr. Alcala posed the question – “Is diversity and productivity related?” Can this relationship be seen in situations when biodiversity is diverse and production is also high? He noted, however, that there are cases when biodiversity is low and productivity is also low. An example is fishing down the food web results to top carnivore loss, i.e., to sustain one species of fish, you need to sustain also the species down its food chain.

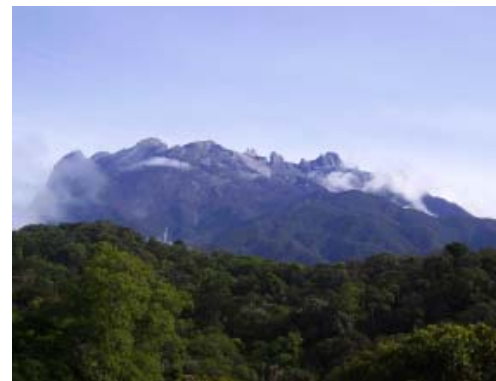
On Malaysia’s country paper. The presentation of Ms. Alona Linatoc, meanwhile, stressed the commitment of Malaysia to protect biodiversity through its policies and programs. The government adapts the policies to maintain harmony between environmental sustainability and economic development.

Dr. Alcala agreed that consultations with governments and other relevant institutions must be done to avoid conflicts in implementing environmental and adaptation strategies. He noted the different projects cited by the presentation such as the energy-based projects under the Clean Development Mechanism (CDM). These projects were anchored on sustainable policies and intersectoral participation. The presentation also cited initiatives to avoid deforestation and forest destruction. For the Malaysian government, this signifies great loss of carbon sinks which exacerbate global warming and climate change.

Dr. Alcala cited the initiatives of the Malaysian government to rehabilitate degraded forests through enrichment planting, reduced impact logging, and rehabilitation of logged-over areas, which incorporates biodiversity concerns. He agreed that studies on the impacts of climate change on biodiversity, volatile organic compounds, and plants’ physiological responses need to be undertaken.

On Vietnam’s country paper. Dr. Nguyen Huu Ninh, meanwhile, showed climate projections based on changes on temperature rise; sea-level rise; increase in the strength, duration and frequency of El Niño and La Niña events; IOD (Indian Ocean Dipole); increased intensity of tropical cyclones; increased storm surges, precipitation and flooding; increased risk of drought; and increased heat waves.

Dr. Alcala noted that the paper presentation illustrated the impacts of climate change on livelihood, national development and economy, agriculture, water supply, and health conditions of Vietnam. He agreed with Dr. Huu Ninh that natural resources management policies could introduce interventions to increase resilience, help reduce poverty, help create local employment, and address the issue of denying locals the benefits from loss of common property resources.



Dr. Alcala agreed that provisions should be made on the legal framework and that perception of people on climate change on every level must be changed.

On Thailand's country paper. Dr. Amnat Chidthaisong's presentation, meanwhile, showed various experiences of Thailand on climate change - increase in temperature and precipitation, droughts, tropical storms, sea level rise. Dr. Alcala summarized the impacts of climate change such as forest species composition change, flooding increase, shoreline change, seawater intrusions, coastal erosion, and mangrove quality. He agreed with Dr. Amnat that one impact of climate change might not be the same in the other areas. He agreed with Dr. Amnat that more research on the ability of organisms to recover from climate change impacts is needed. In addition, Dr. Alcala commented "We still have a long way to go in terms of biodiversity conservation halting the loss of biodiversity. We should not just be preoccupied with climate change adaptation but also on how to save biodiversity."

In conclusion, Dr. Alcala quoted E.O. Wilson in this book "The Future of Life" (2002), "At the end of the day, in a more democrat world, it will be the ethics and desires of the people, not their leaders, who give power to government and the NGOs or take it away. They will decide if there are to be more or fewer reserves, and choose whether particular species will live or die."



Synthesis of Donors' Perspectives

European Union

“European Union Perspective: In Supporting Development Efforts on Biodiversity and Climate Change in SEA”

Mr. Juan Jose Echanove

Programme Officer, Environment and Sustainable Development

Delegation of the European Commission to the Philippines

Makati City, Philippines

According to Mr. Echanove, the European Union (EU) continues to be at the forefront of international efforts to combat climate change – participation in the UNFCCC in 1992, and the Kyoto Protocol in 1997.

By 2020, it hopes to reduce GHG emissions by 20%, and ready to step up its efforts by 20% if international agreements are in place. In addition, increased use of renewable energies is targeted at 20%, while increased use of biofuels in transportation is targeted at 10%.

EU's main objective is to halt biodiversity loss within its partner countries by 2010. The main instrument to achieve this is the Natura 2000 network - the largest coherent network of protected areas in the world.

According to Mr. Echanove, if biodiversity is protected, it can limit GHG emissions and lessen the GHG concentrations in the atmosphere. However, policies are needed to help biodiversity adapt to the impacts of climate change.

The Action Plan on Climate Change and Development in 2004 aimed to assist EU and developing countries to implement UNFCCC and the Kyoto Protocol. Strategic priorities include raising the policy profile, and extending support for adaptation, mitigation, and capacity development.

EU works with several agencies with regards to biodiversity and climate change-related concerns in SEA:

- EU and ACB (formerly the ASEAN Regional Center for Biodiversity Conservation or ARCBC) work to address issues on biodiversity loss at the regional level (e.g. trans-border protected areas, wildlife trafficking, international and regional agreements, policy and legislation standardization, invasive alien species, etc.). It also promotes database management and information sharing, and research and development.



So far, EU and ACB have helped classify habitats, identify and protect ASEAN Heritage parks, formulated competence standards for protected area jobs, developed biodiversity information sharing systems, and helped discover 113 new flora and fauna, among other achievements.

- EU and SGP PTF helped promote tropical forests in SEA, and community-based forest management (CBFM), while drawing lessons from local experiences. It also initiated programs to build grassroots capacities, and publish lessons learned (e.g. Forest Lives). More importantly, the small grants helped conserve the tropical forests of Barake, developed livelihood and capacity building opportunities, and promoted agroforestry and the use of nontimber forest products.

Mr. Echanove enumerated some of EU's activities on tropical forests and climate change adaptation. These included the implementation of rural development projects (e.g. watershed rehabilitation, agroforestry promotion, environmentally sustainable farming practices, etc.), organization of regional policy dialogues through workshops, mainstreaming of adaptation strategies into development policies, and implementation of other innovative ways to finance adaptation strategies with focus on the role of the private sector.



Other forest-related projects in SEA included leveling the playing field on local partnerships to improve forest sustainability, improving governance, sharing and promoting awareness and regional knowledge, implementation of community-based forest management projects, etc. These projects directly and indirectly address climate change impacts in SEA.

In conclusion, Mr. Echanove outlined EU's plans. Among them were the implementation of the Environment and Sustainable Management of Natural Resources Programme (ENRTP) and the formulation of the Global Climate Change Alliance.

ENRTP aims to help SEA and developing countries to promote climate change mitigation, biodiversity conservation, sustainable development, etc. The Alliance, meanwhile, aims to assist countries in preparing for natural disasters caused by climate change. Focus will be on reducing emissions from deforestation, preparing for natural disasters, integrating climate change preparation activities in the development policies of countries, and encouraging the participation of stakeholders.



Asian Development Bank

“Climate Change and Biodiversity: Risks, Vulnerabilities and Responses”

Mr. Urooj S. Malik

Director, Agriculture, Environment and Natural Resources Division (SEA Department)

Asian Development Bank

Manila, Philippines

Mr. Malik stressed, “Global warming is unequivocal,” citing that there will be consistent changes in temperatures and rise in sea levels. Temperature increase is projected at 4-6°C. GHG concentrations will continue to increase further. However, climate change can be mitigated if tropical deforestation is slowed down.

In terms of biodiversity, Mr. Malik said that tropical forests harbor over half of all plants and animals. However, tropical forests are cleared to provide livelihoods and vital environmental services to people.

Asia Pacific is very vulnerable to climate change, according to Mr. Malik. This is evidenced in the loss of coastal communities, loss of biodiversity and ecosystems, spread of infections and diseases, occurrence of heat-related mortality, and many others.

This interrelatedness shows the link between biodiversity, climate change, and human well-being. Climate change had changed the distribution of over half of the species. It also increased the risks of sea level rise, storm surges, rise in sea temperatures, rise in sea acidity, changes in hydrological conditions, higher silt loads, flooding, increased rainfall, and extreme weather events that cause landslides. These risks increase the vulnerabilities of communities, and their food and livelihood security.

“It is thus important to protect the biodiversity corridors,” stated Mr. Malik. Protection should also be complemented by mitigation (by lowering carbon intensity) and adaptation measures to safeguard the ecosystem functions.

For its part, ADB works at areas where collective action is being undertaken. Projects serve as investments on reducing GHG emissions, implementing mitigation measures, helping communities to adapt to changes caused by climate change, helping those who are dependent on agriculture, and supporting industries. Mr. Malik stressed that focus on all these initiatives should be balance.

At present, ADB is focused on the protection of biodiversity in the Greater Mekong Subregion. Support had been provided for infrastructure development, expansion of the project to include other ecosystems, and implementing climate change mitigation measures.





Specifically, ADB is into:

- Connecting areas through road construction to facilitate trade and communication;
- Enhancing carbon sequestration through reforestation – replacing grass and shrubby vegetation for more forest tree cover, offsetting CO₂ emissions yearly, promoting the use of biofuels, and balancing all these efforts with food production; and
- Promoting adaptation measures to safeguard ecosystem functions – establishing agroecological networks and conservation corridors through early warning systems and adjustments in rainfall and temperature rises.

United States Agency for International Development (USAID)

Ms. Aurelia Micko

***Deputy Chief, Office of the Energy and Environment
United States Agency for International Development
Pasay City, Philippines***

According to Ms. Micko, USAID does not usually support research. Based from the discussions, the challenge of addressing the massive impacts of climate change, including developing the appropriate responses for these impacts, is huge. She also observed the lack of responses as compared to the impacts.

She noted that the discussions on adaptation strategies were very piecemeal. These strategies seemed to be just starting. “There is lack of holistic policies and plans to integrate all the things being done,” according to Ms. Micko.

She agreed that climate change would cause serious disruptions in the development of progress. It can arrest development in some areas and even set these areas a bit back when it comes to progress. She also noted the huge consensus that development cannot proceed without adaptation.

In response to the problem on climate change, Ms. Micko cited the involvement of the US government in implementing mitigation measures, but there are increasing efforts in terms of formulating and implementing adaptation measures. Lessons gained from these initiatives may be applied in many developing countries.

She added that climate change and biodiversity conservation are being widely supported in terms of funds, technology sharing, and information sharing. She cited that 1960s projects that USAID funded in the Philippines as examples. These projects focused on land and green biodiversity, water and coastal resources management, livelihood, and poverty alleviation.

She noted that the climate change portfolio is in the process of expanding. There are now different ways to approach climate change adaptation. She stressed that the real challenge for the Philippines is adaptation.

Ms. Micko outlined USAID's plans when it comes to climate change mitigation and adaptation. These include the:

- Implementation of clean energy projects;
- Implementation of pollution control mechanisms;
- Implementation of climate change mitigation projects;
- Implementation of natural resources management;
- Integration of climate change adaptation strategies into individual projects;
- Implementation of climate change adaptation programs such as the Coral Triangle Research;
- Integration of climate change adaptation strategies into existing biodiversity conservation projects; and
- Exploring support in the development of a research agenda.

She also emphasized the need to:

- Consider the larger picture in terms of research support on climate change adaptation;
- Look beyond natural resources management, biodiversity, and coastal resources management as climate change impacts on different sectors;
- Reach out to the poor and safeguard their developmental potentials; and
- Integrate all efforts on climate change and biodiversity conservation.

Ms. Micko said that USAID is very supportive of the plans and programs of the Philippine government on climate change adaptation. However, she noted the lack of research agenda. "Donors can pick up and invest on research as long as it is holistic," stressed Ms. Micko.

She outlined the areas that the Philippine government could prioritize:

- Climate change adaptation programs;
- Good governance programs to help climate change adaptation strategies;
- Climate proofing;
- Planning on different scales;
- Paying attention to the community, national, multinational, and regional levels;
- Public awareness at all levels and how this activity can be integrated into national plans; and
- Looking into the other sectors that have not been involved in the debate on climate change and biodiversity conservation – the agriculture, energy, human health, and coastal resources sectors.



One point that Ms. Micko emphasized was the role of the other agencies when it came to climate change adaptation and mitigation. She posed the questions “Where are the other sectors, like PAGASA (Philippine Atmospheric, Geophysical and Astronomical Services Administration), when we speak of climate change?” “How can we link the other concerned sectors?” For her, these are important considerations when planning for climate change adaptation.

In closing, Ms. Micko encouraged the participants to “take the lead for the donors to follow.”

Earth System Science Partnership (DIVERSITAS)

Dr. Lijbert Brussaard
Professor of Soil Biology and Biological Soil Quality,
Department of Soil Quality and
Director, Graduate School Production Ecology and Resource
Conservation
Wageningen University and Research
Wageningen, Netherlands

DIVERSITAS consists of the International Programme of Biodiversity Science, International Human Dimensions Programme, World Climate Research Programme, and International Geosphere-Biosphere Programme (URL: <http://www.ess-p.org>).

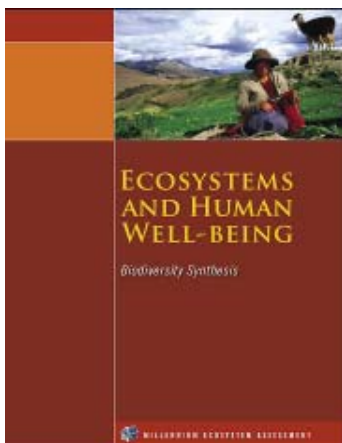
According to Professor Brussaard, this network was formed to address the problems on climate change. He stressed the need to encourage scientists to think globally and integrate all efforts at the regional and global levels. There is a need to coordinate all efforts.

DIVERSITAS aims to:

- Link biological, ecological, and social disciplines;
- Produce socially relevant new knowledge;
- Provide scientific bases for the conservation and sustainable use of biodiversity; and
- Achieve the interrelated goals of biodiversity changes, ecosystems goods and services, human activities, and drivers.

Professor Brussaard described the implementation of the agroBIODIVERSITY Science Plan which consists of bioDISCOVERY, ecoSERVICES, and bioSUSTAINABILITY.

The Millennium Ecosystem Assessment, meanwhile, looks into the role of science by understanding the functions, services, and value of biodiversity.



It investigated the following hypotheses:

- High-input intensification of agriculture builds pressure on biodiversity and environmental quality;
- Biodiversity based practices can reduce pressure by providing ecosystem services – traditional management practices, adoption of new uses of biodiversity;
- Reducing the pressure from agricultural intensification- extend habitats of wild species, enhance ecosystem services at the landscape level, provide resilience and risk mitigation; and
- Rewards, recognition, and PES will build social capital and public support for biodiversity conservation.

To address these hypotheses, a research program was conducted which focused on the indicator measures of biodiversity in and outside the protected areas; the functions, services, and value of agroBIODIVERSITY; the impacts of agroBIODIVERSITY on neighboring protected areas; the participatory approaches for biodiversity use and conservation; the potential for PES and other incentives. It also explored the strategies for assessing the value of biodiversity as natural capital for human well-being, and engaging society in biodiversity conservation for agricultural landscapes.

Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ)

Mr. Uwe Scholz

Programme Adviser, Coastal Fisheries Resources Management Programme, Deutsch Gessellschaft für Technische Zusammenarbeit (GTZ) Makati City, Philippines

Mr. Scholz clarified that GTZ is not a donor agency but an agency that works with donors. From the discussions during the conference-workshop, he noted several issues that have emerged, particularly on healthy ecosystems and disaster risk management:

- Ecosystems have to cope with the impacts of climate change;
- Healthy ecosystems are more capable of coping with stress;
- Healthy ecosystems can be found in reserves which can function to support other ecosystems; and
- Permission for local communities is needed to help classify and protect the whole coastlines as marine reserves.

Mr. Scholz said that the impacts of disaster and risk management projects are more sustainable if the local communities are involved at the onset. Their involvement would make the projects more sustainable especially after the donors have finished their support. Moreover, Mr. Scholz said that coastal resources protection is a big and dangerous job so it would be more effective if politicians are pressured into implementing ways to realize their responsibilities in this area.



Workshop Discussions

Guide Questions

The participants were randomly grouped into three. The groups were tasked to deliberate on the gaps in knowledge and actions on climate change and biodiversity interactions, and prioritization of actions. Three questions were posed for discussion:

1. What do we still need to KNOW and DO together about climate change and biodiversity interactions in SEA?
2. How are we going to fill the gaps in knowledge and actions on climate change and biodiversity interactions in SEA?
3. With whom shall we do #2?
4. Of the actions identified, which ones comprise the first three priorities to be done?

Synthesis of Discussions

The summary of the workshop outputs of the three groups are categorized into: 1) knowledge and action gaps, 2) ways of addressing knowledge and action gaps; 3) partners in addressing knowledge and action gaps; and 4) priority actions.

Knowledge and Action Gaps

The knowledge gaps identified were the following:

- Existing level of awareness of people in governance to effectively match knowledge needed at a particular level and scale;
- Indigenous knowledge;
- Hotspots or priority areas where biodiversity and climate change are interacting which may be at the community level, or forest and coastal ecosystems – i.e., “hotspots” may mean communities that have less understanding of biodiversity conservation and climate change;



- Existing understanding and knowledge of people on biodiversity and climate change – i.e., understanding on the interaction between the two areas in terms of complexity, nuances, and people/agencies/sectors that are involved, or at the forefront in facing issues and challenges;
- Climate change impacts to know the actual challenges that are being faced, and reduce uncertainties because of lack of knowledge;
- Appropriate standard indicators and methodologies to quantify and compare data across sites – e.g., specific species as indicators of climate change impacts and biodiversity loss, ways of measuring biodiversity loss and climate change and their corresponding social impacts, etc.;
- Known harmful reactions to find win-win activities and account for risks;
- Knowledge/integration links that specify biophysical and cultural knowledge – e.g., means to measure biodiversity resources from the valuation and markets standpoints, interactions, market drivers (commoditizing environmental services) across levels, etc.;
- Alternative valuation systems through the different aspects of culture – e.g., how other communities look at the valuation process, how the valuation process can be done to come up with a bigger picture or a holistic presentation of information and knowledge on biodiversity conservation and climate change, etc.;
- Tools, methods, and protocols that measure and account biodiversity resources and strengthen the link between biodiversity and climate change; and
- Sustainable financing mechanisms – i.e., finding out what available funds are there and how they can be optimized and maximized; and rechanneling the funds so that it would be used properly and sustainably.



The action gaps that were identified were:

- Standardization of buffer zones;
- Allocation of funds by the government and international organizations for the implementation of advocacy programs;
- Implementation of capacity building activities on climate change and biodiversity;



- Identification of critical areas to maximize limited funding opportunities (e.g. identification of hotspots, hottest areas) through:
 - Standardized priority areas;
 - Identification of specific areas (e.g., Tonle Sap Lake in Cambodia) where agrobiodiversity needs more focus;
- Implementation of national capacity assessments which can:
 - Document biodiversity and desertification;
 - Identify future actions;
 - Push governments to act based on the documented information;
 - Help promote programs, formulate policies, etc., based on the extent of comprehensiveness of the documentation;
 - Show the link between biodiversity and climate change;
- Implementation of local-level actions based on comprehensive assessments and mobilization;
- Identification of variables and harmonization of the methods;
- Bringing down the understanding of the two concepts from the global level and translating them for use of regional, national, and local levels;
- Strengthening of the science-policy link by finding political ecologists or ecologists who know political nuances for better development and enforcement of policies; and
- Making information access and communication channels available to everyone, and even cut across all levels – i.e., there should be exclusiveness on the information being generated.

Ways of Addressing Knowledge and Action Gaps

To address the knowledge and action gaps, the following ways were proposed by the participants:

- Localize the system of information, education, and communication (IEC) or undertake IEC at all levels;
- Group countries according to typology of threats or risks of climate change to formulate adaptation measures to enhance biodiversity – i.e., focus on specific cases or areas where climate change is manifesting itself (e.g., countries that are affected by

precipitation, temperature, etc.) and use these as sites to gain a better understanding of biodiversity and climate change;

- Get the lessons learned at the local level and bring it up at the policy level (two-way exchange of experiences, information, etc.);
- Establish a national network of experts that is similar to a global network or build on existing networks – i.e., undertake mapping of the activities being done on biodiversity conservation and climate change mitigation and adaptation, and make this network available for access by everyone;
- Establish links or promote partnerships at the grassroots and national levels, and with the private/business sector, donors, and other countries;
- Conduct data mining to find the needed data and information critical for analysis;
- Update information and managements systems for more convenient data acquisition;
- Undertake interdisciplinary research to improve the understanding of the interconnectivity of biodiversity and climate change;
- Scale up the initiatives and move them across disciplines (e.g., population issues, health, etc.); and
- Formulate a code of ethics for environmental management.

At the regional level, the participants expressed the need to strengthen linkages among countries, come up with a regional program (among countries), and strengthen the institutions involved in climate change mitigation and adaptation and biodiversity conservation among ASEAN members. It was suggested that a proposal on climate change and biodiversity would be developed and submitted to the ASEAN Secretariat. Appropriate policies formed at the regional level would also help control species extinction and migration, and address other biodiversity issues.

Partners in Addressing Knowledge and Action Gaps

To address the knowledge and action gaps, the participants agreed that multisectoral and multilevel involvement is necessary. The participants in the conference-workshop were even identified as the focal point for collaboration. The involvement would have to focus on the interaction between biodiversity and climate change.

Priority Actions

The participants identified the need to strengthen local actions (across ecosystems and sectors) in terms of:

- Strengthening governance, partnerships, and collaboration;
- Learning-by-doing;
- Using pilot-testing in the implementation of initiatives; and
- Recognizing farmers' rights and the role of agrobiodiversity in climate change mitigation.

The need to enhance knowledge management and IEC, including their links with policy formulation and implementation, was also identified. This should consider the following:

- Public awareness, local perception, and advocacy; and
- The role of the university in IEC particularly how climate change and biodiversity conservation concepts could be integrated into the formal education curricula.

Interdisciplinary research that should focus on the development/ validation and implementation of methodologies, approaches, and tools on biodiversity conservation and climate change adaptation and mitigation was considered. Research results would help:

- Gain a better understanding on the interconnection between biodiversity and climate change;
- Support climate change adaptation and mitigation strategies;
- Clarify data on the impacts of climate change and biodiversity loss;
- Promote a more holistic or the ecosystem approach in approaching the problems and challenges;
- Develop and implement transregional methodologies;
- Implement IEC at all levels;
- Group countries according to typology and threats; and
- Integrate the concepts of biodiversity conservation and climate change in the formal academic curricula.

The participants stressed that immediate actions and adaptation are critical. Research will help provide the tools and the knowledge to initiate projects on-the-ground. However, all sectors must be involved and should collaborate with one another for these initiatives to take place and be effective.



Workshop Participants

Group 1

Robert Alexander

East West Center, Honolulu, Hawaii

Nathaniel Alibuyog

Mariano Marcos State University

Cecilia Astilla

Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ)

Arsenio Balisacan

Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA)

Suwignyo Bambang

Gajah Mada University

Juliet Caceres-Gonzales

Bicol University

Chea Chan Thou

Ministry of Environment
Phnom Penh, Cambodia

Oliver Coroza

Conservation International Foundation

Erik de Ruyter van Stevenick

UNESCO-IHE Institute for Water Education

Juan Jose Echanove

Delegation of the European Commission in the Philippines

Marissa Estrella

Bicol University

Juan Carlos T. Gonzales

Institute of Biological Sciences
University of the Philippines Los Baños

Carmelita G. Hansel

Mindanao State University Main Campus

Rodel D. Lasco

World Agroforestry Center (ICRAF-Phils)

Amy M. Lecciones

Philippine Sustainable Development Network (PSDN)

Victoria Lopez
Sibol ng Agham at Teknolohiya (SIBAT)

Ben S. Malayang III
Silliman University

Urooj S. Malik
Asian Development Bank

Renee Paalan
Silliman University

Prattana Meesincharoen
Office of Natural Resources and Environmental Policy and Planning
(ONEP)

Manuel Rangasa
Office of the Governor
Legaspi City, Albay

Percy E. Sajise
Biodiversity International for Asia, Pacific and Oceania

Cesario Sayre
Asset-based Community Development with Equity (ABCDE)
Association

Talib Abdullah Shani
Universiti Malaysia Sabah

Wilfredo H. Uy
Mindanao State University-Naawan

Vathana Sann
Royal University of Agriculture
Chamikar Daung, Dangkor District
Phnom Penh, Cambodia

Jojo Elvira
1st National Conference on Climate Change Adaptation
Office of the Governor
Legaspi City, Albay

Dr. Sitti Raehanah Muhd. Salleh
Borneo Marine Research Institute

Group 2

Romulo Aggangan

Philippine Council for Agriculture, Forestry and Natural Resources
Research and Development

Ruth Grace Ambal

Conservation International Foundation

Amnat Chidthaisong

Joint Graduate School of Energy and Environment (JGSEE)
King Mongkut's University of Technology Thonburi

Victor B. Amoroso

Central Mindanao University

Evelyn Grace Ayson

Southeast Asian Fisheries Development Center (SEAFDEC)

Lijbert Brussaard

Wageningen University and Research

Hilconida Calumpong

Silliman University

Claro V. Cortes

Foreign Correspondents Association of the Philippines (FOCAP)

Datin Mariam Abdul Latip

Universiti Malaysia Sabah

Rodrigo U. Fuentes

ASEAN Centre for Biodiversity (ACB)

Delfin J. Ganapin, Jr.

UNDP GEF Small Grants Programme

Maria Consuelo Garcia

ASEAN Centre for Biodiversity (ACB)

Angela Consuelo S. Ibay

Klima Center, Manila Observatory

Gordon Bernard Ignacio

Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ)

Lorna C. Malicsi

SEARCA

Aurelia Micko

United States Agency for International Development (USAID)

Olga Nuñez

Mindanao State University- Iligan Institute of Technology (MSU-IIT)

Perry S. Ong

Institute of Biology
University of the Philippines-Diliman

Pak Sum Low

United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)

Honorato G. Palis

Ecosystem Research and Development Bureau (ERDB)

Filiberto Pollisco, Jr.

ASEAN Centre for Biodiversity (ACB)

Ridzwan Abdul Rahman

Universiti Malaysia Sabah

Purple Romero

Newsbreak Magazine

Gregorius Rosariastoko

ASEAN Centre for Biodiversity (ACB)

Sheila Vergara

Conservation International Foundation

Maria Victoria Vidaure

Embassy of France to the Philippines

Group 3

Oliver Agoncillo

Office of Energy and Environment
United States Agency for International Development (USAID)

Angel C. Alcala

Silliman University Angelo King Center for Resources and Environmental Management

Dallay Annawi

Environmental Science for Social Change (ESSC)

Nicolas Bailly

The Worldfish Center

Rowena Boquieren

Conservation International Foundation

Nicomedes D. Briones

School of Environmental Science and Management, UP Los Baños

Maria Celeste H. Cadiz

SEARCA

Chou Loke Ming

National University of Singapore

Carlos Cortez

Bicol University

Ronnel Dioneda, Sr.

Bicol University

Rudy Fernandez

Philippine Star

Arnulfo G. Garcia

SEARCA

Sandra C. Honrado

Association of Development Financing Institutions in Asia and the Pacific (ADFIAP)

Alona C. Linatoc

Universiti Malaysia Sabah

Ines Loge

Embassy of France to the Philippines

Mahmud Sudin

Universiti Malaysia Sabah

Antonio Manila

Protected Areas and Wildlife Bureau (PAWB),
Department of Environment and Natural Resources (DENR)

Nguyen Huu Ninh

Center for Environmental Research, Education
and Development (CERED)
Vietnam National University (VNU)
Indochina Global Change Network (IGCN)

Enrique Oracion

Silliman University

Pham Hoang Viet

Ministry of Natural Resources and Environment
Hanoi, Vietnam

Florencia B. Pulhin

College of Forestry and Natural Resources (CFNR)
University of the Philippines, Los Baños

Delbert Rice

Kalahan Educational Foundation

Rosnah Ismail

Universiti Malaysia Sabah

Gil C. Saguiguit, Jr.

SEARCA

Mary Magdeline Siambun

Universiti Malaysia Sabah

Zenaida Ugat

Society for the Conservation of Philippine Wetlands (SCPW)

Rene van Veenhuizen

ETC Foundation, The Netherlands

Reiner Wassmann

Coordinator of the Rice and Climate Change Consortium
International Rice Research Institute (IRRI)

Teresa Mundita Lim

Protected Areas and Wildlife Bureau (PAWB)
Department of Environment and Natural Resources

Conference Synthesis and Reflection

Dr. Ben S. Malayang III
President, Silliman University
Negros Oriental, Philippines

The discussions during the two-day conference-workshop focused on the interaction between biodiversity and climate change, particularly in SEA. The information was derived from scientific research by the participating institutions. Dr. Malayang cited that the conference-workshop was successful in identifying “what we still need to KNOW, what we must DO together, and with WHOM” should the actions be implemented (“among ourselves or others?”).

Dr. Malayang, however, stressed the need to continue thinking about three issues:

- Climate change’s interconnection with biodiversity and vice versa and/or global change? - Global change can be considered as larger than climate change and biodiversity.
- Certainty and uncertainty: how much is expected from science and lore (indigenous knowledge)? - Can science and lore be looked into to provide information on what can be done in each place and time, or to give general principles as basis for specific actions?
- Science-ethics-politics – These three areas continue to influence present actions and the way these actions are done. There is no specific answer yet on how these three areas can be combined.

Dr. Malayang posed 10 difficult questions or issues for all participants to reflect on:

1. The scale in problem-handling, planning, or acting is not clear. “How much adaptation and/or mitigation should we be doing?”
2. There are no clear “decision rules” on scaling.
3. Which is more appropriate - sustainability or sustainagility? “Do we sustain conditions or the present state of affairs because it is convenient or do we sustain our flexibility and adaptability?”



4. There is a need for problem-identification and action-taking across gradients of social organization from local to global because “something changes when we go up and down [the levels].”
5. What should be the major focus – the supply or the demand side? “Do we need to focus on capability building on those that can do something about it? Do we need to focus on building the capacities of local communities? Or both?”
6. SEA is a high risk area. However, there is limited information as to how high the risks are, and where these high risk areas are.
7. Donors need to understand the needs, science, and urgency of acting on climate change and biodiversity conservation.
8. People and communities are lynchpin stakeholders. “How can we communicate with them? How can they be mobilized?”
9. How much of the interaction between climate change and biodiversity is science? How much of this interaction is political?
10. To what extent is democracy (“people participating”) a key element in addressing human risks due to the interaction between climate change and biodiversity? How can this level be translated into actions or interventions?

Dr. Malayang stressed that climate change is indeed a pressing reality. But the role of humans in rapidly and extensively changing the ecosystems should also be considered.

He added that the implications of climate change on SEA are projected to be serious. Hence, seriousness should also be the tone in viewing the critical interplay between climate change, biodiversity loss, poverty alleviation, and other factors.

Dr. Malayang agreed that there is limited research on the close link between climate change and biodiversity in SEA. This conference-workshop recognized that “all are still grappling with the impacts of biodiversity loss and climate change in the region.”

Hence, there is a need to put up a project to enhance the understanding of impacts on biodiversity loss in SEA. This project can explore how management of biodiversity conservation and climate change mitigation/adaptation can be corrected. This project can also pave the way for developing a climate change alliance in SEA starting with the participants/participating institutions of the conference-workshop as members.

Committing to the Road Map

Action Plan

Dr. Percy E. Sajise

Regional Director

Biodiversity International Regional Office for Asia, Pacific and Oceania

Oceania

Darul Ehsa, Malaysia

Dr. Sajise stressed the need for coping mechanisms on the impacts of biodiversity loss and climate change. These coping mechanisms could be realized when all the participants of the conference-workshop would be one in taking the same path of implementing biodiversity conservation, and climate change mitigation and adaptation measures.

A major station in this path or road may be a regional collaboration to better look into the link between biodiversity and climate change, and how these two are interacting. Dr. Sajise stressed that countries should come together. There is even added value as outputs are shared among the countries, lessons are learned on the use of better technologies, innovative communication strategies are put in place, and different situations per country are properly handled.

This regional collaboration can be created through five steps:

Step 1: Consolidation, scoping, and integration. The major activities for this step include the consolidation of regional priority activities that have been identified by the participants in the conference-workshop, including possible key institutions and individuals. Possible donor interests will be scoped, and their concerns and priorities (i.e., technical inputs of donors) must be integrated at the onset.

The key players responsible in making these activities happen will be SEARCA, as the lead agency, in collaboration with ACB and Silliman University.

Step 1 is scheduled to be completed on March 2008.

Step 2: Follow-up. In this step, the collaborators' feedbacks on the priority activities will be followed up. Commitments and contributions will be firmed up and used as basis for drafting regional proposals. According to Dr. Sajise, there can be three proposals – one that will focus on the Mekong region, the countries



affected by typhoons and cyclones, and those countries affected by precipitation.

The key players responsible in making these activities happen will be the Steering Committee of the conference-workshop with the support of SEARCA, ACB, ICRAF-Philippines, and Bioversity International.

Step 2 is scheduled to be completed on April 2008.

Step 3: Review of proposal. Activities in this step will include the distribution of the draft proposal(s) among the collaborators and possible donors for review. Their feedbacks will be used to finalize the proposal(s).

The Steering Committee of the conference-workshop will be mainly responsible for this step with the support of SEARCA, ACB, ICRAF-Philippines, and Bioversity International.

Step 3 is scheduled to be completed on May-June 2008.

Step 4: Marketing. This step will focus on soliciting funding for the proposal(s), and approval from donors.

SEARCA and ACB will be responsible for this activity, together with the other collaborators. Dr. Sajise emphasized the need for a negotiation process between all institutions.

The timetable for Step 4 is on June-August 2008.

Step 5: Implementation. Upon approval of funding support, implementation of the regional project will commence during the last quarter of 2008. SEARCA and ACB will be the responsible institutions for the regional project.

Dr. Sajise said that one to two projects will hopefully be implemented by the end of 2008.

Signifying Commitments

Based on the tasks stated in the road map discussed by Dr. Sajise, representatives from SEARCA, ACB, ICRA-Philippines, and Bioversity International signified their commitment and support to the regional collaborative project.



Dr. Balisacan signified the commitment of SEARCA to lead the follow-up activities as soon as possible so as not to lose the momentum started by the conference-workshop. He said that a small group can be convened to put flesh in the proposal to make it more solid and marketable to potential donors. He added that the focus of

the one to two regional projects may be on research and policy. But he also suggested that donors' interests should also be considered.

Dr. Low, meanwhile, suggested that links with United Nations (UN) agencies can be explored through the UN Foundation. Some of the UN agencies have funds allocated for climate change and biodiversity especially those that focus on energy mitigation, and impact studies.

Dr. Low added that the Climate Change Convention can quickly operationalize funds for climate change adaptation measures. Funds come from proceeds (2%) from the implementation of CBFM projects, and special funds. "We can tap funds for research as long as the focus can be linked to adaptation. We can also explore regional projects that are cost-effective," said Dr. Low. He said that the Global Environment Facility (GEF) can also be tapped for funds for linkages and regional projects.

Director Fuentes, meanwhile, committed ACB's role in the regional projects. He stressed that ACB is still a young institution but it will nevertheless mobilize resources to maintain sustainability. He also cited that the regional projects will be the initiative of all the participants in the conference-workshop. "We can readily identify ourselves with this regional initiative." Director Fuentes also added that all voices will be considered, and all perspectives will be captured as much as possible. Outputs from this conference-workshop could be presented as the participants' collective position to ASEAN member-countries for possible guidance. Director Fuentes reiterated that ACB is committed to the process, and hope to "see our dreams come into fruition."

At this point, Dr. Malayang said that SEA will come up with internal arrangements to develop its own sustainable funding mechanisms (internal capital for the region) rather than rely on external donors. Reliance on external donors can only be up to a certain extent. Self-reliance is the best measure of the participants' commitment in solving the region's problems. "This should be thought of seriously because climate change and biodiversity loss are continuous and permanent problems for us. Together with donors but not dependent on donors," stated Dr. Malayang.

For its part, Dr. Lasco cited ICRAF's concern for small farmers. He said that ICRAF looks into how small farmers can benefit from biodiversity, or how they can adapt to climate change through biodiversity. He cited ICRAF's commitment to the regional collaboration but more on the local level.

However, Dr. Huu Ninh cautioned that small steps should be done first because it is difficult to cover all countries in the region. He stated that common interests must be identified first, then make steps on what directions to take. Donors will have to see what the group





can do first. He added the need to compile impact studies, and to be realistic with negotiations with donors.

Dr. Ganapin stressed that the Road Map can be realistic if the first practical and manageable steps could be identified first, considering the available resources that already exist. It must also be explored if these steps could be used as basis to have a more comprehensive regional approach to the issues.

Dr. Ganapin raised the issue of supporting local actions or initiatives. ICRAF and SGP, for example, could provide funds to these local initiatives and then move on to bigger funding sources. Donors who would provide bigger funds would want to see the track record first. This is where the results of supporting local actions would come in. Hence, local actions are more feasible to do first, according to Dr. Ganapin.



He added that links to the CBD Secretariat, Secretariat of the UNFCCC, within the ASEAN group of countries, and UN agencies are critical. These links would show that this regional effort is worth funding and gaining bigger funds. The private sector can also be tapped – e.g., Unilever and the Society for the Conservation of Philippine Wetlands, etc.

“Start with what is practical and can be funded or done first very quickly at our level. And then build on it to come up with proposals for a more comprehensive regional approach which requires larger funding,” stressed Dr. Ganapin.

Dr. Low agreed with the consensus among the collaborators that financing mechanisms for the regional projects must be made sustainable, and to become self-reliant.

As the song composed by Mr. Robert Alexander says – “seek new options, teach each other, change before the change becomes too deep.”

Synthesis of the Closing Program

Dr. Gil C. Saguiguit, Jr.
Deputy Director for Administration
Southeast Asian Regional Center for Graduate Study and Research
in Agriculture (SEARCA)
Laguna, Philippines

In his closing remarks, Dr. Saguiguit Jr. cited the main achievement of the conference-workshop – all gained a better understanding of how climate change affects biodiversity and vice versa. The discussions that focused on the interface of climate change and biodiversity would help find ways to mitigate climate change, and develop adaptation measures.

He stressed that the global concepts of climate change must filter down to all levels. This would lead to better adaptation and action. However, the biophysical, institutional, political, and other aspects must be equally considered. Hence, Dr. Saguiguit Jr. cited the need for a systems or a holistic approach in addressing the impacts of climate change and biodiversity loss.

This conference-workshop is considered a “bold step.” According to Dr. Saguiguit Jr., the conference-workshop broke new grounds, and served as a regional response to the twin concerns of climate change and biodiversity conservation. The outputs allude to a research program as elements have already been laid out in the conference-workshop.

Dr. Saguiguit Jr. expressed his appreciation to all the supporters. He encouraged all the participants to continue the collaboration beyond the conference-workshop. He even encouraged donors, who have the same interests, to join the collaboration. He expressed the importance of continuous communication to keep the informal network going. He anticipates that a concrete program would be drafted to respond to the impacts of climate change and biodiversity loss.

Dr. Saguiguit Jr. again expressed his thanks to the organizers, secretariat, and collaborators. He closed his message by saying “we will meet somewhere down the road as we attempt to conserve biodiversity in our part of the world and mitigate and cope with climate change.”



Directory of Participants



Aggangan, Romulo
Philippine Council for Agriculture, Forestry and Natural Resources
Research and Development
Los Baños, Laguna, Philippines
Tel: (+63-49) 536-0014 to 15/ 536-0017 to 20/ 536-0024
Fax: (+63-49) 536-0016/ 536-0132
[E-mail: r.aggangan@pcarrd.dost.gov.ph](mailto:r.aggangan@pcarrd.dost.gov.ph)



Agoncillo, Oliver
Development Assistance Specialist
Office of Energy and Environment
United States Agency for International Development (USAID)
8th Floor, PNB Financial Center, Pres. Diosdado Macapagal Blvd. 1308
Pasay City, Philippines
Tel: (+632) 552-9823; Fax: (+632) 552-9997
[E-mail: oagoncillo@usaid.gov](mailto:oagoncillo@usaid.gov)



Alcala, Angel C.
Director,
Silliman University Angelo King Center for Resources
and Environmental Management
Dumaguete City, Negros Oriental, Philippines
[E-mail: suakcrem@yahoo.com](mailto:suakcrem@yahoo.com)



Alexander, Robert
Rural Livelihood, Risk Management Consulting
1711 East-West Road MSC 678
Honolulu, HI 96848-1711 USA
Tel. (001) 808-956-0938
E-mail: bfootbob@hawaii.edu; bfootbob@hotmail.com



Alibuyog, Nathaniel
Assistant Professor
Mariano Marcos State University
Batac, Ilocos Norte, Philippines
[E-mail: natzalibuyog@yahoo.com](mailto:natzalibuyog@yahoo.com)

Ambal, Ruth Grace

Conservation International Foundation
6 Maalalahanin St., Teacher's Village
Diliman, Quezon City 1101, Philippines
Tel: (+63-2) 924-8235; Mobile: 0918-906-7630
[E-mail: rambal@conservation.org](mailto:rambal@conservation.org)



Amnat Chidthaisong

Assistant Professor, Joint Graduate School of Energy and Environment (JGSEE)
King Mongkut's University of Technology Thonburi
126 Pracha-Uthit Rd., Bangmod, Tungkru, Bangkok 10140
Tel: (+66-2) 4708309 ext 4119; Fax: (+66-2) 8729805
[E-mail: amnata_c@jgsee.kmutt.ac.th](mailto:amnata_c@jgsee.kmutt.ac.th)



Amoroso, Victor B.

Head, Biodiversity R and D Unit
Central Mindanao University
Musuan, Bukidnon, Philippines
Fax: (+63-88) 356-1921
[E-mail: amorosovic@yahoo.com](mailto:amorosovic@yahoo.com)



Annawi, Dallay

Project Coordinator
Environmental Science for Social Change (ESSC)
1/F Manila Observatory Bldg., Ateneo University Campus
Loyola Heights, Quezon City, Philippines
[E-mail: dallayannawi@essc.org.ph](mailto:dallayannawi@essc.org.ph)

Astilla, Cecilia

Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ)
GTZ Office Manila, PDCP Bank Centre
9/Floor, V.A. Rufino cor..P. Leviste Sts, Makati City, Philippines
Tel: (+63-2) 8123165; Fax: (+63-2) 7531441
[Email: cecilia.astilla@gtz.de](mailto:cecilia.astilla@gtz.de)



Ayson, Evelyn Grace

Director for Research
Southeast Asian Fisheries Development Center (SEAFDEC)
Tigbauan, 5021, Iloilo, Philippines
Tel: (+63-33) 511 – 9174; Fax:(+63-33) 335 – 1008
Mobile: 0917-3032077; 09065038472
[E-mail: edjayson@seafdec.org.ph](mailto:edjayson@seafdec.org.ph)



Bailly, Nicolas

Officer-in-Charge
The Worldfish Center - Philippine Office
IRRI, Los Baños, Laguna, Philippines
[E-mail: n.bailly@cgiar.org](mailto:n.bailly@cgiar.org)



Balisacan, Arsenio M.

Director
Southeast Asian Regional Center for Graduate Study and Research in
Agriculture (SEARCA)
College, Laguna 4031. Philippines
[E-mail: ambalisacan@agri.searca.org](mailto:ambalisacan@agri.searca.org)



Bambang Suwignyo

Faculty of Animal Science
Gadjah Mada University
Jl. Agro Karangmalang No. 1, Yogyakarta, Indonesia 55281
Tel: +62-27-4513363; FAX: +62-27-4521578
[E-mail: wignyo-kp@lycos.com.ph](mailto:wignyo-kp@lycos.com.ph)



Boquieren, Rowena

Conservation International Foundation
6 Maalalahanin St., Teacher's Village
Diliman, Quezon City 1101. Philippines
Tel: (+63-2) 924-8235; Mobile: 0928-501-2459
[E-mail: rboquieren@conservation.org](mailto:rboquieren@conservation.org)



Brinks, Robert G.

Ambassador Extraordinary and Plenipotentiary
Royal Netherlands Embassy
26th Floor Equitable PCI Bank Tower, 8751 Paseo de Roxas, Makati City,
Metro Manila, Philippines
Phone: +63 2 786-6666; Fax: +63 2 786-6600
[Website: www.netherlandsembassy.ph](http://www.netherlandsembassy.ph)



Briones, Nicomedes D.

Professor, School of Environmental Science and Management, UP Los
Baños. College, Laguna. Philippines
Tel: 049-536-2251/2836
[E-mail: nicomedes_briones@yahoo.com](mailto:nicomedes_briones@yahoo.com)



Brussaard, Lijbert

Professor of Soil Biology and Biological Soil Quality, Department of Soil
Quality, and
Director Graduate School Production Ecology & Resource Conservation

Wageningen University and Research
P.O. Box 47. 6700 AA Wageningen, The Netherlands
Tel +31 317 483325; FAX +31 317 483766; 419000
[E-mail: Lijbert.Brussaard@wur.nl](mailto:Lijbert.Brussaard@wur.nl)
[Web site: www.dow.wau.nl/soil_quality](http://www.dow.wau.nl/soil_quality)



Caceres-Gonzales, Juliet

Associate Professor, Bicol University
Rizal Street, Legaspi City. Philippines 4500
Tel: (+63-52) 820-6319
[E-mail: jumari26@yahoo.com](mailto:jumari26@yahoo.com)



Cadiz, Maria Celeste H.
Manager, Training Unit
SEARCA, College, Laguna 4031. Philippines
Tel: (+63-49) 536-3459 loc 125
[E-mail: mchc@agri.searca.org](mailto:mchc@agri.searca.org)



Calumpong, Hilconida
Silliman University, Hibbard Avenue
Dumaguete City, Negros Oriental. Philippines
Trunkline: (+63-35) 4226002
[E-mail: hpcalumpong@yahoo.com](mailto:hpcalumpong@yahoo.com)



Chea Chan Thou
Deputy Director for Planning
Ministry of Environment
Phnom Penh, Cambodia
[E-mail: chanthouchea@yahoo.com](mailto:chanthouchea@yahoo.com)



Chou Loke Ming
Professor, Department of Biological Sciences
National University of Singapore
Blk S1, 14 Science Drive 4, Singapore 117543
Tel (+65) 6516-2696; FAX: (+65) 6779-2486
[E-mail: dbscml@nus.edu.sg](mailto:dbscml@nus.edu.sg)
[Website: www.nus.edu.sg](http://www.nus.edu.sg)



Coroza, Oliver
Conservation International Foundation
6 Maalalahanin St., Teacher's Village
Diliman, Quezon City 1101. Philippines
Tel: 02-924-8235; Mobile: 0918-911-9120
[E-mail: ocoroza@conservation.org](mailto:ocoroza@conservation.org)



Cortez, Carlos Jr.
Assistant professor, Bicol University
Rizal Street, Legaspi City. Philippines 4500
[E-mail: olrad69@yahoo.com](mailto:olrad69@yahoo.com)

Cortes, Claro V.
Executive Director
Foreign Correspondents Association of the Philippines (FOCAP)
Tel: (+63-2) 890-9936
[E-mail: clarocortesiii@yahoo.com](mailto:clarocortesiii@yahoo.com)



Daclan, Marion Antonette
Conservation International Foundation
6 Maalalahanin St., Teacher's Village
Diliman, Quezon City 1101. Philippines
Tel: 02-924-8235; Mobile: 0918-906-7617
[E-mail: mdaclan@conservation.org](mailto:mdaclan@conservation.org)



Datin Mariam Abdul Latip

Deputy Dean (Academic), School of Sustainable Agriculture
Universiti Malaysia Sabah
Locked bag 2073, 88999
Kota Kinabalu, Sabah, Malaysia
Tel.: +60 88 320306; Fax: +60 88 320278
[E-mail: almariam@ums.edu.my](mailto:almariam@ums.edu.my)



de Ruyter van Steveninck, Erik

Acting Head, Environmental Resources Department and Senior Lecturer,
Aquatic and Marine Ecology.
UNESCO-IHE Institute for Water Education
PO Box 3015, NL-2601
DA Delft, The Netherlands
Tel: +31(0)15 2 151 777; Fax: +31(0) 15 2122921
[E-mail: e.deruytervansteveninck@unesco-ihe.org](mailto:e.deruytervansteveninck@unesco-ihe.org)



Dioneda, Ronnel Sr.

Associate professor II and
Assistant Director,
Bicol University Research and Development Center
Rizal Street, Legaspi City. Philippines 4500
[E-mail: rrdioneda@yahoo.com](mailto:rrdioneda@yahoo.com)



Duya, Melizar

Outcomes Coordinator
Biodiversity Analysis, Synthesis and Monitoring Unit
Conservation International Foundation
6 Maalalahanin St., Teacher's Village
Diliman, Quezon City 1101. Philippines
Tel: 02-924-8235; Mobile: 0928-501-2462
[E-mail: mvduya@conservation.org](mailto:mvduya@conservation.org)



Echanove, Juan Jose

Project Officer
Delegation of the European Commission in the Philippines
30/F Tower II, RCBC Plaza
6819 Sen. Gil Puyat cor. Ayala Ave.,
1200 Makati City. Philippines
Tel: 859-5100; Fax: 859-5109
[E-mail: Juan-Jose.Echanove@ec.europa.eu](mailto:Juan-Jose.Echanove@ec.europa.eu)
DELEGATION-PHILIPPINES@ec.europa.eu



Elvira, Jojo

Secretary General and Conference Director
1st National Conference on CC Adaptation
Office of the Governor
Legaspi City, Albay. Philippines



Estrella, Marissa

Associate Professor, Bicol University
Rizal Street, Legaspi City. Philippines 4500

[E-mail: mnestrella13@yahoo.com](mailto:mnestrella13@yahoo.com)



Faylon, Patricio S.

Executive Director
Philippine Council for Agriculture, Forestry and Natural Resources
Research and Development
Los Baños, Laguna, Philippines

Tel: (+ 63-49) 536-0014 to 15/ 536-0017 to 20/ 536-0024

Fax: (+ 63-49) 536-0016/ 536-0132

[E-mail: pcarrd@pcarrd.dost.gov.ph](mailto:pcarrd@pcarrd.dost.gov.ph)



Fernandez, Rudy

Columnist, Philippine Star

Tel: (049) 536-8595; 536-6307



Fuentes, Rodrigo U.

Executive Director
ASEAN Centre for Biodiversity (ACB)
3rd Floor, ERDB Bldg., Forestry Campus
University of the Philippines (UPLB)
College, Laguna 4031, Philippines

Telefax: (+ 6349) 536-2865/ 536-1044

[E-mail: Rufuentes@aseanbiodiversity.org](mailto:Rufuentes@aseanbiodiversity.org)



Ganapin, Delfin Jr. J.

Global Manager
UNDP GEF Small Grants Programme
304th East 45th Street, Room FF-910
New York, NY, 10017, USA

Tel: (212) 906-6191

[E-mail: delfin.ganapin@undp.org](mailto:delfin.ganapin@undp.org)



Garcia, Arnulfo G.

Manager, R&D Department
SEARCA, College, Laguna 4031. Philippines

Tel: (+ 63-49) 536-3459 local 131

Fax: (+ 63-49) 536-4015

[E-mail: agg@agri.searca.org](mailto:agg@agri.searca.org)



Garcia, Maria Consuelo D.

Director, Biodiversity Information System
ASEAN Centre for Biodiversity (ACB)
3rd Floor, ERDB Bldg. Forestry Campus
University of the Philippines (UPLB)
College, Laguna 4031, Philippines
Telefax: (+ 6349) 536-2865/ 536-1044
[E-mail: mcdgarcia@aseanbiodiversity.org](mailto:mcdgarcia@aseanbiodiversity.org)



Gonzalez, Juan Carlos T.

Assistant Professor, Institute of Biological Sciences
University of the Philippines Los Baños
College, Laguna 4031 Philippines
[E-mail: jctgonzalez@yahoo.com](mailto:jctgonzalez@yahoo.com)



Hansel, Carmelita G.

Professor, and Director of Research
Mindanao State University Main Campus
Marawi City, Philippines
[E-mail: carmelita_hansel@yahoo.com](mailto:carmelita_hansel@yahoo.com)



Honrado, Sandra C.

Senior Executive, Programs
Association of Development Financing Institutions in Asia and the Pacific
(ADFIAP)
2/F Skyland Plaza. Se. Gil Puyat Ave.
Makati City 1200. Philippines
Tel: 2-816-1672/843-0932
[E-mail: shonrado@adfiap.org](mailto:shonrado@adfiap.org)



Ibay, Angela Consuelo S.

Program Manager/Coordinator
Klima Climate Center, Manila Observatory Ateneo de Manila Campus.
Loyola Heights, Quezon City, Philippines
Tel. No. (+ 632) 4265921; Fax (+ 632) 4260847
[E-mail: klima@observatory.ph](mailto:klima@observatory.ph)
[Website: www.klima.ph](http://www.klima.ph)



Ignacio, Gordon Bernard

Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ)
GTZ Office Manila, PDCP Bank Centre
9/Floor, V.A. Rufino cor..P. Leviste Sts,
Makati City Philippines
Tel: +63 2 8123165; Fax: +63 2 7531441
[Email: Gordon.Ignacio@gtz.de](mailto:Gordon.Ignacio@gtz.de)

Kazuyuki Tsurumi

Representative
UN Food and Agriculture Organization (FAO)
29th Floor, Yuchengco Tower RCBC Plaza
6819 Ayala cor. Sen. Gil J. Puyat Avenue
Makati City, Philippines
[e-mail: Kazuyuki.Tsurumi@fao.org](mailto:Kazuyuki.Tsurumi@fao.org)



Lasco, Rodel D.

Philippine Programme Coordinator
World Agroforestry Center (ICRAF)
2/F College of Forestry and Natural Resources (CFNR) Administration
Bldg., UPLB, College, Laguna 4031. Philippines
Tel: (63-49) 536-2925/536-7645
Tel (via IRRI): (63-2) 845-0563/0569 local 2675
Fax: (63-49) 536-4521
[E-mail: r.lasco@cgiar.org](mailto:r.lasco@cgiar.org)
[Website: www.worldagroforestrycentre.org](http://www.worldagroforestrycentre.org)



Lecciones, Amy M.

Executive Director
Philippine Sustainable Development Network (PSDN)
Unit F, 9th Floor, Strata 100 Condominium, Emerald Avenue
Ortigas Center, Pasig, Philippines
Telefax: (+ 63-2) 637 2409
[E-mail: info@psdn.org.ph](mailto:info@psdn.org.ph)



Lim, Teresa Mundita

Director, Protected Areas and Wildlife Bureau (PAWB), Department of
Environment and Natural Resources (DENR), North Aven., Dilliman
Quezon City. Philippines
[E-mail: munditalim@yahoo.com;](mailto:munditalim@yahoo.com)
planning@pawb.gov.ph



Linatoc, Alona C.

Researcher, Universiti Malaysia Sabah
Institute of Tropical Biology and Conservation
Locked Bag 207388999
Kota Kinabalu Sabah, Malaysia
Tel: +60 88 320104; Fax: +60 88 320291
E-mail: alona@ums.edu.my; alo675@yahoo.com



Loge, Ines

Scientific Attaché
Embassy of France to the Philippines
16th Floor, The Pacific Star Building
Makati corner Gil Puyat Avenue
1200 Makati City. Philippines
Tel: (+ 63-2) 857-6934; Fax: (+ 63-2) 857-6956
[E-mail: Ines.LOGE@diplomatie.gouv.fr](mailto:Ines.LOGE@diplomatie.gouv.fr)
[Website: www.ambafrance-ph.org](http://www.ambafrance-ph.org)

Lopez, Victoria

Executive Director
Sibol ng Agham at Teknolohiya (SIBAT)
4-5 Floor #40 Mandaluyong St.,
Brgy. Central, Quezon City 1100. Philippines
Tel: 2-928-8316/926-8971
[E-mail: florinda_conception@yahoo.com](mailto:florinda_conception@yahoo.com)



Mahmud Sudin

Dean, School of International Tropical Forestry
Universiti Malaysia Sabah
Locked bag 2073, 88999
Kota Kinabalu, Sabah, Malaysia
Tel.: +60 88 320404; Fax: +60 88 320876
[E-mail: mudsudin@ums.edu.my](mailto:mudsudin@ums.edu.my)
pejspta@ums.edu.my



Malayang, Ben S. III

President, Silliman University
Hibbard Avenue, Dumaguete City
Negros Oriental. Philippines
Trunkline: +63.35.422.6002
[Website: www.su.edu.ph](http://www.su.edu.ph)



Malicsi, Lorna C.

Head, Knowledge Management Unit
SEARCA, College, Laguna 4031. Philippines
Tel: (+63-49) 536-3459; Fax: (+63-49) 536-4015
[E-mail: lcm@agri.searca.org](mailto:lcm@agri.searca.org)



Malik, Urooj S.

Director, Agriculture, Environment and Natural Resources Division
(Southeast Asia Dept.)
Asian Development Bank (ADB)
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines
[E-mail: umalik@adb.org](mailto:umalik@adb.org)



Manila, Antonio

División Chief, Wildlife Resources Division
Protected Areas and Wildlife Bureau (PAWB), Dept of Environment and
Natural Resources (DENR), North Ave., Dilliman Quezon City.
Philippines
[E-mail: acmanila@hotmail.com](mailto:acmanila@hotmail.com)



Micko, Aurelia

Deputy Chief, Office of Energy and Environment
United States Agency for International Development (USAID)
8th Floor, PNB Financial Center
Pres. Diosdado Macapagal Blvd
1308 Pasay City, Philippines
Tel. No. 552-9823; Fax No. 552-9997
P.O. Box EA 423, 1000 Ermita, Manila
[E-mail: amicko@usaid.gov](mailto:amicko@usaid.gov)



Mollen, Allen

Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ)
GTZ Office Manila PDCP Bank Centre
9/Floor, V.A. Rufino cor. L.P. Leviste Sts
Makati City, Philippines
Tel: +63 2 8123165; Fax: +63 2 7531441
[Email: Allen.Mollen@gtz.de](mailto:Allen.Mollen@gtz.de)



Nguyen Huu Ninh

Chairman, Center for Environmental Research, Education and
Development (CERED);
Senior lecturer, Vietnam National University (VNU);
Coordinator, Indochina Global Change Network (IGCN), 279/24, Giang
Vo, Hanoi, Vietnam
Tel/Fax: 84-4-5120210/5141550
Mobile: 84-0989121048
[E-mail: cered@hn.vnn.vn](mailto:cered@hn.vnn.vn)
[Website: www.cru.uea.ac.uk/tiempo/annex/cered](http://www.cru.uea.ac.uk/tiempo/annex/cered)



Nuñez, Enrique

President, Kapusod Inc.
2/F Big Ben Complex, Ayala
Highway, Lipa City 4217. Philippines
Tel (+63-43) 757 3192
[E-mail: thirstyplanet@yahoo.com](mailto:thirstyplanet@yahoo.com)
enrikenunez@gmail.com



Nuñez, Olga M.

Officer-in-Charge
Office of the Vice Chancellor in Research and Extension, Mindanao State
University- Iligan Institute of Technology (MSU-IIT)
Tibanga, Iligan City. Philippines
[E-mail: olgamnuneza@yahoo.com](mailto:olgamnuneza@yahoo.com)



Ong, Perry S.

Director, Institute of Biology
University of the Philippines
Diliman, Quezon City, Philippines
[E-mail: ongperry@gmail.com](mailto:ongperry@gmail.com)
perry.ong@up.edu.ph



Oracion, Enrique

Director, Research and Development
Silliman University, Hibbard Avenue
Dumaguete City, Negros Oriental. Philippines
Trunkline: +63.35.422.6002
[E-mail: ikeoracion@lycos.com](mailto:ikeoracion@lycos.com)



Paalan, Renee

Director, CENTROP
Silliman University, Hibbard Avenue
Dumaguete City, Negros Oriental. Philippines
Trunkline: +63.35.422.6002
[E-mail: rbpaalan@yahoo.com](mailto:rbpaalan@yahoo.com)



Pak Sum Low

Consultant, Environment and Sustainable Development
United Nations Economic and Social Commission for Asia and the Pacific
(UNESCAP) Bangkok, Thailand
Tel: (+66-2) 288-1620; Fax: (+66-2) 288-1025
[E-mail: low@un.org](mailto:low@un.org)



Palis, Honorato G.

Research Supervisor
Ecosystem Research and Development Bureau (ERDB), Forestry Campus,
UP Los Baños
College, Laguna. Philippines 4031
Mobile: 0915-845-5007
[E-mail: palishg@yahoo.com](mailto:palishg@yahoo.com)



Pham Hoang Viet

Official, Natural Conservation Division
Vietnam Environmental Protection Agency
Ministry of Natural Resources and Environment
Hanoi, Vietnam
Email: vietph@nea.gov.vn; phamhoangviet@gmail.com;
hoangviet_ph@yahoo.com



Pollisco, Filiberto Jr.

Policy and Program Development Specialist
ASEAN Centre for Biodiversity (ACB)
3rd Floor, ERDB Bldg. Forestry Campus
University of the Philippines (UPLB)
College, Laguna 4031, Philippines
Telfax: (+63-49) 536-2865/ 536-1044
E-mail: duknoy@yahoo.com; fapollisco@aseanbiodiversity.org



Prattana Meesincharoen

Environmental Officer
Office of Natural Resources and Environmental
Policy and Planning (ONEP)
60/1 Soi Pibunwattana 7, Rama VI Road
Phyathai, Bangkok 10400 Thailand
Tel: +66 2 265 6500 Ext. 6784;
Fax: +66 2 265 6612, 2 265 6602
Mobile: +66 8 6070-3738
[E-mail: prattana@onep.go.th](mailto:prattana@onep.go.th)



Pulhin, Florencia B.

Researcher, College of Forestry and Natural Resources (CFNR), University
of the Philippines Los Baños
College, Laguna 4031 Philippines
Tel: (+63-49) 536-2341; Mobile: 0920-8876543
[E-mail: yaypulhin@yahoo.com](mailto:yaypulhin@yahoo.com)



Rangasa, Manuel

Consultant, Environment and Eco-Tourism
Office of the Governor, Legazpi City, Albay, Philippines
Tel: (+63-52) 481-2555, 435-0250, 481-9470
[E-mail: govoffice@albay.gov.ph](mailto:govoffice@albay.gov.ph)
albay_climatechange@albay.gov.ph
nongrangasa@yahoo.com



Rice, Delbert

Executive Director
Kalahan Educational Foundation
Philippines
[E-mail: kalahan2@gmail.com](mailto:kalahan2@gmail.com)
kalahan3@yahoo.com



Ridzwan Abdul Rahman

Dean, School of Sustainable Agriculture
Universiti Malaysia Sabah
Locked bag 2073, 88999
Kota Kinabalu, Sabah, Malaysia
Tel. +60 88 320306; Fax: +60 88 320278
[E-mail: ridzwan@ums.edu.my](mailto:ridzwan@ums.edu.my)
pejspl@ums.edu.my



Romero, Purple

Newsbreak Magazine
#2 SNF Condo, Panay Avenue
Quezon City, Philippines
Mobile: +63-928-9043654
[E-mail: ruscal_tin6@yahoo.com](mailto:ruscal_tin6@yahoo.com)
[Website: www.newsbreak.com.ph](http://www.newsbreak.com.ph)



Rosariastoko, Gregorius Wisnu

Director, Networking
ASEAN Centre for Biodiversity (ACB)
3rd Floor, ERDB Bldg. Forestry Campus
University of the Philippines (UPLB)
College, Laguna 4031, Philippines
Telfax: (+63-49) 536-2865/ 536-1044
[e-mail: gwrosariastoko@asenbiodiversity.org](mailto:gwrosariastoko@asenbiodiversity.org)



Rosnah Ismail

Director, Centre for Research and Innovation
Universiti Malaysia Sabah
Locked bag 2073, 88999
Kota Kinabalu, Sabah, Malaysia
Tel.: +60 88 320326; Fax: +60 88 320127
[E-mail: isrosnah@ums.edu.my](mailto:isrosnah@ums.edu.my)



Saguiguit, Gil Jr. C.

Deputy Director, SEARCA
College, Laguna 4031. Philippines
Tel: (+63-49) 536-3459 local 115
[E-mail: gcs@agri.searca.org](mailto:gcs@agri.searca.org)



Sajise, Percy E.

Regional Director, Bioversity International
for Asia, Pacific and Oceania
P.O. Box 236, UPM Post Office
Serdang 43400 Selangor
Darul Ehsan, Malaysia
Tel. (60-3) 8942 3891; Fax. (60-3) 8948 7655
[E-mail: p.sajise@cgiar.org](mailto:p.sajise@cgiar.org)
bioversity-apo@cgiar.org
[Website: www.bioversityinternational.org](http://www.bioversityinternational.org)



Salzer, Walter

Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ)
GTZ Office Manila PDCP Bank Centre
9/Floor, V.A. Rufino cor..P. Leviste Sts, Makati City. Philippines
Tel: +63 2 8123165; Fax: +63 2 7531441
[Email: Walter.salzer@gtz.de](mailto:Walter.salzer@gtz.de)
gtz-philippinen@gtz.de



Santos-Borja, Adelina C.

Chief, RDD and Team Leader
Laguna de Bay Community Carbon Finance Project
Laguna Lake Development Authority (LLDA)
Annex Building, Laboratory Complex
Capitol Compound, Pasig City 1600. Philippines
Telefax: +63-2-637-7581
[E-mail: lennieborja@yahoo.com](mailto:lennieborja@yahoo.com)



Sayre, Cesario

Executive Director
Asset-Based Community Development with Equity (ABCDE) Association,
Dipolog City, Philippines
[E-mail: a249403@anu.edu.au](mailto:a249403@anu.edu.au)



Schindeler, Paula

Second Secretary for Economic and Cultural Affairs, Royal Netherlands
Embassy
26th Floor Equitable PCI Bank Tower, 8751 Paseo de Roxas, Makati City,
Metro Manila, Philippines
Phone: +63 2 786-6608; Fax: +63 2 786-6600
[E-mail: paula.schindeler@minbuza.nl](mailto:paula.schindeler@minbuza.nl)



Scholz, Uwe

Programme Adviser, Coastal Fisheries Resources Management
Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ)
GTZ Office Manila PDCP Bank Centre
9/Floor, V.A. Rufino cor. L.P. Leviste Sts,
Makati City, Philippines
Tel: +63 2 8123165; Fax: +63 2 7531441
[Email: Uwe.scholz@gtz.de](mailto:Uwe.scholz@gtz.de)
gtz-philippinen@gtz.de



Siambun, Mary Magdeline

Lecturer, School of Sustainable Agriculture
Universiti Malaysia Sabah
Locked bag 2073, 88999
Kota Kinabalu, Sabah, Malaysia
Tel.: +60 88 320306; Fax: +60 88 320278
[E-mail: msiambun@ums.edu.my](mailto:msiambun@ums.edu.my)

Singh, V. P.

ICRAF-South Asia Regional Coordinator
New Delhi, India
[E-mail: v.p.singh@cgiar.org](mailto:v.p.singh@cgiar.org)



Sitti Raehanah Muhd. Salleh

Deputy Director for Research and Innovation
Borneo Marine Research Institute
Sabah Malaysia
Tel: +60 88 320121; Fax: +60 88 320261
[Email: sittirae@ums.edu.my](mailto:sittirae@ums.edu.my)



Talib Abdullah Shani

Administrative Officer/Assistant Registrar
School of Sustainable Agriculture
Universiti Malaysia Sabah
Locked bag 2073, 88999
Kota Kinabalu, Sabah, Malaysia
Tel. +60 88 320306; Fax: +60 88 320278
[E-mail: talibhja@ums.edu.my](mailto:talibhja@ums.edu.my)



Ticsay, Mariliza V.

Consultant, Program Development and Implementation
SEARCA, College, Laguna 4031. Philippines
Tel: (+63-49) 536-3459 local 132
Fax: (+63-49) 536-4105
E-mail: mvt@agri.searca.org; mvticsay@yahoo.com



Ugat, Zenaida

Society for the Conservation of Philippine Wetlands (SCPW)
11th Floor, Strata 100 Condominium, Emerald Avenue, Ortigas Center,
Pasig, Philippines
Telefax No: (+63-2) 637 2409
[E-mail: zeni_ugat@yahoo.com](mailto:zeni_ugat@yahoo.com)



Uriarte, Monina T.

Training and Publications Specialist
ASEAN Centre for Biodiversity (ACB)
3rd Floor, ERDB Bldg. Forestry Campus
University of the Philippines (UPLB)
College, Laguna 4031, Philippines
Telefax: (+6349) 536-2865/ 536-1044
[E-mail: mturiarte@aseanbiodiversity.org](mailto:mturiarte@aseanbiodiversity.org)



Uy, Wilfredo H.

Professor, and Dean
Institute of Fisheries Research and Development
Mindanao State University-Naawan
Naawan, Misamis Oriental. Philippines
[E-mail: wilfredo.uy@gmail.com](mailto:wilfredo.uy@gmail.com)



van Noordwijk, Meine

Regional Coordinator
ICRAF- SEA Regional Programme
Jl CIFOR, Situgede, Sindangbarang
PO Box 161, Bogor 16001m Indonesia
Tel: (61-2) 516-25415; Fax: (61-2) 516-25416
[E-mail: m.van-noordwijk@cgiar.org](mailto:m.van-noordwijk@cgiar.org)



van Veenhuizen, Rene

BRP Support and Liaison Office Coordinator
Urban Agriculture Programme
ETC Foundation, Kastanjelaan 5,
3833 AN Leusden, The Netherlands
Tel: +31.33.4326000; Fax: +31.33.4940791
[E-mail: r.van.veenhuizen@etcnl.nl](mailto:r.van.veenhuizen@etcnl.nl)



Vathana Sann

Program Coordinator, Graduate School of Agriculture
Royal University of Agriculture
Chamkar Daung, Dangkor District
Phnom Penh, Cambodia
Tel 855-1295- 0410
[E-mail: vathana20@yahoo.com](mailto:vathana20@yahoo.com)



Velasco, Luis Rey I.

Chancellor, University of the Philippines Los Baños
College, Laguna. Philippines 4031
[E-mail: lrvuplbca@yahoo.com](mailto:lrvuplbca@yahoo.com)



Vergara, Sheila

Conservation International Foundation
6 Maalalahanin St., Teacher's Village
Diliman, Quezon City 1101. Philippines
Tel: 02-924-8235; Mobile: 0920-952-7482
[E-mail: svergara@conservation.org](mailto:svergara@conservation.org)



Vidaure, Maria Victoria

Trade Adviser, Mission Economique
Embassy of France in the Philippines
Rufino Pacific Tower, Units 34 A & B
6784 Ayala Avenue, Makati City
Manila, MCPO 1299
Tél : +63 (2) 811 1001-04 Fax : +63 (2) 811 1033
[E-mail: maria-victoria.vidaure@missioneco.org](mailto:maria-victoria.vidaure@missioneco.org)



Wassmann, Reiner

Coordinator, Rice and Climate Change Consortium, International Rice
Research Institute (IRRI)
College, Los Baños, Laguna. Philippines
Tel: (+63-49) 845-1292/0569/0570
Fax: (+63-49) 845-1292/0606
R.WASSMANN@cgiar.org

Secretariat



Abad, Maria Angela F.
Public Relations Specialist
SEARCA, College, Laguna 4031
Tel: (+63-49) 536-3459 local 419
Fax: (+63-49) 536-4015
[E-mail: mafa@agri.searca.org](mailto:mafa@agri.searca.org)



Abes, Joan S.
Executive Technical Assistant
ASEAN Centre for Biodiversity (ACB)
3rd Floor, ERDB Bldg. Forestry Campus
University of the Philippines (UPLB)
College, Laguna 4031, Philippines
Telefax: (+6349) 536-1563/ 536-1044
[E-mail: jsabes@aseanbiodiversity.org](mailto:jsabes@aseanbiodiversity.org)



Alegre, Maciste B.
General Services Assistant
SEARCA, College, Laguna 4031
Tel: (+63-49) 536-3459 local 175
Fax: (+63-49) 536-4015
[E-mail: mba@agri.searca.org](mailto:mba@agri.searca.org)



Arboleda, Leah P.
Instructional Designer
RenditionDigital, Inc., Makati City
Mobile: 0917-4790953; 0928-6360980
[E-mail: lparboleda@gmail.com](mailto:lparboleda@gmail.com)
lparbo@yahoo.com
lparbo_devcom@yahoo.com



Decena, Cristina L.
Office Assistant, Training Unit
SEARCA, College, Laguna 4031
Tel: (+63-49) 536-3459 local 417
Fax: (+63-49) 536-4015
[E-mail: cristina.l.decena@gmail.com](mailto:cristina.l.decena@gmail.com)



Dicatoria, Ranell Martin M.

Information and Communication Associate
Knowledge Management Unit, SEARCA
College, Laguna 4031

Tel: (+ 63-49) 536-3459 local 192

Fax: (+ 63-49) 536-4015

[E-mail: rmmd@agri.searca.org](mailto:rmmd@agri.searca.org)



Dia, Jaymark Warren T.

Information Systems Specialist
Management Services Unit
SEARCA, College, Laguna 4031

Tel: (+ 63-49) 536-3459 local 151

Fax: (+ 63-49) 536-4015

[E-mail: jwtd@agri.searca.org](mailto:jwtd@agri.searca.org)



Foronda, Randy Neil A.

Production Specialist
Knowledge Management Unit, SEARCA
College, Laguna 4031

Tel: (+ 63-49) 536-3459 local 402

Fax: (+ 63-49) 536-4015

[E-mail: raf@aqgri.searca.org](mailto:raf@aqgri.searca.org)



Genosa, Eidelmine F.

HR Specialist, SEARCA
College, Laguna 4031

Tel: (+ 63-49) 536-3459 local 420

Fax: (+ 63-49) 536-4015

[E-mail: efg@agri.searca.org](mailto:efg@agri.searca.org)



Ibañez, Mayla A.

Partnership and Resource Mobilization
Specialist

ASEAN Centre for Biodiversity (ACB)

3rd Floor, ERDB Bldg. Forestry Campus

University of the Philippines (UPLB)

College, Laguna 4031, Philippines

Telefax: (+ 6349) 536-2865/ 536-1044

[E-mail: mayla@aseanbiodiversity.org](mailto:mayla@aseanbiodiversity.org)



Inciong, Rolly

Head, Public Affairs

ASEAN Centre for Biodiversity (ACB)

3rd Floor, ERDB Bldg. Forestry Campus

University of the Philippines (UPLB)

College, Laguna 4031, Philippines

Telefax: (+ 6349) 536-2865/ 536-1044

[E-mail: rainciong@aseanbiodiversity.org](mailto:rainciong@aseanbiodiversity.org)



Limbaco, Van Allen S.

Transport Services Assistant
SEARCA, College, Laguna 4031
Tel: (+63-49) 536-3459 local 157
Fax: (+63-49) 536-4015
[E-mail: vasl@agri.searca.org](mailto:vasl@agri.searca.org)



Mariano, Lamberto N.

Facilities and Equipment Assistant
SEARCA, College, Laguna 4031
Tel: (+63-49) 536-3459 local 155
Fax: (+63-49) 536-4015



Nadres, Arlene A.

Clerk, Knowledge Management Unit
SEARCA, College, Laguna 4031
Tel: (+63-49) 536-3459 local 138
Fax: (+63-49) 536-4015
[E-mail: aan@agri.searca.org](mailto:aan@agri.searca.org)



Oabina, Arnel R.

Accounting Associate, SEARCA
College, Laguna 4031
Tel: (+63-49) 536-3459 local 120
Fax: (+63-49) 536-4015
[E-mail: aro@agri.searca.org](mailto:aro@agri.searca.org)



Ramos, Nova A.

Training Associate, SEARCA
College, Laguna 4031
Tel: (+63-49) 536-3459 local 125
Fax: (+63-49) 536-4015
[E-mail: nea@agri.searca.org](mailto:nea@agri.searca.org)



Robles, Adoracion T.

Research Associate, SEARCA
College, Laguna 4031
Tel: (+63-49) 536-3459 local 132
Fax: (+63-49) 536-4015
[E-mail: atr@agri.searca.org](mailto:atr@agri.searca.org)



Salazar, Natividad P.

Treasury Services Assistant, SEARCA
College, Laguna 4031
Tel: (+63-49) 536-3459 local 117
[E-mail: nmp@agri.searca.org](mailto:nmp@agri.searca.org)



Sanchez, Patricia J.

Researcher, World Agroforestry Center (ICRAF)

2/F College of Forestry and Natural Resources
(CFNR) Administration Bldg., UPLB, College,
Laguna 4031

Tel:(63-49) 536-2925/536-7645

Tel (via IRRRI): (63-2) 845-0563/ 0569 local 2860

Fax: (63-49) 536-4521

[E-mail: gensp.sanchez@cgiar.org](mailto:gensp.sanchez@cgiar.org)



Talatala, Mina G.

Archives Assistant, SEARCA

College, Laguna 4031

Tel: (+ 63-49) 536-3459 local 136

[E-mail: mgt@agri.searca.org](mailto:mgt@agri.searca.org)



Villamor, Grace

Researcher, World Agroforestry Center (ICRAF)

2/F College of Forestry and Natural Resources
(CFNR) Administration Bldg., UPLB, College,
Laguna 4031

Tel:(63-49) 536-2925/536-7645

Tel (via IRRRI): (63-2) 845-0563/ 0569 local 2675

Fax: (63-49) 536-4521

[E-mail: g.villamor@cgiar.org](mailto:g.villamor@cgiar.org)

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and Research in Agriculture (SEARCA)**