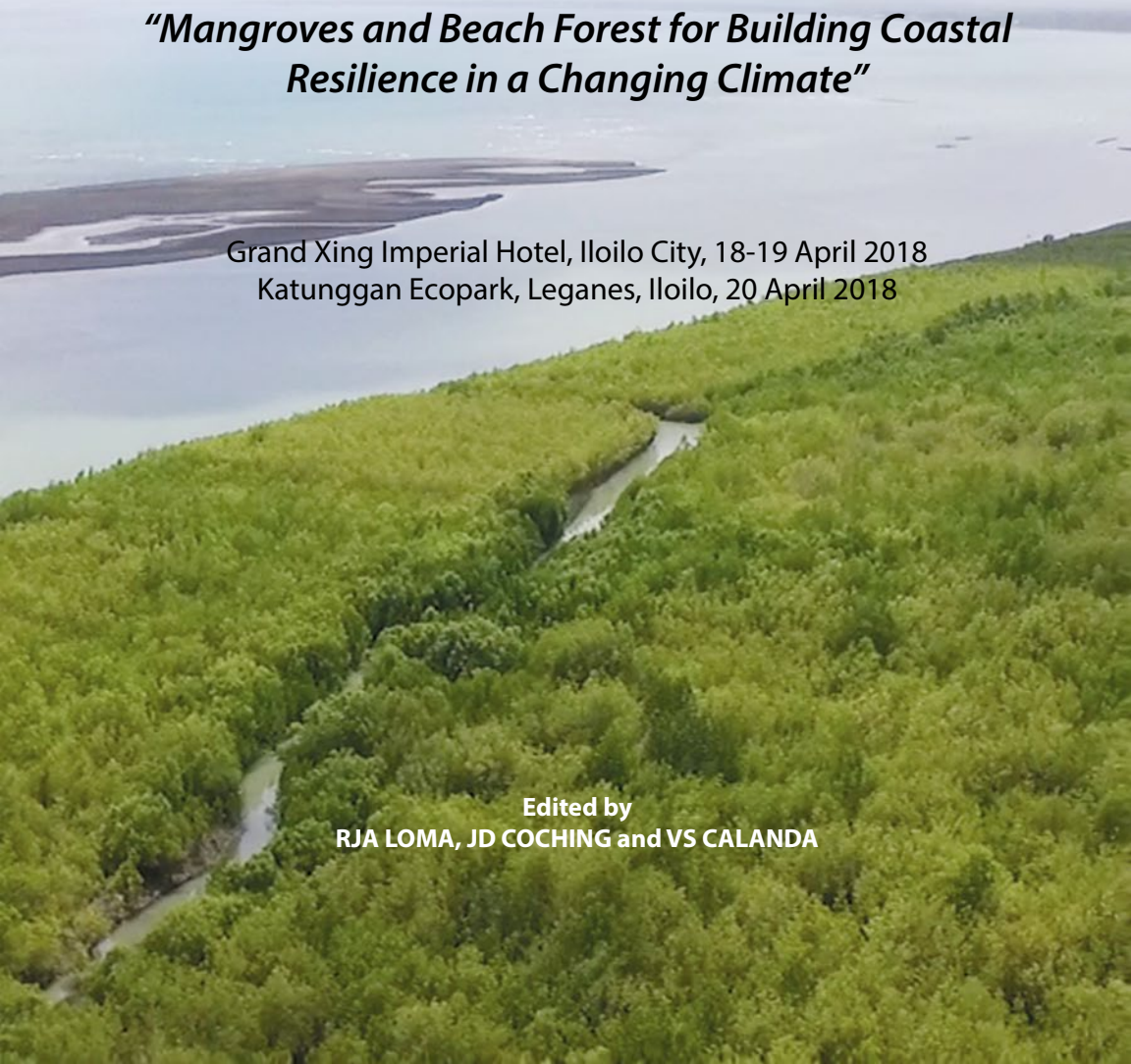
PROCEEDINGS OF THE
3rd National Mangrove Conference

"Mangroves and Beach Forest for Building Coastal Resilience in a Changing Climate"

Grand Xing Imperial Hotel, Iloilo City, 18-19 April 2018
Katunggan Ecopark, Leganes, Iloilo, 20 April 2018



Edited by
RJA LOMA, JD COCHING and VS CALANDA

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Editors

Organized by

Zoological Society of London-Philippines
Barangay Pedada Fisherfolk Association

Sponsored by

Turing Foundation, DENR-Biodiversity Management Bureau, Forest Foundation Philippines, Foundation for the Philippine Environment, Wetlands International, Adventist Development and Relief Agency, Province of Iloilo, Darwin Initiative, Metro Pacific Investment Corporation

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Foreword

Mangroves and beach forests forming coastal greenbelts are extremely important bioshields that reduce wave impact, storm surges and tsunamis. As the Philippines has been a pathway of catastrophic typhoons, the country's mangroves are recognized as primary frontline of defense of coastal communities. Unfortunately, these forests are among the first habitats to disappear largely due to anthropogenic factors. In the face of climate change, there is no appropriate time but now to scale up our interventions taking into account science-based approaches on rehabilitation.

The 3rd National Mangrove Conference with the theme, "Mangrove and Beach Forest for Building Coastal Resilience in a Changing Climate," is a venue to share knowledge, experiences, and lessons on mangrove and beach forest rehabilitation and management in response to a changing climate. The conference is an opportunity for interactions between various mangrove and beach forest stakeholders on the different approaches applied with regards to ecosystem-based disaster risk management; reversion of abandoned, underutilized and undeveloped fishponds to mangrove forests; multiple habitat marine protected areas; and carbon stock assessments in the country.

On behalf of the Zoological Society of London – Philippines, I would like to thank our partners for their support, namely: Turing Foundation, Barangay Pedada Fisherfolk Association, Wetlands International, Adventist Development and Relief Agency – Philippines, Biodiversity Management Bureau of the Department of Environment and Natural Resources, Forest Foundation Philippines, Foundation for the Philippine Environment, Provincial Government of Iloilo and Metro Pacific Investments Corporation. Organizing a national conference takes significant effort. My thanks to the ZSL Philippines team for their hard work and commitment and to the presenters and participants for their contributions in making the conference a success.

It is my hope that the conference and this proceedings will serve as a guide for future steps towards attaining resiliency of our coastal communities in a changing climate.

ZSL | LET'S WORK FOR WILDLIFE

Godofredo T. Villapando, Jr.
Country Director
Zoological Society of London-Philippines

Foreword

As an archipelagic country, there is intensified need for us to realize the urgency of conserving our mangrove forests. They serve as habitat for fish and wildlife, provide coastal defense against strong waves and storm surges, and regulate climate by storing carbon. Despite these benefits, our mangroves remain threatened by overexploitation; conversion to fishponds, industry and settlement; and poor rehabilitation practices.

To address these, the Biodiversity Management Bureau, through the Coastal and Marine Ecosystems Management Program or Agos ng Buhay, aims for sustainable management of resources, thereby increasing their ability to provide ecological goods and services. Agos ng Buhay will hopefully improve quality of life of the coastal population particularly by ensuring food security, climate change resiliency and disaster risk reduction.

Together with the Ecosystems Research and Development Bureau, the Bureau developed a joint technical bulletin to serve as guideline on enrichment planting of mangroves and beach forest for biodiversity conservation and coastal resiliency. Among the concepts highlighted in the technical bulletin are the choice of suitable species and zoning, nursery establishment, and maint○○enance.

DENR cannot do the work alone; there is a need for different sectors of the society to collaborate and act together in protecting our mangrove ecosystems. With this, we would like to commend the Zoological Society of London (ZSL)- Philippines, and all the agencies who supported and participated in the 3rd National Mangrove Conference held on 18-20 April 2018 at Iloilo City.

The proceedings of the conference contain best practices and gaps in mangrove management; lessons learned and next steps in the country's mangrove rehabilitation. It also includes results of mangrove carbon stock assessment; payments for ecosystem services studies; and marine protected areas as approach in ensuring ecosystem resiliency.

We believe that this publication will be helpful in increasing public appreciation of mangrove ecosystems, and will be likewise be a valuable source of information for future mangrove programs and policies.

(Sgd.) **Crisanta Marlene P. Rodriguez**
Director, Biodiversity Management Bureau

Foreword

Greetings from Forest Foundation Philippines!

We are privileged to be one of the supporters of the 3rd National Mangrove Conference, entitled Mangroves and Beach Forests for Building Coastal Resilience, organized by the Zoological Society of London - Philippines, in Iloilo City, Philippines.

The Foundation sees mangroves as an important ecosystem that provides livelihoods for coastal communities and also protects us from the changing climate. In fact, a hectare of mangrove forests can store up to five times more carbon than most tropical forests around the world. This is, in part, due to the deep, organic rich soils in which they thrive.

Unfortunately, like most forest types, the areas of mangrove forests have been in decline. This is why we have allocated a substantial part of our grants to mangrove conservation.

In 2013, when Super Typhoon Yolanda (International name: Haiyan) hit the Philippines, we implemented our first Forest and Community Rehabilitation Program. Through this program, we provided grants and technical assistance to non-government organizations (NGOs) and people's organizations (POs) in Capiz, Iloilo, Leyte, Eastern Samar and Northern Palawan for ecosystem assessment, capacity building, forest protection and rehabilitation activities, and advocacy campaign, among others. This program enabled us to work with the Zoological Society of London–Philippines to implement a communication project, which advocated for the natural growth and survival of our native mangroves. Since then, we have been working with ZSL-Philippines and other partners in mangrove conservation.

By supporting this conference, we hope to further increase awareness, knowledge and skills in coastal greenbelt establishment and recovery. Moreover, by empowering the participants to share their experiences and lessons on mangrove and beach forest recovery and management work in response to the changing climate, we are hopeful that we are able to contribute to the creation of a mutual learning environment. It is through learning and working together that we can address the threats to and conserve our remaining mangrove forests.

On behalf of the other organizers, we wish everyone a successful conference.

Thank you.

Jacanivel

Atty. Jose Andres Canivel
Executive Director
Forest Foundation Philippines

Forest Foundation Philippines
Let's grow together.

Foreword

The Foundation for the Philippine Environment (FPE) expresses its solidarity with the conveners and participants to the 3rd National Mangrove Conference with the theme "Mangrove and Beach Forests for Building Coastal Resilience in a Changing Climate." The relevance and timeliness of this conference are spot on as the needs are great, especially the fishers, rural women, and children who are at risk and vulnerable to climate change.

We join the call of coastal women and men—fishers, local governments, private sector across the country who need the tools, technology, policy and technical support, among others in order for them to be more resilient and better stewards of mangroves and beach forests, which provide the many environmental and economic services as building blocks of the local economy for a sustainable future.

Thus, we congratulate the Zoological Society of London-Philippines, the Barangay Pedada Fisherfolk Association (BPFA) and other conveners who brought together different stakeholders to share innovations, experiences, best practices and lessons learned to synergize local initiatives, and scale up work so that others can draw inspiration from.

Sound policies and management measures, mangrove and coastal ecosystem research, and strict enforcement of regulations, developed in a participatory and inclusive way are critical to be sustained and effective.

Again, congratulations and we look forward to the application of the conference results on the ground.

Oliver Agoncillo

Mr. Oliver Agoncillo
Executive Director
Foundation for the Philippine Environment

Executive Summary

One essential and timely topic, eighteen enlightening presentations, 229 active participants from local government units (LGU), the academe, national government agencies, non-government organizations, people's organizations, and the private sector: the 3rd National Mangrove Conference was, undoubtedly, a resounding success.

The conference was a gathering that discussed mangroves and all other related ecosystems, species benefitting from them, and their global impact. Their relation to disaster management was highlighted through concrete examples and inspiration from resource persons and participants alike.

With the theme, "Mangroves and Beach Forest for Building Coastal Resilience in a Changing Climate," the lectures and presentations were divided into four (4) sessions and topics:

Session 1: Ecosystem-based disaster risk management including coastal protection from mangrove-beach forest greenbelts

Session 2: Mangrove rehabilitation with focus on reversion of abandoned, underutilized, and undeveloped fishponds to mangrove forests

Session 3: Carbon stock assessments of mangroves in the Philippines

Session 4: Marine protected areas with multiple habitats for ecosystem resilience

The three-day event gave everyone varying views, and left everyone inspired to continue their unique approaches and work on conservation and protection.

Here are some encouraging words, realizations and lessons from the conference:

"There is more than one solution backed by science, and we just need to choose the most appropriate to the conditions and the place." ~ Mr. Klaus Schmitt

"Let us celebrate our successes, no matter how small." ~ Atty. Gerthie Mayo-Anda

"The Philippines, with mangrove area of 356,000 ha has a total estimated 26.7 Million USD Blue Carbon Credit." ~ Dr. Dixon Gevaña

"Diversity is not important for carbon BUT it enhances greenbelts." ~ Dr. Clare Duncan

"Thousands of transplanted corals do not make a reef." ~ Dr. Wilfredo Licuanan


3rd NATIONAL
Mangrove
CONFERENCE
Save our
mangroves
shield
home
ZSL
LET'S WORK FOR WILDLIFE
BPFA
3rd NATIONAL
Mangrove
CONFERENCE
Mangroves and Beach Forests for Building Coastal Resilience in a Changing Climate

Contents

Introduction

Mangroves are highly productive forests, thriving between land and sea, hosting a rich and complex array of associated species, and providing ecosystem services to humans (Barbier et al., 2011). In the past decades, high mangrove loss resulted from timber harvesting, aquaculture conversion, and clearing for development (Walters, 2004). The Philippines is one of the countries in Southeast Asia with continuous mangrove loss (Richards and Friess, 2016).

Mangrove rehabilitation programs in the Philippines received renewed impetus after the 2013 Typhoon Yolanda that resulted in mixed successes and failures. Outputs were seldom evaluated as to what characteristics of the natural ecosystem has been reproduced through rehabilitation, and what ecosystem services they can deliver (Primavera et al., 2011; Samson and Rollon, 2008; Wolanski and Elliott, 2015).

Mangroves and the beach forest, along with other forests, are now considered effective long-term carbon sinks (Howard et al., 2017). Within the context of climate change mitigation, enhancing the capacity and role of natural carbon sinks is an important scientific and political topic (Marchio et al., 2016).

Through sharing of knowledge, experiences, and lessons on mangrove and beach forest rehabilitation and management in response to a changing climate, the National Mangrove Conference established a mutual learning environment in partnership with mangrove researchers, rehabilitation practitioners and managers throughout the Philippines.

The Zoological Society of London – Philippines (ZSL-Philippines), together with Turing Foundation, Barangay Pedada Fisherfolk Association (BPFA), Wetlands International, Adventist Development and Relief Association – Philippines (ADRA Philippines), the Provincial Government of Iloilo, the Biodiversity Management Bureau of the Department of Environment and Natural Resources (DENR-BMB), Forest Foundation Philippines (FFP), Foundation for Philippine Environment (FPE), and Metro Pacific Investments Corporation (MPIC) organized the 3rd National Mangrove Conference in Iloilo City.

Conference objectives

1. To review ecosystem-based disaster risk management and showcase best practices and lessons on coastal protection including mangrove-beach forest greenbelts;
2. To review mangrove rehabilitation including reversion of abandoned, underutilized and undeveloped fishponds to mangrove forests as a climate change adaptation strategy;
3. To review and showcase best practices of marine protected areas with multiple habitats as key to improving and maintaining ecosystem resilience in a changing climate; and
4. To review and identify gaps in carbon stock assessments of Philippine mangroves recognizing the role of Blue Carbon in climate change mitigation.

The Conference was opened with messages from the organizers and lead institutions. Conference expectations, norms and raising questions or concerns through metacards, open forum and online application www.slido.com were discussed by Ms. Ma. Victoria Maglana, the conference moderator. A poll was also set up using www.mentimeter.com to gather relevant issues from the participants that will be tackled in the workshop on Day 2.

The Keynote Address was given by National Scientist of the Philippines Dr. Angel Alcala, which highlighted the importance of a super ecosystem that includes mangroves, seagrass beds and coral reefs to the improvement of fish productivity. The topics focused on ecosystem-based disaster risk management including coastal protection from mangrove-beach forest greenbelts and reversion of abandoned, underutilized, and undeveloped fishponds to mangrove forests.

Topics for Day 2 focused on carbon stock assessment of mangroves in the Philippines and marine protected areas with multiple habitats for ecosystem resilience. A workshop was conducted to generate information on responses to the 2015 National Mangrove Conference Call to Action and put forward recommendations to key issues on mangroves and beach forests towards building coastal resilience in a changing climate.

The last day of the Conference was an optional trip to *Katunggan* Ecopark in Leganes, Iloilo, which highlighted the reversion of a municipal-owned abandoned and underutilized fishpond back to mangrove forest.

Other equally important activities during the Conference were a press conference and poster exhibit on the opening day. The Governor of the province of Iloilo sponsored the welcome dinner on the evening of Day 1 with a launching of ZSL's Mangrove Rehabilitation and Conservation Flip Chart and Booklet and re-launching of DENR-Ecosystem Research and Development Bureau's book Mangrove and Beach Forest Species in the Philippines.

The succeeding pages report the highlights of the resource speakers' presentations, discussions in open fora, workshop output, and other relevant documentation of the 3rd National Mangrove Conference.

Messages

Mr. Godofredo T. Villapando, Jr.
Country Manager, ZSL–Philippines

"I hope that we will learn a lot from the different topics and be inspired from the inputs and sharing of our resource persons on mangroves and beach forest in relation to disaster risk management, conservation strategies, connectivity of the different habitats, and financing mechanism. It is also my hope that we can apply learnings from this conference and start, or enhance, our mangrove, as well as beach forest conservation efforts."

"The Iloilo River is a reflection of the Ilonggos' love and unity for enhancing environment potentials into creating great economic opportunities and impacts for the benefit of the people."

Mr. Dominador Co
Local Government of Iloilo City

ARD Jessie Vego
Department of Environment and Natural Resources

"Mangrove forest is key to a healthy coastal ecosystem. Mangroves and beach forests are indeed vital in building coastal resilience in a changing climate. Let us preserve and protect these species and ecosystem for the lives and livelihood of our people in the coastal communities in particular and the whole populace in general.

"As one quote says "if there are no mangroves, then the sea will have no meaning, it is like having a tree without roots, for the mangroves are the roots of the sea..."

Asst. Dir. Drusila Esther Bayate
Bureau of Fisheries and Aquatic Resources

"Aside from the many ecological services that mangroves provide, mangroves are the most 'natural' disaster risk reduction and management structures we can ever build. They are our natural breakwaters against sea level rise, salt water intrusion, and tidal surges during typhoons."

"Most worthy of note today is that mangroves are the best blue carbon sinks. These, along with other coastal ecosystems, have the potential to sequester substantial amounts of atmospheric carbon dioxide and store carbon in its biomass, mitigating the impacts of climate change."

"Looking at this great collaboration in the Philippines, we are in particular proud in bringing our long-standing knowledge and technical expertise in rehabilitation of beach forests and mangroves and are very keen in supporting new areas – Boracay and beyond. I am sure the colleagues will discuss this in detail over the next three days and we are keen to support initiatives in the next 22 years and onwards."

Mr. Raki Nikahetiya
Conservation for Communities Programme Manager, Zoological Society of London

Mr. Rob Contractor
Head of Political Economic Section, British Embassy Manila

"As one of the countries with the longest coastline worldwide, the Philippines has a unique challenge with building coastal resilience. An important aspect of building such resilience is the conservation and rehabilitation of Philippine mangroves and beach forests. These are not only important for adaptation and disaster risk management, but also for climate change mitigation – as mangroves serve as a very effective natural carbon sink, as well as biodiversity protection – because mangroves provide highly productive areas for a rich array of species."

Hon. Arthur Defensor, Sr.
Governor, Province of Iloilo

"...I found out that a lot of things depend on mangroves. I was invited by Governor Marañon (Negros Occidental) to visit an island in Sagay City – Molocaboc Island. The mangrove forest in Molocaboc is 30 hectares. There are 11 kinds of shells. Some I have seen and tasted for the first time on the island. The community is engaged with sea ranching. And they harvest fish – several species of fish. The people of Molocaboc make sustainable livelihood from it."

Keynote Address

Mangrove and Beach Forests: Environmental Buffers and Fishery Producers

Dr. Angel C. Alcala | National Scientist of the Philippines

Our forest ecosystems tropical rain forests, monsoon rainforests, rainforests, beach forests and littoral or mangrove forests – covered about 60% of the total land area of the Philippines, which is 300,000 square kilometers, at the turn of the 20th century. These forests were continuous from coastal areas to the tops of the mountains. Now, the country has lost a substantial part of these natural forests. Forests have been converted to human communities, farm lands, industrial and commercial areas and fishponds and some remain as secondary forests. Rainforests have been logged for lumber and firewood. The Philippines now has less than 40% forest area, the ideal forest cover of a country, according to many ecologists.

The subjects of this conference are beach forests and littoral or mangrove forests, which, in many places, are still found adjoining each other. Mangroves also occupy banks of rivers from their mouths to upstream areas reached by sea water during high tides. Some mangrove trees grow even in intertidal areas directly exposed to the sea.

In the past, we have taken for granted our natural forest ecosystems and we have not realized their importance to us humans and their associated biodiversity. I think this is partly because our early education did not teach us about the value of our natural environment. I do not remember my elementary school teachers teaching me about the important roles of mangroves, beach forests, rainforests and their associated biodiversity in our lives. So we grew up with little or no knowledge of these ecosystems. I hope that educators will realize this gap in the basic education of Filipinos.

A number of books and scientific papers have been published in the Philippines on mangroves. In 2001, my friends Dr. Prescillano Zamora of the University of the Philippines published his 100-page Annotated Bibliography of Mangrove Biodiversity in the Philippines in which he listed published and unpublished papers, including his own papers. Dr. Jurgenne Primavera is now the authority on mangroves and has written a lot about mangroves. Recently, she delivered a comprehensive lecture on mangroves at a NAST meeting in Cagayan de Oro. There are several recent books and papers and other publications on mangroves and their associated biodiversity dealing with mangrove ecology, aquaculture, natural history, conservation and other topics.

In contrast, there have been relatively fewer Philippine publications on beach forests and other marine ecosystems such as seagrasses. Examples are the papers of Palis (2013) and Jurgenne Primavera and Sadaba (2012). A review of seagrasses in the ASEAN region (1989) was published by Dr. Miguel D. Fortes. Fortes and co-authors published several papers on seagrasses.

Beach forests, and to a certain extent, mangroves, may be seen as extensions of tropical rainforests and can be expected to host many terrestrial species of vertebrates that are

considered rainforest species. Beach forests are important egg-laying sites for marine turtles and the incubator bird or mound-builder, which is a rainforest species. Some lizard species have wide geographic distributions because they are able to colonize small islands via mangroves. Without enumerating the other species, I can say that quite a number of vertebrates (amphibians, reptiles, birds and mammals) in the Philippine rainforests extend their geographic ranges into the adjoining beach and mangrove forests. Some species of birds and bats perform essential ecological functions, such as pollination of trees and nipa palms.

This conference should open our minds to learning more about mangrove forest and other coastal ecosystems.

It is common knowledge that mangroves and beach forests serve as first line of defense for local communities against storm surges and tsunamis. But the mangroves' more important function is related to the maintenance of fisheries, and any human activity or natural occurrence that degrades mangroves also degrades fisheries. Two leaflets published by the FISH Project supported by USAID entitled "Why Protect Seagrass Beds?" and "Why Protect Mangroves?" describe well the human benefits and services of these two ecosystems and their important roles in stabilizing and keeping the integrity of these ecosystems. The leaflet on mangroves mentioned above starts by saying that "Mangroves are essential to fish production." There are of course other marine regions without mangroves but with moderate abundance of fish. An example is the Spratlys, which have moderate fish biomass on coral reefs of about 40 tons of fish per square kilometer. In comparison with the Philippines, where mangroves exist and where coral reefs are protected, fish biomass average some 100 tons per square kilometer.

"The mangroves' more important function is related to the maintenance of fisheries, and any human activity or natural occurrence that degrades mangroves also degrades fisheries."

In this connection, I would like to add that in both Palawan and associated small islands and Siargao Island, where there are large areas of mangrove forest, the presence of the Estuarine Crocodile most probably enhances fish yields of fishermen fishing in coral reef areas in the vicinity of mangrove forests.

Given that mangroves provide habitats for fish and other marine species and are known for the marine species used as source of human food, I find that practically no study exists which quantifies the fishery contribution of mangroves and seagrass beds. So, I think that research must be conducted to determine the contribution of seagrass beds and mangrove forests to the fishery of coastal areas. There are some mangroves in Murcielagos Bay

(Mindanao), Masbate City, Panay, and elsewhere that have been fully protected for decades but whose impact on fish yields is still not well known. We also want to know whether the increased biomass and species diversity on these protected mangroves have resulted in the export of adult fish to fishing sites of fishermen, thus increasing fish catches, as well as export of fish larvae, thereby promoting fishery sustainability in the future.

At the present time, our hypothesis is that mangroves and seagrass beds contribute significantly to fishery production in bays, where all these ecosystems and coral reefs are present, but by how much – is the question. We are presently conducting collaborative studies to answer this question. These studies are likely to show that long-term protection from fishing of coral reefs, mangroves and seagrass beds will build up fish biomass and abundance in coastal areas. It is therefore suggested that more mangrove forests and seagrass areas are to be protected fully and monitored for fish yield studies.

Mangroves, seagrass beds and coral reefs found in storm-free bays together may be considered a productive "super-ecosystem" as far as fisheries is concerned. It is known that many species of fin-fish live in these three habitats at various times in their life history. This synergistic interaction among these habitats may result in enhanced fishery production than the sum of the individual productions of these three habitats. But this needs to be demonstrated by empirical data.

One major factor affecting the health of coastal ecosystems is, as we all know, climate change, particularly storm surges and tsunamis. Storm surges frequently occur during typhoons, which now hit all parts of the country from north to south. We all know that, in the past, southern Philippines was rarely hit by typhoons. So projects establishing protected areas or rehabilitating these environments should take into consideration the possible effects of these natural events. Fortunately, our country has many areas that are naturally protected from storm surges, especially those in bays in the western parts of the islands.

It is also necessary to look at fish habitats found in the depths exceeding 40 meters where cooler water exists because of the influence of oceanic currents. Such areas would be less vulnerable to high temperatures due to climate change. At present, such deeper habitats have been shown to be productive of deep-water fish species as indicated by high yields of trap fishermen. Our initial work in deeper waters has identified many families of target fish.

I hope this Conference will deepen our understanding of the important role of coastal ecosystems in the production of fish and other useful marine species, as well as the source of microorganisms that produce medicinal chemicals.

Session 1: Ecosystem-based disaster risk management including coastal protection from mangrove-beach forest greenbelts

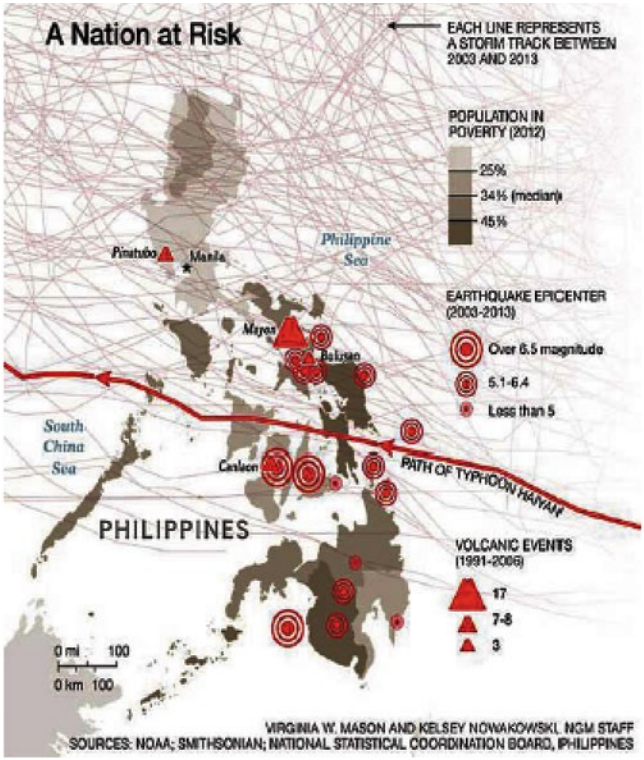
Climate change and disaster risk concepts, tools and policies in coastal areas

Dr. Rosa T. Perez | Research Fellow, Manila Observatory

> *"Resilience is beyond adaptation, it is transformation."*
>
> ~Dr. Rosa T. Perez

Presentation outline:

- Risks: Concepts and Definitions
- Components of Risks
- How does climate change affect coastal marine ecosystems?
- State of knowledge in detection and attribution of climate change impacts in coastal areas.
- Why do we want to assess Risk?
- Coastal Adaptation and Risk Management: Current and Recommended Measures and Policies
- Conclusion



The Philippines is at risk

Highlights:

Climate change affects the coastal ecosystem. Philippines is at risk being in the Pacific Ring of Fire; experiencing all the different kinds of hazard. Hazard is only one component of risk.

Disaster risk is a probability and, when it is realized, then you have disaster. Climate and development contribute to the probability of risk.

Risk is the potential loss of life, injury, or destroyed or damaged assets, which could occur to a system, society or a community in a specific period of time, determined probabilistically as function of hazard, exposure, vulnerability, and capacity.

There is, however, hope, as it is only a potential, and we can do something to stop the risk from being realized.

Climate hazards and related drivers of risks in the coastal area include sea level, storms, wind, waves, extreme sea levels, sea surface temperature, freshwater input, and ocean acidity. Ocean acidification is one of the rarely discussed climate related drivers. It is sometimes referred to be climate change's equally evil twin because it is a very slow event and cannot be observed as it happens underwater.

The global sea level rise predicts that areas around the coasts will be underwater by the end of the century. It is a slow process but becomes a hazard if there is a typhoon as it intensifies storm surge height.

Climate change affects marine animals, corals, plants, particularly mangroves, with the changes in the availability of light, salinity, and temperature. Warmer temperature changes the species composition of an area as some animals shift towards more favorable environment.

Risk assessment is important to identify the following:
- What can go wrong?
- What are the effects?
- How bad are the effects if something goes wrong?
- How often do these events occur?
- What could be done?

The assessment leads to identification of coastal adaptation and risk management options that are individual, structural, and institutional.

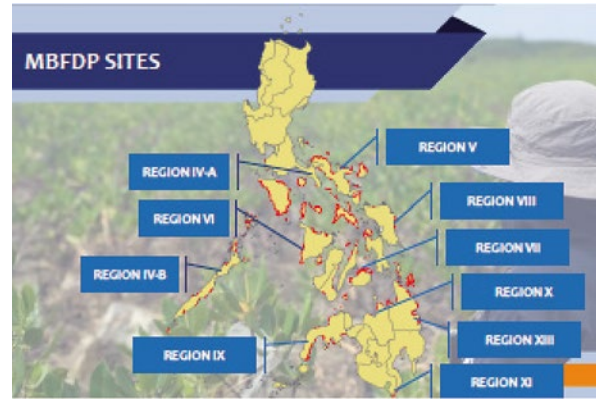
The recommended solution is for Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR):
- as a broad formula for research, policy, and practice to concurrently address climate change adaptation and disaster risk;
- as a blueprint for early action on climate-related extremes – addressing the current adaptation deficit in the short term (disaster risk reduction), and mainstreaming climate change into medium term (climate change actions);
- CCA and DRR mean comprehensively reducing, preparing for, and financing climate-related risk, while tackling the underlying risk drivers, including climate-related and socio-economic factors; and
- engaging relevant stakeholders in the process;
- the long-term goal would be risk resilience: transformation.

The Mangrove and Beach Forest Development Project: Lessons Learned

Dr. Carmelita Villamor | National Coordinator, DENR-MBFDP Director, DENR-Ecosystem Research and Development Bureau (ERDB)

Presentation outline

- Background of Mangrove and Beach Forest Development Project (MBFDP)
- Features of MBFDP
- General Criteria for Site Selection
- Target and Timeline
- MBFDP Process
- ERDB-MBFDP Technical Bulletin
- Accomplishments
- Issues and Concerns
- Lessons Learned



Highlights:

The Mangrove and Beach Forest Development Project (MBFDP) has been allocated PhP 1 Billion for mangrove and beach forest rehabilitation and development to enhance coastal protection and resiliency

The project has the following features:

- Science-based
- Implantation of case-for-work scheme in the different stages of plantation
- Incorporation of capacity-building and sustainability mechanism strategies
- Distinct target sites from the regular National Greening Program (NGP) mangrove sites
- Strong monitoring and evaluation system

The areas selected were affected by typhoons Yolanda, Santi, Odette, Pablo, Sendong, Vinta and Labuyo. Areas affected by siege and unrest as well as earthquakes were included in the selection. Total target area is 50,000 hectares.

To date, 50,417.71 hectares of mangroves and beach forest established and 140,186,391 planting materials (propagules and seedlings) produced. There were 88,231 jobs generated and 55,028 individuals benefitted. General weighted average survival rates of outplanted mangroves at 78.3% and beach forest at 76.3% conducted February to May 2016.

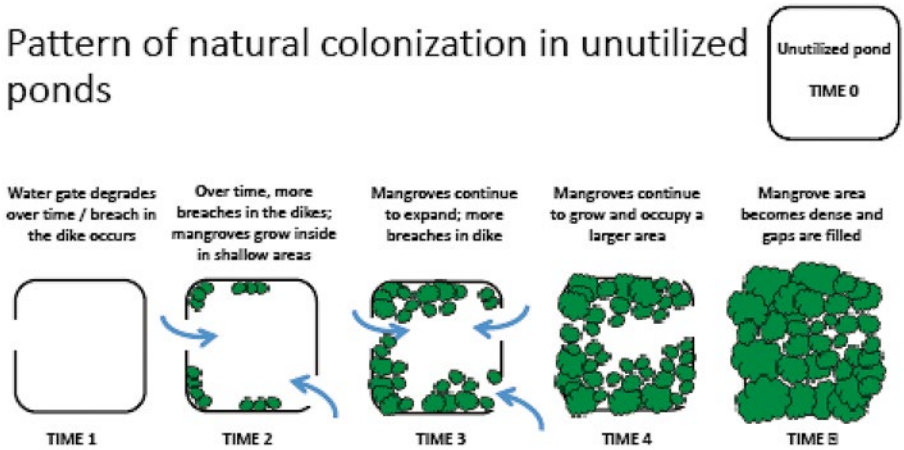
Weather disturbances, particularly El Niño, are the biggest threat to planted propagules and seedlings. Other issues and concerns were planting of immature propagules and incorrect species, barnacle infestation, breakage due to fishing/passage, washing out due to strong waves, some selected sites were not suitable for planting, and financial concerns or delayed release of funds.

Rate of natural mangrove colonization in accreting shoreline and unutilized fishponds

Dr. Fernando Siringan | Institute Director, Marine Science Institute, University of the Philippines

The presentation answers the following questions:

- How fast do mangroves colonize unutilized fishponds?
- What mangrove species grow in these disturbed sites?
- How does natural colonization on eroding or accreting seaward fronts compare to that in unutilized fishponds?



Highlights:

The presentation is based on a Master's Thesis by Gianina Albano with the support of Maricar Samson, PhD.

There are two (2) study areas – Municipality of Juban, Sorsogon and Municipality of Sibunag, Guimaras. Satellite images were retrieved from Google images and were digitized using Manifold.

Colonization rates in fishponds were estimated from 1,890 m^2/yr to 2,035 m^2/yr based from two project sites. Natural forest in Guimaras with eroding fronts undergoes densification with colonization rate of 1,297 m^2/yr while mangrove forest in Sorsogon with accreting front undergoes densification and expansion at 2,820 m^2/yr.

ADD fast recolonizing species

Main points of the study:

- Mangroves naturally colonize abandoned fishponds quickly
- Natural colonizers are more resilient to typhoon impact (case of Typhoon Yolanda)
- Money set aside for seafront rehabilitation efforts can be redirected to re-acquiring these fishponds instead
- Reversion of abandoned and underproductive fishponds to mangroves would address greenbelt targets and coastal protection

Advocacy and accountability engagements to protect mangroves in Palawan

Atty. Grizelda Mayo-Anda | Law Professor, Palawan State University College of Law

Presentation outline:
- Good News and Bad News
- Disturbing Trends in Palawan
- Advocacy Engagements
- Accountability Engagements
- Key Challenges and Insights
- Environmental Protection Order
- Writ of *Kalikasan*
- Writ of Continuing Mandamus


Massive Mangrove Tanbarking of *ceriops tangal* in Balabac, Southern Palawan

Highlights:

Palawan comprises 30% of mangroves in the country with 24 mangrove species in the island. Its cover increased from 58,000 hectares in 2005 (Palawan Council for Sustainable Development) to 63,532 hectares in 2015 (National Mapping and Resource Information Authority). The average mangrove density is 1,438 to 2,739 trees per hectare.

There is a continuing conflict between mangrove conservation policies, laws, and government plans. Such conflicts results in mangroves being used as resettlement areas, re-classification of lands covering mangroves, and reclamation and other infrastructure development. In addition, the implementation of mangrove laws and policies is weak such that illegal occupation of mangrove areas occur, debarking or tanbarking, illegal logging, and illegal fishpond operations take place.

Advocacy is important because of the following reasons:
- Change in attitude and behavior
- Give an initiative or project a broader impact
- Change policies and practices
- Reforestation institutions? and compel the government to do its job
- Alter power relations

The challenges in mangrove protection are the institutional and bureaucratic issues in the government. The divergent understanding of issues and approaches as well as different community interests contribute to difficulty of implementation.

In spite of the challenges, there are important opportunities with Supreme Court ruling on Prosecution of Environmental Cases (SC-RPEC) which highlights the following:
- Citizen Suits
- Environmental Protection Order
- Writ of *Kalikasan*
- Writ of Continuing Mandamus
- Strategic Lawsuits against Public Participation (SLAPP)
- Precautionary Principle

> *"Let us celebrate our successes, no matter how small."*
>
> ~Atty. Mayo-Anda

The Negros Occidental Initiatives: The Provincial Natural Resources Management Framework

Ms. Maria Elena San Jose | Senior Environmental Management Specialist, Provincial Environment Management Office – Negros Occidental

Presentation outline:

- Background
- Coastal Resources Management Issues
- Top 10 Natural Resources Management Initiatives of Negros Occidental
- Highlights of PNRM Framework Implementation for Coastal and Marine Ecosystem in Negros Occidental
- Future Directions

Highlights:

Twenty-five years of environmental work of the Provincial Government of Negros Occidental through the Provincial Environment Management Office (PEMO).

ADD details on CRM issues

The top 10 natural resources management initiatives of the province are as follows:

1. Creation of the Provincial Environment Management Office
2. Creation and support to inter-local government unit (LGU) alliances
3. Enactment of the Provincial Environment Code and formulation of the Provincial Natural Resources Management Framework
4. Paradigm shift in the Natural Resource Management Program implementation
5. Increased participation through linkaging and networking
6. Intensify information, education, communication (environmental thematic activities), and recognition of partners thru Seal of Environmental Good Governance
7. Creation of Legal Unit to strengthen environmental law enforcement

8. Establishment of local conservation areas as a microcosm of our vision
9. Institutionalized network of cooperation
10. Harmonization of Coastal and Marine Ecosystem Management Programs in Negros Occidental

One of the most strategic initiatives of PEMO is the creation and support of the Inter-LGU alliances or Inter-Local Cooperation (ILC). There are six (6) ILCs in the province with the first one established in 1996 and the latest in 2014, which covers one of the recently-declared RAMSAR sites. The ILCs are also supporting different environmental initiatives in the region.

Pedada, Ajuy Breakwater Case Study

Ms. Rona Joy Loma, Project Manager, Zoological Society of London–Philippines

Presentation outline:

- Rationale
- The Pedada, Ajuy breakwater
- Surveys
- Breakwater design
- Breakwater construction
- Monitoring of sediment accretion
- Monitoring of mangrove survival and growth
- Conclusion and recommendations

Highlights:

The conversion of mangrove areas into agriculture ponds is the main contributor to declining mangrove cover in the Philippines. To address this, many mangrove rehabilitation efforts were launched but with low survival rates.

In ZSL-Philippines sites, the common mangrove rehabilitation issues are burying of newly planted mangroves in sediment, uprooting of seedlings, and severe coastal erosion.

Coastal erosion is present in all areas including Barangay Pedada, Ajuy, Iloilo. The area is dominated by century-old *Sonneratia alba (pagatpat)* and *Avicennia alba (bungalon)*. Typhoons and big waves that hit the area are contributing factors to the low success rate of planted mangroves.

ZSL-Philippines aims to establish a solid mangrove and beach forest greenbelt by planting in forest gaps and improve survival rate of mangrove rehabilitation. With this as objective, a breakwater design to reduce erosion and increase mangrove survival and growth was developed with an engineering company. The breakwater was designed to be temporary, which is only to last until mangroves have grown to 5-10 meters.Yearly visual surveys were conducted to monitor effectiveness of the breakwater.

Conclusion and recommendations:

- Protective structures, including breakwaters and barriers, may be required in highly eroded areas with strong wave action to protect young mangrove plants.
- Geological and hydrological studies are needed prior to construction of gray infrastructure along the coast to ensure a suitable design that will not affect local circulation and sediment transport.
- Involvement of various stakeholders in constructing such infrastructure will enhance the sense of ownership of the project.
- Planting should commence 2-3 years after the start of sediment accretion for stability.
- Long-term monitoring of the rehabilitation area will help evaluate the effectiveness of the structures.

Open Forum for Session 1

Comment from Mr. Klaus Schmitt on the breakwater structure:

> *Water can go out if permeable structure is used. In permanent structures, sedimentation starts from land to the breakwater. Whereas sedimentation startsfrom the breakwater towards the land for non-permanent structures. There is more than one solution backed by science and we only need to choose the most appropriate to the conditions and the place.*

Question for Atty. Mayo-Anda

DENR has authorized our organization to plant mangroves and take care of it, but the area will be affected by the LGU proposed seaport. Is there a possibility to save the planted area?

> *Champions are important to support and promote conservation efforts. The law and scientific-backed studies can be used to support the initiative. However, the government program affecting the effort has to be checked. The Comprehensive Land Use Plan of the municipality should be used as reference. All these can be used as basis to convince and engage the government. If the issue is institutional, study the available options.*

Question for Dr. Siringan

Do you know the depth of ponds? Is there a need to stop mangrove planting to avoid mistakes?

> *At low tide, water depth is less than knee high. At maximum tide, height is just above a meter depth. As shown in the presentation, colonization is along the fringes where it is always shallow and where sediments accumulate. The study only used satellite data to monitor growth, but it also recognizes the role of pond depth.The depth of fishponds of Guimaras, Sorsogon, and some fishponds north of Manila Bay are about 2 meters deep with continuous transfer of mud from the ponds to its sides to increase height of its borders (dikes) to prevent overflow during flooding.*

I think we should push for greater percentage of reverting unutilized fishponds into mangrove areas. The budget would be PhP25,000 per hectare (based on 2007 rate) and to compare it with the PhP1B budget, there would be more money saved even with 50,000 hectares target of the MBFDP project.

Question for Ms. San Jose of PEMO
Are there issues or concerns such as overlapping of roles and questions on efficiency upon changing the organizational structure, as a way of adopting to the environmental approach?

We defined the functions and roles of each staff. The coordinators have their clear and specific assignment and functios, including their assigned ecosystems – upland and coastal.

Question for Atty. Mayo-Anda
Do you recommend a policy instrument to strengthen accountability of government officials and project audits?

It is a very good question because laws are sometimes too general. Except for specific agreements in terms of government commitments. For example, the Annual Investment Plan is based on the Comprehensive Land Use Plan and there is a commitment that X amount must be allocated. Plans can be powerful basis for demanding accountability. We need to look at plans, like the investment plans, and they always become a top down approach. At least we have an example from Negros Occidental (PEMO). We need to utilize those opportunities. Specific instruments are not needed as long as those plans are accessible, well-written and participatory particularly in the budgeting and planning process. You just need to utilize tools we have now for effective governance. The Negros (Occidental) experience reminds us of that opportunity. The question is how you determine the government's willingness to respond. Does it need a written letter or petition from a civil society group or any stakeholders? It would be very important because that written document should be replied to.

Question for Dr. Siringan
It is difficult to propagate mangroves. We asked assistance from UP MSI to help us propagate other mangrove species for diversity in our reforestation project site and prevent pest and diseases and improve chances of survival. Is there a possibility for your institution to assist our project?

Unfortunately, we do not have a faculty or researcher whose work is on the biology of mangroves. That is still a gap in UP-MSI. What we can do is to recommend you to the right group of people who can possibly help you. Dr. Primavera has developed a protocol on how to go about it. But as an effort on our part, the area across the laboratory is now an experimental site. The objectives of the experiment are (1) to address coastal erosion and (2) to plant mangroves in hard substrates. First, we removed the jetty that was formerly operational and used by the municipality then collected all the rocks/stones and planted different species of mangroves to see survival rate. We were successful in addressing the issue of coastal erosion. The solid waste pier prevented the sediment coming from west to east side where a public beach and our site are located. We were successful in that part and the public beach became bigger.

We want to use this opportunity to ask for partnerships. If you have nurseries, we would like to ask for seedlings that we can plant at the experimental site.

Question for Atty. Mayo-Anda
Can the LGU just take over FLAs in the municipality?

Firstly, thank you for your effort in planting mangroves. FLAs can't be issued anymore but one option is local or area-specific agreements with the agencies involved. We tried it with Dr. Primavera and we have a national joint MOA with DILG, DENR and DA with the National Convergence Initiative. Ten (10) years passed already and it is still unsuccessful. For it to work, you have to do it locally or area-specific and have a MOA with the local or provincial government and DENR. The question is if the FLA is expired. If not, then it is not a crime to take-over the area as the objective of taking over is also good. I would suggest for the LGU to coordinate with BFAR, DENR and DILG.

Question for Ms. Loma
The breakwater experience is interesting but quite expensive and a long process. How can we prove to the LGUs that this is worth doing?

Answer of Dr. Primavera:
The expensive part of this intervention is the consultancy fee. We buy the science. It is very good science that is why it is effective. Our hope is that more LGUs will engage in this consultancy groups. Their clients are beach resorts and other rich clients. If the LGUs will engage in this scheme, there is a possibility that the rates will go down and they can follow available materials.

Comment of Atty. Mayo-Anda:
Let us not give up on the National Convergence Initiative. We still have hope with the NCI. Harmonization is needed between agencies, including the Department of Finance.

Comment of Dr. Siringan:
When you put any structure anywhere along the coast, there is always a chance that you change the circulation or movement in the area. We always have to ask the question if the impact will be negative or positive. In the case of Pedada, the erosion is already big in the area right behind the breakwater that was previously occupied by mangroves. There is a need to look into the historical context of the area before putting any structure – hard or permeable. There are many methods that are available like the reef balls, a permeable structure which we have to explore. But then again, any structure that you put offshore or along the coast will have an impact and you have to check if that is the impact you are aiming to achieve.

Question for Ms. San Jose
Conservation is equal to livelihood. Can you cite specific experiences to support that?

For this principle, we have several local conservation areas (LCA) in Negros Occidental that focus on the conservation of mangroves and beach forests like Himamaylan and Kabankalan. The fisherfolk in these areas get their sustenance from mangroves. We do not need to provide financial assistance for their livelihood. We just need to

increase their level of awareness so they will realize the need to conserve and protect the area because they get their livelihood from it. Every year, researchers and visitors come for birdwatching in the mudflats of San Enrique. The locals serve as tour guides to the guests. They are aware that the mudflats are feeding area of birds, thus the need to protect this ecosystem. The local conservation ordinance states collection of environmental and user' fee for the area. We see to it that the LCA management board is active and conservation efforts and goals are pushed forward.

You have ten (10) initiatives in your program, do you have an example on the socio-economic impact on the conservation of the coastal environment.

We are working on the data as of the moment. An example of an impact on the environment would be the increase in fish abundance in Hulao-Hulao in Southern Negros after its 7-month closure. Dugongs and sea turtles were also sighted in the MPA.

Session 2:
Mangrove rehabilitation with focus on reversion of abandoned, underutilized, and underdeveloped fishponds to mangrove forests.

The Philippine National Aquasilviculture Program

Ms. Abigail Javier | Aquaculturist II, National Brackishwater and Fisheries Technology Center, Bureau of Fisheries and Aquatic Resources

Bureau of Fisheries and Aquatic Resources – SUCs

Mangrove Rehabilitation Project

FY 2012 – 2016 and FY 2017

REGION/ CENTER	Area Covered		Estimated no. of area planted (ha)	No. of beneficiaries
	No of Project Sites			
	Municipality	Barangay		
Region 1	51	204	1,598	4,178
Region 2	21	102	1,947	5,806
Region 3	35	104	894	2,819
Region 4a*	29	87	683	810
Region 4b*	40	115	1,037	1,528
Region 5	55	134	1,061	1,695
Region 6	42	124	1,139	3,209
Region 7	66	224	1,340	7,585
Region 8*	60	170	682	733
Region 9*	18	56	581	2,025
Region 10	47	150	1,284	2,568
Region 11	24	82	791	1,881
Region 12*	4	6	688	561
Region 13	27	46	865	1,806
ARMM	39	129	1,455	9,805
NBFTC	12	31	151	1,206
TOTAL	564	1,764	16,197	48,215

* Not updated

Presentation outline

- Background
- Mangrove rehabilitation project
- Aquasilviculture
- General observations
- Future interventions

Highlights:

The Philippine National Aquasilviculture Program is being implemented through a MOA between BFAR and CHED with the goal of addressing climate change, contribute to food security, and alleviate poverty among marginal coastal fisherfolk. It has three (3) components: (1) mangrove resource rehabilitation, (2) aquasilviculture projects, and (3) community-based multi-species hatcheries (CBMSH). The projects are implemented in abandoned, underutilized,and underdevelopedfishponds, and DENR and LGU identified areas. It is covering more than 61 coastal provinces, 560 municipalities and 1,764 coastal barangays. The program duration is from 2012 to 2016.

Mangrove rehabilitation accomplished 94% of project target with planting of 93,330,950 propagules and seedlings. Total area covered was 16,197 hectares in 564 municipalities with 48,215 beneficiaries. Mangrove rehabilitation was constrained by (a) AUUs and cancelled FLAs still occupied by operators or illegal occupants, (b) slow procurement/ bidding process, (c) limited support staff, (d) poor site selection and inappropriate species planted, (e) mangrove diseases, pests, human and animal damages, and (f) natural calamities.

Aquasilviculture component accomplished 77% of targets with 1,217 projects established. These are distributed in 269 municipalities and included 2,032 beneficiaries. However, only 20-30% of the established aquasilvi projects are operational. This is due to (a) insufficient supplies and materials to operate the project, (b) lack of interest or willingness of FA members to do voluntary work, (c) low income due to mortality of stocks, poaching, etc, and (d) natural calamities.

Recommendations and Future Interventions:

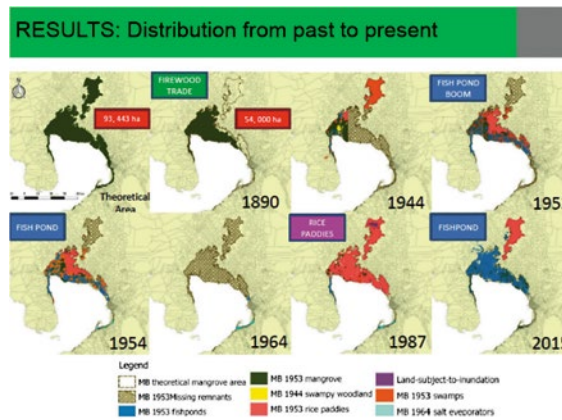
- Continuous rehabilitation of denuded mangrove forests, particularly AUU fish ponds
- Monitoring and protection should be given more importance insteadof straightforward paid planting
- Continuous capability building or skills training of project beneficiaries; promote sustainability and community' ownership of projects
- Make coastal fisherfolk sustainably productive through aquasilviculture and other environment-friendly livelihood projects
- Validate and assess mangrove areas reported as rehabilitated in terms of surviving mangrove trees and extent of cover
- Conduct stock assessment studies in established CBMSH areas and mangrove rehabilitation projects to determine improvement in catch of fisheries products
- Rehabilitate and protect equally important coastal ecosystems

Restoring mangrove forests in the coastal floodplains of the Pampanga River delta: Implications to the environmental vitality of Manila Bay

Dr. Rene Rollon | Institute of Environmental Science and Meteorology, College of Science, University of the Philippines

Presentation outline:

- Background of Manila Bay
- Mangroves in Manila Bay
- Objective of the study
- General Approaches and Methods
- Main Results
- Conclusion
- Recommendations



Highlights:

About a quarter of the population of the Philippines live along or around the 200,000-hectare Manila Bay. It is bounded by five (5) provinces: Cavite, Metro Manila, Bulacan, Pampanga, and Bataan. Manila Bay is one of the biggest fishing grounds and reportedly big fish catch volume in the Philippines.

The main objective of the project is to determine the past and present distribution of mangroves along Manila Bay, with focus on the Pampanga River flood plain. This project tries to reconstruct historical mangrove distribution in an area that could have been rich in mangroves.

The general approaches applied are as follows:
- Present distribution: digitizing available high resolution satellite imageries (mainly Google Earth)
- Past distribution: compilation of old topography maps (pre-1900s, 1944, NAMRIA, topography maps in 1950s, 1960s, also Google Earth); geo-referenced, digitized
- Names of barangays, towns and cities (e.g. Pagatpatan, Sasahan, etc.), which may be linked to mangroves flora, fauna, or associates were mapped as another layer of matching historical distribution.

Main Results
- There are a number of barangays, towns and cities named after a mangrove (e.g. *nilad* or *Scyphiphora hydrophylacea* for Maynilad/Manila) and after mangrove associates and faunal species.
- The theoretical distribution from past to present based on the maps available. It showed the decline of mangrove cover from past to present and showed a trend on the different uses of the area. There is a cyclical change or conversion of land use from rice paddies to fishponds to salt evaporators.
- There is a big loss of mangrove cover over the years.

Conclusion Remarks

1. Past extent of mangroves in Manila Bay
   - Expansive in the past (93,443 hectares)
   - Supposedly a significant support estuarine systems (especially Pampanga Delta) for Manila Bay fisheries
   - Critical roles as buffer, feeding, spawning and nursery
   - 1:2 mangrove to bay area ratio
2. Present distribution reflects huge loss
   - Decimated today, with only 1,308 hectares (1%) left
   - Apparently converted to fish ponds/rice paddies (74,879 hectares, 80%)
   - Other uses (18,255 hectares, 19%)
3. The 90,000 hectares loss in relation to carbon balance (carbon change mitigation):
   - Carbon stock lost (released): 937 metric tons C per hectare x 90,000 hectares means 84.33 million metric tons C (released)
   - Carbon not sequestered: 1.5 metric tons C per hectare per year x 90,000 hectares x 75 years means 10.125 million metric tons C (not sequestered)
4. There is continuing pressure and threat to Manila Bay

The main question that has to be answered is where we should be going. Could we still return 10% of what has been lost?

Initiatives to strengthen community resilience through Integrated Risk Management

Dr. Annadel S. Cabanban and Dr. Arne Jensen | Wetlands International

Presentation Outline
- Wetlands International
- Definition of Wetlands
- Project Areas in the Philippines
- Mangrove Rehabilitation
- Lessons Learned: Implementation of the Coastal Protection Strategy Tacloban and Palo and of the One Resilient Team: Tacloban Project (piloting Greenbelts and Fishpond Restoration)

Highlights:

Partners for Resilience is an alliance of The Netherlands Red Cross, Care, Cordaid, Climate Centre, and Wetlands International. The alliance members are promoting integrated risk management which is basically the provision of strategies for environmental management, rehabilitation and restoration in disaster risk reduction and climate change adaptation. Our goal is to build the resilience of the communities to disasters.

The projects are in the following areas:
- Manila Bay and adjacent coastal zone
- Tacloban-Palo-Tanauan
- Talacogon-Monkayo
- Cagayan de Oro

The publication *Mangrove Restoration: To Plant or not to Plant*, which is translated into Filipino serves as a guide for the project. It has the following aims:
- To ensure biophysical conditions are appropriate for mangrove recovery
- To ensure socio-economic conditions allow mangrove recovery

The publication can be downloaded from this web address:
https://www.wetlands.org/publications/mangrove-restoration-to-plant-or-not-to-plant/

The implementation of the Coastal Protection Strategy for Tacloban and Palo has the following realizations:

- Comprehensive Land-Use Planning
- Barangay Disaster Risk Reduction and Management (BDRRM) planning and implementation
- Build hard engineering where needed without reducing biodiversity and ecosystem functions
- Establish/restore greenbelts with suitable mangrove species or beach forest
- Keep space for rivers and streams
- Restore vegetation in the 20x20 meter public riverbank zone
- Use coastal wetlands as a critical ecosystem – DRR protected flood surge buffer

Taking off from the Coastal Protection Strategy, the Partnership for Resilience Alliance partnered with the Local Government of Tacloban City and NGO One Architecture to implement the project "One Resilient Team: Tacloban" with the seed grant from Global Resilience Partnership. The aim is to document innovative approaches as part of DRR sound coastal protection for possible scaling-up. The objectives include:

a. Establishment of mangrove and beach forest as part of coastal DRR greenbelts; and
b. Ecosystem protection, management, and restoration as part of integrated BDRRM

Lessons learned on:

a. Beach forest pilot project: "smooth sailing" for LGU and community implementers to implement within their own area of jurisdiction
b. Mangrove fishpond pilot project: despite science information in place and shared, it is "mission impossible" to change old policies and department cultures.

Important messages that the presenter wanted to get through are the following:

- A mudflat is not just mud. It is a high value food chamber for many coastal communities;
- Many mudflats are also the only place where most migratory birds can feed and roost. They do NOT thrive in mangrove plantations;
- The Philippines is a member of the RAMSAR Convention and the Convention for Migratory Species that actively promote maximum protection of migratory birds, while their food flats are converted into single species tree plantations;
- All over the Philippines, food flats are lost at an alarming rate. No food means more species and populations risk extinction. The flyway has more threatened species than any other flyway in the world.

Leganes Case Study: Reversion of Abandoned Fishpond to Mangroves

Mr. Wilson Batislaon | Municipal Environment and Natural Resources Officer, Local Government of Leganes, Iloilo

Presentation Outline:

- Project Description
- Timeline
- Partners
- Importance of Bamboo T-fence
- Results and Impacts
- Transferability and Sustainability
- Awards and Recognition

Highlights:

Katunggan Eco-park is a 15-hectare abandoned, underutilized, and unproductive (AUU) municipal-owned fishpond, which was successfully reverted to a healthy mangrove forest through assisted natural regeneration (ANR), active monitoring, and surveillance.

Katunggan Eco-Park holds 10 species of mangroves; site is visited by 39 species of migratory birds

The following are the project objectives and targets:

- Promote sustainable management and rehabilitation of mangrove forest as carbon sink for Climate Change Mitigation and Adaptation.
- Develop effective maintenance and protection of the mangrove forest and its ecosystem following science-based protocols.
- Ensure food security and livelihood of coastal communities.
- Raise public awareness and education on the benefits, importance, and protection of mangrove forest.
- Encourage community-based participation in the rehabilitation and protection of mangrove forests.
- Support the development and research of mangrove forests.
- Decrease the vulnerability of coastal communities to natural disasters (e.g. typhoons, erosion, storm surge, etc.)
- Create awareness on various laws on mangrove conservation.

The project has accomplished the following:

- Produced more than 86,000 seedlings which are mainly from wildlings bagged by various volunteer groups, students, LGUs, and ZSL from 2009 to 2015;
- A total of more than 82,000 seedlings planted;
- Monitoring and maintenance activities were conducted to ensure survival of mangrove seedlings;
- Re-orientation of newly-elected municipal officials on the mangrove rehabilitation program in January 2010 ;
- Construction of a bamboo hut as reception area for volunteer groups;

- The abandoned fishpond was declared fully planted and focus shifted to maintenance activities of out-planted seedlings;
- The Municipality of Leganes passed the Leganes Mangrove Ordinance No. 2011-227 establishing regulations for conservation and protection of mangrove areas, and providing penalties for violations;
- Deputation of Bantay Dagat for Leganes in 2012; and
- Launching of the *Katunggan* Eco-park in 2014.

There were research studies conducted in *Katunggan* Eco-park. The eco-park also became a learning site visited by foreign and local tourists.

One strategy that the eco-park employed is the installation of bamboo T-fence in eroded portions with reference to the studies conducted by Dr. Klaus Schmitt of the German Development Cooperation (GIZ).

Open Forum for Session 2

Question for Ms. Javier
What is your incentive for the fisherfolks?

We try to increase awareness by campaigning on the importance of mangroves, capacity building, and developed a livelihood component of the program. The reaction on the ground varies. There is a need to increase effort in awareness campaign.

Question for Dr. Cabanban
What are your actions on the missing wetlands in Boracay Island and how do you collaborate in its rehabilitation?

We are not currently working in Boracay Island but we are following the developments.

Question for Ms. Javier
Do we have a successful and sustainable PNAP site which can be a model replicated in other areas?

There is one in Bataan and another in Batangas. In every region there are sites that can be considered successful.

Question for all
Contrary to natural mangrove forest, plantations are very densely planted. Doesn't that leave less space for non-vertebrates such as shells? Is a single species mangrove plantation equal to less diversity?

Dr. Rollon:
It is less diverse in terms of flora, but not in the case of fauna

Question for Ms. Javier
Define aquasilviculture?

It is silvi-fishery. You plant mangroves and you can culture or farm fish or crabs. There are models: 50-70% of the area is allocated for mangroves, while the rest for fish or crab culture. It is more environment friendly than the developed fishponds.

If 90 million mangroves are planted, what is the survival rate at 1 year, 3 years, and 5 years?

The survival rate is varied – from 0-90%. There was a survival rate of 98% in some parts of Quezon and 0% in Tacloban which was damaged by the typhoon.

Dr. Siringan's research found out that *Avicennia* and *Sonneratia* grow better in abandoned fishponds. Why did you plant *Rhizophora*?

Rhizophora species is fast growing and easier to propagate than the other species. Government processes, especially of DBM, does not allow the plantation of Avicennia and Sonneratia as there is limitation in duration of projects.

Comment from one of the state universities with a PNAP Project:
On the first year of the project, we got low survival so we intended to return the remaining funds.The Commission on Audit recommended to prepare a proposal use the remaining money for monitoring of the surviving mangroves. If you really want to walk-the-talk and see results in our lifetime, connect it to money. Include biological assets in the financial statements because trees have value. One learning from the PNAP is that we should include the protection of the mother trees – pay people to protect the trees.

Request for BFAR by Atty. Mayo-Anda
I would like to reiterate respectfully for the BFAR to revisit the PNAP.

Question for Dr. Rollon
Can we appeal to the Supreme Court to stall reclamation projects in Manila Bay? The reclamation projects can put at risk all efforts done in the area. No biodiversity assessment were conducted in the project sites. We can use findings of the high court for the case.

It is difficult to reject Environmental Compliance Certificate application once it has started with the process. It is easy to approve an ECC application. If the government doesn't act on the ECC application after sixty (60) days, it is good as approved.

Question for Dr. Jensen
How are the stakeholders in Tacloban doing "mission impossible" together? (This is related to the question to Dr. Rollon above, in terms of projects that are done in the mangrove ecosystem).

The project (One Resilience), together with Red Cross, is a non-formal platform where we discuss issues, share information, and dialogue with our partners. This way, we try to strengthen participation of the stakeholders. We put all efforts together because some of the areas also deal with different agencies like the Department of Public Works and Highways, DENR, LGU, etc. Aside from mobilizing communities, you also have to make sure that you manage to get through the message to agencies concerned on better solutions for communities in the area. This also goes with policies.

There is no excuse not to focus on diversity. Less diversity, less options. We also would like to spend more time to put all good efforts together. You cannot plant and reclaim

just that easy where you have migratory bird species. You have to do a biological impact assessment.

Question to Dr. Villamor and Mr. Batislaon
What are the efforts from DENR or NGOs that address coastal erosion along the mangrove-suitable planting area?

This is still a big question to us in DENR. But one of the projects of the DENR is to address coastal erosion in planting mangroves. We are also protecting coral reefs and seagrass beds.

In relation to the question on ECC, there is no valuation before its issuance. Without valuation, we cannot put worth on what they are destroying. We cannot talk about data on ecosystem services of mangroves. Valuation is not available at the moment and we are asking partners from the academe and other sectors to help us with it. It will help us in our recommendation to the Secretary to sign or not to sign the ECC application.

Mr. Batislaon:
You have to put structures to protect the mangroves before you start planting. We recommend T-fence for protection since it is not expensive and ensures survival.

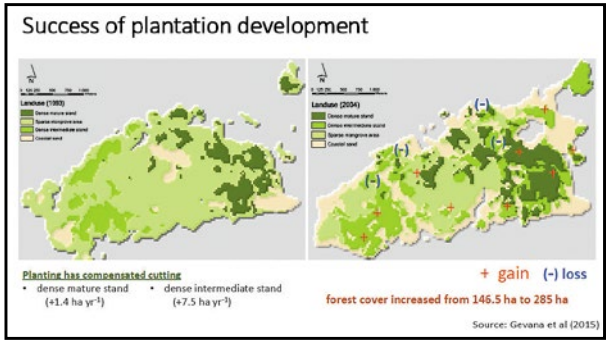
Session 3:
Carbon stock assessments of mangroves in the Philippines

Carbon stock of the Philippine Mangroves: Prospects and Challenges in Blue Carbon Governance

Dr. Dixon Gevaña | Assistant Professor, University of the Philippines Los Baños

Presentation outline:

- Blue Carbon Concept
- Blue Carbon estimates: Regional and National
- Blue Carbon potential of mangrove plantation
- Blue Carbon in International Climate Change Agreements (Prospects and Challenges)



Highlights:

Blue carbon was coined to differentiate it from the black/gray carbon (emissions, industries) and the green carbon (forests). Blue carbon is stored and released from coastal ecosystems namely: salt marsh, seagrass meadows and mangroves.

Mangroves are part of the ridge-river-reef landscape. It filters the water from upland, protects the coasts from big waves, and sequesters carbon. Carbon is intangible so it is difficult to value (monetary) and pay.

In primary science, carbon sequestration process is photosynthesis. The tree grows, which is the result of stocking in carbon. When you burn wood, carbon sequestered will become carbon emitted.

In 2009, there was an increase in popularity of the role of coastal forest in carbon sequestration. The United Nations Framework Convention on Climate Change (UNFCCC) had a full article for the Parties' commitment to conserve and enhance, as appropriate, sinks and reservoirs of greenhouse gases and mitigating coastal and marine ecosystems. It is because 83% of the global carbon is in the ocean which serves as the 'radiator' of the Earth.

Dr. Gevaña presented the process on taking carbon stocks in mangroves. He presented data from six (6) natural mangrove stands and showed carbon sequestered by the vegetation and sediment. Results revealed more mud means more carbon stored.

A study was also made in Banacon Island, Bohol, one of the largest mangrove plantations in Asia, on its carbon stock. The successful community-initiated project of Banacon Island received multiple awards for its rehabilitation project. It is part of the Sulu Sulawesi Biodiversity Seascape and its potential for future carbon offset is huge. However, there is poor floristic diversity in the area which is a tendency in mangrove plantations.

In sum, mangroves have a very huge economic and ecological potential for a carbon offset project. The Philippines, with a mangrove area of 356,000ha has a total estimated USD 26.7 Million Blue Carbon Credit.

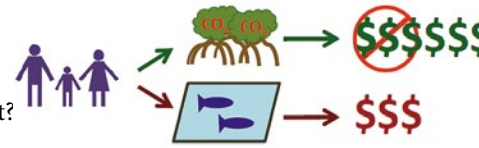
Some other important points of the presentation:
- Blue carbon ecosystems are not yet accounted for under the Land Use and Land Use Change and Forestry (LULUCF), and mangrove reforestation is not included in the UNFCCC.
- Robust science is needed.
- Blue carbon in Kyoto Protocol's Clean Development Mechanism
- Blue Carbon in Cancun Protocol's Reducing Emission from Deforestation and forest Degradation (REDD)
- Comparison of REDD and REDD+

As closing, Dr. Gevaña reminded the participants that there is a need for more collaboration and more researches to continue providing good science.

Moving from mangrove carbon stocks assessments towards payments for ecosystem services (PES) implementation: considerations and challenges

Mr. Benjamin Thompson | PhD Candidate, National University of Singapore Department of Geography

Presentation outline
- Is mangrove PES economically viable?
- Will payments encourage participation?
- How might incoming payments be spent?



Highlights:

The Payments for Ecosystem Services (PES) is a conservation approach whereby land owners (individuals or a community) are incentivized to conserve their land and the ecosystem services it provides, rather than convert it to an alternative land-use that can generate revenue.

PES is mainly used in terrestrial forests and watersheds, not many on mangrove forests.

Answering the questions:

1. Is mangrove PES economically viable?
   Based on the carbon credits and opportunity costs, it is around USD 12 per credit that is required to fully compensate landowners for the loss of aquaculture profits, but the current carbon credit prices are around USD 5.

2. Will payments encourage participation?
   The result of the study suggests that PES could increase on the annual income between 1-8%.

3. How incoming payments might be spent?

Based on the respondents, the following are plans to spend the incoming payments:

a. New fishing equipment
b. Community hog raising project
c. Convenience store
d. Community poultry raising project
e. Microfinance scheme
f. Vendor support

There is, however, a potential problem with the respondents' top choice. Additional fishing equipment might result to increased fishing effort and consequently result to a perverse outcome for a project attempting to produce a net environmental benefit not only to mangrove forests but also to adjacent ecosystems and livelihood resilience.

However, there is also a potential solution which is to focus on new livelihood opportunities such as community hog or poultry raising, craft training and microfinance schemes to encourage local entrepreneurship. Another option is to invest income in other fishing-based assets such as local storage and transport to reduce post-harvest costs.

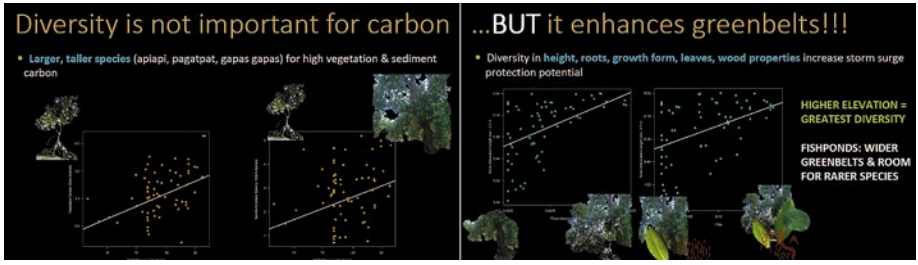
Not all fishers listed the "new fishing equipment" as a choice. Only 31% of females chose fishing equipment compared with 82% for the males. These choices highlight the importance of having a demographically-representative committee to decide how PES monies should be spent.

Mangrove forest protection and rehabilitation for ecosystem services: carbon stocks and coastal protection

Dr. Clare Duncan | Research Fellow, Deakin University, Melbourne, Australia

Presentation outline

- Outline and aims of PhD research in the Philippines
- Findings from two key research chapters
- Lessons learned and gaps remaining: greenbelts and blue carbon



Highlights:

Mangroves in the Philippines have not reached the recommended ratio of 4:1 mangrove to fishpond and there is continuous degradation of mangrove forests.

The mangrove rehabilitation problems, not only in the Philippines but also in other countries in Southeast Asia, are (1) the availability of the seafront areas (narrow and low-intertidal) and (2) mostly monoculture (re)planting.

The research aims to answer the following:

1. Can AUU fishpond reversion produce greater blue carbon and coastal protection than current practice?
2. Does mangrove diversity produce greater blue carbon and coastal protection than monoculture?

Two (2) main factors are considered: (1) the area cover and configuration and (2) the forest structure of the mangroves. These factors may affect the delivery of ecosystems services related to climate change mitigation and adaptation (CCMA).

The approaches employed include the following:

- Site selection includes natural, rehabilitated (seafront and fishponds) mangrove areas in Aklan and Iloilo provinces;
- Carbon stock assessments (trees and soils);
- Forest community structure assessment;
- Required width assessment; and
- Satellite mapping.

Findings:

- Reversion of AUU fishponds has greater potential for CC mitigation and blue carbon projects;
- Planting of narrow seafront areas will not be effective for CC adaptation with regards to typhoon resilience;
- Safe-guarding and increasing species type diversity may result in narrower greenbelt requirements; and
- Current greenbelt width mandates (50-100 m) may be too narrow and need reversion to >200 meters.

Moving forward, there should be prioritization of AUU fishpond reversion. BFAR, DENR, & LGUs integrate to enforce legal mandates such as DENR MO 3 (1991), Joint DA-DENRgen MO 3 (1991) and FAO 197 (2000).

- Sea-facing AUU ponds >370 m width
- Rehabilitation site selection (for CCMA) should follow prioritization flow
- Learn from best-practice case studies (i.e. Leganes *Katunggan* Eco-park)

Open Forum for Session 3

Question for Dr. Gevaña

As a state university, we are involved in the research on carbon successes. We found out that there are uncertainties in the blue carbon estimations and it is still unknown until 2017. There are allometric equations using mangrove roots which are said to be 40% lower than other methodologies. What would be the best model to follow?

If you can develop your own allometric equation, that would be better as you need to contextualize. The allometric equation for this site might not be applicable to another. Scan literature if there are available equations for the Philippines for you to assess the biomass of your site in the absence of site-specific equation.

Question for Mr. Thompson
In very simple terms, how do you explain PES to the community? How can the community access PES?

Use very indirect method as you would want to avoid false expectations in case it is promising additional stream of revenue when the project has been implemented. In my study, we used very indirect language when we were talking about income and additional income sources. It also depends on the base knowledge of the community on mangroves – its importance, its value, concepts on blue carbon, and on other related topics.

On the access, you have to look for those willing to offset their carbon emissions by paying the community to plant mangroves. This also has to be explained very carefully.

Question for Dr. Gevaña
Is there information you can share on the volume of carbon that a hectare of mangrove forest emits when there is a typhoon?

There is still no data but that is interesting to look at.

Question for the panel
What terrestrial species can you recommend that has comparable degree of carbon absorption to the mangroves? Who is responsible to undertake carbon stock assessments?

Answer from Dr. Gevaña:
Mangroves are slow growing compared to terrestrial species like mahogany. If you are just comparing tree species or forests, then terrestrial forest can absorb better.
It is difficult to pinpoint who is responsible to undertake carbon stock assessments. We have to submit the National Green House Gas Inventory System and that is in close coordination with the DENR Forest Management Bureau or Environmental Management Bureau. But this might not be the task for the LGUs as you need the technical knowledge.

Answer from Mr. Thompson:
The responsibility remains with the scientists. I don't think that the concept of blue carbon is rather embedded in the government policies – applying and strategizing. I don't really know whether it is fair to expect them to facilitate the processes. The key task is to communicate scientific assessments to increase awareness.

Question for Mr. Thompson
If ever you put government-owned and replacing individual and/or privately-owned land, how would you appropriate this to your research questions?

The land tenure instrument used in the Philippines is the Community-Based Forest Management Agreement (CBFMA), I would say you would try to apply for those. The process can probably take a long time. As far as I am aware of in the Philippines, PES have been implemented in ancestral domains, particularly in Mindanao.

Question for Dr. Gevaña
How do you assess blue carbon and how do you conserve it?

The process or protocol would take one (1) week of training. It is very detailed and accurate. We are looking at the set-up or platform of REDD and REDD+, which are both with strict protection combined with planting.

Question for Dr. Duncan
How do we link blue carbon with coastal ecosystem conservation efforts? How long will blue carbon stocks recover in a damaged mangrove forest?

It depends on the damage. If the damage is small, it would take 10-20 years.

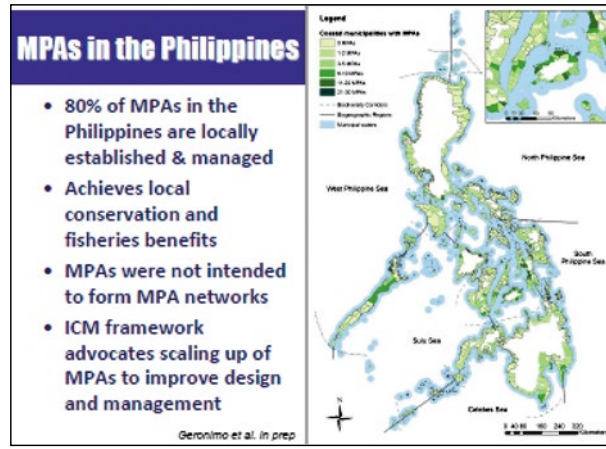
Session 4:
Marine protected areas with multiple habitats for ecosystem resilience

From MPA to MPA Networks Philippines – Lessons in its Science and Practice

Dr. Porfirio Aliño | Professor, Marine Science Institute, University of the Philippines

Presentation outline:

- The Philippines as an archipelagic state
- The Blue Highway
- Connectivity of Coral Reefs, Seagrass and Mangroves
- MPAs as one entry strategy in an Integrated Coast Resource Management
- Biodiversity Resources Information Network Group (BRING)
- Fisheries Information for Sustainable Harvests Bio-Economic Model (FISH-BE)
- MPA Management Effectiveness Assessment
- Learning and Moving Forward



Highlights:

It would take 100 years to protect 10% of the coral reefs in the Philippines. The target is to accelerate the area covered and improve its effectiveness.

Various studies and projects offer lessons to help overcome challenges and find synergies in looking at MPA networks and ecosystem-based management. Some of the approaches are:

- SSS-GSIS – Suitability, Susceptibility, Sensitivity - Governance, Socio-economic, Integrated System
- MERF – Monitoring Evaluation Response Feedback

MPAs in the Philippines were:

- locally established and managed (about 80%)
- aiming for local conservation and fisheries benefits
- not intended to form MPA networks
- introduces to the ICM framework that advocates scaling up of the MOAs to improve design and management

Through the years, the movement on MPAs in the Philippines have progressed. Starting from the works of Dr. Alcala and colleagues from the mangrove committee in the 80s, there were a series of workshops done, strategies formulated, and awards given in the last decades. Just last year, 2017, it was the 10th year of the Marine Protected Areas Support Network (MSN) and the 5th Para El Mar Recognition.

To accelerate the efforts, there was a concept called STAIR WAYS:

Synergies and valued added benefits	**W**in solutions
Thresholds and threats	**A**CT NOW
Accelerated effects	**Y**early reporting (State of the Coasts)
Integrated synergies and value-added effects	**S**cale Up and/or down
Rates and types of change	

Currently, there is the BRING project which is to bring HOPE (Hub of People and Ecosystems) and bring HOME (Hub of Marine Ecosystems). It is a knowledge exchange platform.

In addition, there is the FISH-BE Model with the library of models for coral reefs, fisheries and food security.

There was a significant increase of MPAs in the Philippines with the count to 1,800 as of 2014. More than 400 towns in the Philippines have at least one MPA. The MPA Management Effectiveness Assessment Tool (MEAT) was used to assess about 387 MPAs, 262 of which are with correct geo-references and about 154 MPAs are effectively managed.

The outcomes and targets for Locally-Managed MPAs are as follows:
- Increasing modal MPA size (from 12 ha to 20 ha)
- Increasing number of MPAs (thereby improving representation across the country)
- Regular management effectiveness assessment conducted by local governments and communities
- Increasing effectiveness through better governance systems, linking the ecological with the governance and socio-economic indicators
- Continuous documentation of lessons learned and good (and bad) practices

By 2040, the desired outcome is that 40% of the GDP is contributing to Blue Economy measured by indicators showing benefits on improved quality of life and resiliency from 88 municipalities in 11 climatological regions. MPA networks are also intended to be replicated in the 11 climatological regions.

There are now over a dozen organizations with the MSN, and younger generations were trained to possibly continue the effort.

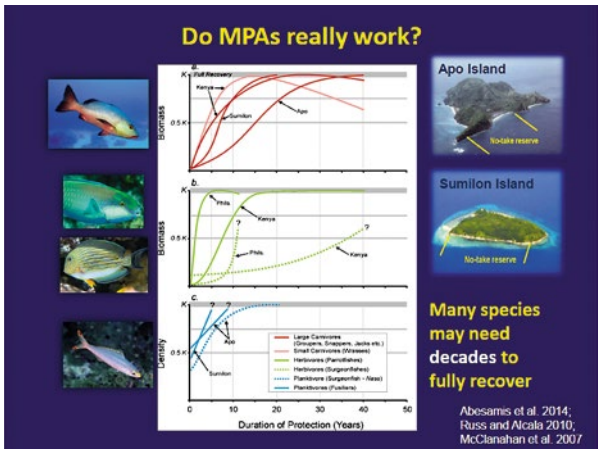
> *"Remember that we only borrowed this time from our next generation."*
>
> – Indian proverb

Mangroves, seagrass and macroalgal habitats as fish nurseries: their importance for marine protected area networks

Dr. Rene Abesamis | Postdoctoral Research Officer, Silliman University-Angelo King Center for Research and Environmental Management

Presentation outline:

- Overview of Philippine MPAs: status, successes and shortcomings
- MPA Networks: theory and evidence for enhancement effects
  a. Larval connectivity
  b. Habitat connectivity – role of mangroves, seagrass, macroalgae
- Challenges (5) – how to make effective MPA Networks?



Highlights:

A brief definition of a MPA from Kelleher (1999):

> *"Any area of intertidal or sub-tidal terrain, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment."*

In the Philippines, the definition may entirely be or include "no-take" area like marine sanctuary, fish sanctuary, marine reserve, and core zone. MPAs can help overfished species to recover using biodiversity conservation and fisheries management tools. These tools, however, are not "cure-all".

There are more than 15,000 MPAs worldwide which covers 6% of the ocean. In 2020, it is aimed to increase to 10% and 30% in 2030. In the Philippines, we have 1,800 MPAs and there was a substantial increase in the 1990s to the early 2000s. Two (2) good examples are Apo Island and Tubbataha Reefs.

MPAs are proven to work as shown in the long-term study in Apo Island. It takes time, however, as many species need decades to fully recover. The Philippines needs more MPAs. 90% of the existing MPAs in the country are small, usually around 10-50 hectares. We are protecting only 0.5% of the municipal waters with the ideal 20% coverage to benefit the community. About 70% of these MPAs are just "paper MPAs" and non-functional. Most of these MPAs are also coral reef MPAs that are only protecting less than 4% of the total reef area. Of the 1,800 MPAs in the Philippines, 7% only include mangroves and 1% only include seagrass beds. There is no data on the MPAs with macroalgal beds.

MPA network, as a concept, is a system that protects a sufficient proportion of the population of at least one species during vulnerable life stages (juveniles and adults). It highlights on the connectivity especially during the vulnerable life stages of the species. Consideration for MPA networks are:

- Size, spacing, and location
- Representation of important habitats (target 20-40%)
- Replication of MPAs within each important habitat

The more MPAs, the more species protected. Larval connectivity is the strongest effect of an MPA network. What is hoped for the MPAs is for its species to reach other MPAs and that speeds up the recovery.

With the study conducted on larval dispersal, here are the implications:

- MPAs will strongly depend upon each other for synergistic recovery
- MPAs also highly depend on fished areas if MPA coverage is small (<20%)

Habitat connectivity is important as it can enhance fish populations because:

- Fish biomass is up to 25 times higher in mangrove-rich areas vs. mangrove-poor reefs
- Mangroves are used by some fish as intermediate nursery (from seagrass beds to patch reefs)
- Mangroves may increase survival of juvenile fish by providing a physical refuge from predators
- MPA effect on fish density much stronger on reefs near mangroves vs. reefs far from mangroves

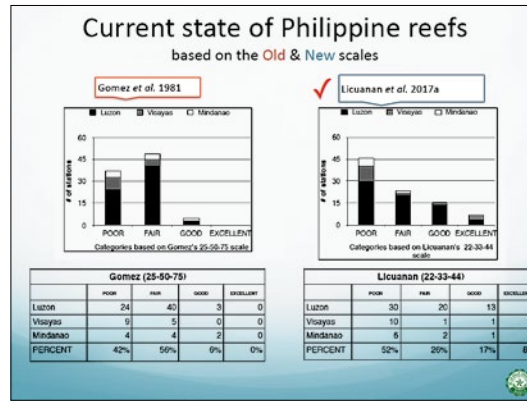
The challenges that MPA networks face are:

- Creation of no-take MPAs that encompass scale of fish home ranges (increase to 20%)
- Creation of no-take MPAs that include mangroves, seagrass, macroalgal beds, coral reefs in a continuous swath, rather than in isolation
- Creation of a dense system of closely-spaced no-take MPAs (<<15 km apart) that protect at least 20% of all important habitats at the local, provincial and regional levels
- Management of fisheries outside of no-take MPAs especially if there are still big shortcomings in points 1-3. There should be:
  a. Gear restrictions
  b. Effort restrictions
  c. Seasonal closures
- Empirical evaluation whether larval and habitat connectivity can enhance MPA network performance and fisheries. There is a need to:
  a. Invest in long-term (decadal-scale) monitoring
  b. Quantify effects across various ecological settings

We can do more to save coral reefs with MPAs

Dr. Wilfredo Roehl Licuanan | Professor, De La Salle University

Presentation outline:
- Philippine Corals
- What is a coral reef?
- Importance of coral reefs
- Status of Philippine reefs
- Coral Gardening
- Next steps and recommendations



Highlights:

Corals come in variety of sizes, big corals can be 3 meters across and small ones can be like grass and be 20 years old. One emphasis is that when the corals leave their skeleton and that skeleton accumulates, in the long run they become reefs. When we are talking about reefs, we are talking about structures, and these are old structures.

It is important to be reminded that:
- It takes thousands of years for a reef to fully form; and
- Do not mistake the coral for the reef.

Taking the DENR's definition of forest:

> Forest, according to the current definition used in the Philippine government, is an area with more than 0.5 hectares of trees that form a crown cover or tree clustering of more than 10%. The Food and Agriculture Organization (FAO) definition emphasizes that the mature trees should be at least 5 meters tall to be considered as forests. Forests are also classified as closed (i.e., trees with different heights with discontinuous dense grass cover) or open (i.e., continuous vegetation cover in which tree cover is more than 10%).
>
> Plantations and young natural stands established for forestry purposes (e.g., used for timber) are reflected as forests in the Philippine reports. (Source: FAO Global Forest Resource Assessment 2000. Rome.)

That may be the reason why a lot of people are transplanting corals: thousands of transplanted corals do not make a reef. There is a tendency to treat corals as if it is the same as mangrove rehabilitation.

There is a study that refers to Sulu Sea as the richest ecoregion for corals with 505 species. A healthy reef produces white sand at about 1-5 $kg/m^2/yr$, which attracts tourists. Healthy and fully formed reefs are, indeed, very valuable.

In the last 3 years, there were 415 stations visited, of which 200 stations were surveyed. There are 151 stations with well-developed reefs. The study showed the following:
- Only half were surveyed as only half of the coral reefs based on the map were located.

- Using the scales of Dr. Alcala and Dr. Gomez during the first national coral reef assessment, they found 5% of around 800 reefs were in excellent condition. Using the scale from 40 years ago, you will not find a reef in excellent condition. It does not mean that they do not exist anymore, but using the scale, you cannot have an excellent reef.
- Looking at the details, we lost 1/3 of our corals in the last 2 decades
- Based on the new scale, benchmarking on Tubbataha, poor reefs are in the Pacific and best reefs are in the Sulu Sea. In the past, the Visayas Islands were highlighted with good reefs

The coral crisis cannot be solved by transplantation. Coral gardening has the following problems:
- Coral stressors remain
- Fragments are too few and too small
- Diversity is not respected
- Effort is not cost-effective
- Requires permit from BFAR

Transplantation effort is also not cost-effective. With an island-wide MPA, estimated budget is PhP1.6M. With coral gardening, it is estimated at PhP4.2M– 5.6M per hectare.

Recommendations:
- Manage activities from ridge to reef
- Manage complete habitats
- Allow reefs to heal themselves

Shore It Up

Ms. Melody del Rosario | Vice President, Public Relations and Corporate Communications, Metro Pacific Investment Corporation

Presentation outline
- Mangrove Propagation Information Centers
- Shore It Up Milestones
- Recognition and Opportunities

Highlight:

Shore it Up is celebrating its 10th year. It is the corporate social responsibility by the Metro Pacific Investments.

Mangrove Propagation Information Centers are Shore It Up's legacy which started in communities of Siargao in Surigao del Norte, Alaminos in Pangasinan, and Cordova in Cebu.

Sending the message that "mangroves can be sexy" started as a challenge. With the help of the quad media, the message is slowly getting through and soon the Shore It App will be launched to reach more people. There are also livelihood projects and events conducted related to mangroves. Partnerships are important in the endeavor of Shore It Up.

Accomplishments on mangrove management:

- 95% threat reduction of mangrove cutting as of 2014
- 70% reduction based on visual observation
- 85% average survival rate of mangrove planting in 800 hectares more than 200 apprehensions in 3.5 years
- 15% increase in fish stock
- illegal mangrove cutters and illegal fishers are now mangrove tour operators

Cleaning the ocean is not the only solution.

Some of the economic gains:

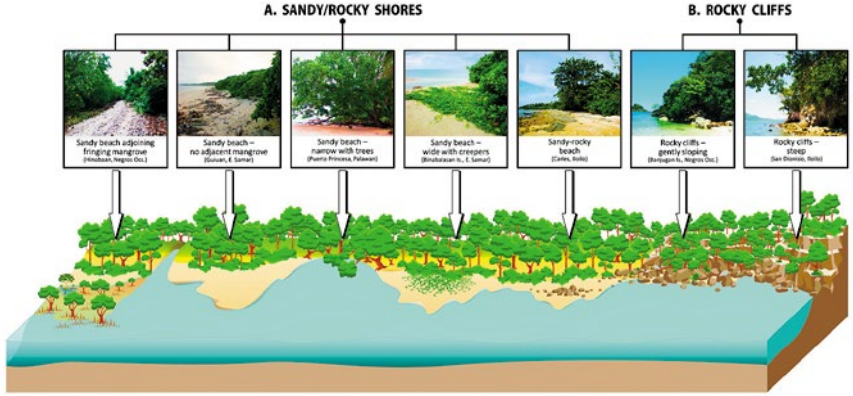
- 42 boat operators for mangrove tour operations at 1-2 trips per day with an average gross income of PhP30,000/month/boat
- 72 homestays with varying gross income depending on their room capacity
- PhP80,000 monthly for BACAMA operating Sugba Lagoon in Siargao
- 4 MPIC EcoGuides and more tour guides
- Famous King Crabs program of Del Carmen in Siargao
- PhP50,000 average monthly local income of LGU Del Carmen from mangrove tours

Beach Forest and Climate Change – Coastal Protection and Reforestation

Dr. Jurgenne Primavera | Chief Mangrove Scientific Advisor, Zoological Society of London

Presentation outline:

- Climate Change
  a. CO_2 and other greenhouse gases (reforestation)
  b. Increasing storm intensity, frequency (coastal protection)



- Beach Forests: types, morphology, taxonomy
- Nursery/Outplanting Trials

Highlights:

The increasing storm intensity and frequency require coastal protection as experienced during the last years, especially during Typhoon Yolanda (Haiyan). Depending on the physical factors, mangroves can dissipate, attenuate, or even absorb the energy of waves.

A year after Typhoon Yolanda, the Senate proposed a National Coastal Greenbelt Bill, followed by the Congress the following year.

Mangrove forests are our first line of defense, as evidenced after big typhoons, mangroves are still standing. However, protection should always look at the ridge-to-reef approach. Greenhouse gases contribute to climate change and our goal is to lessen CO_2 emissions. Mangrove forests are more effective in CO_2 absorption.

The National Greening Program promotes 50% planting of fast growing trees, 10% dipterocarps and other premium and indigenous species, and 40% fruit trees. As an example, the reforested Maasin, Iloilo Watershed caused a flash flood in Iloilo City and other downstream municipalities in 2008 because 60% of trees planted are mahogany and other exotic trees. The effect is loss of its natural biota.

Beach forests are located behind mangrove forests and above the high spring tide water. They can thrive immediately from the beach to 200km inland. It is interesting to note that there are many places in the Philippines named after mangrove trees and associates. Beach forests are considered pioneer species, thus should be used for rehabilitating degraded coastal areas instead of climax dipterocarps species.

Importance of beach forest species

- rehabilitation species which are colonizing and sturdy are appropriate for climate change mitigation
- beach forest-mangrove greenbelts or bioshields for coastal protection
- medicinal and other traditional uses
- ornamental species for gardens, landscaping and fence
- biotech, industrial applications
- wildlife habitat

Open Forum for Session 4:

Question for Dr. Abesamis
How can we form a network of MPAs if in five (5) municipalities one or two Chief Executives have different political affiliations?

It is a huge challenge even in places where we have demonstrated how MPA networks work. It is very difficult to gain support at that level. In some places, you have successful collaboration across municipalities. Dr. Alinio highlighted the formation of local government alliances composed of 2-5 or more municipalities working together. It will pose difficulties but there are good examples to follow.

Question for Dr. Licuanan
How can we address the issue of DPWH road construction creating erosion, which covers coral reefs?

Quick answer:, I do not know. As an educator, we just try to make sure that the next generation is not going to be the first one. I have issues with many programs whose graduates have job descriptions that have great impact (negative) on the environment but have no time for environmental science.

Question for Dr. Alinio
Will reef enhancement or artificial reefs structures help in the MPA network?

Dr. Alinio:
I think the answer should come from Dr. Licuanan. But the term artificial reefs is a misnomer.

Dr. Licuanan:
Artificial habitat is the more appropriate term to be used. Most of artificial habitats barely solve anything. I got involved in this because we had budget for a coral gardening project.The context where we did that is in a community with ecotourism-livelihood wherein they actually earn income by showing visitors their mangroves and reef. Having something to show in addition to those natural habitats would be something that generates income than having a bunch of divers "plant corals".

Dr. Primavera:
What drives these "environmental" programs? It is budget driven and not science-based. Can the LGUs, please, say no to these projects?

Follow up question
Will installation of fish condominiums made of hollow blocks on barren sea beds help in MPA networks?

Dr. Licuanan:
We have developed artificial reefs in the 70's, but then if you ask around, very few people can pinpoint success stories. If we go into artificial habitats again without learning from the past, we will be wasting resources again. One of the learnings from the past is that site selection is critical. Coming from the perspective of someone who works on corals or seagrass, what is barren to them is habitat to some other organisms

like sea pens that do not grow on corals. They like sand. Another learning is that science and monitoring are missing. Nobody really monitors things like survival rates. There are literatures from various regional universities on success of coral gardening but there are no studies on survival rate. We should always monitor as it allows us to learn from successes and mistakes.

Question for Ms. Del Rosario
How do you bring science to initiatives of the private sector?

We have a Board of Advisers and Dr. Primavera is one of them. We have advisers and experts on eco-tourism, marine conservation, and threatened marine species whom we refer to on things we do. We cannot waste money as we spend for these initiatives.

Question for Dr. Primavera
How do you determine the age of a plant by just looking at them?

It depends on the species of mangroves. Some of them are fast growing, some are slow. With the same age, a species will be shorter or taller than the other. You need to know the mangrove species and the substrate. It is difficult to determine by just looking at them.

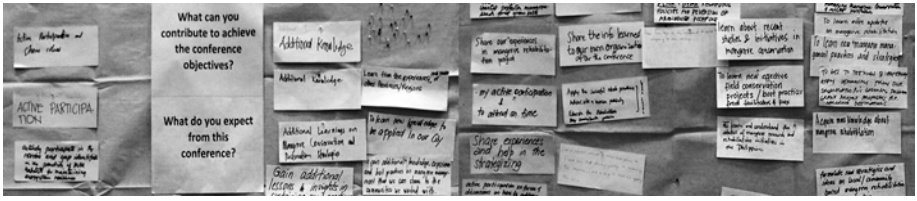
Question for Dr. Abesamis and Dr. Licuanan
Isn't it a good thing that macroalgae are growing on dead corals since these are also important fish nurseries?

Dr. Abesamis:
It's a sad thing. It's not a good thing. We already lost a lot of biodiversity. Macroalgal beds are not only nurseries for fish. The coral reef is an entire ecosystem that functions in a connected manner. You have to preserve the components of that ecosystem.

Dr. Licuanan:
The coral reef is built by corals. If your corals die, your reef will not grow. Which is why one of the things we need to get across to people is that even if the coral is really less, don't give up on that reef. There is one reef near our marine station with just 12% coral cover and has 105 species of coral. Even with 10% coral cover, there is still hope. Don't write off any of the sites.

Question for Dr. Primavera
Dipterocarps are found in montane forests and are not adapted to lowlands. Is it accurate to compare them with the beach forests for survival rate?

Dr. Primavera
There are both lowland and highland dipterocarps.



Simultaneous Workshop

Mechanics for the Simultaneous Workshops

A. Workshop Objective

The objectives of the workshop are to:
1. generate information on responses to the 2015 National Mangrove Conference Call to Action; and
2. put forward recommendations to key issues on mangroves and beach forests towards building coastal resilience in a changing climate.

B. Review of the 2015 National Mangrove Conference Call to Action

Science-based Approaches to Mangrove and Beach Forest Rehabilitation: Sharing experiences and lessons on post-Yolanda mangrove recovery work 1-2 September 2015, MO2 Westown Hotel, Iloilo City

WE, the participants of the 2nd National Mangrove Conference held 1-2 September 2015 in Iloilo City, call on mangrove and marine scientists and practitioners; academe; national government agencies, local governments; people's organizations; NGOs; humanitarian aid agencies; and the private sector to:
1. Follow science-based protocols in mangrove conservation and rehabilitation, such as planting the right species in the right sites. In general, seafronts should be rehabilitated with *Avicennia marina (piapi)* and *Sonneratia alba (pagatpat)* and not *Rhizophora* spp. *(bakhaw)*. Post-Yolanda surveys showed that *piapi* and *pagatpat* were more resilient.
2. Strictly avoid mangrove planting on seagrass beds and tidal flats as they are highly productive ecosystems that buffer waves, stabilize substrates, and improve water quality.
3. Focus post-disaster efforts and resources on:
   a. Ground assessment as basis for site-specific and appropriate mangrove and beach forest recovery work;
   b. Protection of recovering and remaining mangroves and beach forest through proper zoning in Comprehensive Land Use Plans (CLUPs), establishment of *Bantay Gubat/Katunggan*, and development of ecoparks, among others;
   c. Reassessment of target planting area, e.g., Mangrove Beach Forest Development project (MBFDP), Philippine National Aquasilviculture Program (PNAP), humanitarian, and private sector initiatives.
4. Develop an accrediting/permitting/auditing system for mangrove and beach forest rehabilitation projects especially in post-disaster contexts.
5. Establish or adopt long-term success indicators such as survival rates and increase in forest area, in addition to short-term indicators, such as no. of propagules/seedlings, no. of hectares planted.
6. Lobby for the passage of the National Coastal Greenbelt Bill (SB 2179 and HB 5948) and the reversion of abandoned fishponds to mangroves (HB 5585);
   a. Review and harmonize laws and policies on issuance of tax declarations, local taxation, titling, utilization of forest lands, land classification;
   b. Relocate coastal villages and beach resorts away from coastal greenbelt zone;

c. Appropriate funds to effectively implement mandatory land allocation for socialized housing.

7. Adapt green-gray engineering approaches for coastal resilience building.
8. Develop incentive schemes to community groups/LGUs involved in mangrove conservation and rehabilitation, e.g. Best Mangrove Management Awards.

C. Workshop Mechanics

Prior to the conference, all confirmed invitees were informed to bring relevant reports on mangrove and beach forest initiatives by their respective organizations. These reports were shared during the review of activities relevant to the 2015 NATMANCON Call to Action.

The different groups are to discuss issues listed below:

1. Coastal greenbelt (4:1, 100 m, site-species matching)
2. Coastal erosion
3. Abandoned ponds
4. Payment for Ecosystem Services and Blue Carbon
5. Multiple habitat MPA and connectivity
6. Use of scientific studies in governance, performance, and accountability mechanisms

Group 1: Coastal Greenbelt

Elements of the 2015 Call to Action	Own/institutional initiatives	Initiatives of others
1. Follow science-based protocols in mangrove conservation and rehabilitation, such as planting the right species in the right sites. In general, seafront should be rehabilitated with *Avicennia marina* (piapi) and *Sonneratia alba* (pagatpat) and not *Rhizophora* spp. (bakhaw). Post-Yolanda surveys showed that piapi and pagatpat were more resilient.	- Mangrove seed bank and nursery established with the help of DENR. Planting of appropriate species started. - Planted propagules of *Rhizophora* spp at Bonbon Coastal Barangay of Clarin, Bohol. This barangay is submerged during high tide. - Mapping of mangrove areas and seagrass beds as aid in planning - Abated erosion by installing bamboo fence to hold sand - Fund raising mangrove activity like Tabanog Fest & Mud Run (Padada, Davao del Sur) - Stopped planting *Rhizophora* and concentrated on *Avicennia* sp. - Established nursery (Padada, Davao del Sur) - Evaluation of proposal on mangrove planting considers species to be planted - Strictly followed the science-based protocol in all sites (conducted training) - Publication / training of pagatpat propagation with *Kapunongan sa Gagmay Mangingisda sa* Concepcion, Zambuanga Sibugay - Partner has provided livelihood assistance to give additional income, not only for active members, but to the whole fishing communities (lapu-lapu culture) - Partnership with other community-based organizations and private institutions supporting mangrove propagation - Establishment of two (2) provincial mangrove nurseries to produce various species of mangrove seedling to be used in mangrove growing project using science-based protocol – site-species matching (Negros Occidental) - Provincial Government of Pangasinan produced, distributed, and planted multi-species seedlings for the coastal/riverbank areas "Provincial Mangrove Nursery" - Established mangrove nursery (multi-species) in Alaminos City, Pangasinan - LGU managed - Philippine Coast Guard Auxiliary national officers visited different districts to conduct seminar on science-based mangrove and coastal rehabilitation - Re-assessment of Mangrove Reforestation Areas with DENR-ROI	

2. Strictly avoid mangrove planting on seagrass beds and tidal flats as they are highly productive ecosystems that buffer waves, stabilize substrates and improve water quality.	- Established nursery people's organization, *Katilingban sang Mga Magagmay nga Mangingisda sa* Dolores (KAMAMADO) - Planting in the mangrove site of KAMAMADO - Planting of mangroves on stable, and not inundated, substrate during neap tide/low tide days - Apply cluster planting for some selected species to have enough areas or space for boat docking, boat and human passages, gleaning, swimming or other uses of the community - Comprehensive survey, mapping, and planning (SMP) was properly observed and selecting planting sites	
3. Focus post-disaster efforts and resources on ground assessment as basis for site-specific and appropriate mangrove and beach forest recovery work	- The PGP of Pangasinan conducted Coastal Resource Education in schools and coastal barangays - Conducted province wide mangrove assessment and inventory to establish database to identify sources of different mangrove species (PEMO Negros Occidental) - St. Therese MTC College – Tigbauan, Iloilo provides manpower for tree planting (fruit bearing trees and mangroves bagging and planting) - at provincial, municipal, and barangay levels - Rapid mangrove assessment in 4 ancestral domains in Coron and Busuanga, Palawan - Strict no planting policy is being imposed on seagrass beds and tidal flats	
4. Focus post-disaster efforts and resources on protection of recovering and remaining mangroves and beach forest through proper zoning in Comprehensive Land Use Plans (CLUPs), establishment of *Bantay Gubat/ Katunggan*, and development of ecoparks, among others	- Strengthening of community-based environment law enforcers *(Bantay Katunggan)* to sustain mangrove protection (PEMO Negros Occidental) - The Regional Development Council approved the PhP10M project of the Proposed EcoPark Development at Bohol Island State University (BISU) – Clarin Campus - Budget was allocated for maintenance and protection of planted mangroves. Also, mangrove areas were properly mapped and incorporated in the resource map/ vegetative cover of Forest Land Use Plan - FPE has crafted the ecosystem based biodiversity risk reduction and management framework for FPE priority sites	

5. Focus post-disaster efforts and resources on reassessment of target planting area, e.g. Mangrove Beach Forest Development project (MBFDP), Philippine National Aquasilviculture Program (PNAP), humanitarian and private sector initiatives	- Coral Reef and Mangrove Area Assessment in Eastern Samar & Gigantes Island; 20 coral reef sites and 50 hectares mangrove green walls	- Supported the project of Silliman University Institute of Environmental Management Science on "Coral Reef Recovery in Typhoon-Damaged Coral Reefs"- IPE
6. Develop an accrediting/permitting/auditing system for mangrove and beach forest rehabilitation projects especially in post-disaster contexts.	- Memorandum of Agreement with Commission on Higher Education & Philippine Coast Guard to include mangroves as a topic in the National Service Training Program - Initiated the First Municipal Oil Spill Response and Control lecture seminar with Dr. Rex Sadaba of the University of the Philippines in the Visayas & PCC Region VI (one of the topics about mangroves by Dr. Rex Sadaba) - The PGP of Pangasinan entered into a MOA with the beneficiaries of the Mangrove Reforestation Project for a long term project with livelihood assistance to POs.	
7. Establish or adopt long-term success indicators such as survival rates and increase in forest area, in addition to short-term indicators such as no. of propagules/seedlings, no. of hectares planted.	- Joint project of BISU LGU Clarin & DENR for the assessment, restoration and monitoring of Silo-Siloan, an islet part of Danajon Bank (Bohol) - Adopt a river program (Sibalom River Brgy 9 Tigbauan Iloilo) - river clean-up, mangrove planting, the 1st Kali "Zumba" - This AY 2018-2019 we are planning to ink an agreement with Barangay Baguingin for the establishment of mangrove nursery and fruit bearing trees in barangays and schools - Uses survival rate and increase in forest cover as success indicator (Provincial Environment and Natural Resources Office - Iloilo) - Provincial Mangrove Rehabilitation Project Monitoring Database - Yearly monitoring & evaluation is conducted for all plantations as far back as 2015 to ensure high survival rate the target was set at least 85% survival and including SPMS indicators of DENR - Action for Re-greening and Transformation for Climate Change Adaptation Program as mitigation on climate change; mangrove planting during the *Semana Sang Iloilo, Piyesta sa Kakahuyan*	

8. Lobby for the passage of the National Coastal Greenbelt Bill (SB 2179 and HB 5948) and the reversion of abandoned fishponds to mangroves (HB 5585); - review and harmonize laws and policies on issuance of tax declarations, local taxation, titling, utilization of forest lands, land classification - relocate coastal villages and beach resorts away from coastal greenbelt zone - appropriate funds to effectively implement mandatory land allocation for socialized housing.	- Coastal villages are not relocated because the identified location is very far from the coastal area - Introduced mangrove experts to lawmakers	
9. Adapt green-gray engineering approaches for coastal resilience building.	- Kalibo Save the Mangroves Association (KASAMA) as member of Provincial Development Council (Aklan) lobbies for green engineering for coastal development projects, e.g., Barangay Pook (Kalibo) land reclamation.	- Students as partners in Mangrove Monitoring & Evaluation (i.e., Research) (DNSC)
10. Develop incentive schemes to community groups/LGUs involved in mangrove conservation and rehabilitation, e.g. Best Mangrove Management Awards	- Provide sustainable livelihood program swap to mangrove growing to coastal communities - PEMO Negros Occidental - Introduce alternative livelihood to coastal villagers - "Pakar Awards" Search for the (Best LGU Implementer) Cleanest River/Riverbanks - PGP of Pangasinan - Food for Work Mangrove Rehabilitation Project – PENRO - Giving of awards to Best PO Partners in CBFM (including those in mangrove areas) - The government's program on mangroves protection conservation and rehabilitation is a good move. However, in the process of implementation lies the problems because there are no proper monitoring or evaluation as to the outcome of the program	- Climate Realty Project Leadership Award established (nationwide) to individuals and organizations (part of Climate Change Commission)

Group 2: Coastal Erosion

Elements of the 2015 Call to Action	Own/institutional initiatives	Initiatives of others
1. Follow science-based protocols in mangrove conservation and rehabilitation, such as planting the right species in the right sites. In general, seafronts should be rehabilitated with *Avicennia marina* (piapi) and *Sonneratia alba* (pagatpat) and not *Rhizophora* spp. (bakhaw). Post-Yolanda surveys showed that piapi and pagatpat were more resilient	- Gabi Isla Gigantes Sur shoreline planting *Rhizophora* and *pagatpat* - Conducted a science-based mangrove education forum among youths, women and BLGU officials including Mangrove Forestation Workshop in Turbulent Coastal Waters (exeptional project)-Center for Sustainable Resource Community Resource Dev. Institute - Seafront planting of bakawan bato or *Avicennia* - Initiated a province wide model of multi-stakeholders engagement (academe-NGO-LGU) on Mangrove Conservation, Education and Management and Rehabilitation Program –lead Agency: Catanduanes State University Center for Sustainable Resource? Community Resource Development Institute and 4 municipal LGUs - *Sonneratia alba* is resilient - Planting of mangrove trees *(Rhizophora)* in fishpond dike facing river/water source - Conduct of annual planting along river bank/coastal area - Nursery establishment (*Rhizophora* and pagatpat) - Seafront planting: piapi, pagatpat - BLGU ordinance on shoreline quarrying - PO & BLGU initiative planting right species and right sites - Mangrove Rehabilitation at Kalangan II & Polloc, Parang Maguindanao with green governance approach (Adat-Betad,Inc.)	- *Rhizophora* spp near natural growth - Mangrove rehabilitation in Palumbaus Island,Caramoan - Mangrove rehabilitation in Agojo Marine Park and Sanctuary, San Andres, Catanduanes - Establishment of mangrove nursery by LGU Virac, Catanduanes - Local community participated in mangrove development - Mangrove rehabilitation in Kalapadan Bay Baras, Catanduanes
2. Strictly avoid mangrove planting on seagrass beds and tidal flats as they are highly productive ecosystems that buffer waves, stabilize substrates and improve water quality.	- Site-species matching - As a general rule avoid planting on seagrasses - Mangrove planting on intertidal zone	- Thinning of mangrove trees planted in tidal flats by LGU

3. Focus post-disaster efforts and resources on ground assessment as basis for site-specific and appropriate mangrove and beach forest recovery work	- Conduct of ground reconnaissance survey	- LGU-Virac collaborated with BFAR Region 5 on Coastal Resource Assessment as a basis for site specific area appropriate mangrove and beach forest recovery work and Integrated Coastal Management Development Plan
4. Focus post-disaster efforts and resources on protection of recovering and remaining mangroves and beach forest through proper zoning in Comprehensive Land Use Plans (CLUPs), establishment of *Bantay Gubat/ Katunggan*, and development of ecoparks, among others	- Supported with local ordinances - Enrichment planting - Assisted Natural Regeneration	
5. Focus post-disaster efforts and resources on reassessment of target planting area, e.g. Mangrove Beach Forest Development project (MBFDP), Philippine National Aquasilviculture Program (PNAP), humanitarian and private sector initiatives	- As one of the institutions who implemented the PNAP, we had done reassessment of the previously planted sites that had high mortality rate and learned from the previous mistakes. Replanting was carefully planned to follow right species on right area. - Periodic assessment of existing practices	- While doing mangrove rehabilitation - Seaweed culture Mangrove rehabilitation - Mussel culture
6. Develop an accrediting/permitting/auditing system for mangrove and beach forest rehabilitation projects especially in post-disaster contexts.	- Develop auditing mechanism of mangrove contribution - On-going research on the Beach documentation of forest assessment in the Catanduanes Island by Cantanduanes State University - Pass resolution to provincial government referred to DENR - Post disaster context (conduct inventory on mangrove mortality)	

7. Establish or adopt long-term success indicators such as survival rates and increase in forest area, in addition to short-term indicators such as no. of propagules/seedlings, no. of hectares planted.	- Studies on the growth and survival rate of species planted were undertaken by students for their undergraduate thesis. Long term monitoring as success indicator - Concern Worldwide/Post Yolanda cash for work for mangrove replanting year 2015 at Bacjawan Sur, Concepcion - Target oriented and fund-driven project - Reporting of monitoring to community/develop feedback mechanism - Monitoring survival rate - Developed existing mangrove nursery - Every 3-6 months M&E & replanting –Adat-Beta dike - Y1 2016 cash for work (mangrove rehabilitation) - Y2 2018 (Protection and Maintenance Fund) - Recommendation: LGU to provide funds for establishment of mangrove nursery	- Research project by Blue Cares and Integrated Assessment and Modelling of Blue Carbon Ecosystem for Conservation and Adaptive Management (IAMBLUECECAM) in mangrove areas (natural and rehabilitated) in Aklan together with local academe
8. Lobby for the passage of the National Coastal Greenbelt Bill (SB 2179 and HB 5948) and the reversion of abandoned fishponds to mangroves (HB 5585); - review and harmonize laws and policies on issuance of tax declarations, local taxation, titling, utilization of forest lands, land classification - relocate coastal villages and beach resorts away from coastal greenbelt zone - appropriate funds to effectively implement mandatory land allocation for socialized housing.	- Strict implementation Existing Zoning Regulation - POs will support the passage of the NCG Bill - Avoid issuance tax declaration in restricted zone - Recommendation: cancelation of tax declaration in restricted zone	
9. Adapt green-gray engineering approaches for coastal resilience building.	- Conservation International covered only 3 barangays in Concepcion for the green-gray engineering project - Establishment of bamboo breakwater to protect seafront mangrove plantation by Himakas Fisherfolks Association of Bacjawan Sur, Concepcion,Iloilo - On-going adoption of green-gray structure	

10. Develop incentive schemes to community groups/LGUs involved in mangrove conservation and rehabilitation, e.g. Best Mangrove Management Awards	- Governor's Prize for Blue Water - Food security program thru technology adoption from mangrove; marine protected spaces –Catanduanes State University - Institutionalize program on mangrove development	

Group 3: Abandoned Ponds

Elements of the 2015 Call to Action	Own/institutional initiatives	Initiatives of others
1. Follow science-based protocols in mangrove conservation and rehabilitation, such as planting the right species in the right sites. In general, seafronts should be rehabilitated with *Avicennia marina* (piapi) and *Sonneratia alba* (pagatpat) and not *Rhizophora* spp. (bakhaw). Post-Yolanda surveys showed that piapi and pagatpat were more resilient	- Information dissemination and lobby with CENRO to use other species of mangroves in NGP - Orientation among fisherfolks/ seminars and trainings - Piapi and pagatpat outplanting/ talisay planting/ pagatpat propagation - Mangrove nursery establishment with mixed species - UP Visayas College of Arts and Science students' research	
2. Strictly avoid mangrove planting on seagrass beds and tidal flats as they are highly productive ecosystems that buffer waves, stabilize substrates, and improve water quality.	- Advocates Ecosystem Approach to Fisheries Management in the Visayan Sea - Increase local communities' knowledge to avoid planting mangroves in seagrass beds - LGU Tigbauan conduct fisheries field school on CRM for fisherfolk	
3. Focus post-disaster efforts and resources on ground assessment as basis for site-specific and appropriate mangrove and beach forest recovery work	- Habitat assessment and mangrove planting in 6 coastal barangays	
4. Focus post-disaster efforts and resources on protection of recovering and remaining mangroves and beach forest through proper zoning in Comprehensive Land Use Plans (CLUPs), establishment of *Bantay Gubat/Katunggan*, and development of ecoparks, among others	- Coastal protection strategy for Tacloban City and Palo, Leyte - Lobbied with Tacloban LGU for protection of mangroves as part of CLUP - Patrolling and surveillance activity on mangrove areas - Northern Iloilo Polytechnic State University - Ajuy campus started mangrove assessment - In support to *Katunggan* Ecopark, St Therese MTC colleges conducted mangrove planting and bagging	

5. Focus post-disaster efforts and resources on reassessment of target planting area, e.g. Mangrove Beach Forest Development project (MBFDP), Philippine National Aquasilviculture Program (PNAP), humanitarian and private sector initiatives	- BFAR implemented PNAP project in partnership with SUCs - PO able to access funds on PNAP for mangrove out planting	
6. Develop an accrediting/permitting/auditing system for mangrove and beach forest rehabilitation projects especially in post-disaster contexts.		
7. Establish or adopt long-term success indicators such as survival rates and increase in forest area, in addition to short-term indicators such as no. of propagules/seedlings, no. of hectares planted.		
8 Lobby for the passage of the National Coastal Greenbelt Bill (SB 2179 and HB 5948) and the reversion of abandoned fishponds to mangroves (HB 5585); - review and harmonize laws and policies on issuance of tax declarations, local taxation, titling, utilization of forest lands, land classification - relocate coastal villages and beach resorts away from coastal greenbelt zone - appropriate funds to effectively implement mandatory land allocation for socialized housing.	- Philippine Reclamation Authority resource/ participant in House Bill hearings - Inventory of existing FLA fishponds - Lobbying of passage of mangrove ordinance	
9. Adapt green-gray engineering approaches for coastal resilience building.	- LGU Buenavista has a long stretch of breakwater project - Through PRDP allocated budget for construction of breakwater - NGOs adopting green-gray engineering approaches	
10. Develop incentive schemes to community groups/LGUs involved in mangrove conservation and rehabilitation, e.g., Best Mangrove Management Awards	- Marine environment protection activity every 3rd Saturday of the month (Phil Coast Guard Auxiliary) - Rice incentive scheme as reward for outplanting activity - One Resilient Team: Tacloban	

Group 4: Payment Ecosystem Services and Blue Carbon

Elements of the 2015 Call to Action	Own/institutional initiatives	Initiatives of others
1. Follow science-based protocols in mangrove conservation and rehabilitation, such as planting the right species in the right sites. In general, seafronts should be rehabilitated with *Avicennia marina* (piapi) and *Sonneratia alba* (pagatpat) and not *Rhizophora* spp. (bakhaw). Post-Yolanda surveys showed that piapi and pagatpat were more resilient	- Tacloban Coastal Protection Strategy - One Resilient Team- Project Tacloban, establishment of mangrove plantation (species used bungalon, pagatpat, and bakhaw), refused to rehabilitate a mangrove area on ongoing reclamation - Pilot LGU/ scaling, assisted LGU of Lubang Occidental Mindoro in evaluating the proposed MOA between LGU and DENR	
2. Strictly avoid mangrove planting on seagrass beds and tidal flats as they are highly productive ecosystems that buffer waves, stabilize substrates and improve water quality.	- ZSL Development ToT, identified & maintained mangrove rehabilitation area. - MSU-Naawan conducts seminars and workshop in Laguindingan to make sure no planting in seagrass beds	
3. Focus post-disaster efforts and resources on ground assessment as basis for site-specific and appropriate mangrove and beach forest recovery work	- Tacloban Coastal Protection Strategy - One Resilient Team- Project Tacloban - Sites suggested by DENR regional office for research studies are rehabilitated areas - Mangrove restoration in Looc, Occidental Mindoro - Discussion with LGU Looc and Lubang on proper mangrove planting areas and species	
4. Focus post-disaster efforts and resources on protection of recovering and remaining mangroves and beach forest through proper zoning in Comprehensive Land Use Plans (CLUPs), establishment of *Bantay Gubat/Katunggan*, and development of ecoparks, among others	- MSU-Naawan take part on mangrove protection and planning of CLUP, development of eco-parks, - discussion with stakeholders involved in 5 eco-parks in Panay	
- Focus post-disaster efforts and resources on reassessment of target planting area, e.g. Mangrove Beach Forest Development project (MBFDP), Philippine National Aquasilviculture Program (PNAP), humanitarian and private sector initiatives	- Post-Yolanda resilience-building	

6. Develop an accrediting/permitting/auditing system for mangrove and beach forest rehabilitation projects especially in post-disaster contexts.	- Aquasilviculture	
7. Establish or adopt long-term success indicators such as survival rates and increase in forest area, in addition to short-term indicators such as no. of propagules/seedlings, no. of hectares planted.	- Annual mangrove community structure survey through the One resilient Team Tacloban Project Research	
8. Lobby for the passage of the National Coastal Greenbelt Bill (SB 2179 and HB 5948) and the reversion of abandoned fishponds to mangroves (HB 5585); - review and harmonize laws and policies on issuance of tax declarations, local taxation, titling, utilization of forest lands, land classification - relocate coastal villages and beach resorts away from coastal greenbelt zone - appropriate funds to effectively implement mandatory land allocation for socialized housing.	- On-going lobbying advocacy for AUU pond reversion, planning an establishment of mangrove research network near *"Ang Pulo"* - all MPA in Calatagan, Batangas - relocate coastal village appropriate area - Guiuan Development Foundation Inc. initiated the efforts on relocating coastal communities in Maliwliw, Salcedo; financial support is provided to small-scale beach resort owners. This is provided by the city Gov't and DSWD for displaced families.	
9. Adapt green-gray engineering approaches for coastal resilience building.	- CHED-National Agriculture and Fisheries Education System Funded Program - Existing mangrove organization, - Conservation International's green-gray project	
10. Develop incentive schemes to community groups/LGUs involved in mangrove conservation and rehabilitation, e.g. Best Mangrove Management Awards	- ZSL Mangrove Award, support small fisher-folks doing project - Existing mangrove organization initiated by different government agencies - Province of Batangas awarded POs doing mangrove conservation and livelihood creation (e.g., mudcrab farming)	

Group 5: Multiple habitat MPA and connectivity

Elements of the 2015 Call to Action	Own/institutional initiatives	Initiatives of others
1. Follow science-based protocols in mangrove conservation and rehabilitation, such as planting the right species in the right sites. In general, seafronts should be rehabilitated with *Avicennia marina* (piapi) and *Sonneratia alba* (pagatpat) and not *Rhizophora* spp. (bakhaw). Post-Yolanda surveys showed that piapi and pagatpat were more resilient	- Piapi and pagatpat were planted as they were found to be resilient but on a limited number due to scarcity of planting materials - Conducted initial assessments of the rehabilitation sites to identify correct species to plant and verify appropriateness of site prior to planting - Formed partnership with BFAR and rehabilitated a total of 42 ha of beachfront including a 6 ha abandoned research pond of BFAR - Iloilo province initiated mangrove rehabilitation in coastal municipalities specifically in Ajuy, Barotac Viejo, San Dionisio, and Batad - Followed the right species as recommended *(Avicennia marina, Sonneratia alba)* - As a CRM coordinator in our LGU, I will suggest to follow science-based protocols in mangrove rehabilitation to come up with more successful mangrove rehabilitation projects - Conducted trainings to planters to orient them on how to properly identify correct planting areas and species - Encouraged stakeholders not to focus on planting *Rhizophora* species but also include other suitable species - *Avicennia marina* should be 50 cm in height before planting with the distance of 1m x 1m along seafront - capacitate the locals or LGU by providing trainings or workshops - monitored *Rhizophora* spp planted in different municipality of Catanduanes thru PNAP - Personally, I am knowledgeable about this but have only been working with LGU Tigbauan for 6 mo. No one from the LGU attended the 2nd Mangrove Conference. I have not had any action on #1 since I am still so new to the LGU	- paradigm shift from *Rhizophora* to *Avicennia* and *Sonneratia* species. - mangrove reforestation in Gigantes Islands with community assisted by UPV and Christian Aid - the university provided technical support and awareness program – LGU needs "science" people to "concede"

2. Strictly avoid mangrove planting on seagrass beds and tidal flats as they are highly productive ecosystems that buffer waves, stabilize substrates and improve water quality.	- conducted photo exhibit and hold seminars about planting methodology of ZSL and campaign to avoid mangrove planting on seagrass and tidal flats of Lagonoy Gulf area and Cabugao bay area	
3. Focus post-disaster efforts and resources on ground assessment as basis for site-specific and appropriate mangrove and beach forest recovery work	- Disagreed with BFAR, DENR, and NGOs regarding the system of their mangrove reforestation projects - Following a CSU modified protocol, we reassessed the planting sites of Baras, San Andres, and Virac, Catanduanes - Provincial government of Sarangani conducted beach forest diversity education of Barangay Kingkiamba to determine and evaluate existing beach forest species as basis for rehabilitation and conservation initiatives - Ongoing coordination with concerned NGAs on the status of existing AUUs which can be possible sites for mangrove rehabilitation area	- collaboration with concerned NGAs in the implementation of mangrove rehabilitation programs
4. Focus post-disaster efforts and resources on protection of recovering and remaining mangroves and beach forest through proper zoning in Comprehensive Land Use Plans (CLUPs), establishment of *Bantay Gubat/Katunggan*, and development of ecoparks, among others	- conduct mangrove and seagrass assessments in 19 coastal barangays in Virac, Catanduanes - establishment of *Bantay Dagat* and *Bantay Gubat* - organized Seedling Growers Association to help people in the community	
5. Focus post-disaster efforts and resources on reassessment of target planting area, e.g. Mangrove Beach Forest Development project (MBFDP), Philippine National Aquasilviculture Program (PNAP), humanitarian and private sector initiatives	- established beach forest in Ajuy, Miag-ao and Tigbauan - undergone training on beach forest management (identification of beach forest species, function, among others)	
6. Develop an accrediting/permitting/auditing system for mangrove and beach forest rehabilitation projects especially in post-disaster contexts.		- accrediting/permitting/auditing system for mangrove and beach forest is the concern of DENR including the implementation thereof

7. Establish or adopt long-term success indicators such as survival rates and increase in forest area, in addition to short-term indicators such as no. of propagules/seedlings, no. of hectares planted.	- applied the monitoring scheme recommended by ZSL in our planting sites to document survival rates, causes of mortality, etc. - partnership with concerned agencies for technical assistance to monitor survival rates and adoption of long term success indicators - construction of bamboo T-fence to help soil accretion	
8. Lobby for the passage of the National Coastal Greenbelt Bill (SB 2179 and HB 5948) and the reversion of abandoned fishponds to mangroves (HB 5585); - review and harmonize laws and policies on issuance of tax declarations, local taxation, titling, utilization of forest lands, land classification - relocate coastal villages and beach resorts away from coastal greenbelt zone - appropriate funds to effectively implement mandatory land allocation for socialized housing.	- municipal zoning review committee conducted surveys and recommended removal or demolition of illegal structures within greenbelt coastal zones - appropriated funds for resettlement project thru a Sanggunian Bayan resolution	- alliances of municipalities formed to promote ICM networking - LGUs that recently updated their CLUPs already included proper zoning for forest areas including mangrove
9. Adapt green-gray engineering approaches for coastal resilience building.	- CI commissioned a study identifying appropriate sites for green-gray engineering structures in Concepcion, Iloilo	
10. Develop incentive schemes to community groups/LGUs involved in mangrove conservation and rehabilitation, e.g. Best Mangrove Management Awards	- Food for work: delineation and installation of marker buoys - giving incentives through fisheries livelihood projects to LGUs with exemplary initiatives on effective mangrove protection and rehabilitation programs which is one of the criteria of the BFAR's *Malinis and Masaganang Karagatan*	

Group 6: Use of scientific studies in governance, performance, and accountability mechanisms

Elements of the 2015 Call to Action	Own/institutional initiatives	Initiatives of others
1. Follow science-based protocols in mangrove conservation and rehabilitation, such as planting the right species in the right sites. In general, seafronts should be rehabilitatated with *Avicenniamarina* (piapi) and *Sonneratia alba* (pagatpat) and not *Rhizophora* spp. (bakhaw). Post-Yolanda surveys showed that piapi and pagatpat were more resilient	- Encouraged partners (NGO, Protected Areas Management Board, LGU) to plant appropriate species - Help in IEC on site-species matching through our NSTP students and partners – Macajalar Bay Development Alliance - Conduct IEC in schools, coastal POs, inter LGU alliances technical working group - Completed enrichment planting for more than 5 ha using correct protocols - Conduct actual assessments on corals, seagrass, mangroves - Establishment and maintenance of provincial mangrove nurseries - Since ERDB has technical bulletins given out to all the field implementers in DENR, it should also give out to other NGOs and LGUs for uniform science-based implementation - Attending seminar and conferences to capacitate the knowledge and skill on mangrove ecology - Highlight science-based restoration and use of native species in trainings and seminars conducted - Translated and published "To Plant and Not to Plant" (guide for proper mangrove rehabilitation)	- Conduct IEC in schools, organized coastal communities, Alliances' Technical working group - Forest Foundation Philippines – highlights the use of native species and following a science-based method and restoration in lectures they gave - ZSL conducted Training of Traininersfor Mangrove Rehabilitation and Conservation - International funders - Procurement of mangroves other than *Rhizophora* spp. by PENRO Saranggani for the rehabilitation project - Stop research for research - Planted *Rhizophora* spp. along the shores of Dasol Bay – sand-shifting occurred and *Avicennia marina* wildlings growth - CENRO and MENRO of Misamis Oriental looking for propagules of piapi and pagatpat for right site-species planting
2. Strictly avoid mangrove planting on seagrass beds and tidal flats as they are highly productive ecosystems that buffer waves, stabilize substrates and improve water quality.	- Engaged with DENR on mangrove reforestation (NGP) - Conducted school to school symposium on correct planting protocols - Coordinate with DENR specialist on right mangrove species - There is a need to conduct IEC on seagrass importance and identify tidal flats in communities that are identified to have planted in such areas	- Public private partnership with NGOs producing species and planting materials

3. Focus post-disaster efforts and resources on ground assessment as basis for site-specific and appropriate mangrove and beach forest recovery work	- Ongoing assessment on beach forest in Saranggani Bay - Beach forest profiling (barangay Kling, Kiamba Saranggani province); result submitted to PAMB and MLGU - MLGU currently drafting ordinances for its protection and conservation - Conducted site visits to Typhoon Yolanda affected areas to identify LGUs and communities to partner with for the Climate Resident Recovery Training and establishment of rainforest areas - Identification of NGCP's host communities which are typhoon prone areas can be considered as possible sites for mangrove recovery work - Enhance the initiatives and on-going activities in this area - Segregate the area that are not appropriate for planting - Register the areas planted - Prepared DRRM/CCA plans with tree planting as a priority particularly in the mangrove areas - Pilot rehabilitation of AUU in 2 sites near Tacloban (One Architecture Project/ Tacloban/Wetlands International)	- Reassessment of mangrove areas planted after typhoons
4. Focus post-disaster efforts and resources on protection of recovering and remaining mangroves and beach forest through proper zoning in Comprehensive Land Use Plans (CLUPs), establishment of *Bantay Gubat/ Katunggan*, and development of ecoparks, among others	- TIEZA to fund mangrove related projects that are LGU proposed - To establish fishers associations or cooperative for participatory approach for stock and environment conservation - Conduct surveys using historical maps and interviews to determine possible sites for mangrove reforestation - Organization and strengthening of community-based environmental law enforcement team/LGU (with three functions: Bantay *Katunggan*, Bantay Dagat, Wildlife EO) - Eco-tourism propose project development of Bulacan Mangrove Zone 200 m	- DENR-NGP on tidal mudflats and other areas
5. Focus post-disaster efforts and resources on reassessment of target planting area, e.g. Mangrove Beach Forest Development project (MBFDP), Philippine National Aquasilviculture Program (PNAP), humanitarian and private sector initiatives	- Participatory Coastal Resource Assessment - Conduct coastal cleanup/ tree planting activity - Proposed in the management plant to plant mangroves that are endemic	

6. Develop an accrediting/permitting/auditing system for mangrove and beach forest rehabilitation projects especially in post-disaster contexts.	- Environmental compliance mechanism as incentive for LGUs in Manila Bay with DILG	- A resolution approving ordinance no. 99-16, entitled "An Ordinance Adopting Harmonized Iligan Bay Alliance in Misamis Occidental Fisheries Code"
7. Establish or adopt long-term success indicators such as survival rates and increase in forest area, in addition to short-term indicators such as no. of propagules/ seedlings, no. of hectares planted.	- Maintained monitoring and reporting criteria for projects (on-going) - Development of guidelines on proper and science-based restoration for all forest formations - Educate coastal communities regarding green-gray engineering approaches for coastal resilience and coordinate with the DILG, municipal for preparation of resolution	- The IEC and preliminary training on social preparation should be emphasized. Planting of mangroves has benefits to the community (economic, safety)
8. Lobby for the passage of the National Coastal Greenbelt Bill (SB 2179 and HB 5948) and the reversion of abandoned fishponds to mangroves (HB 5585); – review and harmonize laws and policies on issuance of tax declarations, local taxation, titling, utilization of forest lands, land classification – relocate coastal villages and beach resorts away from coastal greenbelt zone – appropriate funds to effectively implement mandatory land allocation for socialized housing.	- Propose ordinance regarding mangrove protected area - Formulation of Local Conservation Area Management Plan - Revision of CLUP - Formulation of the Integrated Coastal Management Plan - Proposed Mangrove MPA Management Plan, included mangrove development in tourism road map	
9. Adapt green-gray engineering approaches for coastal resilience building.	- Advocate for implementation of coastal zone protection strategy in Tacloban-Palo area - Tourism Infrastructure and Enterprise Zone Authority will hire consultant for mangrove projects - Conduct actual assessment (coral, seagrass and mangrove)	- To include green-gray engineering in the building code
10. Develop incentive schemes to community groups/LGUs involved in mangrove conservation and rehabilitation, e.g. Best Mangrove Management Awards	- Promote and support CBST mangrove projects - Sponsor municipal ordinance promoting mangrove conservation and rehabilitation providing incentives and penalties thereof	

Summary of recommended strategies compiled from the workshop output and presentations.

Issue/Concern	Recommended Strategies
1. Coastal greenbelt (4:1, 100 m, site-species matching)	– Inventory of Philippine beach forest and mangroves – Pass the National Greenbelt Act – Promotion and wider dissemination of science-based protocols/ procedures on mangrove rehab – Collaboration among government agencies and mangrove experts – Fund sources
2. Coastal erosion	– Awareness campaign on coastal erosion: challenges and impacts, values enhancement – Assessment of coastal areas prone to erosion for science-based intervention – Policy reforms and strict implementation of existing laws (e.g., Green Governance) – Eco-friendly science-based introduction of gray infrastructure – Multi-sectoral partnership engagement for coastal protection
3. Abandoned ponds	– Clear delineation of functions of line agencies – Lobby for approval of Coastal Greenbelt bill – Secure established legal process on how to revert abandoned fishponds into mangrove areas – Inventory and mapping of all fishpond of all classification
4. Payment for Ecosystem Services and Blue Carbon	– Awareness-raising – Capacity-building – Economic valuation – Policy formation and implementation
5. Multiple habitat MPA and connectivity	– Conduct study on multiple habitat MPAs – Expand MRAs: areas and habitats – Strengthen IEC and structures – Trans-boundary network of MPAs – Efficient law enforcement
6. Use of scientific studies in governance, performance, and accountability mechanisms	– Strengthen linkages of LGUs, government agencies, and scientists – Policy advocacy and implementation – Capacity building – Information and communication technology – Monitoring and evaluation

Annex A: Programme

Time	Activity/ Topic	Resource person
Day 1 | April 18, 2018		
0800-0900	Arrival and Registration	ZSL-Philippines Secretariat
0900-1015	Opening Program	
	Invocation	Ms. Eden Grace Diamante, BPFA
	National Anthem	Ms. Omega Bacosa and Mr. Ramon Barbato, BPFA
	Welcome Address	Mr. Godofredo T. Villapando, Jr. Country Manager, ZSL-Philippines
	Introduction of Participants	Hon. Jose S. Espinosa III Mayor, City of Iloilo
	Presentation of Objectives and Schedule	
	Messages	Hon. Arthur D. Defensor, Sr. Governor, Province of Iloilo
		Hon. Roy A. Cimatu Secretary, Department of Environment and Natural Resources
		Commodore Eduardo B. Gongona (Ret.) Undersecretary for Fisheries, Department of Agriculture and National Director, Bureau of Fisheries and Aquatic Resources
		Mr. Raki Nikahetiya Programme Manager, Marine and Freshwater Conservation for Communities, ZSL
		HE Daniel Pruce British Ambassador to the Philippines
1015-1045	Keynote Address	Dr. Angel C. Alcala National Scientist of the Philippines
1045-1055	Group photo	
1055-1100	Presentation of Expectations, Schedule and Participation Norms	
Session 1: Ecosystem-based disaster risk management including coastal protection from mangrove-beach forest greenbelts		
1100-1125	Climate change and disaster risk concepts, tools and policies in coastal areas	Dr. Rosa Perez Senior Research, Manila Observatory
1125-1150	The Mangrove and Beach Forest Development Project: Lessons Learned	Dr. Henry Adornado National Coordinator, DENR-MBFDP Director, DENR-Ecosystem Research and Development Bureau
1150-1200	Open Forum	
1200-1300	Lunch break	Press Conference

1300-1325	Rates of natural mangrove colonization in accreting shorelines and unutilized fishponds	Dr. Fernando Siringan Institute Director, Marine Science Institute, University of the Philippines
1325-1350	Advocacy and accountability engagements to protect mangroves in Palawan	Atty. Grizelda Mayo-Anda Law Professor, College of Law, Palawan State University
1350-1415	The Negros Occidental Initiatives: The Provincial Natural Resources Management Framework	Ms. Maria Elena San Jose Senior Environmental Management Specialist Provincial Environment Management Office – Negros Occidental
1415-1440	Pedada, Ajuy Breakwater Case Study	Ms. Rona Joy Loma Project Manager, ZSL-Philippines
1440-1500	Open Forum	
Session 2: Mangrove rehabilitation with focus on reversion of abandoned, underutilized and undeveloped fishponds to mangrove forests.		
1500-1525	The Philippine National Aquasilviculture Program	Ms. Abigail Javier Aquaculturist II, National Brackishwater and Fisheries Technology Center, BFAR
1525-1550	Implications of restoring mangrove forests in the coastal floodplains of the Pampanga river delta to environmental Vitality of Manila Bay	Dr. Rene Rollon IESM, College of Science University of the Philippines
1550-1615	Coastal Protection Strategy and Tacloban One Architecture Project: Associated Challenges and Solutions	Dr. Arne Jensen Associate Expert, Wetlands International Dr. Annadel S. Cabanban Country Representative, Wetlands International
1615-1640	Leganes Case Study: Reversion of Abandoned Fishpond to Mangroves	Mr. Wilson Batislaon MENRO, LGU Leganes, Iloilo
1640-1700	Open Forum	
1700-1830	Viewing of exhibit and poster presentation	
1830-2100	Governor's Night and Book Launching (DENR ERDB Mangroves & Beach Forest Species in the Philippines; ZSL Mangrove Rehabilitation and Conservation Flip Chart and Booklet) at Casa Real De Iloilo, Iloilo Provincial Capitol	
Day 2 | April 19, 2018		
Session 3: Carbon stock assessments of mangroves in the Philippines.		
0800-0825	Carbon stock of the Philippine Mangroves: Prospects and Challenges in Blue Carbon Governance	Dr. Dixon Gevaña Assistant Professor, University of the Philippines Los Baños
0825-0850	Moving from mangrove carbon stocks assessments towards payments for ecosystem services (PES) implementation: considerations and challenges	Mr. Benjamin Thompson PhD Candidate National University of Singapore
0850-0915	Mangrove forest protection and rehabilitation for ecosystem services: carbon stocks and coastal protection	Dr. Clare Duncan Research Fellow, Deakin University, Melbourne
0915-0935	Open Forum	

Session 4. Marine protected areas with multiple habitats for ecosystem resilience.		
0935-1000	From MPA to MPA Networks Philippines – Lessons in Science and Practice	Dr. Porfirio Aliño Professor, Marine Science Institute University of the Philippines
1000-1025	Mangroves, seagrass and macroalgal habitats as fish nurseries: their importance for marine protected area networks	Dr. Rene Abesamis Postdoctoral Research Officer Silliman University-Angelo King Center for Research and Environmental Management
1025-1050	We can still do more to save coral reefs with MPAs	Dr. Wilfredo Roehl Licuanan Professor, De La Salle University
1050-1115	Shore It Up	Ms. Melody del Rosario Vice President, Public Relations and Corporate Communications, Metro Pacific Investment Corporation
1115-1140	Beach Forest and Climate Change – Coastal Protection and Reforestation	Dr. Jurgenne Primavera Chief Mangrove Scientific Advisor ZSL-Philippines
1140-1200	Open Forum	
1200-1300	Lunch Break	
1300-1500	Simultaneous workshops on DRRM, Mangrove rehabilitation/pond reversion, Blue Carbon, MPAs issues - discussion and recommendations	ZSL-Philippines Staff
1500-1545	Presentation and discussion of workshop outputs	
1545-1645	Plenary: recommendations and conference statement	
1645-1700	Closing and distribution of certificates	Dr. Jurgenne H. Primavera Chief Mangrove Scientific Advisor, ZSL-Philippines
Day 3 | April 20, 2018		
Group 1		
0630-0715	Travel from Iloilo Provincial Capitol grounds to Leganes *Katunggan* Eco-park	
0715-0800	Guided tour of *Katunggan* Eco-park	
0800-0830	Short talk (snacks)	Mr. Wilson Batislaon MENRO, LGU Leganes
0830-0900	Travel back to Iloilo Provincial Capitol grounds	
	Fly out Iloilo Airport	
Group 2		
0830-0915	Travel from Iloilo Provincial Capitol grounds to Leganes *Katunggan* Eco-park	
0915-1000	Guided tour of *Katunggan* Eco-park	
1000-1030	Short talk (snacks)	Mr. Wilson Batislaon MENRO, LGU Leganes
1030-1100	Travel back to Iloilo Provincial Capitol grounds	
	Fly out Iloilo Airport	

Annex B. Expectations and Contributions

The following are the expectations from the conference:

1. Learn additional knowledge and insights on key topics:
   - Mangrove and beachfront conservation and restoration
   - Climate change and disaster risk
   - Field conservation

- Concepts, tools, policies, and best practices

2. Learn from the perspective and experiences of LGUs and agencies
3. Discuss policies on abandoned fishponds
4. Discuss how to engage other sectors

Contributions:
- Active participation
- Come on time
- Contribute knowledge and experiences
- Passion and inspiration
- Help in strategizing
- Echo what we learn from here to our organizations and communities
- Put our learnings into practice
- Scientific voice supporting science-based policies

Annex C: Proposed Call to Action of the 3rd National Mangrove Conference

3RD NATIONAL MANGROVE CONFERENCE
Iloilo City, Philippines
18-19 April 2018

OUR CALL TO ACTION

We, the participants of the 3rd National Mangrove Conference held 18-20 April 2018 in Iloilo City, Philippines, call on mangrove and marine scientists and conservation practitioners; researchers and the academe; national legislators and government agencies; local governments; national and international NGOs, and civil society organizations; humanitarian aid agencies; donor organizations; the private sector; and people's organizations to:

1. Deepen our understanding on the importance of biological connectivity of mangroves, intertidal mud- and sandflats, seagrass meadows, sediment communities, coral reefs and other critical coastal habitats as a collective ecosystem, and its contribution to supporting fish and shellfish populations and biomass using empirical data.

2. Undertake further scientific studies to provide robust evidence on the functioning, systematics, and ecological and societal importance of mangrove ecosystems
   - as first line of defense for coastal communities, infrastructure, and agri/ aquaculture against natural disasters;
   - as a critical ecosystem-based adaptation and mitigation strategy to climate change;
   - for their supporting role in fisheries production;
   - as a potentially important source of financing/income for coastal communities, and rehabilitation/ conservation activities through blue carbon or other Payments for Ecosystem Services (PES) schemes.

3. Advance and accelerate the reversion of abandoned, undeveloped and underutilized (AUU) fishponds (including titled, tax declared, and Fishpond Lease Agreement (FLA) tenure) to mangrove forests as key to mangrove rehabilitation and conservation and strategy to climate change adaptation and mitigation.
   - DENR, DA-BFAR, DILG and DOF to finalize and sign soonest the draft Joint Administrative Order on Fishpond Lease Agreement-Cancellation and Reversion of Abandoned, Undeveloped and Underutilized Fishponds to Mangroves in view of the urgent need for effective and productive mangrove rehabilitation areas under the National Greening Program of the DENR and Philippine National Aquasilviculture Program of the DA-BFAR;
   - At local levels, forge Memorandum of Agreements (MOAs) between FLA lease holders with BFAR, DENR, LGU and NGOs;
   - Divert donor and public funds for mangrove greenbelt rehabilitation away from ineffective seafront planting and toward buying back AUU fishponds for reversion;

- Where appropriate, utilize naturally colonizing *Sonneratia* spp. and *Avicennia* spp. instead of *Rhizophora* spp. in AUU fishpond reversion assisted recolonization activities.

4. Pass the National Greenbelt Act to ensure the protection and conservation of coastal wetlands – mangroves, marshes, seagrasses; and beach forests, and safeguard coastal communities, build resilience and adaptation capacity to future climate change impacts.

5. Strengthen and further advance the conservation of mangroves and beach forests to build coastal resilience using science-based best practices in mangrove rehabilitation;
   - Undertake a national inventory of Philippine beach forest species, including facilitating improved understanding of their importance, uses and social/ cultural values;

6. Stop planting of mangroves in seagrass beds, intertidal mud/sandflats and other areas where they were not historically present, and because such planting threatens the persistence of other critical coastal ecosystems and their associated fauna.

7. Strengthen enforcement of laws, policies and implementing regulations to protect and conserve mangroves by utilizing accountability mechanisms and tools on duty-bearers, as provided for under our existing legal frameworks and jurisprudence.

8. Develop and strengthen institutions and networks (structures, policy and implementation frameworks) for the protection, management and governance, and enhanced sustainability of natural resources following a 'ridge to reef' framework.

9. Promote, enhance, sustain and replicate best practices that showcase the protection of mangrove ecosystem services and coastal biological connectivity; particularly through community-based livelihoods and effective community tenure schemes, multi-stakeholder partnerships, and strong local governance.

10. Undertake valuation studies to quantify and assess the full suite of ecosystems services delivered by mangroves and other coastal wetlands, in order to provide a basis for complete protection of mangrove and seagrass ecosystems against reclamations and other land use conversions amidst the "build, build, build" development strategy of the current administration;
    - Employ building with nature concept in sustainable development.

11. Promote and advance green-gray engineering approaches to strengthen mangrove greenbelts and coastal resilience using sound scientific knowledge and procedures, taking into account the historical conditions of the respective coastal area.

12. Conduct studies and disseminate the results on ocean acidification as a climate change hazard and its impact on marine life and associated coastal communities' well-being.

13. Accelerate the establishment and strengthen the management of no-take Marine Protected Areas (MPAs) and MPA networks and local conservation areas, ensuring

the protection of coastal habitat connectivity in order to secure the abundance and biodiversity of fish, shellfish, and bird populations.

- Take caution and rethink the promotion and propagation of coral gardening using "fragments of opportunity" and artificial reefs as the panacea to continued degradation of coral communities and fish populations and fisheries, as they are costly, bringing false expectations to communities and local governments and cannot replace the integrity of natural marine environments.

14. Protect remaining intact mangroves and beach forests especially in Key [Marine] Biodiversity Areas (KBAs/MKBAs) in the country such as, Dinagat, Palawan, Siargao, and Tawi-tawi.

15. Promote, develop and prioritize the importance of mangrove ecosystem services, such as blue carbon and coastal protection (infrastructure), which can provide conservation financing and incentives to support communities for wider protection and management efforts.

16. Explore, utilize and maximize the role of media and information technology in mangrove conservation;
    - Develop and engage community champions from the youth, women using quad-media (TV, radio, print and social media) for mangrove rehabilitation and conservation;
    - Develop and maintain an online platform for mangrove conservation.

17. Convene the National Mangrove Convergence Initiative, hosted by the DENR, with membership to including local governments, national and international NGOs and humanitarian aid agencies, donor organizations, the scientific community, the private sector, and people's organizations to harmonize, coordinate and streamline wider collaborative efforts for mangrove conservation.

Signed this 19th day of April 2018...

Note:

A consensus was not made on the draft call to action during the Conference. This is the final Call to Action which was disseminated to Conference participants after the event. Electronic signatures were sent to the secretariat for collation

Annex D: Abstracts of Poster Presentations

MANGROVE RESTORATION IN INFANTA, QUEZON, AN EMPOWERMENT FOR THE COASTAL COMMUNITY

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Abstract

Filipinos witnessed the importance of intact and diverse mangroves as these serve as life-saving natural barriers against the onslaught of storm surge and extreme flooding brought by Category 5 typhoons, such as Tropical Storm Haiyan. Mangrove forests do not only save human lives, but also paves the survival and procreation of different marine life forms, leading to a very rich biodiversity, not only in marine, but in adjacent ecosystems as well. Mangrove restoration increases food security, including potential sources of livelihood for the coastal communities.

As Haribon Foundation continuously contributes to the Philippines' global commitments on Convention on Biological Diversity, through its support to the Philippine Biodiversity Strategy and Action Plan (PBSAP); the United Nations Sustainable Development Agenda 2030; the "Ambisyon Natin" 2040 and the Philippine Development Plan 2017-2022, the need to support the government's efforts to appropriately restore the Philippine mangroves is one of the foundation's priorities as it directly promotes all of these commitments.

In Luzon, Haribon has its five-year Restoration of Mangrove Forest Project in Barangay Dinahican, Infanta, Quezon. The project is funded by Ricoh Company Ltd.'s through its Ricoh Printer for Green Project, channeled through Birdlife International-Tokyo. This supports PBSAP's interventions on Restoration of ecosystem functions and Promotion of Biodiversity friendly livelihoods. The project also responds to Sustainable Development Goal (SDG) 13, where everyone is asked to 'Take urgent action to combat climate change and its impacts' and SDG Goal 14, where people need to "Conserve and sustainably use the oceans, seas and marine resources".

Inclusive approach is evident, concerted efforts are being made by Haribon and its partners, the Maralitang Mangingisda ng Munting Sabang Association, Barangay Dinahican and the Municipal Government of Infanta to restore the mangroves and its marine resources, at the same time come-up with new livelihood options. The project is considered substantial part of the "ridge to reef" efforts, as the municipal government and local Department of Environment and Natural Resources (DENR) continuously restores and protects its upland forests and watersheds.

A number of capacity building support were provided to the partners, from trainings on the proper restoration, maintenance and monitoring of mangroves, environmental law education, livelihood trainings such as Fish Trading and Bagoong Making, Basic Orientation on Sustainable Tourism and Basic Tour Guiding. The project accomplished an enrichment planting of more than five hectares in appropriate intertidal zones,

achieving more than 90% survival of the 10,500 trees planted. The species planted were *Bruguiera parviflora, Bruguiera gymnorrhiza, Avicennia rhumpiana, Xylocarpus granatum, Sonneratia alba, Ceriops tagal, Rhizophora mucronata, Rhizophora apiculata, Aegiceras corniculatum, Scyphiphora hydrophyllacea, Aegiceras floridum*, and *Scyphiphora hydrophyllacea*.

The project is now on its fourth year, and aims to establish a Marine Protected Area (MPA) to ensure the perpetual protection, not only the restored sites, but of all areas within the protection zone identified by Infanta's Forest Land Use Plan (FLUP).

Keywords: mangrove restoration, livelihood, coastal community, local government units.

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THE EFFECT OF ENVIRONMENTAL FACTORS ON THE GROWTH OF MANGROVE SEEDLINGS IN KAUSWAGAN, LANAO DEL NORTE

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Abstract

Seedling is a key factor for mangrove expansion and distribution because mangroves have low or no capacity for vegetative propagation. Likewise, the growth and development of mangrove seedlings and propagules are greatly influenced by natural environmental factors such as water temperature, salinity, pH, dissolved oxygen, nutrients, rainfall and tidal limits. Considering the importance of mangrove seedlings, it is important to know what environmental factors that would affect their growth and development. From December 2013 and January 2014, the percent seedling growth of *Sonneratia alba, Rhizophora mucronata, Rhizophora apiculata* and *Aegiceras corniculatum* found in Kauswagan, Lanao del Norte was determined and some environmental factors were also measured. Result showed that the highest percent growth was found in *Rhizophora apiculata*. On the other hand, Barangay Kawit Occidental had the highest seedling growth and shows to be a good site for mangrove growth and reproduction. Furthermore, the effect of environmental factors on seedling growth was found to be species specific.

Keywords: Seedling growth, *Sonneratia alba, Rhizophora mucronata, Rhizophora apiculata, Aegiceras corniculatum*, species specific

SMALL-SCALE SPATIAL PATTERN OF COMMUNITY STRUCTURE OF MANGAL-ASSOCIATED MALACOFAUNA IN REFORESTED MANGROVE FOREST OF ISLA KAPISPISAN, NEW WASHINGTON, AKLAN

Jamaica Marma Alcedo and Ronald Maliao

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Abstract

Baseline monitoring of malacofauna diversity accumulated within Isla Kapispisan, New Washington, Aklan was carried out to better understand the efficacy of mangrove reforestation as a tool for diversity restoration. A total of 47 molluscs species comprising 28 gastropods and 19 bivalves were found in the area out of the 2,621 individuals gathered in 5 sites using line transect method. Agglomerative Cluster Analysis based on species abundance revealed 3 unique site clusters. Each cluster reflects a unique molluscan community structure, with 2 clusters belonging to the main island while the third cluster coming from the adjacent islets. The clusters in the main island are dominated by *Cerithidea cingulata* and *Terebralia sulcata* while the adjacent islet is abundant in *Cerithium corallium*. The community structure of mangal-associated malacofauna in Isla Kapispisan exhibits significant variation at a scale of kilometres. This result indicates habitat characteristics and consequently molluscan recruitment could vary even at small spatial-scale. An implication on how mangrove ecosystems should be managed, taking into account the distribution and zonation patterns of its associated malacofauna.

Keywords: mangrove, molluscs, spatial pattern, community structure

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BLUE CARBON POTENTIAL OF URBAN MANGROVES IN BATANGAS CITY, PHILIPPINES

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Abstract

Mangrove forest is one of the most important forest formations in the world as it has the ability to thrive in a highly saline environment and to sequester atmospheric

carbon; however, it has been recorded that over 50% of its cover has been converted for urban development, agriculture, and aquaculture purposes such as shrimp and fish farming, as well as salt and rice production. Most mangrove forests are also exploited due to the increasing demand of the growing population whereas such acts contribute to the addition of carbon emission. Batangas City in Luzon, Philippines presents a good case for underlining the critical role of mangrove in mitigating climate change. The study has focused on six mangrove sites which cover a total area of about 26.48 hectares. To quantify blue carbon stocks, 18 randomly selected 10 m x 10 m sample plots established across the identified mangrove sites. Vegetation and sediment carbon pools were assessed. Land cover change analysis was also done to account spatial vegetation changes. Overall results showed that the city holds as much as of 29.92 $ktCO_2$, a value that is worth their conservation. By estimate, such ecosystem service could be valued to much as USD 98,149. Recommendations for mangrove rehabilitation were identified. About 504 hectares of denuded mangrove sites were identified as potential sites for future mangrove rehabilitation. The City Government should therefore pursue participatory ecological rehabilitation of these sites by partnering with important stakeholders, particularly coastal communities, academe and industries that are operating in the area.

Keywords: blue carbon, conservation, city, mangrove, urban

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SPATIALLY EXPLICIT INDIVIDUAL-BASED MODELLING OF MANGROVE FOREST DYNAMICS

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Abstract

Mangroves are proven vital for climate change mitigation, especially along a coastal environment. Previous studies revealed that mangrove forests can sequester and store higher amount of carbon compared to mature tropical forests, recognizing their role in climate change mitigation. However, the benefits and services provided by this ecosystem are threatened by anthropogenic factors and the continuing effects of climate change. Likewise, if degraded or lost, the mangrove ecosystem becomes a significant source of the greenhouse gas carbon dioxide.

In the Philippines, several mangrove rehabilitation programs and policies implemented are still unsuccessful, which indicate the need for improved planning supported by scientific basis. Incorporating science with policy is essential to create a sustainable mangrove ecosystem. Simulation models have been developed worldwide to understand

the dynamics of these ecosystems. Thus, this research aims to develop a simulation model for predicting the long-term dynamics of mangroves in the Philippines. One approach in developing simulation models is through Individual-based modelling which has the capability to analyze complex behavior of an individual agent as part of the system and its interaction with other agents and its environment. Individual-based models have been widely used in ecology to simulate forest dynamics on the basis of establishment, growth and death of individual trees.

In this research, we propose a spatially explicit individual-based model of mangrove forest dynamics based on different published models, adapted to fit the local settings in the Philippines. The model makes mangrove population forecast by anticipating the development of each individual mangrove tree throughout its life. The model is constructed from sub-models that predict individual tree's growth, survival, recruitment and mortality. The growth submodel adopts JABOWA-type growth equation defined by an optimum growth function reduced by local environment and competition from neighboring trees. The environment factors considered in this study are salinity, tidal inundation as stressors and light availability as regulator. The competition submodel adopts the Field of Neighborhood approach introduced in the KiWi model. Stochasticity plays an important role in the recruitment and mortality submodels by using probability function in accordance to Poisson process.

It is envisioned that the prototype model can also be extended and customized, serving as framework for developing other simulation models to be applied in different mangrove sites in the Philippines, which can aid in the decision-making of rehabilitation program managers and policy makers. Implementation of this model can provide information on possible future scenarios based on the current management procedures employed. It can also be used as virtual environments for designing possible mitigation and management methods for mangroves which would in turn affect the blue carbon ecosystems.

Keywords: individual-based model, geosimulation, mangrove, mangrove dynamics, growth, simulation

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TOWARDS SUSTAINABILITY: BASELINE ASSESSMENT OF CARRYING CAPACITY OF SELECTED MANGROVE ECOTOURISM SITES IN CAPIZ

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Abstract

This paper discusses the baseline assessment of the carrying capacity of selected mangrove ecotourism sites in Capiz; The Palina Greenbelt Eco Park and the Cadimahan River Tour. The appeal of the concept of carrying capacity as a paradigm for addressing and limiting the amount of tourism development and use at a destination has clearly emerged, leading to calls to establish carrying capacities in terms of specific numbers

of tourists over a specified time period. Such concerns are deemed appropriate for sustaining local communities and their cultural and environmental context; fears of irretrievably committing resources to specific uses are increasingly important in a world of growing scarcity. Calculations of the carrying capacity of the said site recommends that there should be alternative activities to be offered so as to increase the number of tourist to sustain the income and at the same time preserve the ecosystems of the respective areas.

Keywords: sustainable eco tourism, mangroves tourism, carrying capacity, development

MANGROVE COMMUNITY STRUCTURE IN LIANGA, HINATUAN AND BISLIG BAYS OF SURIGAO DEL SUR

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Abstract

A rapid assessment of mangrove community structure was conducted in Lianga, Hinatuan and Bislig Bays of Surigao del Sur from October 2017-January 2018 under the DA-BFAR FishCORAL Project. A total of 12 sites were surveyed covering the three bays of Surigao del Sur. The transect plot method was used to assess the mangrove forest in terms of species composition, basal area, tree height, density of trees, sapling and seedlings per species. Coring was used in collecting sediment samples for OM and grain size, and HOBO light sensors to measure canopy. Mapping of the extent of mangrove cover is still ongoing using GIS.

Fourteen (14) species of mangroves and nine (9) associates were identified in the three bays. *Rhizophora apiculata* was observed as the most dominant species of mangrove covering most of the coastlines of the three bays including some islets. The least accounted mangrove species were *Xylocarpus granatum* and *Ceriops tagal*. Mangrove basal area per hectare ranged from 185,929 to 1,214,429 cm^2/ha with lowest in Cagwait of Lianga Bay and highest in Barangay Lawigan of Bislig Bay. Mangrove tree density ranged from 1,000 to 6,575 trees per hectare with lowest in Barangay San Juan in Hinatuan Bay and highest in the Municipality of Marihatag in Lianga Bay. Regenerative capacity was highest for *Rhizophora apiculata* for both saplings and seedlings.

Nypa fruticans utilization for native wine production is common in the area. However, other resource utilization such as cutting of mangrove trees for firewood and poles has been observed mostly in unmanaged mangrove areas especially those that are near coastal communities. Mangrove reforestation efforts is also observed in all municipalities using *Rhizophora* seedlings provided by the government agencies as a way of management intervention, supporting preservation and conservation advocacy of the national government.

Keywords: Biodiversity, participatory resource assessment, regenerative capacity, resource management, mangrove reforestation

COMPOSITION AND ABUNDANCE OF MANGROVES IN KAUSWAGAN, LANAO DEL NORTE

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Abstract

Mangroves are among the most threatened and rapidly disappearing natural environments in the world. With this, baseline ecological studies are required whether it is undisturbed or disturbed mangrove ecosystems to support management and conservation objectives. From December 2013 to January 2014, the species composition, abundance and zonation pattern of naturally grown mangroves in seven (7) coastal barangays of Kauswagan, Lanao del Norte were determined. Six (6) species of mangroves were identified: *Sonneratia alba, Avicennia alba, Rhizophora mucronata, Rhizophora apiculata, Lumnitzera racemosa* and *Aegiceras corniculatum*. Result showed that *S. alba* was the most abundant and dominant species of mangroves in Kauswagan. Among the seven sampling sites, Barangay Kawit Oriental had the highest abundance in terms of density, biomass, basal area and canopy height. The mangrove in Kauswagan is classified as fringing type and it has a typical zonation pattern based on inundation level. Moreover, the mangrove trees in Kauswagan were classified as young stand and this was attributed to the illegal cutting of trees during the last decade which resulted to denser young trees of smaller size.

Keywords: mangrove, biomass, density, zonation

MAGROVE PROFILE OF ALABEL, SARANGANI PROVINCE, PHILIPPINES

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Abstract

One of the important ecosystems in coastal areas of the municipality of Alabel is mangrove forest which provides ecological and economic benefits to surrounding environment and many communities. Mangrove profiling is the process of obtaining information necessary for effective resource management. This study was conducted in 2016 to assess the status of the mangrove community and vegetation of mangrove forest. This study provides an updated baseline information. Using transect lines, 10 m x 10 m quadrats were set up perpendicular to the shore, all mangrove species found in the quadrat were identified and counted individually and recorded at the species level. Mangrove vegetation analyses were determined using relative density, relative dominance and importance value. A total of sixteen (16) species of true

mangroves were identified in the whole coastal area of Alabel. *Sonneratia alba* has the highest number of individuals species recorded (1,419), followed by *Avicennia marina* (1,366) and *Nypas fruticans* (731). The vegetation analysis in Alabel showed that the highest relative abundance were *S. alba* (30%) followed by *A. marina* (28%) *Rhizophora apiculata* (12.90%). In total relative frequency, *S. alba* (46%) was the dominant among all species followed by *A. marina* (27%). The results show that the highest computed importance value (IV) were *S. alba* (100%) and *A. marina* (78%). Hence, species with highest importance value were considered dominant in the vegetation of the mangrove forest.

Keywords: mangrove, marine protected area, vegetation analysis, mangrove profiling

PROFILE OF THE MANGROVE COMMUNITY, THE ASSOCIATED FLORA AND FAUNA AND THE PHYSICO-CHEMICAL PARAMETERS IN LAGUINDINGA, MISAMIS ORIENTAL

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Abstract

A mangrove reforested area in Tubajon, Laguindingan, Misamis Oriental was studied in November – January 2015. The profile of the mangrove community, composed of a single species of *Rhizophora apiculata* with its associated fauna was assessed by Transect-Line Quadrat Method. The physico-chemical parameters were also studied. Results indicated that the total number of trees per 100 square meter quadrat ranges from 12-77 with increasing number of trees per quadrat landward. The circumference ranges from 0.1-0.3 m, diameter at breast height (DBH) 0.04-0.1 m, the average total height of the tree 4 m, and the average cover 0.5 m. The survival rate of the mangrove tree is 16-100% with survival rate decreasing seaward. Fauna associated with the mangrove trees include gastropod shells, mussels, sponges, and sea stars. Associated flora include seagrasses and algae. Average temperature is 23°C, water temperature 23.83°C, water pH 7.67, humidity 99.11% and total suspended solids 0.05 g/liter.

Keywords: mangrove, mangrove flora and fauna, physico-chemical parameters

COMMUNITY STRUCTURE AND ESTIMATION OF ABOVEGROUND BIOMASS AND CARBON STOCK OF BEACH FOREST IN AJUY, ILOILO, PHILIPPINES

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Abstract

Sandy beaches provide many ecosystem services that includes wave dissipation and associated buffering against extreme weather events, breakdown of organic materials and pollutants, nutrient mineralization and recycling, maintenance of biodiversity and genetic resources, providing a nursery area, prey for birds and other terrestrial wildlife, scenic vistas and recreational opportunities, and functional links between terrestrial and marine environments. The present study was conducted to assess the community structure and estimate the carbon stock and aboveground biomass of beach forest in Ajuy, Iloilo, Philippines. This study used the modified transect line plots method in assessing selected sites. Transects established were 100 m in length with 10 m x 10 m plots. This method employed a detailed, scientific and qualitative characterization of beach forest species where estimates of abundance, density, basal area, and seedling and sapling of every species were counted. In general, a total of 58 species representing 28 families were found in the sites. However, Brgy Pedada had 50 species representing 28 families while Brgy Bay-ang had 36 species in 17 families. Among the families of vascular plants, Fabaceae was the most represented with 9 species while the other 15 families were represented by a single species only. Among the species, *Artocarpus blancoi* had the highest importance value and was followed by *Cocos nucifera* suggesting that these two species are dominant in the area and contributes a large portion to the entire beach forest ecosystem in Ajuy. The diversity index (H'= 0.53) and the species evenness (J'= 0.45) had low values possibly indicative of the dominance of one to two species among the various species present in the study area. The estimated total above ground biomass in Ajuy was 6,216.96 t/ha that contained a total carbon stock of 2,797.63 t/ha while the average above ground biomass per species was 414.46t/ha and 186.51t/ha for the carbon stock. Among the species, *Sterculia foetida* yielded the highest above ground tree biomass of 3,210.02 t/ha with a total carbon stock of 1,444.51 t/ha while *Buchanania arborescens* had the lowest tree biomass value at 13.22 t/ha containing 5.95 t/ha carbon. The high value of the aboveground biomass and carbon stock in Pedada is attributed to the presence of large tree species such as *Sterculia foetida, Terminalia catappa*, and *Thespesia populnea*. This study has shown that there is relatively high species diversity and substantial amount of above ground biomass and carbon stored in the beach forest of Ajuy despite the evident high anthropogenic pressure. As such, there is an urgent need to preserve and manage the site to maximize the role of beach forest in climate change mitigation at the local level.

Keywords: above ground biomass, beach forest, carbon sequestration, carbon stock, climate change mitigation

COMMUNITY STRUCTURE AND ESTIMATION OF ABOVEGROUND BIOMASS AND CARBON STOCK OF BEACH FOREST IN BARANGAY SANTIAGO, BAROTAC VIEJO, ILOILO, PHILIPPINES

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Abstract

Beach forests are natural structures that provide ecosystem services such as nutrient cycling and storm buffering. They serve as a natural habitat for a variety of life, protect the coastal environment by acting as a bioshield from a lot of natural calamities including flood, wind, tide and wave action, tsunamis and storm surges and most importantly, these forests help mitigate climate change by acting as carbon sinks. There is little to no information however on these beach forests, particularly in the Philippines, and so, the need for this study. The study was conducted mainly to assess the community structure and estimate the carbon stock and aboveground biomass of the beach forest in Barangay Sangtiago, Barotac Viejo. It specifically aimed to i.) identify the beach forest species present in the area; ii) describe the community structure in terms of: species composition, diameter at breast height and stand height, stand basal area, importance value, index of biodiversity, species richness and evenness; iii) determine aboveground biomass and carbon stock; and iv.) determine whether there is a relationship between beach forest species diversity index and carbon stock. Overall, a total of 32 families were observed having a total of 62 species recorded. Particularly, dominance of the family Fabaceae was observed which was represented by a total of 13 species. Although a varied number of beach forest species were recorded, the calculated diversity (H'=0.45) and evenness index is low (J'=0.75) which maybe be due to a nearby area being inhabited by the locals. An estimate of 213.3 t/ha was calculated for the average aboveground biomass while the result for the average carbon stock is 96 t/ha. The result implies that despite exhibiting a variety of beach forest species in the coastal area, only a little amount of carbon is stored resulting from excessive harvesting of old and mature trees. This indicates that better coastal management is needed to maintain the existing beach forest species in the area to ensure its preservation to enhance its capacity in providing ecosystem services.

Keywords: beach forest, bioshield, carbon sink, aboveground biomass, community structure, Barotac Viejo

COMMUNITY STRUCTURE AND ESTIMATION OF ABOVEGROUND BIOMASS AND CARBON STOCK OF BEACH FOREST IN BARANGAY BORONGON, SAN DIONISIO, ILOILO

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Abstract

The Philippine beach forests have suffered severe degradation due to their conversion to various uses and over-utilization for a long period of time. In fact, we lost them much earlier than mangroves to the point that little information is available about them. It is only recently that their importance is slowly gaining recognition in relation to their role in mitigating the impacts of climate change affecting coastal communities. Unfortunately, little information is available; thus, the need for this study. The aim of this study was to assess the community structure and estimate the carbon stock and above ground biomass in two coastal barangays of San Dionisio, Iloilo, Philippines. Specifically, this study aimed to identify the different beach forest species present in the area, describe the community structure (species composition, diameter at breast height and stand height, stand basal area, importance value, index of diversity and species richness) of the beach forest species, determine the aboveground biomass and carbon stock. Two sampling sites were established in barangay Borongon, San Dionisio. This study used the modified line plot method to assess the community structure. A total of 64 species representing 33 families were identified in the two sites with Fabaceae having the highest number of species. The quantitative community structure analysis showed that only eight (8) beach forest species were found to be present in both sites, having a 100% frequency of occurrence. Eight species were found only in Site 1 with only 1 species unique to Site 2. For the frequency across species, in Site 1, five species were classified as very frequent (>30%) with *Artocarpus blancoi* having the highest value of frequency of 56%. In Site 2, four species were classified to be very frequent, with *Ficus pseudopalma* having the highest frequency of occurrence of 78%. The total stand basal area of site 1 was 14.68 m^2/ha with *Cocos nucifera* having the greatest contribution of 11.75 m^2/ha. For Site 2, the total stand basal area was only 1.90 m^2/ha.The species with the highest importance value in both sites was the Cocos nucifera with an importance value of 108.57 and 73.63 respectively. San Dionisio had a mean species diversity of (H'=0.96) and a mean species evenness of (J'=1.00).The overall mean biomass of the beach forest in San Dionisio, Iloilo was 163.15 t/ha and the total mean carbon stock was 73.4 t/ha.

Keywords: Carbon stock, aboveground biomass, beach forest, climate mitigation, San Dionisio, Iloilo

COMMUNITY STRUCTURE AND ESTIMATION OF ABOVEGROUND BIOMASS AND CARBON STOCK OF BEACH FOREST IN BRGY. DANGULAAN, ANILAO, ILOILO, PHILIPPINES

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Abstract

Forests supply multiple environmental, economic and social services, all of which are significant to human development. Importance of beach forest-mangrove belts include bio-shield function, medicinal and traditional uses and great potential for industrial applications. The effect of coastal forests, including mangroves, is to slow the progress of water from storm surges and tsunamis by reducing the height and speed of the wave and reducing water currents as seawater propagates inland. There is little to no information however on these beach forests, thus, the need for this study. The study was conducted mainly to assess the community structure and estimate the carbon stock and aboveground biomass of the beach forest in Barangay Dangulaan, Anilao, Iloilo, Philippines. It specifically aimed to a) identify the beach forest species present in the area; b) describe the community structure in terms of: species composition, diameter at breast height and stand height, stand basal area, importance value, index of biodiversity, species richness and evenness; c) determine aboveground biomass and carbon stock; and d) determine whether there is a relationship between beach forest species diversity index and carbon stock. A field survey was conducted using three 100 meter transects with 3 plots each in Barangay Dangulaan. Overall, a total of 29 families were observed having a total of 54 species recorded. Particularly, dominance of the family Fabaceae was observed which was represented by a total of 7 species. The number of beach forest recorded were varied but the calculated diversity (H' = 0.71) and evenness index (J' = 0.746) is low which is due to the conversion of sandy beach forest lands into fish pens and the local settlement of lands in the area by natives. The average total carbon in the area resulted in 4,160.4 t/ha and the average tree biomass was 9,245.3 t/ha. This result would imply that there are still large and mature trees that is in the area comparing since mature trees stock more carbon. The area in Barangay Dangulaan still needs better coastal management needed to maintain the existing beach forest species. This study provides baseline information useful in the establishment of sustainable efficient conservation strategies for restoration, rehabilitation, and protection and protection of the remaining beach forest in Anilao, Iloilo.

Keywords: above ground biomass, beach forest, carbon sequestration, carbon stock, climate change mitigation

COMMUNITY STRUCTURE AND ESTIMATION OF ABOVEGROUND BIOMASS AND CARBON STOCK OF BEACH FOREST IN BACJAWAN NORTE, CONCEPCION, ILOILO, PHILIPPINES

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Abstract

Beach forests are important environmental resources that provide economic and ecological services. They can mitigate climate change by sequestering carbon and act as bioshields that protect coastal environments from erosion and damage from the wind and sea. The present study was conducted to assess the community structure, biomass and carbon stock of beach forest in Concepcion, Iloilo. A modified transect method was used to assess the target sites in this study. Three transects 100 m in length with 10 m x 10 m plots. This method allowed for a systematic and thorough characterization of beach forest species. Indices for diversity and evenness, species richness and values for stand basal area were determined using the data collected. The total tree biomass and carbon stock was determined by measuring the diameter at breast height (DBH) of the sampled trees. A total of 62 species from 27 families was present in the area. *Artocarpus blancoi* had the highest importance values, indicating dominance in the community, as well as the largest biomass and carbon stock. A low diversity index of (H'=1.31) and an evenness index of (J'= 0.93). This study has shown that there is relatively high species diversity in the area as well as substantial amounts of carbon sequestered in aboveground biomass. Proper conservation efforts and management in the area is needed to preserve the existing beach forest.

Keywords: above ground biomass, beach forest, carbon sequestration, carbon stock, climate change mitigation

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COMMUNITY STRUCTURE AND ESTIMATION OF ABOVEGROUND BIOMASS AND CARBON STOCK OF BEACH FOREST IN CARLES, ILOILO, PHILIPPINES

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Abstract

Beach forests have long been forgotten or even ignored in mainstream science for a long period of time. It is only fairly recently that their role in mitigating the impacts of climate change are again gaining attention. Beach forests can prevent coastal erosion and shows an adaptation to salt spray, high temperature and radiation as well as mobile substrates. Unfortunately, little is known about them in terms of diversity, ecology and distribution that make this study useful. This study aimed to assess the community

structure and estimate the carbon stock and aboveground biomass of beach forest in Barangay Puta, Carles, Iloilo, Philippines. Specifically, it aimed to: a) identify the beach forest species present in the area; b) describe the community structure in terms of: species composition, diameter at breast height and stand height, stand basal area, importance value, index of biodiversity, species richness and evenness; c) determine aboveground biomass and carbon stock; and d) determine whether there is a relationship between beach forest species mean DBH and carbon stock and between mean height and carbon stock. A field survey was conducted using five (5) 100 m transect line with 3 sub-plots each on February 6-8, 2016. Results showed a total of 63 beach forest species belonging to 30 families. Family Fabacaeae ranked first with 10 species, followed by Euphorbiaceae and Apocynaceae with 8 and 7 species, respectively. *Cocos nucifera* recorded the highest value basal area (27.49), relative dominance (45.66%), relative frequency (11.69%) and importance value of 62.97. Average biomass was 259.6 tons/ha and estimated to contain 129.8 tons/ha carbon stock. The beach forest forest in the surveyed sites showed a relatively high diversity at H'= 1.24 and high amount of above ground carbon stock useful in mitigating the impacts of climate. There is an urgent need to protect, preserve and conserve the areas for the benefit of future generations.

Key words: beach forest, density, frequency, dominance, importance value, biomass, carbon stock

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BEACH FOREST DIVERSITY EVALUATION OF BARANGAY KLING, KIAMBA, SARANGANI PROVINCE, PHILIPPINES

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Abstract

Beach forest is a unique type of ecosystem, a mixed group of littoral creepers, shrubs, and trees above the high tide level. In Sarangani Province, beach forest is not well studied even though it experienced various environmental threats due to the increase of coastal development and tourism. Thus, this study aimed to determine the composition and diversity of beach forest species in Barangay Kling, Kiamba, Sarangani Province and relate it to the whole coastal area of the municipality by producing a profile. Specifically, the study sought to determine the species composition of beach forest in the sampling areas; assess the beach forest diversity of at least three sampling areas in Barangay Kling. The methods involved transect-quadrat method. Species were identified through identification guides, and data analysis included relative density, relative frequency, relative dominance, species diversity index and species importance value. Results of the assessment of species composition and community structure of beach forest in Barangay Kling, Kiamba showed that a total of 39 beach forest species distributed among 23 families are present on the site, and another ten species were observed outside of the study area. *Milletia pinnata* has the highest importance value with a rating of 79.04, followed by *Terminalia catappa* (65.54) and

Barringtonia asiatica (44.04). The results show that the area has a huge potential for developing into a beach forest park considering the diversity and maturity of the stand. In addition, management, protection, and rehabilitation of beach forest are also highly recommended to maximize their potential as climate change mitigators and their role in coastal protection.

Keywords: Coastal ecosystem, mangrove associates, coastal protection, Kiamba Sarangani

Annex E: Messages

Mr. Godofredo T. Villapando, Jr.
Country Manager, ZSL-Philippines

To our Keynote Speaker, Dr. Angel Alcala, one of our National Scientists, Governor Arthur Defensor, Sr. of the Province of Iloilo, Mr. Dominador Co, representing the City Mayor of Iloilo, For. Jessie L. Vego, ARD for Technical Services of DENR 6, representing DENR Secretary Roy Cimatu, Ms. Drusila Esther F. Bayate, Assistant Director for Technical Services, representing Undersecretary Eduardo Gongona of DA-BFAR, Mr. Rob Contractor, representing His Excellency Daniel Pruce, the Ambassador of the British Embassy in Manila, Mr. Raki Nekahetiya, ZSL-UK's Marine and Freshwater Programme Manager for Conservation for Communities, Dr, Jurgenne Primavera, Chief Mangrove Scientific Advisor of ZSL-Philippines, our resource persons, conference participants, and my colleagues from ZSL-Philippines, a pleasant good morning to all of you.

April is one the very exciting months in 2018 for all of us at ZSL-Philippines. It is not only because of the celebration of Earth Day this April 22 but because we have some exciting events wherein either ZSL-Philippines is leading or involved in organizing important events in addressing environmental conservation. In the first week of April, ZSL-Philippines participated in the planning-workshop to launch and implement a national campaign to address plastic pollution in our seas and oceans with a hashtag #CleanSeas_Pilipinas. The group is led by the SMARTSeas PH Project of the DENR-BMB with UNDP and other conservation organizations that will launch the campaign on 26 May 2018 in Quezon City, and the regional launching will follow after that.

Last week, ZSL-Philippines was in Puerto Princesa City, Palawan and co-organized the 1st National Philippine Pangolin Conservation Planning Workshop with the support of the Palawan Council for Sustainable Development, IUCN SSC Pangolin Specialist Group, Katala Foundation, Inc. and ZSL-UK. It was a very successful workshop and was capped by the release of a male Palawan pangolin in the wild, which was found by a youth group in Sitio Sabang, Puerto Princesa City and turned over the animal to the Protected Area Superintendent of the Puerto Princesa Subterranean River National Park.

Last week, we had a fruitful conversation and agreements have been made with our partners in pursuing our conservation effort on ideal marine protected area that we are implementing in Northern Iloilo.

And this week, we will talk about mangroves and beach forest.

Allow me to give a brief recollection on the two previous conferences on mangroves led by ZSL-Philippines. In 2012, the 1st National Mangrove Conference was organized to facilitate learning about the role of mangroves in our ecosystem. In 2015, the 2nd National Mangrove Conference resulted in the issuance of a statement from the participants that called the government and other stakeholders to act on the need to apply the science-based protocols on mangrove conservation, to avoid planting of mangroves in seagrass beds, and to address other pressing issues at the time.

Three years after, the ZSL-Philippines has gathered us all here in Iloilo City for the 3rd National Mangrove Conference with the following objectives:

1. To review ecosystem-based disaster risk management and showcase best practices and lessons on coastal protection including mangrove-beach forest greenbelts;
2. To review mangrove rehabilitation including reversion of abandoned, underutilized, and undeveloped fishponds to mangrove forests as a climate change adaptation strategy;
3. To review and showcase best practices of marine protected areas with multiple habitats as key to improving and maintaining ecosystem resilience in a changing climate; and
4. To review and identify gaps in carbon stock assessments of Philippine mangroves recognizing the role of Blue Carbon in climate change mitigation.

I hope that we will learn a lot from the different topics and will be inspired from inputs and sharing of our resource persons on mangroves and beach forest, in relation to disaster risk management, conservation strategies, connectivity of the different habitats, and financing mechanism. It is also my hope that we can apply learnings from this conference and start or enhance our mangroves, as well as the beach forest conservation efforts.

This Conference will not be realized without the support of different institutions who shared their resources for this important event. I would like to mention and take this opportunity to say thank you to all of them:

1. Department of Environment and Natural Resources – Biodiversity Management Bureau;
2. Provincial Government of Iloilo;
3. Turing Foundation;
4. Foundation for the Philippine Environment;
5. Wetlands International;
6. Forest Foundation Philippines;
7. Metro Pacific Investment Foundation; and
8. Barangay Pedada Fisherfolk Association.

I would like also to thank the ZSL-Philippines Team for doing a great job – not only in undertaking conservation work in the Philippine and other parts of the region – but also in organizing this Conference. Likewise, I would like to thank ZSL-UK for all the support to ZSL-Philippines.

On behalf of the Zoological Society of London – Philippines and the Turing Foundation, I welcome you all to the 3rd National Mangrove Conference. I am looking forward for your active participation.

Thank you.

Hon. Mayor Jose S. Espinosa III (delivered by Mr. Dominador Co)
Local Government of the City of Iloilo

I warmly greet our guests, dynamic partners and friends from the Zoological Society of London-Philippines on this significant 3rd National Mangrove Conference here in Iloilo City!

The City of Love is honored to host your big gathering. We are privileged to have your precious presence because it simply proves our proud reputation as ideal convention destination.

The City Government commends the stakeholders, key players, delegates and participants, our partners for progress and development, for actively participating in noble undertakings. We continue to cultivate a culture of excellence in every endeavor through the cooperation, active collaboration and strong support of stakeholders.

Iloilo City is now accommodating the influx of investments and fast rising developments, but without sacrificing the environment.

If you want to know what I really mean, just take a look at the Iloilo River, a home to 22 of the country's 35 mangrove species.

We also take seriously the preservation of our wetlands and wildlife sanctuaries such as in Hinactacan at Lapaz District.

The waterway at the heart of the metropolis mirrors including good governance in implementing high impact projects and services for the general welfare.

To dwell on the steps and specifics may not be enough of our allotted time. But the best practices and successful initiatives being done for Iloilo River as a centerpiece of environmental protection have already gone a long way.

After all, the Iloilo River Development Project already received recognition from global award-giving institutions such as the UK-based International Livable Communities and Autralia-based International River Foundation Thiess River Prize.

We have successfully revived and transformed a dying body of water full of dilapidated and sunken ships, informal settlers, and floating garbage as we continue cleaning the Iloilo River to create ecologically-friendly environs.

The Iloilo River is a reflection of the Ilonggos' love and unity for enhancing environment potentials into creating great economic opportunities and impacts for the benefit of the people.

The cleanup initiatives don't end in dredging, removal of illegal structures, release of fingerlings, planting of mangroves but, most importantly, providing housing, education, health services and livelihood to a thousand families relocated from its riverbank to safer ground away from threats of flooding.

Its multiplier effects showcase the establishment of Esplanade, the most beautiful and longest landscaped linear park in the country, the rise in value of properties along the riverbank, establishment and widening of roads and bridges and bike lanes. Our bike

lanes will be showcased to a wider audience as we host the 5th Iloilo Bike Festival in May.

We always look forward to promoting and advocating a healthy and sustainable environment through clean-up drives, beautification activities, strict enforcement of anti-littering and anti-smoking ordinances, and comprehensive solid waste management program.

We are now operating the Calajunan engineered sanitary landfill. Part of the property is already a rising Wedding Eco-park where marrying couples plant tree seedlings before they can avail of civil matrimony officiated by the mayor.

We have organized the waste-pickers and fish-pen operators and provided them with livelihood assistance and skills trainings to become productive workers without compromising our environmental assets.

Again, if you take a look at the Iloilo River you will realize that the model and masterpiece of development is a manifestation of our collective efforts towards the achievement of environmental goals in our livable and vibrant community.

It is very pleasing to note that numerous priority programs and projects we have been actively working on are already attuned to a wider environmental transformation.

Iloilo City has been a staunch supporter of cleaning, greening, and environment-friendly efforts. In fact, our City Hall building is an example of "green government building" in the country.

Our City Hall has introduced solar-assisted air conditioning units, rain-catchment, and wastewater treatment facility. This has helped the City Government cut down its energy consumption, and save water. Likewise, tons and tons of carbon dioxide emissions are avoided in the process each year. Our big malls here have also shifted to solar panels that fill their rooftops.

But our fight against pollution, the mission for more potable water, and cleaner environment should spread and extend from City Hall to our communities.

We have projects for reforestation and re-planting such as the eco-park in San Pedro, Molo, as well as the greening of our public plazas. It has the backing of our friends from the private sector, the academe, and the Ilonggo community.

I am certain that you will agree that Iloilo City sets as fitting backdrop to your meeting.

With you around, I am confident that you will be able to share the good news about our metropolis to your families and friends, so they may also visit us soon.

Please enjoy the gastronomic treat, tourism attractions, and warm Ilonggo hospitality we can offer to visitors. We also hope that you will be able to have a memorable learning experience of best practices, great success, and pride of the Ilonggos.

Again, my warmest greetings to everyone. Thank you.

Hon. Roy A. Cimatu (delivered by ARD Jessie Vego, TSD)
Department of Environment and Natural Resources

It is my great honor and pride to welcome you all to Region 6, Western Visayas and particularly to Iloilo City for this very momentous event – the 3rd National Mangrove Conference with the theme: "Mangroves and Beach Front Forest for Building Coastal Resilience in a Changing Climate".

As you all know, mangroves, considered as the "rainforest of the sea", are among the most productive and biologically complex ecosystem and probably the most stressed among forest species having to grow in areas of desiccating heat, deep mud, and salt levels that would kill an ordinary plant within a few hours.

Mangroves are believed to have originated from Southeast Asia and are now found in tropical regions in which Bangladesh is the largest surviving single tract of mangroves in the world. Nevertheless, the International Union for Conservation Network (IUCN) classifies the Philippines as the "center of the center" of marine ecosystem biodiversity which is home to about half of the world's mangrove species. Of the world's more than 70 mangrove species, around 46 species are known to exist in the country.

Mangroves and associated organisms are among the most valuable ecosystems that have tremendous value for coastal communities. They are being destroyed at alarming rates for the past 50 years. The country's original 500,000 hectares of mangroves has declined to 100,000 hectares or even less as reported in a study conducted. This was mainly due to overharvesting, coastal development, land conversion (urban, agriculture, aquaculture), and reclamation.

Among these threats to mangroves, conversion of mangrove ecosystems to fish shrimp ponds is the most frightening. Not only does the practice clear large areas of coastal habitat, it also pollutes nearby coastal waters and marine habitats, such as coral reefs with waste matter from the ponds.

However, mangroves don't always provide a stand-alone solution; they may need to be combined with other risk reduction measures to achieve a desired level of protection. Therefore, involvement of the DENR and other government agencies, Local Government Units (LGUs), academe, organizations, and the local communities for the restoration and rehabilitation of this ecosystem is a must through re-planting and coastal clean-up activities. Local communities can be stewards for mangrove management and can be the direct beneficiaries from the services that the mangrove environment could provide.

Mangrove plantation and beach forest establishment, maintenance, and protection are major components of the National Greening Program of the Philippine National Government through DENR. This effort is being supplemented by the Iloilo Provincial Government through the Action for Re-Greening and Transformation Project.

Mangrove forest is key to healthy coastal ecosystems. Mangroves and Beach Forests are indeed vital in building coastal resilience in a changing climate. Let us preserve and protect these species and ecosystem for the lives and livelihood of our people in the coastal communities, in particular and the whole populace, in general.

As one quote says "if there are no mangroves, then the sea will have no meaning, it is like having a tree without roots, for mangroves are the roots of the sea..."

Here's to a successful and fruitful conference in this beautiful City of Iloilo, the Philippines' City of Love. Thank you very much and God bless.

Commodore Eduardo Gongona (delivered by Assistant Director Drusila Esther Bayate)
Bureau of Fisheries and Aquatic Resources

Good Morning!

Allow me to thank the Zoological Society of London –Philippines for inviting BFAR to the 3rd National Mangrove Conference along with other fisheries experts, managers, government officials and stakeholders. With the protection and conservation of our coastal resources as the mandate of the Bureau of Fisheries and Aquatic Resources, this conference theme which brings to the fore the valuable role of mangroves and other coastal habitats in mitigating climate change is truly a timely theme.

Aside from the many ecological services mangroves provide, mangroves are the most 'natural' disaster risk reduction and management structures we can ever build. They are our natural breakwaters against sea level rise, saltwater intrusion and tidal surges during typhoons.

Most worthy of note today is that mangroves are the best blue carbon sinks. These, along with other coastal ecosystems, have the potential to sequester substantial amounts of atmospheric carbon dioxide and store carbon in its biomass, mitigating the impacts of climate change.

But despite the strategic importance of the coastal ecosystems, they are among the most threatened and rapidly disappearing natural environments worldwide as a result of continual conversion of lands such as tidal swamps, mangroves, marshes, foreshore lands and ponds to other uses such as agriculture, aquaculture, residential use, and industrial use.

In response to this, the Bureau of Fisheries and Aquatic Resources has been consistently implementing its established regulations to fish farming activities. In collaboration with DENR, the Bureau also implements the policy that existing of mangroves are no longer converted into fishponds or for any other purposes.

The program *Malinis at Masaganang Karagatan* or MMK, also known as the National Search for Outstanding Coastal Community, also promotes sustainable fisheries management and coastal ecosystem protection by incentivizing LGUs with exemplary Coastal Resource Management initiatives and projects. Among the five criteria of the search are the establishment of marine protected areas and effective mangrove protection and rehabilitation programs.

In the recently concluded MMK 2017, all the national finalists showcased their dense mangrove forests but Laguindingan, Misamis Oriental, emerged as the grand winner

for their conscious effort to sequester carbon from the atmosphere and help relieve the impacts of climate change by planting hectares of mangroves. Palompon, Leyte on the other hand, keeps their mangrove forests intact to continually provide habitats for the endemic and endangered golden-capped fruit bats. Learning of these success stories, we hope that more coastal communities commit to protect and conserve their coastal resources.

We place much hope in the research initiatives of the academe that affirm mangroves as valuable carbon pools of nature, as well as the efforts of other national government agencies and the local government units in promoting coastal habitat conservation.

Our policies have been and can be revised many times to be kept responsive to changing circumstances, at this juncture, our climate. Certainly, the results of your studies and your testimonies relevant to fisheries management will be powerful including perceptive considerations in the future policy making activities in the bureau.

I am confident that with the rate at which we are working now, we can all look forward to a more verdant Philippines in the years to come.

Again, good morning and *mabuhay po kayo!*

Mr. Raki Nikahetiya
Programme Manager, Marine and Freshwater Conservation for Communities, ZSL

Dear honourable guests and distinguished delegates, it is a true honour to be part of the 3rd Philippines National Mangrove Conference.

The Philippines, being a biodiversity hot spot have a very special place in the hearts of the Zoological Society colleagues in London. When we first started in the Philippines 22 years ago in 1996 – we went from initially ensuring the protection of tiny seahorses in Danajon Bank and today progressed to helping coastal communities getting more resilient through alternative sources of income and establish bigger and better marine protected areas across the Philippines.

Two words come to mind: innovation and inclusion.

Innovative projects like Net-Works, enabled fishing communities to sell waste fishing nets into a global supply chain; getting rid of plastics and giving an opportunity that would otherwise be unavailable to these communities. Learning from the pioneering Philippines expertise, we now replicate similar initiatives in other countries.

But all these would have not been possible without help.

In particular, we would like to thank the excellent support and partnership with the local government units, People's Organisations and the UK Embassy. Looking at this great collaboration in the Philippines, we are in particular proud in bringing our long-standing knowledge and technical expertise in rehabilitation of beach forests and mangroves and are very keen in supporting new areas – Boracay and beyond. I am sure the colleagues will discuss this in details over the next three days and we are keen to support initiatives in the next 22 years and onwards.

Mr. Rob Contractor
Head of Political and Economic Section, British Embassy Manila

Good morning. I am Rob Contractor, Head of Political and Economic Section, British Embassy Manila.

I would like to thank to pay particular thanks to:

Mr. Godof Villapando, Country Manager, ZSL-Philippines; and Mr. Raki Nikahetiya, Programme Manager, Marine and Freshwater Conservation forCommunities, ZSL London. I would also like to acknowledge and thank other eminent guests, including: the Hon. Arthur Defensor, Governor of the Province of Iloilo; Commodore Eduardo Gongona (Ret.), Undersecretary for Fisheries, Department of Agriculture, and National Director of the Bureau of Fisheries and Aquatic Resources; the Hon. Jose Espinosa III, Mayor of Iloilo City, and Director Jim Sampulna, Regional Director, DENR Regional Office 6.

Climate change is a priority for the UK. Prime Minister Theresa May has declared support for climate change to be a "moral imperative". This is echoed by our Foreign Secretary, Boris Johnson, who confirmed that climate change remains at the "front and centre of British foreign policy".

Climate change informs the vision the UK sees for its economy in coming years. As the British PM said in the context of the UK's Clean Growth Strategy and Industrial Strategy: 'Clean growth is not an option, but a duty we owe to the next generation, and economic growth has to go hand-in-hand with greater protection for our forests and beaches, clean air and places of outstanding beauty'.

As one of the countries with the longest coastline worldwide, the Philippines has a unique challenge with building coastal resilience. An important aspect of building such resilience is the conservation and rehabilitation of Philippine mangroves and beach forests. These are not only important for adaptation and disaster risk management, but also for climate change mitigation - as mangroves serve as a very effective natural carbon sink, as well as biodiversity protection – because mangroves provide highly productive areas for a rich array of species.

Unfortunately, for numerous reasons, mangrove loss is high in the Philippines. The UK is delighted to be able to support organisations like the Zoological Society of London in the Philippines, based here in Iloilo, a long-term partner of the UK in various efforts, including the fight against illegal wildlife trade. I was actually in Puerto Princesa last week with Godof trying to save the Philippine Pangolin!

The UK government has been funding major efforts globally. The UK's multi-billion-dollar International Climate Fund (IFC) is testament to our commitment to assist developing countries with climate change. The UK continues its climate leadership being the 3rd largest contributor to the Green Climate Fund, as well by providing continuous support for development banks such as the World Bank, ADB, and others. The UK has pledged at least $7.5 billion of international climate finance between 2016-2020.

We very much look forward to working with the Philippines in these endeavours.

Annex F. Directory of Participants

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