ONLINE EDITION

Developing Sustainable and Resilient Rural Communities in the Midst of Climate Change : A Challenge to Disaster Preparedness and Mitigation Strategies

PROCEEDINGS

THIRD INTERNATIONAL CONFERENCE

Quezon City, Metro Manila
Philippines

Let us be partners in creating a new earth for the children

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CONTENTS

BEST PRACTICES OF RURAL COMMUNITIES

PAGE

Forest and Rural Communities: Examples and Hypotheses on Sustainability and Resilience
Mamoru Kanzaki 1

Reduced Tillage and PalayCheck System in Irrigated Rice Production for Increased Productivity and Income
Ruben B. Miranda 7

Community-based Participatory Initiatives on Climate Change Resiliency and Sustainability in Aquaculture
Nelson A. Lopez 12

Mining and the Environment
Teodorico A. Sandoval 26

DISASTER PREPAREDNESS AND MITIGATION

Forests and Shelter Security of Communities from Typhoons: Cases
Ya Min Thant 34

Climate Change and Sustainability of Marine Ecosystems
Rhodora V. Azanza 40

Redefining Preparedness in the Context of Climate Resilience: Focus on Rural Communities
Antonio L. Fernandez 47

Mangrove Communities and Disaster Risk Reduction: Cases in Vietnam
Le Anh Tuan and Maria Lourdes T. Munárriz 56

Agritourism as a Climate Change Adaptation Strategy: Challenges and Success Factors
Miguela M. Mena 67

Transportation and Logistics Planning for Disaster Prevention: The Case of the Greater Manila Area, Philippines
Jun T. Castro 78

Heritage and Conservation in the Light of Rural Community Planning: Cases on Climate Change Mitigation Strategies
Carlos M. Libosada, Jr. 87

CONTENTS

POST-DISASTER INTERVENTIONS

PAGE

Development of Support Model for Farmland Restoration after Flood Disasters in Hilly and Mountainous Areas: Cases Affected by Torrential Rainfall in Northern Kyushu, Japan
Kazuo Asahiro 92

The Challenge of Physical Activity in Disaster Preparedness and Post-disaster Interventions
Gilda L. Uy and Alberto L. Dimarucut 101

Evidence-based Planning for Resilient Local Health Systems (rEBaP) in Yolanda-affected LGUs in Iloilo-Capiz-Cebu
Philip Ian Padilla, Calvin de los Reyes, Marshaley Baquiano, Johnrev Guilaran, Mary Ann Naragdao, Gertrude Mikee Canonero, Dorothy Sarangaya, and Darryl Ferrer 108

Enhancing Human Security by Developing Resilient Post-Conflict Rural Communities
Carmeli Marie C. Chaves 118

SUSTAINABLE AND RESILIENT APPROACHES

Human Capacity Building for Sustainable Development of Ifugao Rice Terraces in the Philippines and Noto's Satoyama Satomi in Japan
Koji Nakamura and Rizalita R. Edpalina 128

A Planning Perspective on the Socio-Entrepreneurial Venture of Rural Farming Communities through the Community Supported Agriculture
Dina C. Magnaye 138

Rural Areas and Climate Change Disaster Risk Prevention Strategies
Aldjumar B. de Guzman 152

Development of Rural Roads and Resiliency of Local Communities
Ma. Sheilah G. Napalang and Jose Regin F. Regidor 158

Climate Change and Crop Production in Vietnam
Nguyen Mau Dung and Maria Lourdes T. Munárriz 168

FOREWORD

The international conference brought together experts in various fields to share their research, experiences and suggestions towards shaping a better response to the changing environment of rural communities. The country side is our primary source of food, water and materials for shelter, and any change or support for rural communities will have effects on the entire nation. How can our rural communities better prepare for continuing climate changes?

Drastic shifts in weather have altered habitats and ecosystems, affecting all sectors and industries. Even now, changes in our climate have affected the schedules of planting and harvesting. Much time, effort and money are wasted because the systems and practices that worked for us through many seasons no longer apply. There is an urgent need to develop strategies for the sector on agriculture, fisheries and forestry, as well as our water and energy resources, transportation and communications.

Significant inputs from neighbouring countries, which have similar land and climate conditions, prove valuable and this publication hopes to encourage a more systematic assessment of climate change impacts, closer collaboration among neighbouring regions, and to help launch the development of relevant designs, systems and infrastructure. Most submissions were not peer reviewed as they represent reports of continuing research. It is expected that they will appear in a more polished and complete form in scientific journals later.

The Proceedings is divided into 4 major themes, namely: best practices of rural communities; disaster preparedness and mitigation; post-disaster interventions; and sustainable and resilient approaches. Under the theme on Best Practices of Rural Communities, Kanzaki emphasized the importance of forest and its resources by presenting the history of forest utilization in Japan and citing a number of case studies in Southeast Asia. Then, he proposed the landscape requirements for the long-term sustainability of forests. Miranda presented the successful project of the Department of Agriculture on reduced tillage technology, a result of soil intervention by tractor-drawn paddy wheels and attached harrow during the course of repeated pressing operations. Lopez presented the Philippines as among the economic-state recipients that showcase aquafarming projects in tilapia and seaweeds involving small-scale fisher folks. This was in line with the Blue Growth Initiative programme launched by the Food and Agriculture Organisation of the United Nations, in addressing climate change adaptability and sustainability to intensify aquaculture production. Sandoval explained that the final stage in the operation of mines is a process of closing a mine (rehabilitation), which re-contours, re-vegetates and restores the water and land values of the area. He stated that mine planning engineers should include the rehabilitation process in the overall plan.

With respect to the Disaster Preparedness and Mitigation theme, Ya Min Thant presented the case of Myanmar after it was hit by Cyclone Nargis in 2008. Her study examined the cyclone's impacts on humans and the role of forests in mitigating damage on man in his environment. Considering the reported global increase of Harmful Algal Bloom outbreaks, a potential indicator of climate change, the paper of Azanza primarily focused on the major Philippine marine ecosystem issues that need to be considered in relation to the country's economic development framework/ strategy. Fernandez emphasized that the idea of building a community culture is essential in moving towards resiliency. The paper also looked into the good practices in disaster preparedness in both urban and rural settings, focusing on the case of San Francisco, an island municipality in Cebu province. Le Anh and Munárriz discussed the importance of mangrove forests in reducing impacts of natural disasters along coastal areas and the degradation of mangrove forest belts in Vietnam.

Mena emphasized that agritourism can be a short-term strategy to increase households' revenues, reduce risks associated with agricultural production, and decrease the depletion of natural resources (soils, water, biodiversity) for the long-term sustainability of Philippine agriculture-based livelihoods. Castro argued that in order to manage risks effectively, an understanding of the dynamics of the hazards and the logistics system in the Greater Manila Area is essential for allocating resources and formulating policies. His paper proposed strategic policy measures on logistics planning that government can consider for mitigating the adverse impacts of disasters in economic zones within the Greater Manila Area. Regarding heritage and conservation, Libosada argued that there is a need for Filipinos to deepen their knowledge and skills in adequately managing and protecting the country's natural and cultural heritage, which is made more significant by the threats of climate change.

In light of the Post-disaster Interventions theme, Asahiro presented the restoration activities in farmlands on the hilly and mountainous areas of Fukuoka Prefecture after floods destroyed a considerable amount of produce. Dimarucut and Uy emphasized that post-disaster intervention is more than just distributing relief goods and building temporary shelters. Rather, it is the psycho-social intervention through physical activity that builds internal coping mechanisms and the resilience of affected individuals and communities. Padilla et al. dealt with the UNICEF-funded evidence-based planning for resilient local health systems. They discussed the plans on health emergency preparedness, response, and recovery during disasters. The activities are currently implemented in Yolanda-affected local government units in Iloilo, Capiz and Cebu. Chaves discussed the situation in Zamboanga city after the 21-day conflict between the Armed Forces of the Phippines and the Moro National Liberation Front in September 2013. The recovery process, outlined in the Zamboanga City Roadmap to Recovery and Rehabilitation designed by the local government, shows that various ethnic, religious and socio-economic groups can peacefully co-exist through consultative planning.

On the theme Sustainable and Resilient Approaches, Nakamura and Edpalina showed that capacity building of young members of Satoyama communities is effective in the reactivation of ecosystems services, e.g., agricultural production, biodiversity, traditional knowledge and culture. Magnaye's paper provides a planning perspective on a potential entrepreneurial venture for small-scale rural farmers through a social enterprise modality called Community Supported Agriculture (CSA). CSA highlights a trust-based sharing of responsibilities and risks between farmers and community members. The paper of de Guzman presented projects of the Environmental Management Bureau of the DENR on climate proofing, i.e., training different organizations on climate proofing in order to analyze the hazards posed by changes in climatic patterns. Napalang and Regidor explained that rural roads need to be resilient in the midst of natural disasters, in order that the very same communities that use them may quickly recover from such calamities. Nguyen Mau and Munárriz presented the negative impacts of climate change on the agriculture of Vietnam. Several adaptation measures for crop production, e.g., changes in crop structure and crop calendar, the use of new varieties and farming techniques, and improved irrigation systems that have been applied, were also discussed.

With each listening ear and each willing hand, we can help formulate strategies, build better homes and businesses, and create a new earth – a legacy for our children and generations to come.

Maria Lourdes T. Munárriz

Forest and Rural Communities: Examples and Hypotheses on Sustainability and Resilience

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Abstract

In this comprehensive conference on sustainability and resilience of rural communities, I would like to emphasize the importance of forest and forest resources. I will report the lessons from the history of forest utilization in Japan and several case studies conducted by our group in Southeast Asian countries. Then, I will propose the landscape requirements for the long-term sustainability. Current dense cover of Japanese forest was achieved by intensive reforestation efforts after 1950's. Serious forest degradation and associated crises occurred several times in Japan's history. The most famous crisis in mid-18th century was solved by the intensification of forest protection. There was a rise in the number of plantation activities in forestry and local commons system for forest resources. Finally, the rural areas of Japan covered by "Satoyama" landscapes, where various croplands and forests made patch mosaics. Japanese forests were also seriously exploited for energy and wood until 1950. After the shift of energy source to fossil fuels, the dense forest cover was achieved in Japan. Current trend in promoting woodbiomass energy may become the next challenge for the sustainable use of the forest in Japan. A land-use or a landscape designed to maximize its productivity frequently loses the capability to adapt to changing conditions. Land-use diversity like satoyama possibly correlates to the functional diversity of the ecosystems and can secure the capability of rural communities.This kind of landscape is very common in Asian countries and is applicable for enhancing the sustainability of rural communities.

Introduction

Japan is covered by dense forest, but this forest cover has been achieved in the last 50 years by intensive reforestation activities. Before the 1950s, Japanese mountains were defaced by seriously degraded forest. This paper consists of two parts: 1) Lessons from Japanese Forest History and 2) The way to our future, based on integration of our wisdom and experience.

History of Japan's Forest Degradation

The history of massive deforestation could be traced back to around 2000 years ago, when the large scale conversion of forest areas into cropland began. In the pollen analyses, the rapid increase of pine species was recorded from this age (Takahara & Takeoka, 1992) and also the dendro-chronological record from the buried stumps of Japanese cedar excavated from current rice paddy fields support the massive conversion of wet land to paddy around AD500 (Figure 1). In the following 1000 years, Japanese harvested natural timbers and also expanded the cropland. Finally, at the end of 16th century, when Toyotomi government unified Japan, there was construction of many large memorial buildings, and timbers from natural forests were collected from all of the Honshu, Shikoku, and Kyushu Islands (Totman, 1989). Japanese cedar was also collected from the southern remote island, Yaku Island, in the

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late 16th century (Figure 2). The expanded population and cropland consumed forest biomass as organic fertilizer and fuel, and use of forest land for shifting-cultivation seriously damaged Japan. Charcoal and fuel wood consumption for industrial use, such as iron making, salt making and pottery making, also expanded during Edo Period. The mid Edo period (around AD 1750) was considered to be the most critical age for the forest.

Figure 1. Excavated Japanese cedar stumps at Mikata, Wakasa City. The dendrochronological study clarified that the trees were cut around 5th Century (Katsuhiko Kimura, personal communication). *Photo by M. Kanzaki , 1989.*

Figure 2. Japanese cedar's stump with its four meter stem diameter, named Wilson Stump, recorded as having been ordered cut in 1586 by Hideyoshi Toyotomi. The famous World Heritage site is located in Yaku Island at 1000 meters altitude. *Photo by M. Kanzaki, January 1980.*

Japan survived this forest crisis through various approaches (Totman, 1989). The lack of timber was solved by the development of natural forest management for timber production in Aomori, Akita, Tosa, Kiso, and other areas. Reforestation was developed in the 18th Century in Yoshino, Nishikawa, Ome, Owase, Tenryu, Hitoyosi, Obi, etc. Until the end of Edo period, selective logging, felling cycle, enrichment planting, sapling production in nursery, cutting propagation and grafting technique were already established and practiced in Japan. Timber products were tagged with respect to their sources, e.g., cedar for barrels from Yoshino, cedar for ship-making from Obi, and small size round timber from Ohme. Forest protection laws were enacted and strictly implemented with fatal punishment for illegal logging and encroachment. Reserved forests, called "Tomeyama", "Tateyama", "Kinrin", or "Ohayashi" were established. Another approach implemented by Japan at that time was the community-based forest management, known as the "iriai" system (local community system), which authorized villagers to utilize forest products. This system was gradually implemented, but with some serious conflicts between the governors and the farmers during Edo period.

Rapid industrialization during Meiji period, following the Edo period, was another most unforgettable era of forest history in Japan. This was characterized by: a) rapid population increase, industrialization based on charcoal, and expansion of agricultural productivity. All these resulted in the degradation of forests and increase of denuded mountains (Figure 3). Okayama Prefecture, Shiga Prefecture and Aichi Prefecture were the three areas with numerous denuded mountains. Similarly, during the Pacific War (1941-1945), forests were critically damaged through the lack of proper forest management. Demand for timber peaked in 1950 because of post-war restoration. Demand of wood after the 1950s was quite large, but the domestic wood supply showed a sharp decrease until 2003 with increasing imported wood from tropical countries and boreal countries. The reduced wood exploitation from Japanese forest resulted in the recovery of growing stock.

Figure 3. A signboard showing the 100-year restoration activity of Tanakami Yama, in one of the famous denuded mountains in Shiga Prefecture. To the right of the signboard is a rocky portion of Tanakami Yama that still remains denuded. *Photo by M. Kanzaki, June 2015.*

Source of Energy

Energy source in Japan from 1900 to 2000 shifted from wood/charcoal to oil/gas and nuclear energy. The shift of energy source contributed to the reduction of pressure on Japanese forests. Secondary hardwood forests for charcoal production were converted to conifer plantations for timber production after 1950's, the reforestation area was doubled from 1950 to 1980. Consequently, Japan successfully restored the degraded forest and increased the growing stock of the plantation forests.

Thus, the current dense forest cover in Japan was achieved by the intensive silvicultural work after 1950. On the other hand, the domestic wood supply continuously decreased because of the price competition with imported wood. It had a direct impact on the local economy of hilly regions of Japan, where the people at least partly depended on timber production. After the Fukushima nuclear disaster in March 2011, renewable energy source including wood biomass energy became a hot issue in Japan. Small scale wood biomass generators are increasing in Japan because of the expectation of its positive impact on the economy. On the other hand, the increasing wood demand for power plants may induce the degradation of forests in future. Japan may need to meet the challenge for sustainable utilization of forest again.

The Way to Our Future

To strengthen the rural communities' resiliency and sustainability and minimize their vulnerability, performance should be evaluated from various disciplines. Seeking only the highest efficiency of specific products or livelihood cannot achieve a strong community. For instance, when Cyclone Nargis hit Ayeyarwady delta of Myanmar in 2008, tree-less paddy field landscapes were dominant. The storm surge reached up to 100 kilometers into a densely

Figure 4. Mosaic patch of various landcover elements in Doi Inthanon National Park, Thailand.Currently this kind of landscape is called "Satoyama" landscape,adopting the Japanese word. *Photo by M. Kanzaki, December 1995.*

populated Ayeyarwady delta and left at least 138,000 fatalities. The detail fine-scale mortality survey clarified that the mortality was significantly reduced by the existence of forest stand in or around the community (Ya Mint Thant et al., 2010). Many people survived in the forest by clinging on to trees and managing to stay above the storm surge. Treeless paddy landscapes elevated the mortality of people. Another economic risk factor that weakened the community was the drastic price changes of cash crops like oil palm, rubber, cassava, etc., which resulted in serious financial problems for the planter who depended solely on a single crop. The sustainability of communities must be measured by, at least, their productivity, economic soundness, social strength, health, and disaster preparedness.

A useful concept of rural development approach which is multi-disciplinary is the "Satoyama" concept (Integrated Landscape Approach). Currently, the word Satoyama means a framework for balancing competing demands and integrating policies for multiple land uses within a given area. Satoyama is a Japanese word meaning the forest as surrounding a village, but the Satoyama landscape is found not only in Japan. It may be a ubiquitous landscape in Asia (Figure 4).

Another interesting system is the multi-layered system for agricultural production. Examples are the tea cultivation under a forest canopy in Thailand (Sasaki et al. 2007), and multi-layered cropping where many fruit trees and vegetables are planted under 30-meter high durian trees in Indonesia and Malaysia (Figure 5). These multi-layered systems in agriculture are one of the characteristics of Southeast Asia (Tanaka 2010). The mosaic arrangement of monoculture field and the multi-layered cropland will enhance the sustainability of the communities. We can utilize these systems to enhance the sustainability of rural communities.

In Kyoto University, various activities for sustainable development are geared to education and research. Some of these are: the AUN-KU Student Mobility Program toward Human Security Development, the Inter-Graduate School Program for Sustainable Development and Survivable Societies (GSS), the Japan – ASEAN Science and Technology Innovation Platform (JASTIP), etc. All of these programs seek the multi-, inter- and trans-disciplinary approaches. We welcome close collaboration within the ASEAN region for achieving Sustainable Development Goals.

Figure 5. Multilayered fruit garden in South Sumatra State, Indonesia. Uppermost durian trees aged nealy 100 Years old. Under the durian canopy are para rubber, jackfruit, jenkol, Baccaurea sp., langsat, and coffee are planted. *Photo by M. Kanzaki , September 2005.*

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About the Author

MAMORU KANZAKI received his Doctor of Science degree from Osaka City University and had more than a decade of exposure in plant ecology when he was affiliated with Osaka City University between 1985 and 1999. Thereafter, he joined the Graduate School of Agriculture of Kyoto University and has served for tropical forest resources and environment until 2013 then for forest resources and society as a professor. He began publishing his works from 1984 and has co-authored about 100 publications, mostly in academic journals. Some of these are: the "Effects of logging and line planting treatment on canopy openness in logged-over forests in Bornean lowland dipterocarp forest", "Determination of epiphyte biomass composition and distribution with a three-dimensional mapping method in a tropical montane forest in northern Thailand", "Carbon sequestration by mangrove plantations and a natural regeneration stand in the Ayeyarwady Delta, Myanmar" and "Sprouting traits of Fagaceae species in a hill dipterocarp forest, Ulu Gadut, West Sumatra".

Reduced Tillage and PalayCheck System in Irrigated Rice Production for Increased Productivity and Income

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Abstract

Reduced Tillage Technology involves minimum tillage as a result of soil intervention by tractor drawn paddy wheels and attached harrow during the course of repeated pressing operations. The "Reduced Tillage Technology and PalayCheck System for Irrigated Rice Production" project is aimed at increasing the productivity and net income of participating farmers by demonstrating and understanding cost-saving technologies and mitigating the effects of climate change in irrigated rice production. A project on this technology was started in 2012 by the Department of Agriculture and Philippine Rice Research Institute in nine provinces, namely: Aurora, Bukidnon, Bulacan, Ilocos Sur, Nueva Ecija, Pampanga, Pangasinan, Tarlac and Zambales. Eighty-six (86) municipalities and 480 Participatory Technology Demonstration sites were involved. The paper concentrates on the Nueva Ecija experience. Results of 38 Participatory Technology Demonstration sites in 31 barangays from 12 municipalities and cities are discussed in comparison with data from Conventional Tillage in terms of amount of yield, cost and other variables. In conclusion, Reduced Tillage was a faster, cheaper, and easier method of preparing the land under irrigated lowland rice production. It was well-adopted in transplanted or direct-seeded methods of crop establishment. Higher yield and income were achieved during dry season when farmers shifted from transplanting to direct seeding technology. Farmers must be well-equipped with best practices in energy and cost-saving technology within the PalayCheck system.

Introduction

Rice farming is the major source of employment and income of the rural population in many parts of the country, but income derived from it is relatively low. The cost of production increases every cropping season. To profit more from rice farming, farmers must be provided with alternative technologies that will reduce the cost of production and at the same time increase yield. There is a need to stabilize greenhouse gases in the atmosphere. Reduced Tillage Technology (RTT) in irrigated rice production helps mitigate the adverse impact of climate change. We have to prepare our farmers to be ready to compete in the World Trade by helping them reduce their cost of production.

Reduced Tillage: Preparations and Adoptation

Reduced tillage is an alternative system of preparing the land for rice production. It modifies field operations by completely eliminating plowing and substituting minimal harrowing and leveling. It involves soil soaking to soften the soil and multi-pass of hand tractor's paddy wheels attached with harrow or riding-type leveler to create minimum tillage, to press and incorporate rice stubbles and other crop residues.

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In preparing the land using reduced tillage, the following steps are undertaken:

1. Rice straw from previous harvest is scattered before the onset of the cropping season (Figure 1a).
2. The field is irrigated at a depth of not less than 3-5 centimeters (Figure 1b).
3. The field is maintained at submerged condition for 5-7 days to soften the soil.
4. After 5-7 days at submerged condition, the first harrowing to press rice stalks and weeds into the soil is performed (Figure 1c).
5. The second harrowing is performed 5-7 days after the first harrowing, maintaining water depth at 3–5 centimeters.
6. Final harrowing and land leveling maybe needed for better soil conditions for transplanting or direct seeding.

Reduced tillage is appropriate for all methods of rice cropping, i.e., manual rice transplant by farmers (Figure 2), or the use of mechanical rice transplanter or drumseeder (Figure 3).

The Nueva Ecija Experience

In Nueva Ecija, 38 sites having an area of more or less 0.5 hectare in 31 barangays from 12 municipalities and cities were identified as Participatory Technology Demonstration (PTD) sites. These had an average yield of 7.15 tons/hectare. This is a yield advantage of 0.49 tons/hectare over the 6.66 tons/hectare achieved in Conventional Tillage (CT). Partial Budget Analysis (economic benefits of intervention) showed an average savings of PhP3,380 per hectare on a contracted basis and PhP1,250/ hectare for farmers themselves doing the land preparation adopting RTT over CT. These savings on land preparation by RTT was attributed to faster time of operation by 5.09 hours/hectare over CT and a fuel savings of 14 liters of diesel or 50 % lower than the total fuel consumption in CT. Cost and return analysis had an average net income of PhP48,290/ hectare for RTT compared to CT of PhP42,589/hectare or a net income advantage of PhP5,700/ hectare.

Using secondary data on Nueva Ecija from the 1995 Provincial Rice Statistic for a sample computation showed that savings can be gained when the RTT is adopted over the CT method. If an area of 95,450 hectares of irrigated rice field adopts the RTT, the total time spent on operation per hectare per hour would be less than 6.01 hours with the

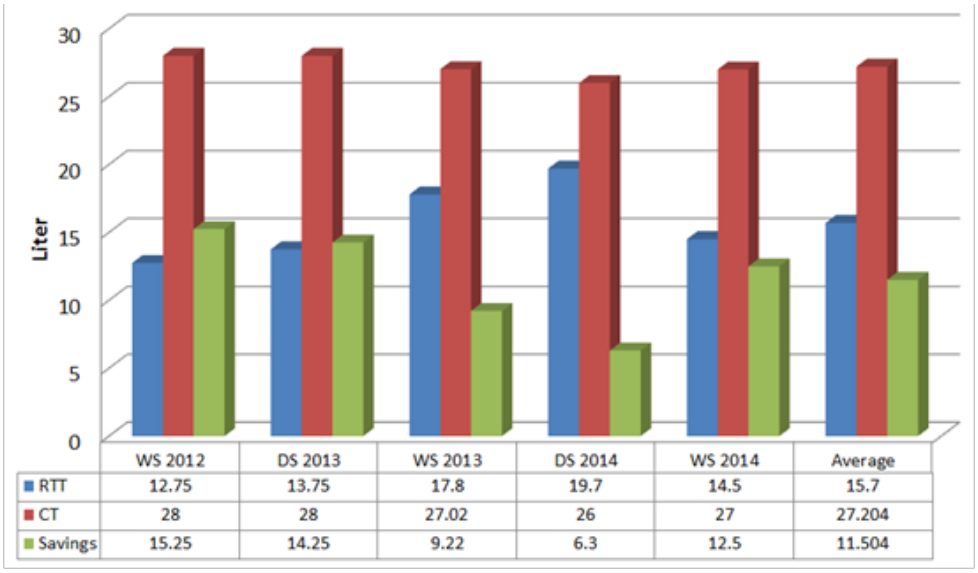
Figure 1. (top photo) Scattering rice straw from previous harvest; (middle) Field is irrigated and submerged in water for 5-7 days; (bottom) Pressing rice stalks and weeds into soil.
(Source: RTT Program 2011-14, DA and PhilRice)

Figure 2. Manual Rice Transplant by Farmers
(Source: RTT Program 2011-14, DA and PhilRice)

CT method. Consequently, the total fuel consumption per hectare in liters would be less by 11.5 liters. Thus, applying RTT on a 95,450-hectare land will mean a savings of PhP32,930,250 in fuel consumption.

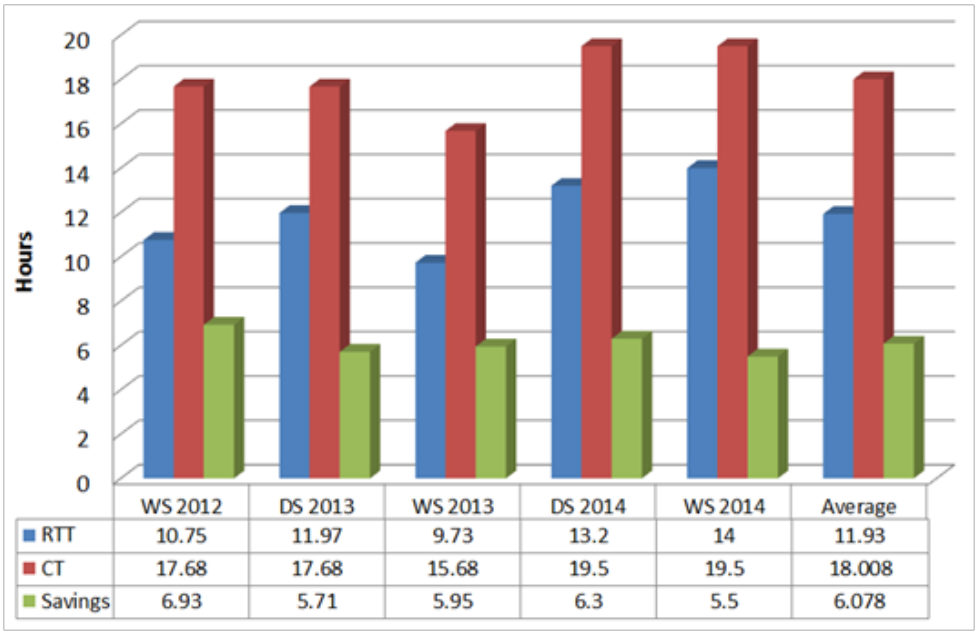
The case study on RTT showed the benefits of RTT over CT as follows: a) RTT reduces labor cost and other expenses on land preparation of up to PhP3,000 per hectare; b) RTT reduces air pollution due to reduction on the use of diesel fuel by almost 12 liters per hectare (Figure 4); c) RTT reduces the number of hours per hectare in preparing the land for crop establishment (Figure 5); d) Less wear and tear for tillage machine due to shallow soil depth operation and complete elimination of plowing; and e) RTT attained higher yield and income by 5-10 cavans per hectare. Yet another valuable contribution of RTT is that the rice stubble and weeds are harrowed back into the soil instead of being burned and contributing to the greenhouse gases.

Figure 3. (left photo) Plastic drumseeder; (right photo) Mechanical rice transplanter
(Source: RTT Program 2011-14, DA and PhilRice)



	WS 2012	DS 2013	WS 2013	DS 2014	WS 2014	Average
RTT	12.75	13.75	17.8	19.7	14.5	15.7
CT	28	28	27.02	26	27	27.204
Savings	15.25	14.25	9.22	6.3	12.5	11.504

Figure 4. Savings in fuel consumption per hectare
(Source: RTT Program 2011-14, DA and PhilRice)



	WS 2012	DS 2013	WS 2013	DS 2014	WS 2014	Average
RTT	10.75	11.97	9.73	13.2	14	11.93
CT	17.68	17.68	15.68	19.5	19.5	18.008
Savings	6.93	5.71	5.95	6.3	5.5	6.078

Figure 5. Savings in hourly time spent per hectare
(Source: RTT Program 2011-14, DA and PhilRice)

Conclusion

National demonstration of the technology is underway for wider dissemination of the technology. The theme of "Learning, Checking and Sharing for best farming practice," in adopting the PalayCheck system considers the following: 1) use of high quality seeds of a recommended variety in the locality; 2) leveled field or no high nor low soil spots after the final leveling; 3) synchronous planting; 4) for crop establishment, following recommended

spacing; seeding rates of 20-40 kg/ha, 1-3 seedlings per hill, transplant 20-25 day old seedlings and ensure sufficient number of healthy seedlings; 5) sufficient nutrient during tillering, panicle initiation until flowering; 6) no excessive water or drought stress that would affect the growth and yield of the rice plants; 7) for pest management, there should be no significant damage resulting to yield loss due to pests; and 8) for harvest management, harvest the crop at the right time.

Private sector groups or non-profit organizations could take advantage of the application of this new technology as the palay check system is the Philippine economy's platform for institutionalizing the agricultural training institute and the national fishery.

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About the Author

RUBEN B. MIRANDA, a science research specialist, heads the Technology Management & Services Division of the Philippine Rice Institute. He is a development and extension specialist who was awarded the 2013 Crop Science Society of the Philippines, Achievement Award in Extension in recognition of his outstanding contribution in the field of rice technology extension. He obtained his bachelor's degree in agriculture with major fields in crop protection and crop science from Central Luzon State University and Master's Degree in Rural Development from the same university. As PhilRice development specialist and extension specialist, he was one of the lead implementors on the development and promotion of location-specific high yielding rice-based technology, science-based technology farms and reduced tillage technology, which led to profitable farming. Miranda was among the pioneer development specialists who shared with the Filipino farmers the concept of PalayCheck System, Partnership for Agricultural and Rural Transformation. This helped improve the lives of farmers. These projects were efficiently and effectively implemented in numerous season-long Farmer Field Schools and Agricultural Extension Worker's training nationwide. His written accounts of his development works won recognition by scientific bodies and provided his fellow extension specialists improved ways on how to get rice technologies to the farmers. For these efforts, he was designated National Coordinator of the Department of Agriculture's Upland Rice Development Program. As a development and extension specialist, he received numerous awards, e.g., Outstanding Public Official in 2006-2007 awarded in November 2007 by PhilRice; Medal Sahametrei order "de Chevalier' (Second highest award given by the Kingdom of Cambodia for outstanding contribution in rural development) decreed by the National Assembly; PhilRice Outstanding Development Specialist in 1994 and several best papers given by different award giving bodies. More recently his leadership in Upland Program was adjudged best team by PhilRice. This was in November 2015 during the celebration of "Dangal ng PhilRice".

Community-based Participatory Initiatives on Climate Change Resiliency and Sustainability in Aquaculture

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Abstract

In 2012 December, a year before the Typhoon Yolanda devastation, the Bureau of Fisheries and Aquatic Resources (BFAR) launched the Philippine National Aquasilviculture Programme (PNAP) jointly with the Commission on Higher Educations' 74 State Universities and Colleges (SUCs) in Fisheries to implement an environment friendly-cum-sustainable production in aquaculture utilising the mangrove resources managed by the coastal community aimed to provide livelihood and self-sufficiency in food-fish, environmental protection while preserving the mangrove resource in its natural estate. Recently, two years after the Haiyan phenomenon, the Food and Agriculture Organisation of the United Nations (UN-FAO) launched the 'Blue-Growth Initiative' (BGI) programme addressing climate change adaptability and sustainability in the aquaculture production intensification of which the Philippines was among the economic-state recipient countries to showcase model aquafarming projects in tilapia and seaweeds (Gracilaria spp.) involving small-scale fisherfolks. This paper described the project implementation in designated production areas vulnerable to climate change impacts and the participatory efforts of various stakeholders.

Introduction

The Bureau of Fisheries and Aquatic Resources (BFAR) of the Department of Agriculture (DA) is the government agency mandated to ensure the development, management and conservation of the country's fisheries and aquatic resources. It is also committed to contribute towards achieving food security for the Filipino people and improving the quality of life of fisherfolk through rational and equitable utilization of fisheries and aquatic resources; to empower fisheries stakeholders by enabling them to adapt to changing environmental conditions, global trade and regional fisheries management regimes; to improve productivity of fisheries and aquaculture within ecological limits (BFAR Strategic Management Plan, 2011). Therefore, one of the strategies to realize this mission is the implementation of the Philippine National Aquasilviculture Program (PNAP), a fishery livelihood and conservation program. The PNAP is a banner program of DA-BFAR jointly undertaken with the Commission on Higher Education (CHED), through a Memorandum of Agreement (MOA) signed on December 16, 2012, barely a year before the Typhoon Yolanda caused heavy damages to affected provinces in Eastern Visayas. The program covers the 15 coastal regions of the country. The participating agencies include the BFAR, with its Regional and Provincial Fishery Offices; CHED, and its participating State Universities and Colleges (SUCs); the Department of Natural Resources (DENR), with its Provincial Environment and Natural Resources Offices (PENRO) and Community Environment and Natural Resource Offices (CENRO); and the Local Government

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Units (LGU). The fisherfolk are the primary beneficiaries of the resource rehabilitation and protection and aquasilviculture project while the participating SUCs are the beneficiaries of the community-based multi-species hatcheries.

The Asian Regional Blue Growth Program Initiative (RIBG) on the other hand was conceptualized based on the following premises:

- Fish currently supplies about 20 percent of the protein in people's diets in Asia;
- Due to the increasing population and economic growth, by 2030 fish consumption in Asia is estimated to surge by 30 percent;
- Aquaculture is seen as the only way to meet the increasing demand due to the stagnant production from capture fisheries;
- This Regional Initiative contributes to the sustainable growth of aquaculture in Asia, foreseen to increase 60 percent by 2030.

Member economic ASEAN states were therefore encouraged to effectively address the key issues in "producing more with less", while safeguarding the environment through a Regional Initiative on the Sustainable Intensification of Aquaculture for Blue Growth (RIBG) as unanimously endorsed by member countries on March 2014, during the 32nd FAO Regional Conference for Asia and the Pacific in Ulaanbaatar, Mongolia. The RIBG seeks to assist member countries in the development and implementation of blue economy and growth agendas, primarily by enhancing equitable, productive and sustainable natural resource management and utilization dubbed as a "blue economy". In particular, the RIBG is focused on the following strategies:

i. supporting sustainable management of natural resources through improved governance, ecosystem approaches, participatory processes and actions to improve implementation at local levels;
ii. improving governance and ownership of natural resources by smallholders;
iii. supporting reduction of poverty, improved resource rents, increased food security and improved nutrition of rural, coastal and riparian communities with sustainable intensification of food production; and
iv. supporting management of transboundary issues (e.g. water management, fisheries, forest pests and animal health) and adaptation to climate change.

The Philippine component of the RIBG was launched in the same year that the Initiative was endorsed in 2014. At present, FAO is supporting the Philippine government in the implementation of two (2) Technical Cooperation Projects, with total funding of USD 621,000.00.

The Philippine National Aquasilviculture Program

The Program Components

The concept of the Philippine National Aquasilviculture Program (PNAP) is to come up with self-sufficient fisherfolk families who are advocates of fisheries resource protection through mangrove habitat rehabilitation, promotion of aquasilviculture and establishment of community-based multi-species hatcheries. The PNAP has three (3) components, namely:
(1) resource rehabilitation and protection;
(2) aquasilviculture; and
(3) community-based multi-species hatchery.

The first two projects are being implemented under the guidance of the BFAR-National Brackishwater Fisheries Technology Center (NBFTC) Pagbilao, Quezon while the last component is under the BFAR Inland Fisheries Aquaculture Division (IFAD).

PNAP Objectives

a. The concept of PNAP is to come up with self-sufficient fisherfolk families who are advocates of fisheries resource protection through mangrove habitat rehabilitation; and
b. Promotion of aquasilviculture and establishment of community-based multi-species hatcheries.

Implementation Arrangements

a. BFAR shall provide support funds for the establishment, operation and management of the PNAP;
b. CHED shall provide logistical support in the program implementation;

c. The program covers at least 74 State Universities and Colleges (SUCs) in 61 provinces throughout the country;
d. Potential areas targeted by the PNAP are abandoned, undeveloped and underutilized (AUUs) fishpond lease agreements (FLAs);
e. DENR-identified areas (Key Biodiversity Areas, reforestation areas and co-management agreement areas) from BFAR coastal regions 1 to 13 and ARMM;
f. Participating agencies are DA-BFAR Regional Fisheries Offices (RFOs) and Provincial Fisheries Offices (PFOs), CHED (SUCs), DENR Provincial Environment and Natural Resources Offices (PENRO) and Community Environment and Natural Resources Offices (CENRO), and the Local Government Units (LGUs) in the provinces and municipalities; and
g. Target beneficiaries for the aquasilviculture livelihood projects are at least 1,000 coastal fisherfolk and for the community-based multi-species hatcheries are 64 SUCs who were signatories to the MOA**.**

Mangrove Resource Rehabilitation and Protection

The Philippines is an archipelago of more than 7,100 islands with a vast marine habitat hosting one of the world's richest aquatic biodiversity (BFAR Primer). It has a total land area of 3,003,782 sq.kms representing only 1/7th of its territorial water area (including the Philippine Economic Zone, *EEZ)* of 2.23M sq.kms, excluding inland aquatic resources estimated at 496,000 hectares (Figure 1). The Philippine coastline stretches to around 36,000 kms (Phil. Fisheries Profile, 2011). Mangroves are valuable sources of forest products and aquatic resources. Both offshore and inshore fisheries depend on mangroves as natural habitats. Melana and Courtney (2000) reported that parallel with the decline in the mangrove areas of the Philippines is the significant reduction of fishery resources.

The loss of mangrove forests in the Philippines is also correlated with decreasing fisheries production in municipal waters and the depletion of larval and juvenile stages of shrimps and milkfish which are seed sources for pond aquaculture (Camacho and Malig 1988, as cited in ADB 1990). In 1918, Brown and Fischer estimated the mangrove forest to be as much as 400,000-500,000 hectares. However, the mangrove areas were indiscriminately alienated for other uses such as conversion to fishponds during the 1960s and 1970s, reclamation for residential and industrial development, over-harvesting of mangrove trees for charcoal or fuelwood and urbanization. In 1994-1995, the rehabilitation of mangrove forest was estimated at 120,000 hectares only (Primavera and Esteban, 2008). With the rehabilitation program in place, some progress has become evident. Thus, in the survey of Long and Giri (2011), the latest survey on Philippine mangrove forest, the authors estimated that the total area of mangrove forest in the country, in circa 2000, was 256,185 hectares.

The rapid decline of mangrove forests is alarming considering the ill effects that may have been brought about by climate change in archipelagic countries, like the Philippines, with little mangrove cover. Thus, restoration of mangrove forest is essential to mitigate or build the country's resiliency to climate change. To achieve this, BFAR has targeted to plant 100M mangrove trees in three (3) years to bring back health to its degraded coastal cover. To achieve this, participating fisherfolks will be encouraged to collect, plant, and nurture mangrove propagules. As an incentive, he will be paid P1.50 for every propagule collected, P2.00 for every propagule planted and P2.50 for every fully-grown plant.

Aquasilviculture

Aquasilviculture is a multi-purpose production system that allows production of fish in a mangrove reforestation project. It is a mangrove-friendly aquaculture technique of producing fish in a watered area enclosed with net but does not allow cutting of any mangrove tree. A model of aquasilviculture is showcased at the BFAR-NBFTC Pagbilao, Quezon. The design for the project follows a 70:30 ratio of mangrove to water canal area. This system provides a source of additional income and at the same time increases fish production that is easily adaptable for municipal / artisanal fisherfolk. The fisherfolk beneficiary who participated in the resource rehabilitation activity shall be the primary beneficiary of the aquasiviculture project after undergoing an orientation-training in a regional demo-center (Figure 2).

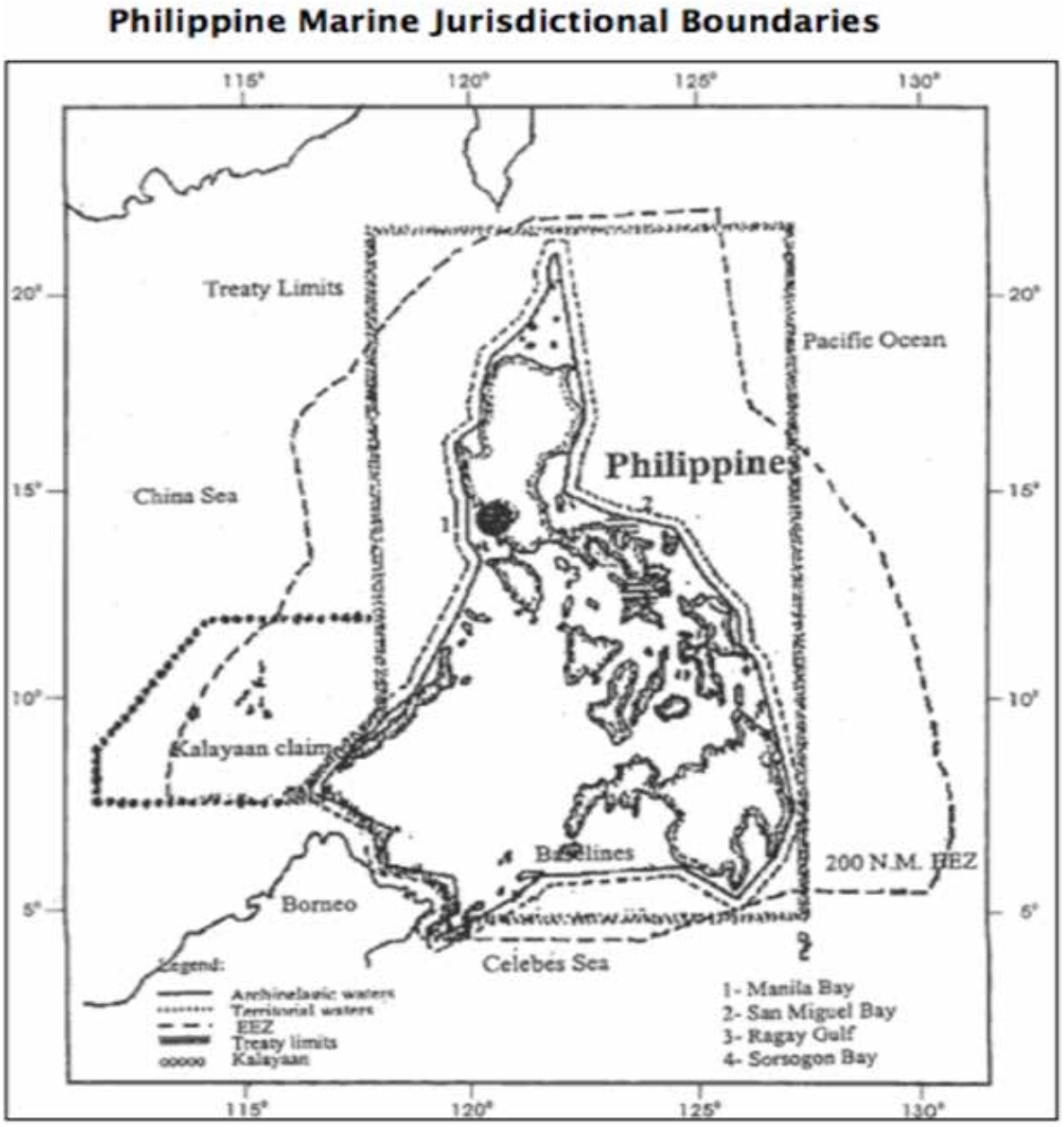

Figure 1. Map of the Philippines showing the limits of archipelagic, territorial waters treaty limits Exclusive Economic Zone (200 N.M. EEZ) and Kalayaan claim

Figure 2. A regional aquasilvi training-demo center in Panabo, Davao, also serving as an eco-tourism spot in the locality

Community–based "Lying-in" Hatcheries

The community-based multi-species hatchery (CBMH) is a facility for spawning gravid fish or crustacean, such as blue crab, caught in the wild to save its offspring that might otherwise be lost due to misuse. The hatchery will be able to contribute to stock enhancement and eventually become a source of fingerlings and seed stock for aquasilviculture and other aquaculture projects. Moreover, the CBMH will serve as a working laboratory of fisheries students of the participating State Universities and Colleges (Figure 3). CBMH may be land-based or holding cages ("lying-in") for gravid, ready-to-spawn crabs (Figure 4).

Figure 3. Launching of a Community-Based Multi-Species Hatchery in Bulacan State University and ceremonial installation of the "lying-in" crab-pots

Blue-growth Program Initiatives

Project Locations

The choice of site selections for the BGI project was primarily based on three (3) tier-major criteria as follows:

a. Small and medium scale traditionally known and established commodity farming areas for Gracilaria (seaweed) and Tilapia;
b. Vulnerability to climatic change impact such as floodings, typhoons, el niño / la niña and aquatic crops related disaster prone areas aftermath (i.e. pests/diseases, irrigation and water source deficiencies, fish kills and environmental degradations of the farming resources); and
c. Farming areas where fisherfolks / fishfarmers normally live below the poverty line.

For this purpose, five (5) coastal municipalities (Barcelona, Gubat, Casiguran, Prieto Diaz including Sorsogon City) with known Gracilaria gleaning activities throughout the year by the artisanal fisherfolks were selected. For the tilapia climate-resilient farming, four established cities/municipalities were chosen in Luzon (i.e. Santiago, Isabela; Munoz, Nueva Ecija; Minalin, Pampanga and Iriga, Camarines Sur) as shown in Figure 5.

Component Projects

Promotion and development of sustainable farming practices for Gracilaria spp. in Sorsogon, Philippines

The General objective under the "Blue Growth Initiative (BGI) in Support of Food Security and Nutrition, Poverty Alleviation and Healthy Oceans", is for the project to contribute to develop improved Gracilaria spp. farming and value chain strategies in the Philippines. It further aims to promote and develop sustainable farming practices for Gracilaria spp. in

Figure 4. Construction and installation of a typical marine-based "lying-in" project

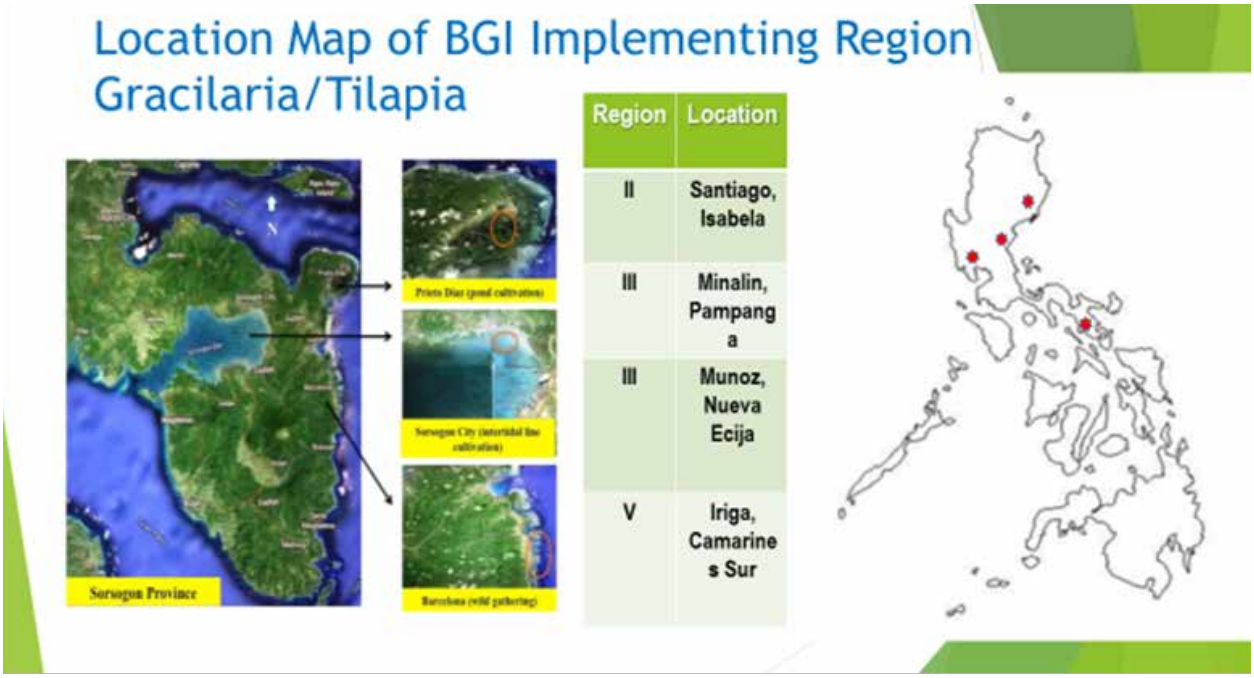

Figure 5. RI-SIA Blue Growth Projects in the Philippines

Sorsogon of Region 5 of the Philippines. The assessment on the technical, environmental, socio-economic and value chain of the Gracilaria Seaweed Farming Sector in Sorsogon, Philippines were limited to the following aspects (Figures 6-8):

a. Only three areas were covered to meet the criteria set by BFAR-NSTDC for this assessment study;
b. Gathering of wild populations in Layog, Barcelona was considered;
c. Cultivation in brackish water ponds by broadcast method in Prieto Diaz and line farming using rope in intertidal flats in Sorsogon City;
d. Three local collectors were interviewed and one big trader/exporter;
e. No agar processors were interviewed;
f. The survey is primarily to assess the Gracilaria farming/gathering in Sorsogon as mandated by FAO 5;
g. Three coastal municipalities were selected based on the criteria set by BFAR-NSTDC to include the following: (1) presence of wild Gracilaria species per season, (2) existing buying station, (3) seaweed farmers, (4) peace and order, (5) Gracilaria producing areas, and (6) availability of seaweed gathering/farming ordinances.
h. Five (5) Gracilaria gatherers in Layog, Barcelona, two (2) pond farmers in Prieto Diaz, five (5) intertidal mudflat farmers in Sorsogon City representing a cooperative, and three (3) local traders were interviewed using a prepared matrix to gather information and data pertinent to technical, environmental, socio-economic and supply chain (value chain) aspects of Gracilaria farming and gathering in order to address the general and specific objectives of the Project.

Figure 6. Six dominant farmed species of Gracilaria and farming practices in Sorsogon

The project by and large has led to the following recommendations:

a. Gathering of wild or natural populations Formulation of crop management program that will address the questions of: (1) how, (2) when, and (3) frequency of harvest and amount of biomass to be left for regrowth based from the results of a monthly assessment of Gracilaria beds for a 12 months duration to evaluate its productivity and reproductive status;

b. On farming Gracilaria: 1. Data logging is of prime importance in monitoring the daily activities (water quality, weather conditions, initial biomass at planting and biomass at harvest). One will be able to estimate the productivity and production of the crop vis-à-vis environmental conditions within one growth cycle to a possible sustainable industry. Of equal importance is the use of science-based technologies and not merely relying on a 'hit or miss' technique.

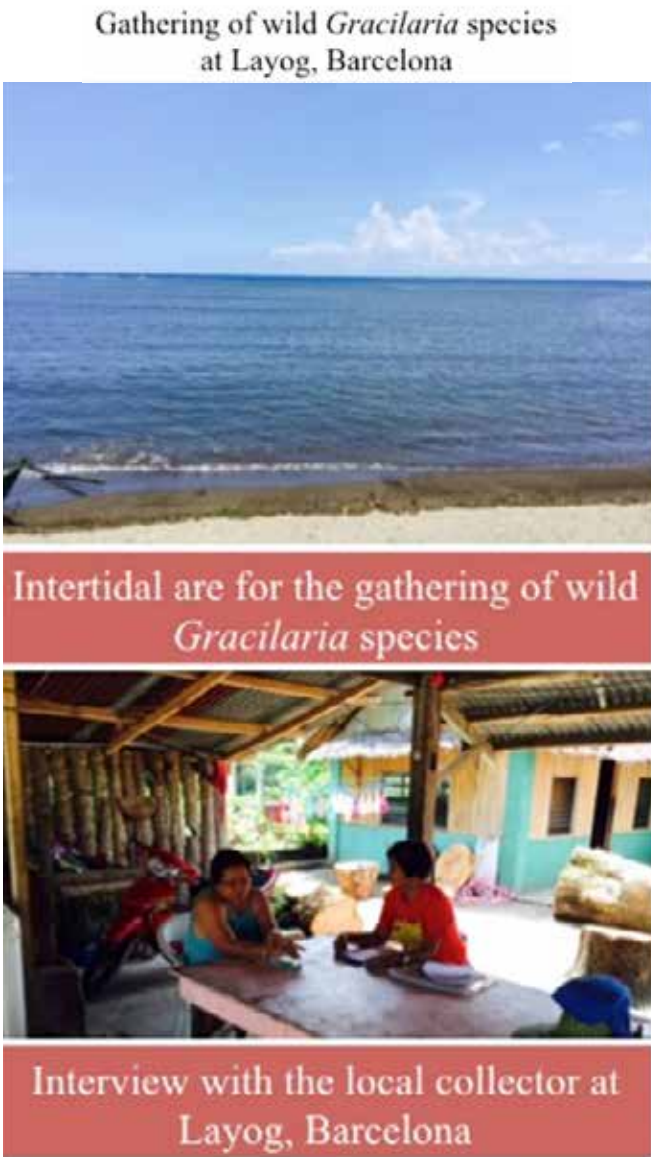

Figure 7. Intertidal gathering areas of Gracilaria and gatherer's interview in Barcelona, Sorsogon

2. Utilization of abandoned brackish fishponds may maximize productivity and production. 3. Poly-culture system of farming must be enhanced with science-based farming technologies. 4. Integrated Multi-Trophic Aquaculture (IMTA) must be adapted based from experiences of other countries with an ultimate objective of producing multi-products in one culture system and, more importantly, having a friendly environment with zero effluents discharge.

Building capacities for a climate resilient tilapia farming in the Philippines (FAO/TCP/PHI/3502D)

The project is a priority activity under the Philippine component of the RIBG. The government request FOR TCP support on this proposal was received by the FAO Representation Office in the Philippines (FAOPH) on 16 December 2014, which was subsequently endorsed to FAO-RAP on 18 December 2014. The project was approved by the FAO Regional Office for Asia and the Pacific on 24 December 2014 for a 16- month duration with the Department of Agriculture – Bureau of Fisheries and Aquatic Resources (BFAR) as the lead implementing agency. Partner agencies involved are the Department of Science and Technology and the Philippine Astronomical Geophysical Atmospherical Services Administration (DOST-PAGASA), through an LOA in collaboration with the Local Government Units (LGU) of: Minalin, Pampanga; Santiago City, Isabela and Iriga City, Camarines Sur, through a MoA with DA-BFAR. The specific project sites activities are as follows (Figures 9-12):

a. Survey of tilapia fishpond operations and Local Government Units (LGUs): Santiago City, Isabela (Northern Luzon); Minalin, Pampanga (Central Luzon) and Iriga City, Camarines Sur (Bicol Region. These areas represent different climatic conditions and scale of tilapia farming operations;
b. Pilot-testing of "climate-resilient" tilapia pond grow-out: Santiago City, Isabela (Northern Luzon); Minalin, Pampanga (Central Luzon); and

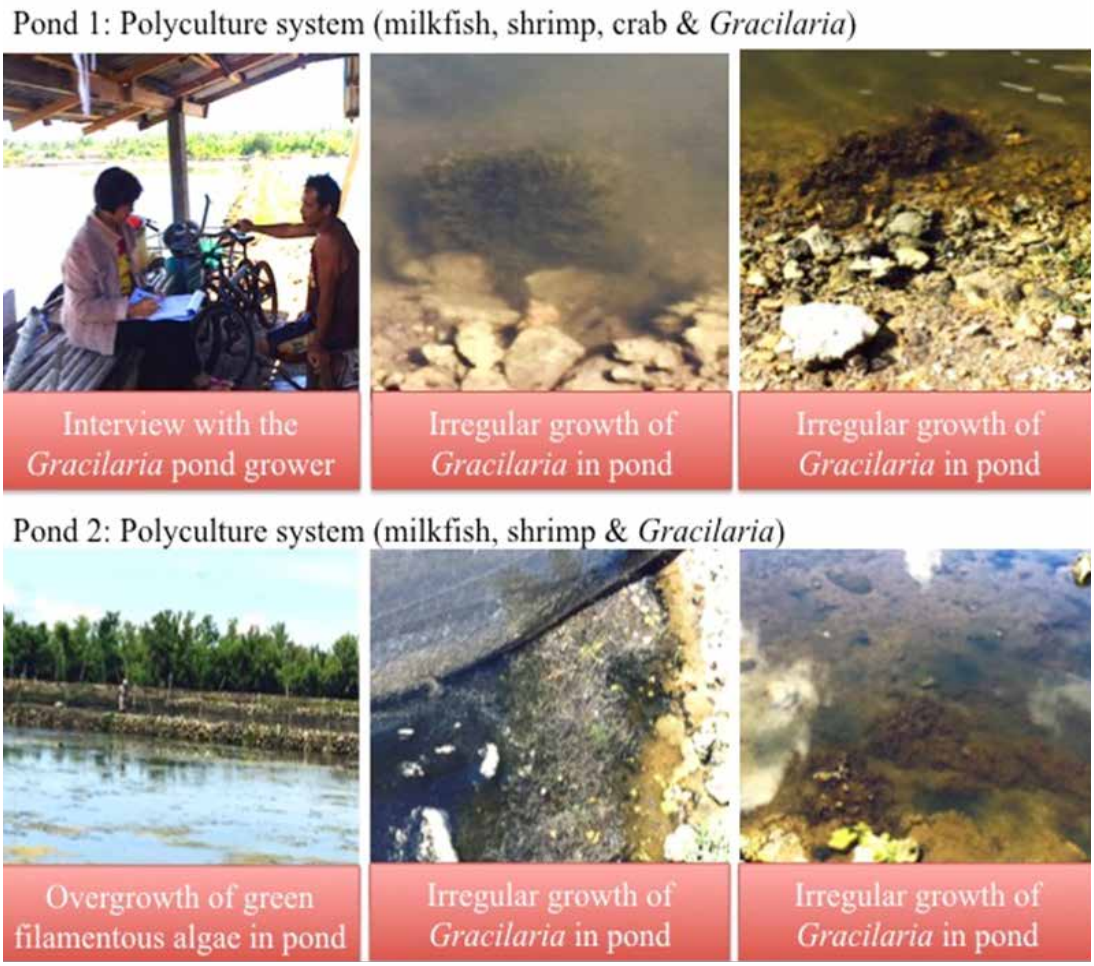

Figure 8. Farming system of Gracilaria in brackishwater pond and growth monitoring

c. Demonstration of the use of Automatic Weather Station (AWS): all LGUs.

The project seeks to increase the resiliency of the tilapia sub-sector, LGUs and BFAR Regional/Provincial units against challenges imposed by climate change and variability. This will be done through the promotion of enabling policies, technologies, information systems, and partnerships that will lessen their exposure to such risks, increase farm-level adaptation and their immediate (e.g., financial) recovery from the onslaught of such negative externalities. The expected project outputs are:

a. A science-based and practical climate-resilient tilapia farming technologies developed and viable sets of farm-level weather advisories established;
b. Tilapia farmer climate risks and vulnerability assessed and viable livelihood options identified in the study areas;
c. Developed and applied enabling tools and information systems for climate resilient tilapia farming and local agro-fishery development planning;
d. Innovative crop insurance and financial products/systems to enhance tilapia farmer economic resiliency; and
e. Enhanced awareness of climate change impacts on freshwater aquaculture and important knowledge products generated through the project.

Figure 9. Training package for tilapia fish farmers conducted at BFAR-NFFTC, Muñoz, Nueva Ecija

Lessons Learned and Way Forward

Aquaculture Planning and Management Significantly Improved

a. Adoption of applicable management planning and management tools, such as aquaculture zoning, traceability and Eco-based Aquaculture and Fisheries Management (EAFM);
b. Improved national policies and processes for the management of aquaculture and fisheries.

Strengthened Resilience of Small-Scale Aquaculture Farmers

a. By applying climate-smart aquaculture practices, establishing national biosecurity measures and disease control systems, improving access to quality production inputs (feeds and seeds) and access to markets;
c. Adoption of best practices (GAqP) and aqua-farming standards.

Figure 10. Practical hands-on training on weather apparatus installations and water quality monitoring in Pampanga

Leading to:

a. Promotions of mitigating and resiliency measures in fish farming design and technology;
b. Efficiency of seafood value chains, improvement in the status of aquatic ecosystem and a reduction of over fishing and resource exploitations;
c. Improve livelihoods and more secure food production systems;
d. Food fish security and economic sufficiency for coastal and inland fisherfolk / fishfarmers

Figure 11. Actual demonstration on the proper acclimatization period of tilapia fingerlings

Figure 12. Experts consultation and orientation-sharing seminar on resilient tilapia farming

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NELSON A. LOPEZ is a scholar and a topnotch aquaculturist. His solid educational background speaks of his passion for his area of expertise. He holds a PhD in Fisheries Technology from the Iloilo State College of Fisheries; he is a Master of Science in Aquaculture Fisheries MOMBUSHO Scholar of Kochi University, Japan; a USDA-Cochran Scholarship/Post-Doctorate Fellow, Texas A & M and Texas University of Austin; Bachelor of Science in Fisheries, Bicol University; Fisheries Technical Course, UP College of Fisheries, Diliman. Presently, Lopez holds various key positions as: Aquaculture Core Expert for the Philippines (SEAFDEC Program); NACA Technical Advisory Council Member for the Philippines; Chief, Inland Fisheries and Aquaculture Division of BFAR and Foreign Assisted Project Coordinator in Aquaculture to European Union-SSA, NORAD, ADB, Worldfish Center, JICA, FAO among others. In his pursuit for wider coverage of a sustainable utilisation and management of both the marine and inland water resources for food fish production in the country, Lopez has written and published various refereed and peer-reviewed scientific and technical papers on the subject. Lopez is likewise a concurrent CHED Technical Committee for Fisheries member charged with Center of Excellence/Centre of Development (COE/COD) evaluation, BSc Fisheries curriculum standardization and K-12 fisheries programme review.

Mining and the Environment

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Abstract

Mining is the process of extracting valuable mineral deposits from the earth. It involves exploration, feasibility study, development, utilization and rehabilitation. In general, there are two mining methods that are widely applied in the extraction of valuable minerals; surface (open pit/quarrying) and underground mining. Open pit mining is a type of strip mining that necessitates the removal of layer upon layer of overburden and ore. In many cases, logging of trees and clear-cutting above the ore deposit may precede removal of overburden. It is therefore, environmentally-destructive if progressive and final mine rehabilitation is not implemented. In underground mining, a minimal amount of overburden is removed to gain access to the ore deposit. It is therefore less environmentally- destructive means of gaining access to an ore.

Introduction

Mining is the process of extracting valuable mineral deposits from the earth. In general, there are two mining methods that are widely applied in the extraction of valuable minerals; surface (open pit/quarrying) and underground mining. The stages of mining include exploration, feasibility study, development, utilization and rehabilitation.

Exploration

This stage of mining determines as accurately as possible the size and value of a mineral deposit, utilizing techniques similar to, but more refined than, those used in prospecting. The line of demarcation between prospecting and exploration is not sharp; in fact, a distinction may not be possible in some cases. Exploration generally shifts to surface and subsurface locations, using a variety of measurements to obtain a more positive picture of the extent and grade of the ore body. Representative samples may be subjected to chemical, metallurgical, X ray, spectrographic, or radiometric evaluation techniques that are meant to enhance the investigator's knowledge of the mineral deposit. Samples are obtained by chipping outcrops, trenching, tunnelling, and drilling; in addition, borehole logs may be provided to study the geologic and structural makeup of the deposit. Rotary, percussion, or diamond drills can be used for exploration purposes. However, diamond drills are favored because the cores provide knowledge of the geologic structure. The core is normally split along its axis; one half is analyzed, and the other half is retained intact for further geologic study. An evaluation of the samples enables the geologist or mining engineer to calculate the tonnage and grade, or richness, of the mineral deposit. He or she estimates the mining costs, evaluates the recovery of the valuable minerals, determines the environmental costs, and assesses other foreseeable factors in an effort to reach a conclusion about the profitability of the mineral deposit. The root of the analysis is the question of whether the property is just another mineral deposit

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or an ore body. For an ore deposit, the overall process is called reserve estimation, that is, the examination and valuation of the ore body. At the conclusion of this stage, the project is developed, traded to another party, or abandoned. (Source: 1987, Hartman, H. L. & Mutmansky, J.M., Introductory Mining Engineering, Second Edition, June 1987.)

A mining project can only commence with knowledge of the extent and value of the mineral ore deposit. Information about the location and value of the mineral ore deposit is obtained during the exploration phase. This phase includes surveys, field studies, and drilling test boreholes (Figure 1) and other exploratory excavations. The exploratory phase may involve clearing of wide areas of vegetation (typically in lines), to allow the entry of heavy vehicles mounted with drilling rigs. Many countries require a separate Environmental Impact Assessment (EIA) for the exploratory phase of a mining project because the impacts of this phase can be profound and because further phases of mining may not ensue if exploration fails to find sufficient quantities of high-grade mineral ore deposits. (Source: "Overview of Mining and its Impacts." https://www.elaw.org/files/mining-eia-guidebook/Chapter1.pdf)

Feasibility Study

This stage is an evaluation of a mineral reserve to determine whether it can be mined effectively and profitably or not. It includes the detailed study of reserve estimation, mining methods evaluation, processing technique analysis, capital and operating cost determination and the process effect on environment. The feasibility study can be divided into two stages: prefeasibility studies and detailed feasibility. Both stages are similar in terms of content. The difference exists in the accuracy and time required to perform the studies. The *Prefeasibility* is the step that determines that the detailed study is required or not. It is done on the basis of estimation of approximate unit cost by a small group of technical individuals with accuracy within 20 - 30%. The *Detailed Feasibility* is the most detailed study to evaluate whether or not to proceed with the project. It is the basis for capital estimation and provides budget figures for the project. It requires a significant amount of formal engineering work and is accurate within 10 - 15%.

Figure 1. Low impact drill machine
(Source: 2004 Report, Mine, Environment, and Safety Division (MESD), Mines and Geosciences Bureau (MGB), Department of Environment and Natural Resources)

Steps for a Feasibility Study

1. Geology and Resource: This is the step where drilling and sampling works are performed. Various methods are available for drilling based on the soil and mineral properties. The drill samples are prepared for the assay in order to determine the minimum, maximum and average ore grade and these figures are

used to make the reserves estimation. The drilling and sampling procedures are based on certain guidelines developed by Canadian Institute of Mining (CIM).

2. Mine design and Mineable reserve: This is the step where the most economic way of mining is developed. Mine planning, model development, operation models and cost analysis are performed and thus the mineable reserve is estimated based on the economy. The major steps for the mine development are mine access (surface/underground), conveying system (especially in UG mines), backfill requirement, ore haulage, ventilation, material top size etc. Then the mining equipment selection is preformed and justified against the performance and economy. The next major stage in mine development is the disposal of overburden generated.

3. Metallurgy and process facility: This is the major backbone of the project development structure. Sampling must be carefully carried out to ensure that the samples used in the metallurgical testwork are real representatives of the whole ore body. Some major characteristics of the ore body are determined prior to the development of the plant design which includes grinding work indices, feed size, settling characteristics, filtration characteristics, etc. Metallurgical testwork are performed in order to determine the amenability of the given ore to different concentration technologies. The major processes that are observed are:

- Crushing and grinding,
- Concentration (Sizing, Gravity or Flotation)
- Dewatering (Mechanical or filtering)
- Chemical extraction (especially for gold)

When these tests are completed, based on the test results, the basic material flowsheet is developed. And then the equipment selection and plant layout figures are generated. These data are used to estimate the amount and grade of concentrate, middling and tailings that are used to research potential customers and revenue.

4. Tailings disposal: In the case when the tailings can't be sold, the tailing disposal system plays a crucial role in order to get the mine permit. Mostly the tailings do not place any major challenges. But, if the tailings have hazardous or toxic materials like cyanide, mercury, etc. in them, then the disposal system must be effective in order to reduce the harmful effects on the environment and society.

5. Infrastructure development: This section includes the civil and major earthworks required to start the production. The office, labs, storage units, plant buildings, mining equipment shelters, etc. are included in the infrastructure.

6. Power supply: Determining the power source, power line distribution, total power required and the power cost are the major things to be looked into in this step.

7. Water: Most of the plant processes are water-based, so, the estimation of water requirement plays an important role in the feasibility studies. Then, based on the water demand, the plant's costs are evaluated.

8. Environmental impacts: For a project to be permitted by any government, an environmental clearance is required. In order to get the clearance, the environmental impacts need to be studied. The important aspects are acid mine drainage, cyanide management, and other toxic material controls (arsenic, mercury, sulfur etc.)

9. Other key parameters: Support facilities, maintenance, transport cost of people/employees and material, labor cost, site access (road facility or construction, fly in fly out, marine etc.), social impacts are also need to be studied.

10. Cost estimation: Based on all of the above-mentioned steps, capital and operating costs for each unit are estimated. It includes all the costs for mine equipment, process equipment, construction costs, etc.

11. Financial Evaluation: This is the stage where the project is evaluated based on the economy. The total cost and expenses are examined against the expected revenue gained from the selling of final products and by-products. The key financial indicators examined to determine the viability of the project include Net Present Value (NPV) and the Internal Rate of Return (IRR). Annual cash flow need to be estimated over the entire life of the project, from construction to reclamation phase, based on upfront capital expenditures, mine and mill operating costs, employee wages and sales revenue.

12. Sensitivity Analysis: A sensitivity analysis is then carried out to determine the impact of variation in metal price, operating cost, metal recovery, metal grade, and capital cost on the overall project NPV and IRR values.

The viability of the mine project is established by all these stages and if based on these considerations, if the mine is feasible, then the next stage of actual development occurs. (Source: "Feasibility Study." http://technology.infomine.com/reviews/FeasibilityStudies).

Development

This stage pertains to the work of opening a mineral deposit for exploitation. With it begins the actual mining of the deposit, now called the ore. Access to the deposit must be gained either (1) by stripping the overburden, which is the soil and/or rock covering the deposit, to expose the near-surface ore for mining or (2) by excavating openings from the surface to access more deeply buried deposits to prepare for underground mining.

Figure 2. Surface Mining
(Source: 2004 Report, MESD, MGB, Department of Environment and Natural Resources)

In either case, certain preliminary development work, such as acquiring water and mineral rights, buying surface lands, arranging for financing, and preparing permit applications and an environmental impact statement (EIS), will generally be required before any development takes place. When these steps have been achieved, the provision of a number of requirements—

access roads, power sources, mineral transportation systems, mineral processing facilities, waste disposal areas, offices, and other support facilities —must precede actual mining in most cases.

Stripping of the overburden will then proceed if the minerals are to be mined at the surface. Economic considerations determine the stripping ratio, the ratio of waste removed to ore recovered; it may range from as high as 45 yd/ton (38 m/tonne) for coal mines to as low as 1.0 yd/ton (0.8 m/tonne) in metal mines. Some non-metallic mines have no overburden to remove; the mineral is simply excavated at the surface. (Source: 1987, Hartman, H. L. & Mutmansky, J. M., Introductory Mining Engineering, Second Edition 1987.)

Surface mining, e.g., open pit, quarrying, is a type of strip mining which the ore deposits extends deep in the ground, necessitating the removal of layer upon layer of overburden and ore (Figure 2). In many cases, logging of trees and clear-cutting or burning of vegetation above the ore deposit may precede removal of overburden. It is therefore an environmentally-destructive type of mining *if progressive and final mine rehabilitation is not implemented.*

Utilization

This stage is associated with the actual recovery of minerals from the earth in quantity. The final concern of the mine planning engineer may be the subsequent use of the land after

Figure 3. Rehabilitation of Drillsite
(Source: 2004 Report, MESD, MGB, Department of Environment and Natural Resources)

Siltation Pond of Philex Bulawan (Negros Occidental) converted into rice paddies

Rehabilitated area converted into farmlands

Figure 4. Vegetation after Mining
(Source: 2004 Report, MESD, MGB, Department of Environment and Natural Resources)

mining is completed. Old mine sites have been converted to wildlife refuges, shopping malls, golf courses, airports, lakes, underground storage facilities, real estate developments, solid waste disposal areas, and other uses that can benefit society. By planning the mine for a subsequent development, mine planners can enhance the value of the mined land and help convert it to a use that the public will consider favorable. The successful completion of the reclamation of a mine will enhance public opinion of the mining industry and keep the mining company in good standing with respect to regulatory agencies. This stage of the mine is thus of paramount importance and should be planned at the earliest possible time in the life of the mine. (Source: 1987, Hartman, H. L. & Mutmansky, J. M., Introductory Mining Engineering, Second Edition 1987.)

Rehabilitation

The final stage in the operation of mines is Final Rehabilitation/Reclamation, the process of closing a mine and re-contouring, revegetating, and restoring the water and land values. The best time to begin the reclamation process of a mine is before the first excavations are initiated. In other words, mine planning engineers should plan the mine so that the reclamation process is considered and the overall cost of mining plus reclamation is minimized, not just the cost of mining itself. The new philosophy in the mining industry is sustainability; that is, meeting the economic and environmental needs of the present while enhancing the ability of future generations to meet their own needs (National Mining Association, 1998). In planning for the reclamation of any given mine, there are many concerns that must be addressed. The first of these is the safety of the mine site, particularly if the area is open to the general public. The removal of office buildings, processing facilities, transportation equipment, utilities, and other surface structures must generally be accomplished. The mining company is then required to seal all mine shafts, adits, and other openings that may present physical hazards (Figure 3). Any existing highwalls or other geologic structures may require mitigation to prevent injuries or death due to geologic failures. The second major issue to be addressed during reclamation

Reforested Mineral Processing Areas of Philex Bulawan (Negros Occidental)

Figure 5. Restoration of Vegetation
(Source: 2004 Report, MESD, MGB, Department of Environment and Natural Resources)

of a mine site is restoration of the land surface, the water quality, and the waste disposal areas so that long-term water pollution, soil erosion, dust generation, or vegetation problems do not occur. The restoration of native plants (Figures 4 and 5) is often a very important part of this process, as the plants help build a stable soil structure and naturalize the area. It may be necessary to carefully place any rock or tailings with acid-producing properties in locations where rainfall has little effect on the material and acid production is minimized. The same may be true of certain of the heavy metals that pollute streams. Planning of the waste dumps, tailings ponds, and other disturbed areas will help prevent pollution problems, but remediation work may also be necessary to complete the reclamation stage of mining and satisfy the regulatory agencies. (Source: 1987, Hartman, H. L. & Mutmansky, J. M., Introductory Mining Engineering, Second Edition, June 1987.)

Mining Methods and the Environment

The two mining methods that are widely applied in the extraction of valuable minerals are surface (open pit/quarrying) and underground mining. In many cases, logging of trees and clear-cutting above the ore deposit may precede removal of overburden. It is therefore, environmentally-destructive if progressive and final mine rehabilitation is not implemented. In underground mining, a minimal amount of overburden is removed to gain access to the ore deposit. It is therefore a less environmentally-destructive means of gaining access to an ore.

Large-scale mining projects have the potential to alter global carbon in at least the following ways: Lost CO_2 uptake by forests and vegetation that is cleared. Many large-scale mining projects are proposed in heavily forested areas of tropical regions that are critical for absorbing atmospheric carbon dioxide (CO_2) and maintaining a healthy balance between CO_2 emissions and CO_2 uptake. Some mining projects propose long-term or even permanent destruction of tropical forests. Environmental Impact Assessment (EIA) for mining projects must include a careful accounting of how any proposed disturbance of tropical forests will

alter the carbon budget. The EIA should also include an analysis of the potential for the host country to lose funding from international consortia that have and will be established to conserve tropical forests. CO_2 emitted by machines (e.g., diesel-powered heavy vehicles) that are involved in extracting and transporting ore. The EIA should include a quantitative estimate of CO_2 emissions from machines and vehicles that will be needed during the life of the mining project. These estimates can be based on the rate of fuel consumption (typically diesel fuel) multiplied by a conversion factor that relates units (typically liters or gallons) of fuel that are consumed and units (typically metric tons) of CO_2 that are emitted. "Overview of Mining and its Impacts" https://www.elaw.org/files/mining-eia-guidebook/Chapter1.pdf

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TEODORICO A. SANDOVAL obtained his Master's Degree in Development Management as one of the government scholars under the Public Management Development Program at the Development Academy of the Philippines in 2015. He also obtained his Master's Degree in Geology as scholar of the Department of Science and Technology in National Institute of Geological Sciences, University of the Philippines in 2006. He obtained his Bachelor's Degree in Mining Engineering at the Mapua Institute of Technology in 1984. Presently he is working as Supervising Science Research Specialist in Mines and Geosciences Bureau (MGB), Department of Environment and Natural Resources. Before his transfer to MGB, he worked as Science Research Specialist at the Philippine Institute of Volcanology and Seismology, Department of Science and Technology where he gained seventeen (17) years of work experience in Scientific Research on field of Volcanology in the Philippines. As Overseas Filipino Worker, Sandoval had two (2) years work experience as Mine Shift Boss in Underground and Surface mining and two (2) years work experience as Exploration Field Assistant in Mineral Industry in Saudi Arabia. He had three (3) years of work experience as Second Class Surveyor on field of Surveying in Engineering Consulting Firms and one (1) year of work experience as Supervisor/ Surveyor in Geotechnical Services in Saudi Arabia. He had two (2) years of work experience as Quality Control Manager and Site Safety Officer in Construction Firm in Guam, U.S.A. on several projects of the United States Naval Facilities Engineering Command and U.S. Army Corps of Engineers.

Forests and Shelter Security of Communities from Typhoons: Cases[1]

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Abstract

Wind speeds at 200 kilometers per hour and tidal wave surges 3.6 meters in height described Cyclone Nargis as it buffeted Ayeyarwady Delta on May 2nd and 3rd of Year 2008. This study examined the Cyclone's impacts on humans and the role of forests in mitigating damage on man in his environment. Four hundred and fifty (450) households in 28 communities of Bogale Township, Ayeyarwady Delta were interviewed for this study. As may be expected, human mortality decreased with distance from the cyclone track. Also, communities adjacent to forest stands did not suffer as much. Storm surges into human settlements swept hundreds of humans along as they sped back into the sea. Majority of survivors reported that as they were carried along towards bare mangrove trunks, they held on and were saved. The Cyclone increased local awareness of the importance of forests in mitigating cyclone and similar disasters.

Introduction

Cyclone Nargis – a category 3 cyclone that struck the coast of southern Myanmar on 2nd May 2008 – had its landfall in the Ayeyarwady Delta. The cyclone's wind speed reached 200km/hr and caused storm surges of 3.6 meters high, sweeping several communities along its path. It was the worst natural disaster in Myanmar's history. Over 140,000 people died in 37 towns. Of the 7.35 million people living in the area, 2.4 million people were greatly affected, i.e., 70% of the population were affected near the areas where Bogalay town is located (Figures 1 and 2).

Prior to the massive destructions brought by the cyclone, the mangrove forests in Ayeyarwady had been decreasing rapidly like in other tropical countries. Even before the storm, the deforestation rate was more than 7,000 hectares per year and considered to be three times faster than the other terrestrial forests in Myanmar. It was observed that the farmers cut the trees in the forests for fuel wood and charcoal; then, they cultivated the area into rice paddies. After 5 or 6 years when the rice production decreased, the farmers transferred to new areas and repeated the same process. From 1924 to 2007 record, the number of mangroves declined in the 9 reserved forests in Ayeyarwady Delta. This has been due to aggressive encroachment because of the increasing demand for forest resources by population pressure and accelerated expansion for agriculture.

The study aimed to know if Cyclone Nargis damaged the mangrove forests and the human settlements and if there were incentives for mangrove rehabilitation. The questions answered by respondents of Bogalay town in Ayeyarwady were: (a) Did the forest reduce the Cyclone damage to human settlements in the Ayeyarwady Delta?; (b) Did the local people's perception of mangrove rehabilitation change after the cyclone?

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[1]The full paper of this case study entitled: "Mitigation Effects of Forests as a Natural Shelter in the Cyclone Nargis in Myanmar" was published in the Asian Journal of Environment and Disaster Management, Vol. 2, No. 2, by Ya Min Thant, Mamoru Kanzaki and Maung Maung Than; doi: 10.3850/S1793924009000169.

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Figure 1. Location of Study Area
(Source: http://www.respond.int.org)

Methods and Materials

To check the distance impact of the Cyclone, three research sites of the study area were selected as follows:

Site 1: Byonemwe (BM) island is a degraded secondary forest – a protected area and is 23 km away from the cyclone track, with 15 plots of 10 x 10 meters, composed of big diameter tree species.

Site 2 and Site 3 are the Community Forestry plantations with trees planted in 2001, hence young and having small diameter.

- Site 2 has 20 plots in Wakone Village (WK1); it is 43 km away from the cyclone track.
- Site 3 has 15 plots set in different location in Wakone Village (WK2) and is 46 km away from the cyclone track.

Findings

Damage of Cyclone to Mangrove Forests

Photographs taken in October 2006 and August 2008 along the riverbank areas were the Rhizophora apiculata, Forest camp in Mainmahla Island and Nypa fruiticans, showed that the mangrove forests were damaged by Cyclone Nargis (Figure 3).

Concerning the damage to mangrove forests, the study showed that the forest nearest the cyclone track had the most damage. Most trees were damaged but they were left standing without branches, leaves, or twigs. The tree trunks provided refuge for the people. The data

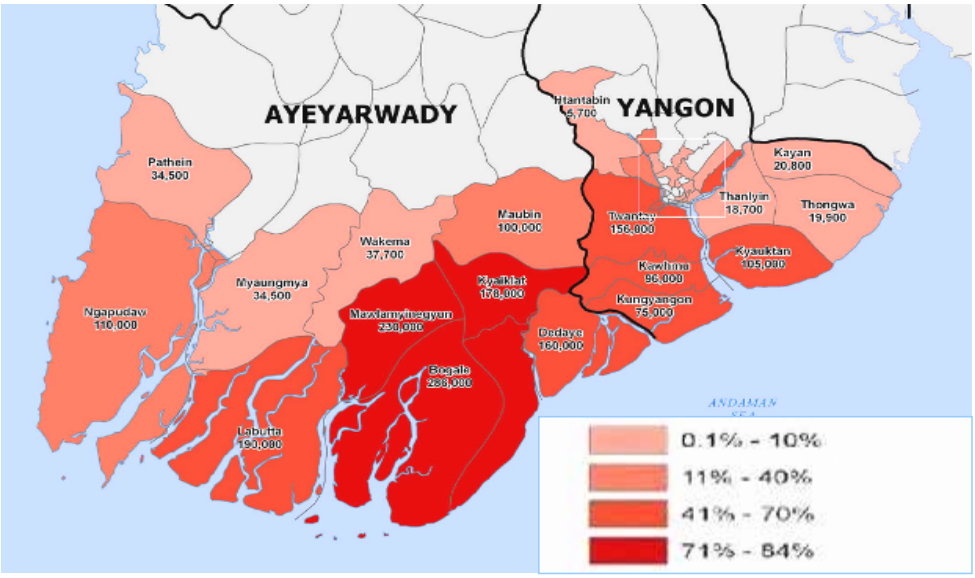

Figure 2. Percent Distribution of Affected Population in Study Area
(Source: PONREPP Report)

further describes that:

- In Byonemwe island (Site 1), 1% of trees were uprooted and 47% heavily damaged.
- In WK1, 1% of trees were also uprooted but only 11% were heavily damaged.
- There is no uprooted tree in WK2 and only 1% of trees were heavily damaged.

Damage of Cyclone to Human Settlements

To further assess the impact of the cyclone on human settlements, 26 villages and 2 forest camps in Bogalay Township were selected. The location and elevation of the villages were recorded using GPS. In these areas, interviews were conducted in 13 to 25 households per village one month after Cyclone Nargis hit the area. Questionnaires were used to survey the household heads, having the following categories: (a) Livelihood conditions before and after cyclone; (b) Human mortality; (c) Damage to their houses and properties; (d) How they survived the cyclone; and (e) Perception on rehabilitation of mangrove.

The selected villages, located between 10 and 15 km from cyclone track, were divided into 2 groups. The first group of 13 villages were with forests and nearby secondary mangrove forest or plantation established by their community forestry program. The second group of another 13 villages had no forest nearby around them. Two other villages were located in the reserved forest, with dense forest cover.

The findings showed that the cyclone caused more deaths among coastal dwellers and seriously impacted the life of people in the study area. The relation between human mortality and the distance of the villages from the cyclone track is significant. Human mortality clearly decreases with the increasing distance from the cyclone. Elevation had no significant effect on mortality. Other important information surfaced in the study. The number of mortality was severe up to 40 km away from the cyclone track. In locations over 43 km away, no high tidal surges were observed among the villages. The rate of mortality was significantly reduced with the presence of forests. And the most amazing result was no mortality was recorded from the villages in the reserved forest with dense forest cover.

Figure 3. Comparison of Plants along Riverbanks Before and After Cyclone Nargis. Debris piled along 15 kms long of big island. *Photos by Ya Min Thant*

Apart from the number of human casualties, there were damages to housing. The pattern of the 'Housing Damage' category was different from the human mortality. Although, housing damage was also severe up to 40 km distance from cyclone, there was no difference between villages with and those without forests. This means that the lower percentage of housing damages in 6 villages were due to the absence of high tidal surge in the villages. These villages are over 40 km away from cyclone track.

Those who survived the natural calamity were saved by the trees because they embraced the branches in order not to be swept by the surge. Among those who were swept by tidal surge, 62% of survivors reached a tree, held on to the tree and survived. Only 15% of the survivors reached a safe man-made structure.

Incentive for Mangrove Rehabilitation

Concerning the attitude of people towards the reforestation program, there was a difference before and after Cyclone Nargis hit their area. The study showed that prior to Cyclone Nargis it was difficult to get villagers' participation in the reforestation program. After the cyclone, the survey found that 90% of villagers believed that mangrove forests reduced the damage brought by the cyclone. About 88% of the respondents answered that they want to participate in mangrove rehabilitation program, and 21% of the respondents answered that they would start mangrove tree planting even without any support from the forest department or NGO.

Not considering the role of forests in saving the lives of people, some 46% of the respondents considered that the most important incentive for involvement in the Community Forestry program is for using the trees as housing materials and fuel wood consumption. Fuel-wood serves as daily energy resource, but this became a serious problem as it led to the continuous depletion of the forest. About 21% of the villagers get their income by selling wood from the forest.

With respect to the most significant finding for prevention measure of disaster brought about by a cyclone, 33% of the villagers stated, after their Cyclone Nargis experience, that mangroves served as the shelter from the disaster.

Conclusion

Mangrove vegetation played a crucial role in saving human lives and is important as potential live-saving buffers. The overexploitation of mangroves over the past decades may have increased the loss of human lives and damage to settlements caused by the cyclones and storm surges. This has increased the awareness of local people on the importance of the rehabilitation program. This is a good opportunity to extend community forestry in the (Ayeyarwady) Delta.

Everyone wants development as the common goal. Even before Cyclone Nargis struck Myanmar, there were initiatives for reforestation projects. In spite of the devastating experience of many with Cyclone Nargis, still only a few pursued mangrove tree planting for a safer environment. Although many wanted to participate in the mangrove rehabilitation program, most of them would do it only with Government or NGO funding support as they will use their time for rehabilitation purposes (a non-income earning activity) and not for livelihood (an income-earning activity). Thus, with low government incentive, local people do not participate in the reforestation program.

About the Author

YA MIN THANT of Myanmar, received her PhD in 2008 from the Graduate School of Agriculture, Kyoto University, Japan. She co-authored internationally published papers on mitigation effects of forests and mangrove plantations as a natural shelter. A number of her research works with Mamoru Kanzaki and Maung Maung Than were presented in international academic conferences, such as: cyclone impacts on mangrove forests and human settlements; post cyclone incentive for mangrove rehabilitation and community forestry; carbon sequestration by mangrove plantations and secondary forestry; and others. Ya Min Thant is currently Environmental/Forestry Specialist of Myanmar Koei International Ltd., South Okkalapa Township, Yangon, Myanmar.

Climate Change and Sustainability of Marine Ecosystems

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Abstract

Utilization of marine resources contributes to economic development, improved human well-being and social equity. The Philippine archipelago provides aquatic resources found in various coastal, marine and inland waters, which are considered as some of the most productive and diverse habitats in the world. Climate change adversely affects the socio-ecological conditions of marine and coastal ecosystems. The Philippines has been projected to be one of the most vulnerable countries to climate change, which is expected to exacerbate extreme events such as heavy rainfall during typhoons, increase in temperature during summer months, and a longer dry season. Global increase of Harmful Algal Bloom outbreaks, a potential indicator of climate change, has also been reported. This paper will primarily focus on the major Philippine marine ecosystem issues that need to be considered in relation to the country's economic development framework/strategy. Current national initiatives of the Philippines and involvements in regional collaborations relevant to the development of decision support systems for the sustainability and management of these marine ecosystems will also be discussed.

Introduction

To emphasize the vast coverage of marine ecosystem, the earth, our only planet, is 71% water and mostly marine. Of this, 96.5% comes from oceans, seas and bays and 3.5% is freshwater from lakes and frozen water from glaciers and polar ice caps (Shikomanov, 1993). Thus, although human life's natural habitat is the land, the surface of the earth is mostly water. The marine ecosystem makes the earth comfortably habitable for humans.

There are sad environmental scenarios at present, e.g., oceans that have decreasing fish production; lands that have become unproductive; streams that are polluted in many areas and no longer provide safe drinking water; and the ecosystems that are degraded and unfit for residential and other purposes. These negative circumstances eventually lead to impoverishment, natural disasters, hunger, and diseases (modified from UNDP, 2002). It is vital to protect the marine ecosystem. Considering the Aquatic Resource Profile of the Philippines, if full size zoning of marine resources is applied, this can help involve the coastal families and communities to participate in taking care of the ecosystem, i.e., coral reefs, sea grass beds, flora and fauna (Philippine Environment Monitor, 2005). This can partly resolve the deteriorating environmental problem scenario. Considering potential gains from the Philippine marine components, a 2.6 million-hectare of coral reefs can generate a net annual benefit of about US$6.1 billion. Concerning the proportion of coral reefs affected by local threats, the Philippines has more coral reefs at a very high risk compared to Indonesia and to the rest of the Southeast Asian countries. With respect to mangroves and net annual benefit, mangroves can generate US$240 million from an area of around 247 hectares and a 98-hectare seagrass can generate a net annual benefit of about US$4 million (Azanza et al., 2015). As a major source of food security and livelihood, fish provides 67% of the protein requirements of

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Filipinos and fishing is the livelihood of 5-6 million Filipinos (Barut et al., 2003). With respect to employment, the fishery sector provides employment to 5% of the national labor force and around 85% of Filipinos along coastal areas are involved in municipal fisheries (Census of Fisheries, 2002). Figure 1 shows that the value of fisheries production has been increasing from 1998 to 2012 (BAS, 2010; BFAR, 2010; and BFAR, 2011).

Goods and services provided by seas and oceans to humans are recreation, marine transport, renewable energy, medicine from marine plants, ecotourism, and other marine natural products. However, despite the rich environment, people living in the coastal areas are the poorest of the poor. Based on the poverty statistics of the Philippines for years 2006, 2009, and 2012, the fishermen are the poorest, followed by the farmers (Figure 2, Philippine Statistics Authority, 2014).

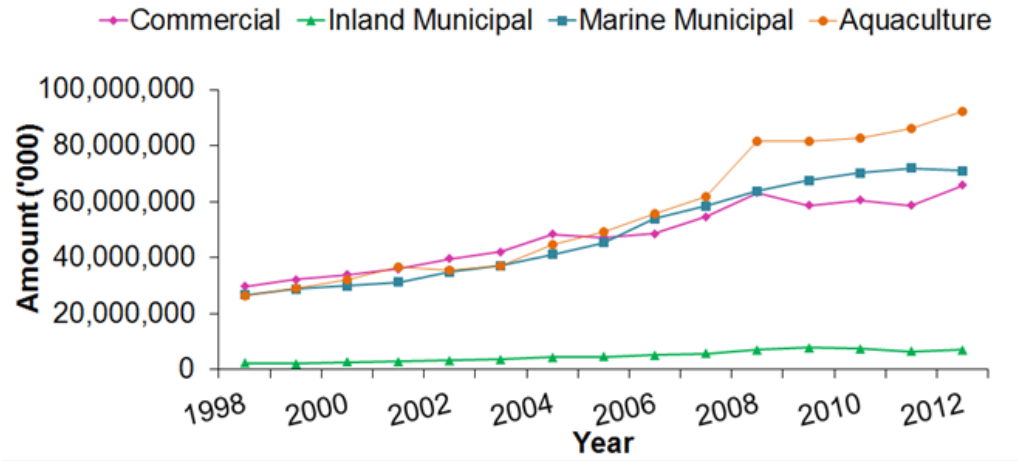

Figure 1. Value of Fisheries Production at current prices (in thousand pesos)
(Sources: Bureau of Agricultural Statistics, 2010;
Bureau of Fisheries and Aquatic Resources, 2010; and 2011)

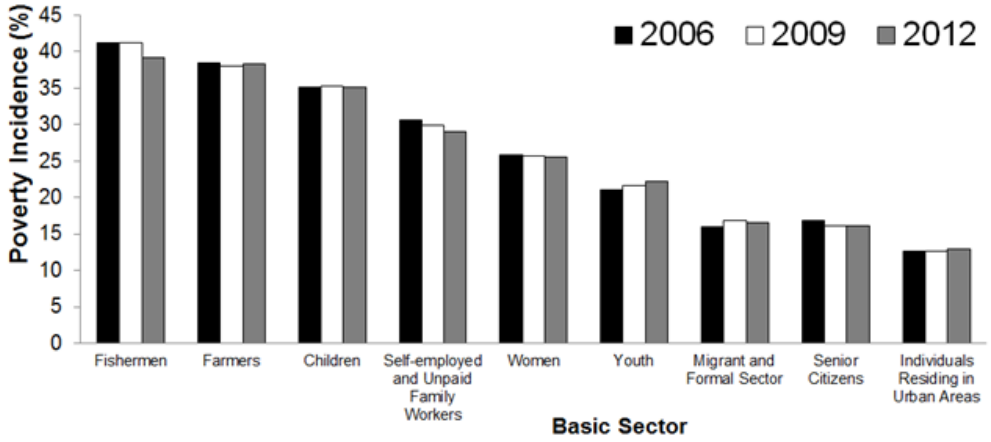

Figure 2. 2006 Official Poverty Statistics for Basic Sectors of the Philippines showing that fishermen, farmers and children comprise the 3 poorest sectors
(Source: Philippine Statistics Authority, 2014)

Climate Change and Ocean Stress

Turley et. al. (2011) summarized some stressors to the marine environment using the Warming, Acidification, and Deoxygenation categories. With increased warming of waters, the basic food of the fish, the phytoplankton, could be negatively affected; i.e., changes in biodiversity, food webs and productivity, with potential consequences to fisheries, coastal protection, and even tourism. Considering the Acidification stressor, the increasing atmospheric CO_2 emissions as a result of industrial emissions are shown to affect the coastal nutrient enrichment. Acidification impedes shell or skeletal growth in many species and brings about changes in biodiversity and ecosystem. With respect to the Deoxygenation stressor, the shift to low oxygen-tolerant organisms has been shown. The loss of some microorganisms for example again could impact fisheries and aquaculture. The combined effect of the three stressors due to climate change is damage to biodiversity and healthy productivity of marine ecosystem, which further increases the risk to food security.

Risks and Threats to Coastal and Marine Ecosystems

Changes in sea surface temperature from 1.5 to 2.5°F have been observed from 1901 to 2014 (Figure 3). With warming, threats to sustainable marine ecosystem are inevitable. The current increase in global temperature of 0.7°C since pre-industrial times is disrupting life in the oceans from the tropics to the poles. A further rise of between 1.4°C and 5.8°C by the end of the century has been predicted by the Intergovernmental Panel on Climate Change (World Wildlife Fund for Nature 2015). The impact is not only at sea but also on land.

There are also man-made threats to marine ecosystem that add to the effects of climate change due to coastal development, excessive nutrient input and pollution, sedimentation, overfishing, and illegal, unreported and unregulated (IUU) fishing (Burke et al., 2011).

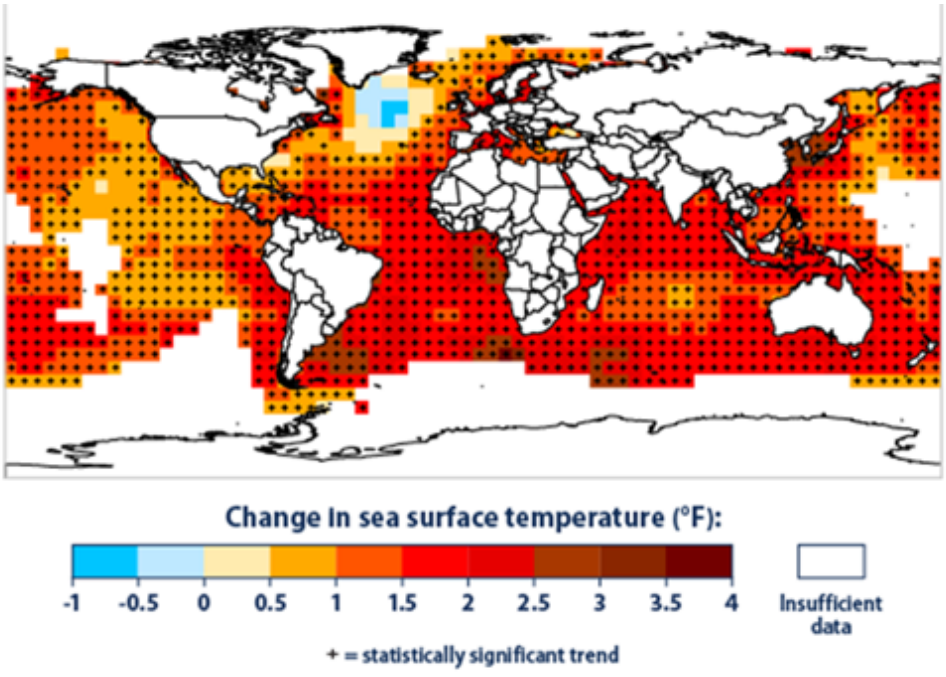

Figure 3. Changes in Sea Surface Temperature from 1901-2014
(Sources: IPCC, 2013; NOAA, 2015)

Overfishing in the Philippines, although less than before, is still relatively high when compared to other Southeast Asian countries that behave differently on fish consumption trends. In the Philippines, individual consumption decreased from 40 kg/yr. (1987) to 35 kg/yr. (1996). This is projected to further decrease to 10 kg/yr. by 2010 (Population, Marine Biodiversity & Food Security, 2008). Nearshore waters have been heavily exploited. Though there are shores with less fishing, there have been more shores that are heavily exploited. Many places with very high exploitation are the nearshore waters (Green et al., 2003).

Climate Change Impacts on the Marine Environment

In the Philippines, the highest increase in temperature is during summer, or the months of March, April and May. Mindanao will experience higher temperature increases than areas in the northern part of the country. We can expect longer dry season. From 2020 to 2050, there will be reduced rainfall, comparable to the prolonged El Niño phenomenon. During extreme weather conditions, increase in rainfall during June, July and August in most parts of Luzon and Visayas can be expected (Azanza et al., 2015). Furthermore, typhoons with heavy rainfalls, like Typhoon Yolanda (Haiyan), affect the coral cover, sea weeds areas, and the flora and fauna. One negative effect observed on corals after Yolanda was the growth of filamentous algae covering the abraded corals. There is also the sea level rise attributed to the melting of the ice. The Philippines' Risk Map to Sea Level Rise predicted that one-meter rise in sea level will affect 64 out of 81 provinces. That can cover at least 703 out of 1,610 municipalities, and inundate almost 700 million square meters of land (Jabines and Inventor, 2007). In other words, the places that are at risk are all over the country (Figure 4).

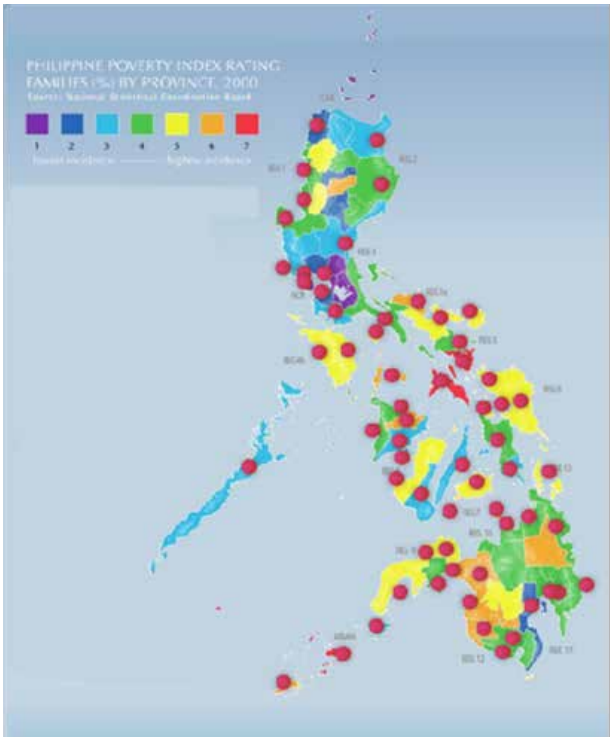

Figure 4. Risk to sea level rise: Regions affected by a one-meter sea level rise, GIS Map Modeling for Greenpeace
(Source: Sambale, 2007)

There is a specialized study focusing on El Niño season giving rise to the proliferation of harmful algal bloom. They have negative or fatal effects on marine food web especially on fish and shellfish. If not properly managed, human beings may also get poisoned. The increase of harmful algal blooms is an indicator of climate change. There are areas with shifts in the diversity of phytoplankton and other poisonous plants taking over in the vulnerable areas. This is to be analyzed further.

Zoning and Planning

The National and Local Agenda for CCA resolved that there should be zoning and planning on coastal environments based on science or knowledge used for modeling. That is a shift from reactive to proactive approaches in relation to climate change adaptations. Moreover, it is necessary to have a strategic multi-sectoral approach that includes livelihood, resiliency, and recovery especially in the coastal areas and for those who are dependent on the goods and services provided by the coastal environment and ecosystem. The Initiatives for Marine Ecosystem Sustainable Development and Management confirms that, in both national and international efforts, marine spatial planning has been done but never completed. There is still much to be done for sustainable ecotourism. Abating pollution is also needed especially in the coastal areas.

Another consideration is the research and development for alternative energy and marine biotechnology including other upgrade of materials that will not destroy the marine ecosystem, such as: (a) Ecosystem Approach to Fisheries Management; (b) Investment in technology for sustainable and efficient fisheries and aquaculture; (c) Professionalizing fisheries so that fishermen can access the different services related to fish production and development; and (d) Disaster risk reduction and climate change adaptation in LGU especially on coastal areas because usually the focus of DRR-CCA is mostly on urban areas and not so much on the rural areas or coastal communities (Azanza et. al., 2015).

Conclusion

The "Philippine Agenda 21" promotes the harmonious integration of sound and viable economy, responsible governance, social progress and ecosystem integrity, to ensure that development is a life enhancing process and should be continued and sustained. Environmental Sustainability is the bedrock for economic stability. If there is no stability in the environment, especially in the marine ecosystem environment, there is no basis for socio-economic sustainability. Thus, the national and local government should have strategies with environmental sustainability as the focal point, and provide many entry points for concerned civic society and business groups for discussion on the issues (Alcala and Azanza, 2010). A management plan must be dynamic. It must be continually reviewed, revised and updated because there are influx of information and changes in the environment that are to be considered so that interventions are appropriate (Chua, 2006). The resiliency and sustainability of local communities, i.e., both rural and coastal, should be given priority because most of the Filipino people are in coastal areas, and are among the poorest of the poor.

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RHODORA V. AZANZA, Professor Emeritus and Scientist III of the Marine Science Institute, University of the Philippines – Diliman and Academician, National Academy of Science and Technology has served the University in various positions including being the first woman dean of the College of Science – Diliman for 6 years. Azanza has 70 publications in international journals. She has extended her expertise to government agencies and international organizations, concurrently being the vice-chairman of UNESCO-Intergovernmental Oceanographic Commission (IOC) Panel on Harmful Algal Blooms (IPHAB) and leader of IOC's Harmful Algal Blooms in Southeast Asia (HABSEA) Portal and e-learning for 7 years. The ASEAN Red Tide Network, was coordinated by Azanza for more than10 years. She has been actively involved in the production and dissemination of UNESCO-IOC HAB information and educational materials. For her pioneering efforts concerning HABs and her significant scientific contributions to the advancement of Kappaphycus/Eucheuma Biology and Culture, she has been given several national and international awards. In 1998, she bagged the first prize Marinalg International Award for a paper delivered during the 15th International Seaweed Symposium in Chile and published in Hydrobiologia the following year. She was awarded the 2002 Hugh Greenwood Environmental Science Award, and the 2005 Most Outstanding Woman Fisheries Scientist. In 2012, she received the UP Alumni Association Centennial Lifetime Achievement Award in Science. She was the recipient of the 2015 DOST-Pantas Award for Outstanding Scientist/Researcher, given every 3 years. At present she is Assistant Vice President for Academic Affairs and Director of the Office of International Linkages (OIL) of the University of the Philippines. In November 2015, the UP Board of Regents approved Azanza's appointment as Professor Emeritus effective upon retirement in 2017.

Redefining Preparedness in the Context of Climate Resilience: Focus on Rural Communities

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Abstract

Preparedness has long been associated with particular focus on drills, stockpiling, and the like. To be disaster and climate resilient, the idea of building a community culture is essential. In the Context of the Sendai Framework for DRR (2015-2030), how can preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction be embedded in a rural community? The paper looks into current good practices in early warning system and disaster preparedness in both urban and rural settings. It then focuses on the case of San Francisco, an island municipality in Cebu province, Philippines. The case illustrates how neighbouring rural communities can move towards resiliency and achieve human security, especially in the context of a changing climate.

Introduction

Over the last decade or so, the Philippine hazardscape has been dramatically marked by hydrometeorological events such as the 2004 Quezon province flashfloods, 2006 Ginsaugon landslide, 2009 Ondoy floods, typhoon Sendong in 2011, Habagat and typhoon Pablo in 2012, typhoon Yolanda in 2013. Extreme weather events and variable climate have been known as climate change impacts. Experts have been careful not to identify a single hazard event as a direct result of climate change. However, that communities – both rural and urban – are increasingly exposed to the disaster and climate risks, cannot be ignored. The uncertainties of climate risks are becoming more and more of a major concern of local government units (LGUs) in the Philippines.

Laws such as the 2009 Climate Change Act (R.A. No. 9729), the 2010 National Disaster Risk and Reduction Management Act (R.A. No. 10121), and the 2011 Act establishing the People's Survival Fund (PSF) to provide long-term finance streams to address climate change (R.A.No. 10174) have provided national policy to mainstream disaster risk reduction and climate change in national and local development planning. Both R.A. 9729 and R.A. 10212 require LGUs to develop and adopt local plans on climate change adaptation (CCA) and disaster risk reduction and management (DRRM), respectively. This has caused a "confusion" among some LGU officials in regard to the Comprehensive Land Use Plan and other development plans that LGUs are required to deliver. R.A. No. 10174 has opened a new funding source for LGUs and local community organizations that want to pursue climate adaptation projects. What projects might be funded by the PSF remain indeterminate for most potential proponents.

RA 10121 (or NDRRM Act) was passed during the decade of the Hyogo Framework for Action (2005-2015) or HFA, a global framework promoted by the United Nations International Strategy for Disaster Reduction (UNISDR) "building resilience of nations and communities."

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This paper uses the metrics for the local implementation of HFA manifested through a tool called Local Government Self-Assessment Tool (LGSAT) consisting of 44 indicators. The tool is based on the Ten Essentials for local authorities[2], which are as follows: 1- Put in place an organization and coordination to clarify everyone's roles and responsibilities; 2- Assign a budget and provide incentives for homeowners, low-income families and private sector to invest in risk reduction; 3- Update data on hazards and vulnerabilities, prepare and share risk assessments; 4- Invest and maintain risk reducing infrastructure; 5- Assess the safety of schools and health facilities and upgrade these as necessary; 6- Enforce risk compliant building regulation and land use planning, identify safe land for low-income citizens; 7- Ensure that education programmes and training in DRR are in place in schools and communities; 8- Protect ecosystems and natural buffers to mitigate hazards, adapt to climate change; 9- Install early warning systems and emergency management capacities; and 10- Ensure that the needs and participation of the affected population are at the center of reconstruction.

This paper has been written while a transition is in progress. The "sunset review" of the NDRRM Law is in progress. The Hyogo Framework for Action (2005-2015)'s successor, the Sendai Framework of Disaster Reduction (2015-2030) continues to work towards the expected outcome of substantial reduction of disaster risk & losses with renewed resolve to prevent new and reduce existing risks. A case study approach is taken to underscore the significance of periodic assessments and measurements at the local level. Field work was conducted in two LGUs in Cebu province – the highly urbanized Mandaue City and predominantly agricultural San Francisco on October 27-30, 2015.

Objectives and Methodology

The objectives of the study are: (1) to analyze the dynamics of disaster preparedness in a changing climate in a rural setting; and (2) to propose measures for disaster risk governance from a rural perspective. The study consists of desk review of relevant documents such as those published by the UNISDR and those provided by the LGUs. Interviews and observations were utilized as primary data gathering for the case study of the municipality of San Francisco.

Figure 1. Community Development and Disaster Risk

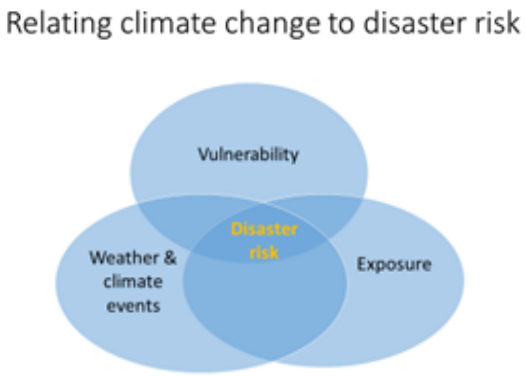

Figure 2. Climate Change and Disaster Risk

[2]United Nations International Strategy for Disaster Reduction (UNISDR), 2012. How to Make Cities More Resilient: A Handbook for Local Government Leaders, UN Geneva (available at http://www.unisdr.org)

Concepts: DRRM – an urban-rural comparison

Figure 1 shows that as a community develops, the more greenhouse gases are generated and thus help induce climate change. Climate change contributes to the variety of risks in communities. In this diagram, climate risks are subsumed under disaster risk. Disasters by themselves cannot be managed, but it is disaster risk that can be 'dealt with' to a certain extent – by avoiding, treating, or transferring risk.

Another option is the "do nothing" approach. Figure 2 gives us the idea that society, government and communities can deal with disaster risk by doing something about vulnerability and exposure. Weather and climate events would then appear as a given in DRRM.

Definitions in the field of DRRM have been evolving as new findings from disaster research and experiences are obtained.[3] The latest definition from the Global Assessment Report 2015 states that "disaster risk reduction (DRR) is the policy objective of anticipating future disaster risk, reducing existing exposure, vulnerability or hazard, and strengthening resilience." Management may be applied to DRR to denote the systems composed of resources and the manner in which these are utilized to accomplish certain goals and objectives.

Thus, GAR 2015 refers to the specific arrangements that societies put in place to manage their disaster risk as disaster risk governance. It is a manner of organizing so that common interests such as disaster risk can be reduced, most obviously by reducing vulnerability and exposure.

It is useful to see how a highly urbanized LGU and an agricultural (rural) LGU manage disaster risk. Table 1 shows concrete ways by which the LGU organizes itself to conduct DRRM. San Francisco, located on a small island off the west coast of Cebu island, is contrasted with the densely populated Mandaue City, which is considered part of Metro Cebu. In the next section, a case study of San Francisco is presented. To contrast the rural setting against the urban, a comparison of San Francisco and Mandaue City is shown in Table 1.

Mandaue City, with a 2010 population of 331,320, is a major component of Mega Cebu, the country's second most important urban center. The City has a population density of 10,100 persons per sq km (est.) and faces several challenges in dealing with urban disasters. The city has made significant strides in preparedness and mitigation to which significant amounts have been allocated from the city disaster risk reduction management fund.

The city has a command center that integrates with emergency management other services rendered by traffic management, fire protection, and the police service. It uses a computer system designed and implemented by the Management Information System Office. The early warning system uses radio and SMS to communicate with the barangay clusters. The city's barangays are divided into four zones depending on the exposure level to five major hazards including flood. The city is also served by two emergency sub-stations – one in the north and another in the south; this is to manage shorter response times of emergency and medical responders. The city has contingency plans for fire, landslide, flooding, storm surge, typhoon, and earthquake. The city has prepared a climate- and disaster-risk sensitive comprehensive land use plan.

The city experienced the October 15, 2013 main shock earthquake (M7.2) that hit Cebu and Bohol provinces. In that earthquake, no major infrastructure damage was reported in Metro Cebu except that a part of the Mandaue City public market collapsed. After the 2013

[3]UNISDR, 2015. Global Assessment Report (available at www.unisdr.org).

typhoon Haiyan came tropical storm Hagupit in December 2014. Mandaue was spared but the city had made the preparations nevertheless.

Typically, the mitigation and preparedness measures are among the tools and instruments in the Ten Essentials. The level of sophistication depends on the requirement (demand) as well as the budget allocation such an office or operations center has (capacity), in a similar way that hardware for early warning system (EWS) may be limited or may expand in capability. What is common to both LGUs is the use of a monitoring system. The Performance Governance System (PGS)[4] used by Mandaue City for overall running of the different departments has helped develop good practice in many aspects of the city's services including city planning, DRRMO, and management information system. The city has been recognized with DILG's Seal of Good Housekeeping (2012) and Islands of Good Governance (IGG) seal by the NGO, Institute for Solidarity in Asia (2015).

Table 1. A comparison of urban and rural disaster risk reduction and management: Mandaue City and San Francisco, Cebu province

Urban (Mandaue City)	**Rural (San Francisco, Cebu)**
• 4 zones based on geography of hazard/exposure level • IT-supported Operations Center • EWS: radio, SMS in 4 four zones & 2 emergency sub-stations • Local DRRM Plan 2013-16 (budgets) -P310 million • Risk-sensitive Comprehensive Land Use Plan • Performance Governance System	• "Purok" system • Local Disaster Risk Reduction Management Office • EWS: radio, SMS per barangay; bamboo devices, & other indigenous ways • Comprehensive DRRM Plan, 2016-2020; Local DRRM fund- P5.2 M/year • CLUP 2012-2021; LCCAP (with Climate Change Commission) • LGSAT & HFA indicators (UNISDR)

Note: EWS-early warning system; CLUP-Comprehensive Land Use Plan; DRRM-Disaster Risk Reduction and Management; LGSAT-Local Government Self-Assessment Tool; HFA-Hyogo Framework for Action; UNISDR-UN International Strategy for Disaster Reduction.

San Francisco, in 2013, utilized the LGSAT, in order to be able to see the progress it has made in DRRM. Its "bottom-up approach" through the "purok" system has been recognized by the United Nations. It was awarded the Sasakawa Award for Disaster Reduction.

Case study: San Francisco, Cebu Province

San Francisco, a third class municipality of 15 barangays (in the Camotes Islands), has a population of 47,457 (2010). With an area of 10,597 hectares; its population density is 444 persons/sq km. The land used for agriculture is 80.7% of total land area. The major products: corn, rice, coconut, vegetables, pigs, chicken and cattle. Some farmers and fishermen are employed elsewhere or self-employed, according to the group interview held at the municipal hall[5]. There is also small-scale commercial and sustenance fishing in the island. All 12 coastal

[4]The PGS is "the local adaptation of the Balanced Scorecard developed in the U.S., a performance and management and measurement tool that translates organizational goals into breakthrough results using a set of performance indicators and indices." (Sarmiento to LGUs: Adopt the PGS, Oct. 26, 2015. Available at www.dilg.gov.ph)

[5]Group interview with San Francisco municipal officers, October 29, 2015.

barangays have implemented Marine Protected Areas while rich mangrove forests are found along four coastal barangays, including the Poblacion. Having white beaches in the island, eco-tourism is being promoted.

Type III climate prevails in the area where there is no distinct dry or wet season. The monsoon plays a big role in community life. Annually, a phenomenon that locals call "walo-walo" – 8 days of rain and high seas and 8 days of sunny days and calm sea happens during the southwest monsoon season. In the last few years, the 8 days have turned to as much as 14 days.

The municipality has maintained its programme called Two Million Trees for Green San Francisco as its environmental commitment, after receiving the cash prize of the 2011 award.

The "Purok" system which the former mayor Aly Arquillano started in 2004 is a sub-village self-organization, a micro-structure of the barangay unit; there are 7-8 puroks per barangay. Information dissemination and communication is facilitated by the purok coordinator. Purok coordinators manage about 21 to 30 puroks each. Purok leaders report to the barangay chairperson, and to the Mayor, through the purok coordinators.

The system came about with the intent to solve the solid waste management problem and the then perennial plastic found along the roads and vacant lots. Eventually, residents helped in maintaining the roads and drains, planting vegetable gardens, starting livelihood projects, and maintaining peace and order (now purok committees). It has become an avenue to educate residents and disseminate essential information, inculcate the value of volunteerism and nationalism. The cash prize of P20,000 for the winning purok in the beautification contest has become an incentive to strive to attain the criteria set by the municipal government. Purok residents may use the money to build up capital funds to serve as revolving funds which the members could borrow to start livelihood projects or use for emergency loans.

The "purok" system is a strength of San Francisco. It also serves as important resource that can be tapped for various concerns of communities. Table 2 shows a matrix of strengths/ resources, weaknesses, opportunities and challenges of San Francisco. One reality which works against development in the island is its vulnerability to extreme events or weather variability.

Disaster profile. Two disaster events previous to typhoon Yolanda were Typhoon Ruping (Tropical Storm Mike) in November 1990 and Typhoon Bising (Tropical Storm Nelson) in March 1982. On November 8, 2013 during typhoon Yolanda, the municipality achieved its zero casualty target. However, there were damages and losses: 7,415 damaged houses (70% of the total); damage to school buildings and supervised neighborhood play centers blown away; destroyed markets, health centers, and fishboats.

In January 2014, San Francisco experienced the longest weather disturbance in the island lasting 3 weeks. Tropical depression Agaton (Lingling) damaged houses made of light materials and uprooted some trees again. This also demonstrated how isolated the island can become. There was a shortage of food supplies, gasoline and other commodities as ferries could not operate. The economic impact on the life of fishermen, tourism industry and businessmen was also felt. The price of fish went up as well.

At the height of Typhoon Yolanda (Haiyan) at 0700-0900 Hrs. on November 8, 2013, San Francisco and the whole of Camotes Islands were under the Public Storm Signal Number 4. A municipal team was assembled to conduct Damage and Need Analysis (DANA), a rapid assessment for the 15 barangays, then followed by validation after 2 weeks. The total damage

was estimated at Php 163.75 M, of which houses, social services equipment and facilities (social cluster) comprised 64%; livelihood (agriculture, fisheries, livestock, businesses, tourism) accounted for 11.1%; and agriculture incurred Php 14.1 M worth of damages (or 8.6%). See Figure 3.

Recovery

Maximizing local resources in building back what was damaged and destroyed was the priority of the municipal government. Food packs and other resources were put together and a cash-for-work scheme was put in place to clean the debris. Cash donations were used for road and school repair and house construction for low-income families, and purchase of boats and agricultural kits for fishermen and farmers, respectively.

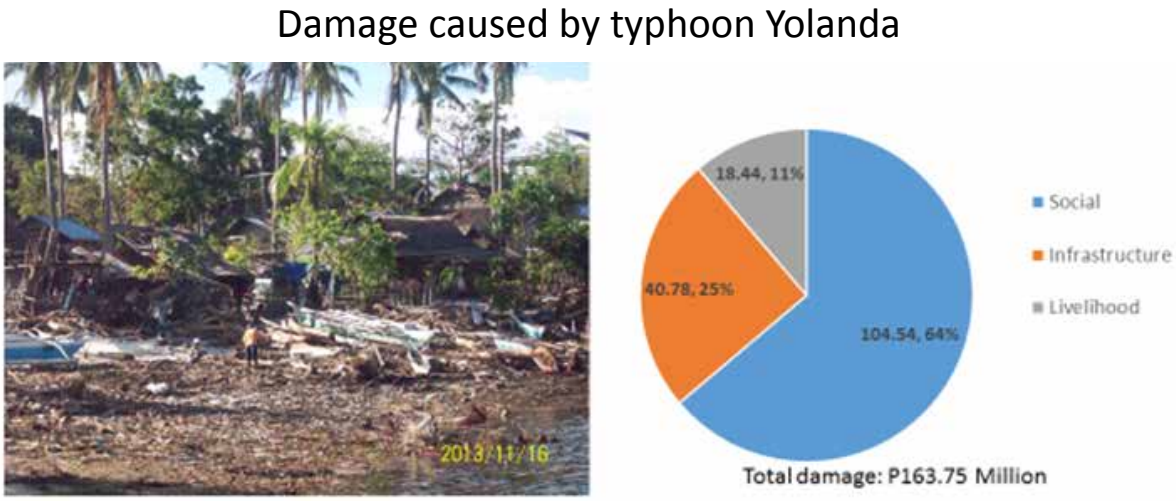

Figure 3. Estimated Damages by Typhoon Yolanda in San Francisco, Camotes Island, Cebu, Philippines

The Comprehensive Rehabilitation Plan that costs Php 425 M includes a storm surge evacuation center located in the higher ground of San Francisco at Barangay Montealegre, an all-weather port, emergency operation center, mobile hospital, solar power for the remote area and financial support for the relocation center.

Discussion

After the municipal government made its self-assessment using the LGSAT in 2013, some improvements were visible in the municipality. It was revealed in the interview that the assessment had been done as a measure to reduce risk after typhoon Yolanda. A visit to Purok Look in Barangay Esperanza where the purok officers and committee members were all women, showed evidence of the strong linkage between the residents and the LGU. The informal interview verified the processes and other information as well as provided insights on the governance structure that exists. One could better understand the "zero casualty" result during typhoon Yolanda as the purok residents retold their stories. It also revealed how health and education services are intertwined with the DRR efforts within the purok in the vaccination efforts and curriculum, respectively.

One result of the planning process of the local climate change adaptation plan (LCCAP) was the establishment of the "adopt-a-family" system. It is essentially making safe structures

Table 2. San Francisco, Cebu: Strengths, Weaknesses, Opportunities and Challenges

Strengths/Resources	Weaknesses (based on LGSAT)	Opportunities	Challenges
• "Purok" system • People's organizations federated at the municipal level: women, solo parents, senior citizens, PWDs (persons with disabilities), farmers, fisherfolk, BHWs (Barangay Health Workers) and Day Care workers • Local churches and faith denominations – strong support, easily mobilized • Cebu Technological University – active in community development and research programs • DepEd for programs in health, water, sanitation and hygiene, DRRM and environment • Partnerships with PLAN international in the past – helped jumpstart some community development programs • The Two Million Trees for Green San Francisco & scholarship program	• Budget & incentives: Low availability of financial services and options (e.g. saving and credit schemes, macro and micro-insurance; micro finance, cash aid, soft loans, loan guarantees etc.) • Little or no partnership with or support efforts of local businesses, small enterprises for business continuity during and after disasters • Few or no measures to protect critical public facilities and infrastructure from damage during disasters • Special programs to regularly assess schools, hospitals and health facilities for maintenance, compliance with building codes, general safety, weather-related risks etc.	• Support for Mainstreaming DRR and CCA: Cebu Province Local Government Development of DRR and CCA and Contingency Planning of 51 LGUs (Phase 1)	• MRF and recycling programs of LGU must cope with the growing population and local context • Erratic rainfall causes confusion and havoc on the local agricultural crop industry, especially in rainfed farms • Problems with water quality and quantity, especially during times of drought • Danger of isolation from mainland Cebu (typhoon season); need for food and water security/stockpiling • Floods and landslides, especially to low-lying areas

Note: The "Weakness" column is based on the lowest LGSAT score of 1 (5 is the best score).

(houses) to serve as evacuation centers; a list of persons per designated evacuation center had been prepared and was therefore followed in the actual evacuation. This had been done during typhoon Yolanda. Residents are also familiar with storm surge as they themselves were participants to a drill done during the LCCAP process.

The Comprehensive Land Use Plan has identified a resettlement area, which is among the critical requirements of a small island like where San Francisco is located. The coastal areas were populated by some informal settlers who had nowhere to go. Sea level rise is another real threat in terms of climate change impact such that preparation for such eventuality is sound.

Strategies.

The factors for success in San Francisco have been mentioned in a few places in the paper. In addition, the list of strategies below show what were working for making San Francisco a safer and resilient place in terms of climate change impacts.

(a) Conduct of regular training and drills (since 2010)
(b) Climate change incorporated into the local school curriculum
(c) Knowledge Management– information is collected, disseminated and used, so that people are aware of impending events and what to do
(d) MDRRMO maximized to become the CCA-DRRM Council
(e) Partnering with the local university to conduct needed research
(f) Agencies lead the implementation of activities/ projects, with monitoring and oversight by the CCA-DRRM Council
(g) Maximizing the Cebu Province Rehabilitation, Recovery and Development Plan for programs and services

Figure 4a. Author in front of purok office, with all-women purok leaders of Purok Look, Barangay Esperanza

Figure 4b. Author with San Francisco DRRMO personnel and purok coordinator

Lessons Learned.

For other LGUs, the following lessons are essential for replication.

(a) Unity of officials speeds up the process.
(b) Empowered local communities facilitates roll-out/coordination of government services and programs/orderly
(c) Associations and organizations should be tapped to respond to disaster and rescue needs
(d) Participatory vulnerability and capacity assessment helped

Conclusion

Challenges remain even as predominantly rural municipalities like San Francisco face unlike urban risks. Barangay to barangay distances can be a constraint for many aspects of managing a municipality but through the puroks, a 'decentralized' system functions but with able guidance from the municipal hall. The system started with the environment (solid waste management, tree-planting) as an effective entry point for local governance. This fact has significance to climate concerns, which can be better explained to citizens as climate change links with disaster risk.

Preparedness is strongly linked to local risk governance. Preparedness is built on an empowering environment with decentralized participation supported by strong guidance and information dissemination from the local institutions.

Through the case study, it has been shown that the governance structure for DRRM in the Philippines can work. LCCAP and NDRRMP can work for the LGU's benefit. Indicators help in capacity assessment as input to planning.

San Francisco as an island municipality has other intrinsic vulnerability. It needs to pay attention to economic resilience of farming/fisheries/livestock (rural) sector; overcome the threat of isolation during prolonged bad weather; and increase social protection measures including finance options especially for puroks where the purok organization is particularly internally weak. These are key issues for future sustainability.

It was shown that rural communities can achieve resilience through strong guidance and communication from an accountable local authority, a sign of sound risk governance.

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Mangrove Communities and Disaster Risk Reduction: Cases in Vietnam

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Abstract

Mangrove forest belts have a very important role on reducing the impacts of natural disasters in the coastal areas. However, in the last three decades, under the pressures of increasing population and man-made disasters, there have been many losses and degradation of mangrove forest belts in Vietnam. As a result, the seashore erosion and human damage are expected to increase due to climate related extreme weather, e.g., tropical storms, high sea waves and strong whirlwind. In order to build the natural disaster resilience and adaptive capacity for coastal communities, mangrove wetland ecosystems development is considered as a long term cost-effective strategy for poverty reduction and biodiversity conservation in Vietnam. This paper reviews and evaluates the mangrove reforestation approach, implementation and management in Vietnam as a case study.

Key words: Climate change, disaster risk, mangrove reforestation, resilience. Vietnam coasts

Background

In the tropics and subtropics intertidal shorelines, mangrove forests that exist and adapt in high coastal areas vary. There are approximately 80 species of mangrove trees in the world (Dugan and Bellamy, 1993). The global mangrove area was estimated at about 15.2 million hectares, with the largest areas found in 124 countries in Asia and Africa, followed by Northand Central America (FAO, 2007) (Figure 1).

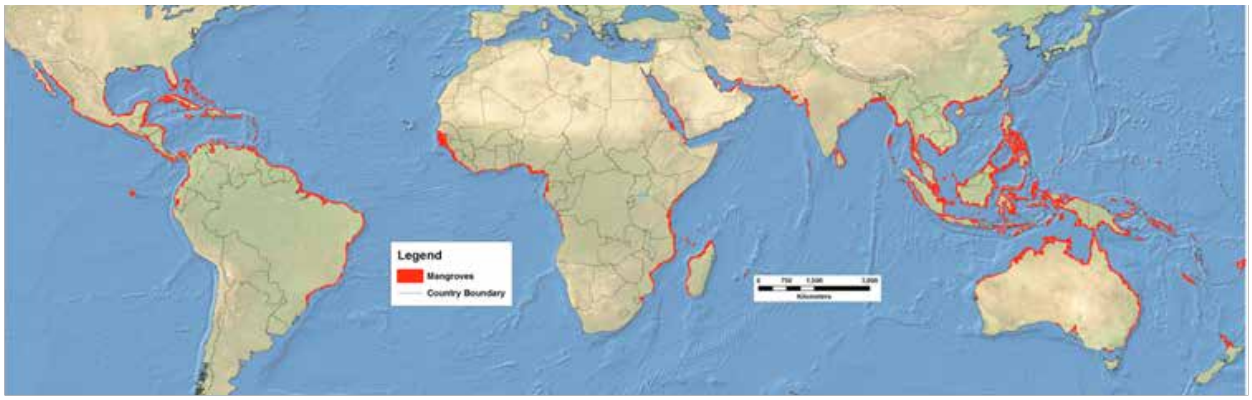

Figure 1. Global mangrove forests distribution – 2000 (Giri et. al., 2011)
(Map redrawn byUNEP/DEW, http://na.unep.net/geas/articleimages/Aug-13-figure-1.png)

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In tropical areas, the red mangrove tree (Rhizophora mangle) dominates mainly in mangrove swamp (Greene, 2004). Mangroves are soil salinity and sea tidal waves-tolerant trees. Their densely spreading and entangled prop roots serve as vertical anchor pillars for standing in waves and tides. Mangrove trees can grow along sheltered coastlines, shallow-water lagoons, estuaries and river-mouth mudflats where current coastal flows allow fine sediments to accumulate and build up the muddy bottom. Mangroves have the ability to survive in low-oxygen (hypoxic) conditions of waterlogged mud. Mangrove forests play a vital role in coastline protection, mitigation of wave and storm impacts and mudflat stabilization, and protection of near-shore water quality (Tran Quang Bao, 2011). Growing in depositional coastal environments with high organic soil content, mangrove forests provide important habitat for a wide range of aqua-animals and wildlife species, throughout their life cycles. Mangrove belts are also outstanding ecosystems in well-protected areas from high-energy wave action, tropical low pressures and storms. The estimated value of benefits that mangroves provide humans is huge, equivalent to about $9,990 per hectare, or $1.648 trillion in total (Costanza et al., 1997). Nagelkerken (2008) stated that mangroves could provide almost 30 million tons of commercial fish annually. In 2008, the global annual wild fish catch was estimated by FAO at 89.7 million tons. Mangroves are recognized for their important role during extreme weather conditions. They also provide an important bulkhead against climate change (Cornforth et al., 2013). Many researches have proven that mangrove forests can generally decrease the strength of sea waves going towards the seashores (Kathiresan and Rajendran, 2005; Asano, 2008, Yanagisawa et al., 2009; Bao, 2011; Ohira et al., 2012) (Figure 2). Mangrove forests can significantly reduce the flow of tsunami waves for at least 100 meters in width (Alongi, 2008). However, the rate of wave reduction depends on the age of trees, species, vegetation density, incoming wave height, the thickness of the forest, and mangrove forests structures (Muliddin et al., 2014), as illustrated in Figure 1. Mangrove forests are really powerful "blue carbon sinks" storages that help in climate change mitigation, thus reducing negative impacts. Although mangroves occupy only 0.5% of the global coastal area, they contribute 10-15% (24 Tg C/year) to coastal sediment carbon storage and export 10-11% of the particulate terrestrial carbon to the ocean (Alongi, 2014).

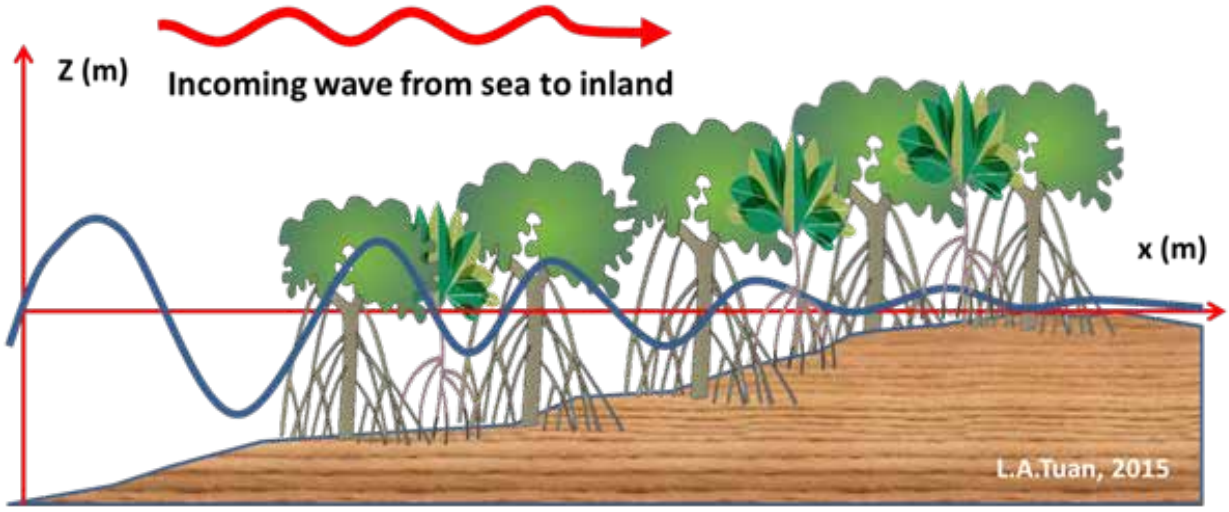

Figure 2. Illustration of sea waves reduction when passing through a mangrove forest.

There are many evidences that show mangroves in the world have dramatically decreased with respect to short-term economic interests, especially during the last three decades. Historically, mangroves were chopped down for wood and charcoal. This has been expanded to cater to shrimp and fish farming, agriculture, salt and rice production within mangrove areas. Finally, mangrove areas were converted for purposes of urban development (Susan, 2002; FAO, 2007). In global scale, mangroves are disappearing at an average rate of 1 to 2% per year (Duke 2007). Spalding et al. (2010) estimated that the world has lost approximately one quarter of its original mangrove cover. For the period 2000-2012, the estimated rate of tropical forest loss from deforestation was increasing by 200,000 hectares per year (Kim et al., 2015). There is an urgent need to recover mangrove communities in order to mitigate natural disasters and the negative effects of climate change. Increasing severe tropical storms and rising sea levels threaten lives, property and livelihoods.

Status of Mangrove Forests in Vietnam

Vietnam has a long coastline, 3,260 km extending from the North to the South, facing the East Sea and the Pacific Ocean. The coastal mangrove forests and wetlands are found in 29 provinces and cities distributed from the northeast to the southwest coast. These are in the five coastal provinces of Red River delta (Quang Ninh, Hai Phong, Thai Binh, Nam Dinh and Ninh Binh), in the 14 coastal provinces in the Central of Vietnam from Thanh Hoa to Binh Thuan and in the 10 provinces of the East and West coasts of South of Vietnam (Ba Ria – Vung Tau, Dong Nai, Ho Chi Minh City, Ben Tre, Tien Giang, Tra Vinh, Soc Trang, Bac Lieu, Ca Mau and Kien Giang). Two main flat coastal lowlands of Vietnam, i.e. the Red River Delta and the Mekong River Delta, have high potential development for mangrove forests. Ca Mau Peninsula, located in the most southern part of the Vietnamese Mekong River Delta, is considered as the largest mangrove forest community of Vietnam. The largest mangrove cover is found in South Vietnam, the location of the Dong Nai River and Mekong River estuaries (McNally et. al., 2011).

In 1943, Maurand reported that the total mangrove area in Vietnam was 408,500 hectares, of which 329,000 hectares were developed in the south. During the Vietnam War from 1962 to 1975, mangrove forest areas were destroyed mostly by herbicides spraying

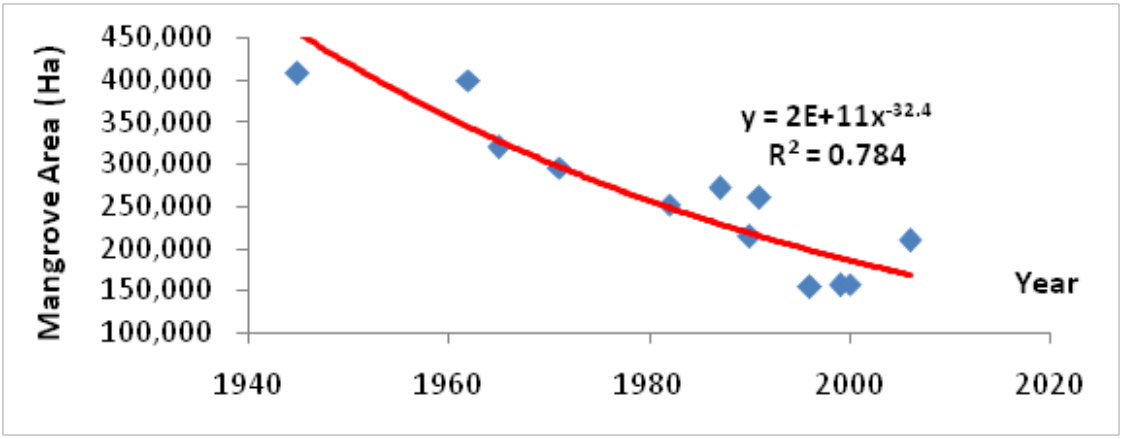

Figure 2: Trends of mangrove forests reduction in Vietnam
(Graphic developed due to the combined data of Hong 1993; FAO, 2005; FIPI, 2010)

and napalm bombs. After 1975, the still-intact mangrove forests decreased largely due to changes in land-use, e. g., expanding shrimp cultivation areas. From 1990 to 2000, nearly 30% mangrove forests in Vietnam were cut. As a result, mangrove destruction for purposes of shrimp farming has seriously caused coastal erosion, salt intrusion and reduction in aquatic biodiversity. Recognizing the losses from significant mangrove deforestation; there are many efforts to reforest and manage existing mangrove forests. Thus, the area of mangrove in Vietnam increased to 209,000 hectares in 2006 (Figure 2).

There is not much available scientific documentation in the number of species of mangrove and mangrove-associated trees in Vietnam. Differences in methodologies, classifications, mapping scales, etc. may have led to discrepancies in Vietnam mangrove data estimations (FAO, 2005). According to Phan Nguyen Hong and Hoang Thi San (1993), there are 69 mangrove species found in the South of Vietnam and 34 species in the North. Southern Vietnam has higher mangrove biodiversity than Northern Vietnam, possibly due to the higher temperatures and better silt-clay soil topography in the South than in the North. The main mangrove species in the Camau Peninsula are Rhizophora apiculata (syn R. conjugata), Bruguiera gymnorrhiza, Ceriops decandra (syn C. roxburghiana) and Lumnitzera littorea (syn L. coccinea) (FAO, 2005). The mangrove communities, from sea to inland, mainly have the following species: the Avicennia, pioneer trees in tidal mudflats; the Rhizophoraceae, mangrove supporting stable alluvial soil; and the Sonneratia, Nypa and other species, mixing together as terrestrial trees in inland (Figure 3). In the Mekong River Delta, the main mangrove species are: Sonneratia caseolaris (Bần chua); Avicennia alba (M61m trắng); Avicennia marina (Mấm biển); Rhirophora apiculate (Đước); Rhirophora mucronata (Đưng); Bruguiera parviflora (Vẹt tách); Bruguiera cylindrical (Vẹt trụ); Ceriop decandra (Dà); Lumnitzera racemose (Cóc vàng); Xylocarpus granatum (Xu ổi); Nypa frutican (Dừa nước); and Threspecia populnea (Tra).

Under the Law on Protection and Development of Forests of Vietnam (Law No. 29/2004/QH11), mangrove forests are classified into three types, based on their main environmental protection uses: (i) Protection forests (rừng phòng hộ), (ii) Special-use forests (rừng đặc dụng) and (iii) Production forests (rừng sản xuất).

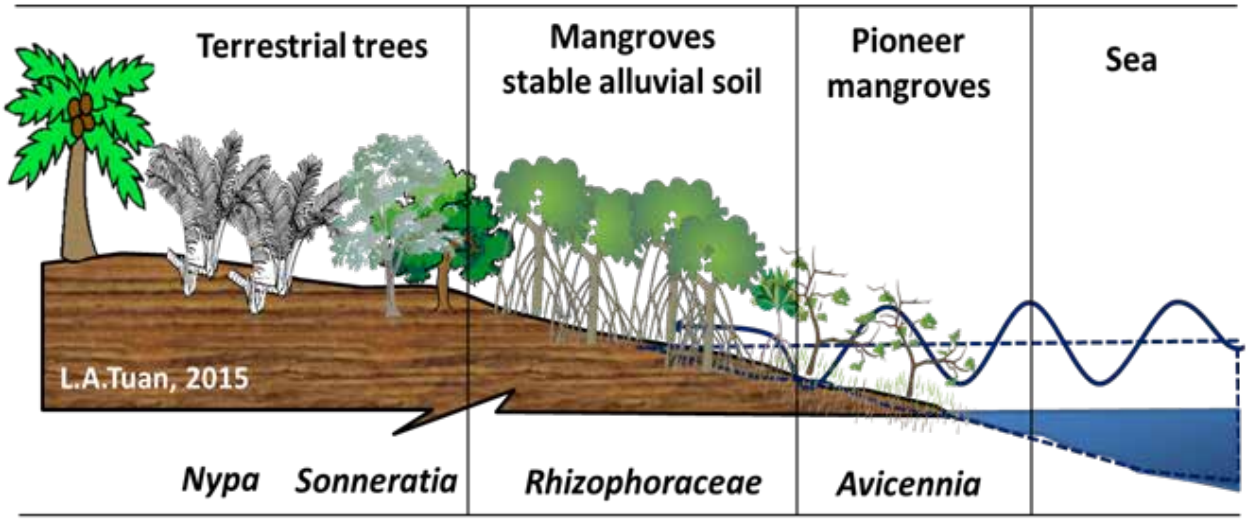

Figure 3: Illustration of typical mangrove communities along the coastal areas of Mekong River Delta, Vietnam

- Protection forests are mainly used to protect water sources and land, prevent erosion and desertification, regulate climate and mitigate natural calamities.
- Special-use forests are mainly used to conserve nature, specimens of the national forest ecosystems and forest biological gene sources; to do scientific research; to protect historical and cultural relics as well as landscapes; and to cater to recreation and tourism services.
- Production forests are used mainly to produce and trade timber and non-timber forest products.

In addition to the above, Article 3.1 of the Forest Law states that forests include both planted forest (rừng trồng) and natural forest (rừng tự nhiên). Table 1 provides the mangrove forest areas in Vietnam following the three types of forest classification. Table 2 gives an inventory of mangrove forests data along the Mekong River Delta of Vietnam.

Table 1. Area Distribution of Mangrove Forests in Vietnam according to Major Uses (2008)

Location	Total (has.)	Forest classification (has.)		
		Protection	Special-use	Production
Nationwide	323,712	153,294	41,666	78,835
With mangrove forest	209,741	115,950	28,311	65,480
Without mangrove forest	113,971	37,344	13,355	13,355
Quang Ninh & Red River delta	88,340	43,776	8,589	35,975
With mangrove forest	37,651	30,928	4,489	2,234
Without mangrove forest	50,689	12,848	4,100	33,741
North of Central Vietnam	7,238	4,420	-	2,817
With mangrove forest	1,885	1,340	-	544
Without mangrove forest	5,353	3,080		2,273
South of Central Vietnam	743	-	-	743
With mangrove forest	2	-	-	2
Without mangrove forest	741	-	-	741
South Eastern	61,110	41,511	900	18,699
With mangrove forest	41,666	38,468	16	3,182
Without mangrove forest	19,444	3,043	884	15,517
Mekong Delta	166,282	63,587	32,177	70,518
With mangrove forest	128,537	45,213	23,806	59,518
Without mangrove forest	37,745	18,374	8,371	11,000

In 1998, the Vietnam National Assembly (Prime Ministry, 1998) approved the "National Program to Rehabilitate and Develop 5 Million Hectares of Forests", better known as the 5 Million Hectare Reforestation Program (5MHRP). This Program was made official through Decision No. 881/QD/TTg, signed by the Prime Minister of Vietnam. The overall target of 5MHRP is that the total forest area of the country increase to 14 million hectares by 2010. That is a 43% increase in the nationwide forest cover of the country. One million hectares of forest in 5MHRP have been planted in coastal watersheds, creating wind break walls, fixing sand dunes and protecting coastal dikes. However, the implementation of the program did

Table 2. Area Distribution of Mangrove Forests in Delta Mekong Provinces (2010)

Province	Protection Forest in Has.		Special-Use Forest in Has.		Production Forest in Has.		Total Hectares		Overall Total Area (in Has.)
	Natural	Planted	Natural	Planted	Natural	Planted	Natural	Planted	
Long An		65					-	65	65
Tien Giang		1,358					-	1,358	1,358
Ben Tre	343	1,469	145	1,885	13	347	502	3,700	4,202
Tra Vinh	821	3,479					821	3,479	4,300
Soc Trang	1,759	4,885					1,759	4,885	6,644
Bac Lieu	1,599	1,014					1,599	1,014	2,613
Ca Mau	3,976	21,066	3,879	5,391	155	18,458	8,009	44,914	52,923
Kien Giang	805	3,042					805	3,042	3,847
Total Area	9,304	36,377	4,024	7,275	168	18,804	13,496	62,456	75,952
Percentage	12%	48%	5%	10%	0%	25%	18%	82%	100%

(Source: MONRE & GIZ, 2012)

not reach its objective. For the period 1998-2005, the total of new plantation forest area was only 70% of the target, and afforestation of industrial plantations achieved only 49% of the target (Prime Minister, 2007). Since year 2000 to the present, many laws and regulations that are related to forest rehabilitation, protection and management have been approved by the Vietnam National Assembly. The Forest Protection and Development Law (Decision 29/2004/QH11, dated 3 December 2004) regulates protection and management of forests and wild species. This Law focuses on varying forest management rights and responsibilities in Vietnam. It recognised distinct categories of forest ownership in allocating forest land use rights to communities, as well as to individual households.

Between 1991 and 2002, eight coastal provinces, i.e., Quang Ninh, Hai Phong, Ninh Binh, Thanh Hoa, Nghe An, Ha Tinh, Thai Binh and Nam Dinh, received various foreign NGO support for rehabilitating 14,000 hectares of mangrove. In addition, some mangrove nature reserves (i.e., Tien Hai Nature Reserve, the Thanh Phu 2 Nature Reserve and the Bac Lieu Sanctuary) and two national parks (i.e. , Xuan Thuy National Park and the Ca Mau National Park) have been supported by mangrove management. In the period of 2004 – 2007, thanks to the World Bank Coastal Wetlands Protection and Development Programme, about 4,662 hectares of mangrove and an additional 1,214 hectares of scattered trees in the southern Mekong Delta provinces have been planted. Experiences from Thai Binh and Nam Dinh provinces in 1996 and 1997 proved that mangroves planted by the Red Cross initially for environmental reasons constituted a good green wall to protect sea dykes against typhoon waves. This means no flooding of agriculture fields or settlements. Fishing boats can use mangroves as shelter during typhoons. The number of deaths fell. In 2003, two typhoons struck Northern Vietnam in July and August but only four people died, no rice fields were flooded and the impact of the typhoon rapidly weakened.

Vietnam expects to develop an additional 100,000 hectares of mangrove forest in the 2010's in order to recover the mangrove losses in the past. In January 2010, Vietnam became

a full member of the Mangrove for the Future (MFF) Initiative and has been receiving support for mangrove planting and restoration activities. The MFF is implemented by the multi-stakeholder National Coordinating Body (NCB). This includes representatives from the Central Government (the Ministry of Natural Resources and Environment, Ministry of Agriculture and Rural Development), the Hanoi National University of Education, the local National Non-Government Organisations (e. g., the Center for Resources and Environment Study, Centre for Marinelife Conservation and Community Development, and others), the international Non-Government Organisations (World Wild Fund, CARE), and international organizations (UNDP, FAO, and IUCN). MFF's priorities in Vietnam are community resilience, adaptive management and knowledge sharing, with mangroves prioritized in the broader context of Integrated Coastal Management.

The concept of forest ownership and management rights has been introduced and applied in Vietnam through long-term leases or management agreements (FAO, 2010). This means that forest management rights and responsibilities are transferred from public administration at the national level to local communities (including indigenous and tribal communities). In the community-managed mangrove forests of Da Loc Commune, Thanh Hoa province, the strengthening and diversification of livelihoods through aquaculture using mangroves has provided considerable new income (RECOFTC, 2012: Sen et al., 2012). See Box 1.

Another project, namely: the Integrated Coastal Management Programme (ICMP), began to be carried out in the Vietnamese Mekong River Delta for the period of 2011 – 2017. The ICMP project was commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ) and supported by the Australian Government's Department of Foreign Affairs and Trade (DFAT) as a Co-Financier. There are three approaches in this project: (i) Implementing the rehabilitation of mangrove forests and using the mangrove ecosystem to protect the coast; (ii) Supporting the local coastal farmers in coping with and adapting to disaster risks and climate change impacts and (iii) Promoting cooperation across borders for coastal protection and climate-resilient development. (see Box 2).

Box 1: Maintaining mangroves for their disaster protective function in Da Loc

Starting in 1989, the Japanese Red Cross, Save the Children and Vietnam government collaborated in planting 350 hectares of mangrove seedlings in offshore area bordering Da Loc. The mangrove plants selected are Kandelia candel (cây Trang) and Sonneratia sp. (cây Bần). Only 15-20% of the tree planting survived within a year of planting.

In 2005, Typhoon Damrey inflicted serious damage on Da Loc. The sea dyke failed to protect the commune except where mangroves remained to buffer the storm. In these sheltered areas, agricultural land suffered less seawater intrusion, whereas elsewhere sea water swept several kilometers inland, destroying settlements and livestock, and taking human lives. The long term impacts on agriculture and freshwater supplies are still felt.

(Source: Sen et al., 2012)

Lessons Learnt on Mangrove Communities

Under the impacts of regional natural disaster risks and global climate change phenomena as well as land use change activities, Vietnam in general and the Mekong River Delta, in particular, are facing many challenges and difficulties at present and in the future, as increasing higher temperatures, abnormal rainfall, tropical storms, sea level rise, salinity intrusion and varying water flow regimes. The mangrove forests along the coast are in dramatic decline. One of the non-structure solutions as a key approach for disaster risk reduction and climate change mitigation is to increase forests and vegetable cover areas, including coastal mangrove replantation and sustainable forest management. It is found that the development of a mangrove community able to manage the coastal Delta ecosystems in a manner that is resilient to climate change is possible.

Box 2: Selected impacts of ICMP in Phase I (2011 – 2014)

- Along 99% of the coastline of Soc Trang and Bac Lieu, the coastal dyke is no longer directly affected by waves.
- More than 600 hectares of mangrove forests have been rehabilitated.
- Some 22 new livelihood models have been introduced in 8,500 households. These models reduce environmental pressure and can raise incomes by up to 60%.
- Two policy packages have been devised on forest management and irrigation management, which are expected to benefit 8.7 million people.

(Source: GIZ, 2014)

Recognizing the importance of mangrove forests in coastal ecosystem and their roles as natural tropical storm barricades, the Vietnamese government has enforced many national programs for forest restoration and development during the last four decades. Coastal forest rehabilitation and wetlands conservation from the North to the South of the country has had some achievements over the past 20 years. Since the 1990s, the Government of Viet Nam has been allocating land use rights over almost 9 million hectares of state forest land to households, communities, and economic entities. In this way, the Government seeks to involve local people in protecting forests, developing plantations and improving living standards (To Xuan Phuc et al., 2013).

However, there were challenges and barriers for the large scale inland forest plantations and coastal mangrove wetlands rehabilitation of Central Government, such as Programme 327 (aimed at "re-greening the barren hills" with the national budget at approximately US$273 million), or 5MHRP. The total planted forest area did not reach their expected targets. All projects were managed as a top down bureaucratic approach. Objectives and procedures were unclear to the poor community members, especially to the vulnerable minority groups. There was a lack of benefit-sharing mechanisms; the project was simply imposed on poor households without considering fully their needs and livelihoods. In coastal areas, shrimp farming for export was encouraged by local governments, leading to mangrove destruction. In some cases, due to the change of local leaders, some contracts and commitments about mangrove protection between NGOs and local authorities have been violated.

Summary and Conclusion

In the case of Vietnam, there are many laws and regulations on the protection of the forests and mangroves, and its forest restoration policy is headed in the right direction. However, it is a pity that legal enforcement and implementation seem lax. Although mangrove forests do not guarantee to provide a higher income for local people when compared to the potential of shrimp harvesting incomes, in the long term sustainable development approaches; i.e., mangrove forests, may mitigate significantly the negative impacts of climate change and other natural disaster risks such as bigger storm surges.

There is a need to establish a clear framework of participatory decision-making processes, including building benefit-sharing mechanisms acceptable to communities. Parallels, upgrading awareness and capacity knowledge for the poor/minority people in communities and control of all the commitments and regulations on mangrove forest conservation and protection should be put in place soonest.

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Agritourism as a climate change adaptation strategy: Challenges and Success Factors

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Abstract

Climate change points to disruptions in the livelihoods of Philippine farmers. The diversity of landscapes supporting rural livelihoods in the Philippines supports the proposition that agritourism could be conceptualized as a climate change adaptation strategy capable of supplementing agricultural incomes and sustaining rural livelihoods. A review of current research and secondary data revealed the challenges of Philippine farmers and the factors determining success of Philippine agritourism farms. Previous research has identified the attributes that could enable or constrain agritourism development at five intervention scales: production, livelihood, community/watershed, landscape/ecosystem, and government. By assessing the climate and socio-economic drivers and dynamics of change, and the local assets enabling agency in rural communities, agritourism can be a short-term strategy to increase households' revenues, reduce risks associated with agricultural production, and decrease the depletion of natural resources (soils, water, biodiversity) for the long-term sustainability of Philippine agriculture-based livelihoods.

Key words: Philippine agritourism, farm tourism, climate change adaptation strategy

Introduction

With its mountainous, archipelagic landscape, 41.6% of the Philippines' land area is considered arable and is used basically for agricultural purposes (World Bank, 2014). The agriculture industry sector, composed of the four (4) sub-sectors: farming, fisheries, livestock and forestry, accounts for more or less 11% of the country's GDP. The Philippines has been considered primarily an agricultural country. However, Habito and Briones (2015) believed that the Philippines cannot be considered anymore as an agricultural economy since its agriculture-derived GDP growth has become stagnant at an average of 1.7% since the 80's from an overall 2.3% GDP average. Way back in 1946, this sector contributed about 30% to GDP but has slowly declined over the years due to government weaknesses, limited access to financing and technology and extreme weather conditions (Habito and Briones, 2015). Unfortunately, the failure to modernize and diversify the agricultural sector made this industry's contribution unsubstantial, if not minimal. Compared to the manufacturing and service sectors, growth and labor productivity in the agricultural sector has been the lowest (World Bank, 2013). The country's unsuccessful agricultural development and modernization is tied with the incomplete agrarian reform programs that have yet to be fully implemented from the time it was enacted in the 1930s. Inadequate funding for proper research and development for climate-resilient crops and the lack of ample government support for farmers and small landowners made the sector vulnerable to calamities and disasters.

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The Philippine Development Plan 2010-2016 looks at three broad strategies towards the agriculture sectors: (1) increase the productivity of the agricultural and fisheries sectors; (2) develop forward linkages in the manufacturing and services industry; and (3) increase resilience from climate change-related risks. The tourism industry, one of the services industries, is also a recognized socioeconomic driver. In 2012, it contributed a total of 6% to the country's GDP (NSCB, 2013) with an average 5.9% GDP contribution for the period 2000-2012. Employment in tourism industry was estimated at 4.2 million in 2012. This accounts for an 11.3% industry employment share for the Philippines (NSCB, 2013). With the Department of Tourism and Tourism Promotions Board's aggressive efforts at marketing the Philippines locally and internationally, the recorded earnings generated from tourism activities in the first five months of 2015 grew 2.74%, aggregating to Php 93.91 billion from the Php 91.40 billion recorded last year (DOT, 2015). But while tourism has contributed significantly to the Philippine economy, its environmental and social impacts have to be taken into consideration as well. Tourism is seen as a force that when managed responsibly can empower communities and harness better lives for its locals. Poorly planned and operated, it can be detrimental to the country's natural, social, historical and cultural resources, which by and in themselves are the reasons for its tourism advantage.

Agriculture and tourism are the "two most dynamic industries in the Philippines" (Icamina, 2012). Both industries are generators of employment in the Philippines (Cayabyab, 2013) and have the capability to benefit all regions and provinces of the country (Marcos Jr., 2009). However, the investments and developments to these industries lag far behind as compared to its neighboring Asian Countries (The Kano, 2011; Cayabyab, 2013). Agriculture and tourism have been seen to be a "perfect tandem" which will complement each other, as agriculture can be packaged as a "tourism product" and be developed with the help of tourism (Lesaca, 2012).

In an attempt to understand the dynamics of the agriculture and tourism, this paper explores the historical development of this niche tourism product in the Philippines and identifies the challenges and success factors in its development as an adaptation strategy for climate change. To accomplish the objectives of this paper, documentary and archival research was performed. The paper is organized as follows: first, a general overview of agritourism is presented, followed by a discussion on the historical development of agritourism in the Philippines. Subsequently, the success factors and challenges encountered by Philippine farmers in developing agritourism are presented.

What is Agritourism?

Agritourism is a combination of tourism and agriculture industries (Freznosa, 2012). It is defined as "a commercial enterprise at a working farm, ranch or agricultural plant conducted for the enjoyment of the visitors that generates supplemental income for the owner" (UC Small Farms Program, 2005). In the Philippines, the Department of Tourism (DOT) defined agritourism as "a form of tourism activity conducted in a rural farm area which may include tending to farm animals, planting, harvesting and processing of farm products. It covers attractions, activities, services and amenities as well as other resources of the area to promote an appreciation of the local culture, heritage and traditions through personal contact with the local people."

Agritourism is also defined to be a "subset of a larger industry called rural tourism

(Bernardo, Leatherman, & Valentin, n.d.), in which it encompasses exposure to and contact with local residents, customs, culture, way of life and activities in the surroundings (Wolfe & Bullen, n.d). Agritourism is considered as "an activity, enterprise or business that combines primary elements and characteristics of agriculture and tourism and provided an experience for visitors that stimulates economic activity and impacts both farm and community income" (Wolfe& Bullen, n.d). It is synonymous and used interchangeably with "agricultural tourism, agri-tainment, agro-tourism, farm tourism, farm visits" (Rich, Barbieri, & Arroyo, n.d).

Origin of Agritourism

The concept of agritourism is believed to have taken root in Europe and in the selected segments of the United States such as the West and upper Midwest (Chesnutt, 2013). Europe has long had concept of farm stays where travellers stay on a working farm for a holiday or vacation. In Italy, agritourism began in 1965 but the official farm land was built in 1973. Like many other countries, it also faced several challenges like having a small amount of arable lands, high density population and high cost of liability and labor. To address these challenges, European Union developed a policy in which they give incentives for producers who participate in agritourism. The overall effect brought a gradual change that it encouraged farmers to produce and market agricultural products (Clemens, n.d). The success of agritourism in Italy is primarily due to the strong support provided by the government in the form of tax breaks, grant funding, dedicated staff that help to promote and raise awareness of the sector (Melville, 2014).

On the other hand, agritourism has flourished in the US during the late 19th century and it continues to be on the rise around the country. The U.S.D.A.'s census of agriculture, which is conducted every five years, estimated that 23,000 farms offered agritourism activities in 2007 (Neuman, 2011).

Neuman (2011) explains that the agritourism movement is fueled by city dwellers who want to understand where their food comes from or who feel an urge to embrace the country life. Evident to the success of agritourism development in United States is the aggressive action of the members of the community to diversify their farms into agritourism.

Agritourism in the Philippines

The agritourism concept in the Philippines emerged in the 1990s but was not yet institutionally defined (Spire, 2013). In 1991, Department of Tourism (DOT) and the United Nations Development Program (UNDP) formulated the Philippine Tourism Master Plan (TMP) which aimed to develop tourism on an environmentally sustainable basis (Spire, 2013). But it took a long time to follow-up this plan and to put it into action.

DOT defined agritourism as a "form of tourism activity conducted in a rural farm area which may include tending to farm animals, planting, harvesting and processing of farm products. It covers attractions, activities, services and amenities as well as the other resources of the area to promote an appreciation of the local culture, heritage and traditions through personal contact with the local people" (DOT, 1987). Agritourism was formally introduced in the Philippines by the Department of Tourism (DOT) and the United Nations Development Program (UNDP) through the 1991 Philippine Tourism Masterplan (Austria & Horigue, 2014). Agritourism sites were initially identified and recognized by both the Department of Agriculture (DA) and DOT in 1999. Both national organizations envisioned a collaborative industry that

would cascade the benefits derived from tourism to the agricultural sector in the rural areas. An agritourism program conceptualized and formed through the collaboration of DOT, DA and the University of the Philippines Asian Institute of Tourism (2002) was launched in the latter part of 2002 to make the country a premier agritourism destination in Asia.

In 2002, the Department of Agriculture (DAR) and DOT worked with the UP Asian Institute of Tourism on a manual that identified agritourism sites in the country (SEARCA, 2011). Initial agritourism sites in the Philippines such as C & B Orchid Farm in San Rafael, Bulacan, Sonya's Secret Garden in Alfonso, Cavite, Oroverde in Guimaras, and Del Monte Plantation in Manolo Fortich, Bukidnon were identified. In recent years, more agritourism sites have been developed including Bohol Bee Farm in Dauis, Bohol, Dragon Fruit Farm in Burgos, Ilocos Norte and The Farm at San Benito, Batangas (SEARCA, 2011).

State universities and colleges (SUCs) in the Philippines have long realized the potential of agritourism as a means to promote agriculture technologies and innovations, as well as, agribusiness opportunities. The College of Agriculture (CA) at the University of the Philippines Los Banos (UPLB), has launched the CA Agritourism Program to integrate and coordinate agritourism-related resources and activities of the College of Agriculture with other units of UPLB and other service providers to contribute in promoting technology commercialization, enterprise development, and entrepreneurship in Philippine agriculture. Benguet State University (BSU) also saw the opportunity to venture into agritourism and was challenged to develop a culture-based agritourism program to introduce the Cordilleras' rich culture to its visitors. With that, BSU was able to showcase Benguet as the Salad Bowl of the Philippines, the strawberry fields of La Trinidad, the thriving cutflower industry in the region and the pioneer Arabica coffee project under the pine trees (Lesaca, 2012).

Currently, there are thirty--two (32) agritourism sites established across the archipelago. Seven (7) of these are in protected areas. Some of these are the strawberry and organic vegetable farms in Benguet and the pineapple plantation farms in Bukidnon, among others. Other agritourism enterprise--destinations are in Ilocos Norte, Batangas, Laguna, Cavite, Palawan, Albay, Bohol, Iloilo, and Davao del Sur.

Success Factors of Agritourism

Gopal, Varma and Gopinathan (2008) identified three factors to be considered for the agritourism to succeed. 1) Attraction – it is something to see: animals, birds, farms, culture of the village, dress and festivals; 2) Activity – it is something to do: participating in agricultural operations, riding camel, buffalo, cooking and participating in rural games; and 3) Product – it is something to buy: rural crafts, dress materials, farm gate fresh processed food. Additionally, professional trainings of farmers for agritourism (Zoto, Qirici,& Polena, 2013) are also crucial to agritourism's success. Trainings will produce a skilled workforce for the agritourism development. More awareness campaigns, seminars, workshops, specialized training programmes regarding various aspects of agritourism should be organized to make people aware of the concept. There should be collaboration and cooperation between stakeholders while conducting agritourism seminars, workshops and organizing training for the farmers for the success of agritourism venture and to develop a larger scale (Pinky & Kaur, 2014). Government support is also very important. Government should provide subsidy for farmers for agritourism development (Pinky & Kaur, 2014). For marketing and promotions, there should be more awareness campaigns.

Challenges Faced by Agritourism Stakeholders

Diverting agricultural lands into agritourism is not an easy process. Stakeholders have faced several challenges before they were able to reap the success of diverting their farms into agritourism.

Lack of Training and Education

One of the major problems about managing the agritourism destinations is the lack of training and education (Pinky & Kaur,2014; Colton & Bissix, 2005; Zoto, Qirici & Polena, 2013; Chadda & Bhakare, 2012). This has resulted in problems such as having a hard time dealing with visitors because of poor communication skills and lack of practical management skills (Holland & Wolfe., n.d.). Similarly, in Sri Lanka, although farmers have basic knowledge about agriculture, still their level of awareness about the benefits of agritourism and related aspects is low. Additionally, farmers have poor level of entrepreneurship, leadership and decision making skills which are relevant in running an agritourism destination (Malkanthi & Routry, 2011). This problem is also related to Nova Scotia. Farmers also lack proper training because of lack of time due to long hours of work in their own farms (Colton & Bissix, 2005).

No Interest to Work in Agriculture Industry

In India, one of the threats of agritourism is the rampant migration from farming to other sectors (Chadda & Bhakare, 2012). In the Philippines, the future of agritourism is also threatened because of only few students taking up agricultural courses. Agricultural courses and career became less attractive to the students and even to farmers who mostly won't advise their child to take agriculture as a course because of the misconceptions about agricultural careers.

Lack of Marketing Knowledge

Good marketing is essential for a business to be successful and sustainable. In New Jersey, marketing was identified as the biggest problem in agritourism (Schilling, Marxen, Heinrich & Brooks, 2006). Lack of marketing knowledge hindered agritourism development (Ryan, DeBord & McClellan, 2006). Colton and Bissix (2005) emphasized the importance of possessing good marketing knowledge and experience in order to market more effectively (Ryan, DeBord & McClellan, 2006). Limited access to information was also identified as a challenge by farmers in New Jersey (Schilling, Marxen, Heinrich, & Brooks, 2006).

Lack of Finance

Agritourism development requires a substantial investment to provide standard facilities and to meet the costs of the development (Budiasa & Ambarawati, 2014). In Hawaii, farmers ranked lack of funding as the second most serious concern in agritourism (Hudson, 2008). In New Jersey, farmers had difficulty in applying for a loan among the traditional lenders because they did not own the land they were farming (Schilling, Marxen, Heinrich, & Brooks, 2006). In other countries, lack of financial assistance to farm operators was also given as a problem (Ryan, DeBord & McClellan, 2006).

Lack of Government Support

Lack of government support and assistance, as well as, the lack of coordination between municipal, provincial, and national government units were presented in many researches as a major hindrance in the development. There were issues in policies and regulations such as signage and zoning bylaws set by the government. In Hawaii, zoning bylaws is ranked as the

number one challenge in their agritourism development (Hudson, 2008). Another issue is the excessive regulations, like the need to get building permits, property taxation, and licenses, which discourage some farmers from diversifying their farms into agritourism destinations. In California, comments from respondents indicated that they were frustrated and overwhelmed with their country's policies and regulations (George & Rilla, 2011). Agritourism operators perceived that permitting processes by the government are confusing and sometimes unnecessary, costly and inflexible (Keith, Rilla, George, et. al., 2003). In Korca, Albania, there was also lack of legislation regarding agritourism and political awareness (Zoto, Qirici, & Polena, 2013). Chadda & Bhakare (2012) also noted in their study the lack of government support in the form of subsidies.

Distance to Markets

The location of agritourism destinations can also hinder the industry's development. The vast majority of agritourists travel only a short distance to agritourism destinations. Farms located in population centers clearly have the advantage of location, as seen in the results of the study made in the USA (Bernardo, Leatherman, & Valentin, n.d.).

Lack of planning and concrete goals

The lack of research, planning or informed decision making is also one of the constraints in agritourism development (Ryan, DeBord & McClellan, 2006).

Seasonality and Weather

The seasonality characteristic of agritourism and its being dependent on upon weather conditions have also been identified as one of the difficulties faced in agritourism development (Ryan, DeBord, McClellan, 2006). In India, climatic conditions are considered threats in agritourism (Chadda & Bhakare, 2012).

Inadequate Price for Farm Products/Activities

The inadequate prices for farm products/activities are also major constraints in establishing agritourism (Shehrawat, 2008).

Conclusion

Agritourism as an industry in the Philippines is still in the development stage. Despite the numerous benefits such as wealth creation, rejuvenation of the countryside and job generation, it is still underdeveloped. (Freznosa, 2012). According to Gutierrez, also mentioned by Freznosa (2012), this industry despite its vast potentials seems to lack support and promotion from the government. During the First National Agritourism Research Conference in 2012, keynote speaker and SEARCA Director, Dr. Gil Saguitsit Jr. noted that in the Philippines, "agriculture and tourism are mutually exclusive" (SEARCA, 2012). The agricultural sector is spearheaded by the Department of Agriculture while the Department of Tourism is mandated to lead the country's tourism industry. Esplana (2012) similarly made mention of this Philippine scenario in his paper, "Development in the supply chain of the Philippine Agritourism Industry", where he noted the lack of collaboration and confluence among government organizations and private sectors in the improvement of the mechanics of accreditation, as well as, in the promotion of agritourism enterprises. Despite the odds, the Philippines, primarily an agricultural country, has an untapped potential to be one of the best agritourism destinations and with proper

planning, implementation and support, agritourism can be a strong source of socio-economic gains.

Agritourism in the Philippines can bring economic advantage and can benefit the sector of farmers, community members and other stakeholders as long as it will be developed sustainably. The perceived challenges of the farmers in the Philippines should be addressed. Studies revealed that the perceived challenges of the Philippine farmers were climate change, inadequate water supply, calamities, and the weak marketing and promotions support from government. Government support and strong partnerships between the stakeholders are necessary for agritourism to become a successful climate change adaptation strategy. Continuous capability and capacity building of the farmers is equally crucial in order to empower the farmers with advanced knowledge on farming technologies, farm management and diversification of income sources.

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Transportation and Logistics Planning for Disaster Prevention: The Case of the Greater Manila Area, Philippines

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Abstract

The Greater Manila Area (GMA), encompassing Metro Manila and the adjacent provinces of Cavite, Laguna, Batangas, Rizal, Bulacan and Pampanga, is one of the most exposed regions to natural hazards. With a population of about 27 million, accounting for more than 25 percent of the total country population, the Greater Manila Area is an important economic center producing nearly 40 percent of the country's GDP. While the government recognizes that transportation and logistics planning in times of disaster is important, such planning is still too often a neglected part of the government's management actions. In order to manage risks effectively, an understanding of the dynamics of the hazards and the logistics system in the Greater Manila Area is essential to allocate resources and formulate policies. The paper aims to propose strategic policy measures on logistics planning that the government can consider for mitigating the adverse impacts of disasters on economic zones in the Greater Manila Area.

Introduction

The Greater Manila Area (GMA) is an important economic center and the hub of industrial activities in the Philippines producing 40% of the country's GDP which makes it the engine of growth of the country. Although the government has started to recognize the importance of logistics to reduce inefficiencies, as emphasized in its Philippine Development Plan 2011-2016 (MTPDP 2011-2016), current policies are inadequate to protect the stakeholders and economic assets that are recurrently affected by the impacts of natural hazards. Hence, this paper will focus on these issues and challenges, and how these can be addressed to improve transport and logistics planning for disaster prevention in the Greater Manila Area.

Logistic Situation in the Greater Manila Area

Road Transport

The Average Annual Daily Traffic (AADT) at major roads is shown in Figure 1. The high volume of vehicle traffic especially at places surrounding urban areas causes road capacity problems. It is evident that the highest volumes of traffic are concentrated in the Greater Manila Area (GMA). Figure 1 also demonstrates the important road arteries that need to be improved in terms of providing higher levels of services. Among the major arteries that require improved levels of services are Metro Manila's roads, Batangas–Metro Manila–Clark road link, and the Subic–Clark road link.

Air Transport

NAIA continues to be the gateway airport of the country with passenger traffic rapidly increasing at an average annual growth rate of 9.3% from 12.8 million in 2001 to 33.9 million in 2012. It likewise handled 462 thousand metric tons of cargo in 2012 (CAAP, 2013) with a 15%

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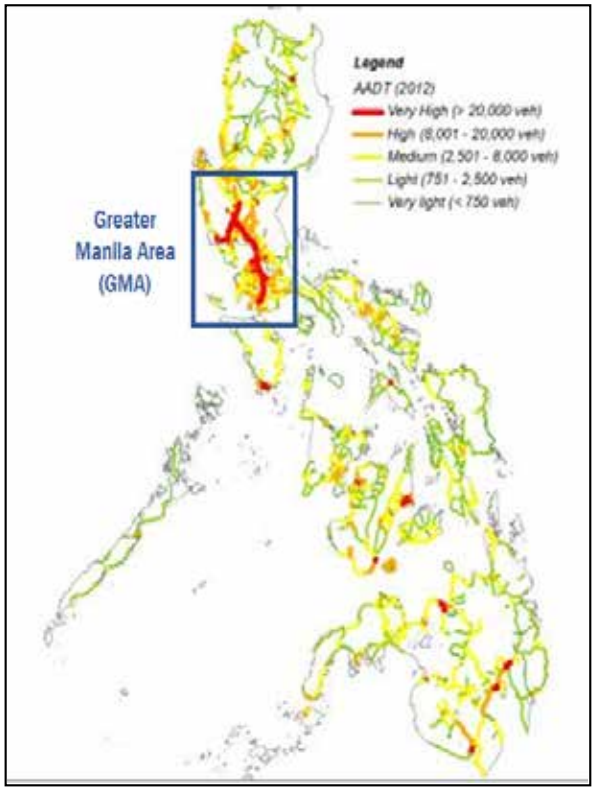

Figure 1. Annual Average Daily Traffic (AADT) at major roads
Source: JICA (2010)

average annual cargo growth. Given the growth of both international and domestic air traffic through NAIA in recent years, serious capacity constraints have emerged. The main challenge is the saturated capacity at NAIA and the unpreparedness of Clark Airport to absorb excess air traffic.

Water Transport

The Port of Manila is the principal gateway seaport of the country. Increasing congestion at the Port of Manila is negatively affecting access of trucks to and from the ports and the overall traffic. Two new ports were built; namely, Batangas Port and Subic Port, to provide the region with additional capacity and overcome some of the limitations of the Port of Manila. The two ports have a combined capacity of 1.0 million TEUs per year, but their current utilization is very low. JICA (2013) reported that the utilization rate of the Batangas and Subic Ports remained low at 4.2% and 5.6%, respectively, of their capacities.

Freight Transport

JICA (2010) estimated the future cargo demand in the Greater Manila Area for 2030 (Figure 2). The highest cargo demands are the linkages between Metro Manila–Laguna, Metro Manila–Bulacan, Metro Manila–Cavite, and Metro Manila–Rizal.

Logistics Networks

Location of Logistics Clusters

Industrial areas in the south (i.e., Cavite, Laguna and Batangas), in the north (i.e., Bulacan and Pampanga), and in the east (i.e., Rizal) were developed and became extensions of the

Area	Cargo Demand (1000 tons/day)			Increase (30/09)	Avg. Growth Rate (30/09)
	2009	2020	2030		
Metro Manila	1,603	2,138	2,584	1.61	2.2%
*Neighboring of MM	878	1,228	1,548	1.76	2.6%
Other Study Area	84	113	139	1.65	2.3%
Total	2,566	3,479	4,293	1.67	2.4%

Cavite, Bulacan, Rizal, Laguna

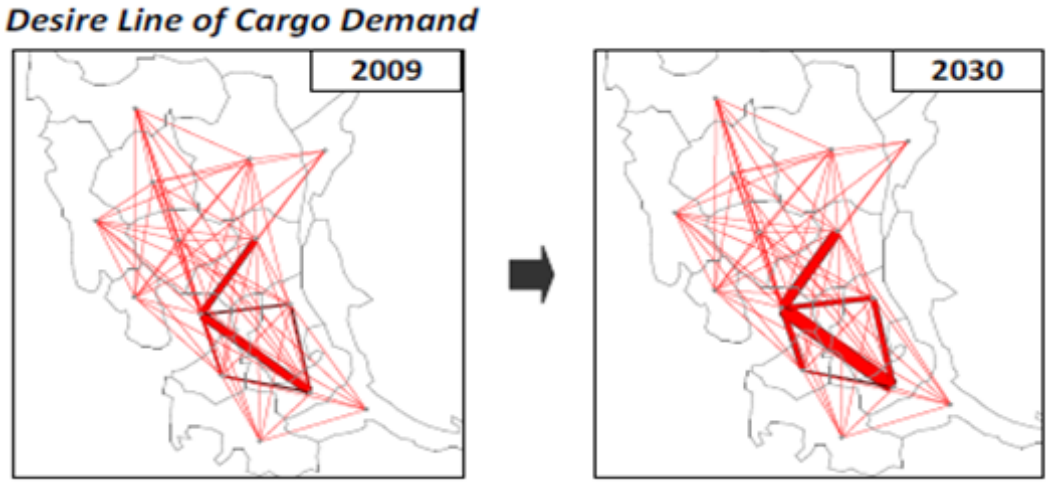

Figure 2. Future cargo demand
Source: JICA (2010)

metropolis. These logistics clusters are mostly located near expressways or national roads for accessibility and easy transportation of their products. The darkest areas in Figure 3 represent those places with the highest concentration of economic zones or the location of major logistics clusters. It can be deduced from the resulting image that economic zones are agglomerated in the Laguna area near the South Luzon Expressway (SLEx), in Clark near Clark Airport, and in Batangas near Batangas Port.

Logistics Corridors

According to the JICA High Standard Highway Study (2010), most of the locators interviewed in the economic zones utilize Manila Port as the point of entry for their raw materials as well as their port of exit for their finished products. Some locators indicated that they likewise use Ninoy Aquino International Airport (NAIA) as the port of exit for their electronic products and computer parts. The identified major logistics corridors are the South Luzon Expressway, Manila Cavite Coastal Expressway, Southern Tagalog Arterial Road, Aguinaldo Highway, Governor's Drive in the South of Metro Manila, and the North Luzon Expressway, Manila North Road and the Olongapo–San Fernando Road in the North of Metro Manila (Figure 4).

Logistics Issues and Challenges

Poor logistics infrastructure

The road network has not been developed fast enough to meet the ever-increasing transport demand, and has been focused on road widening and construction of grade-

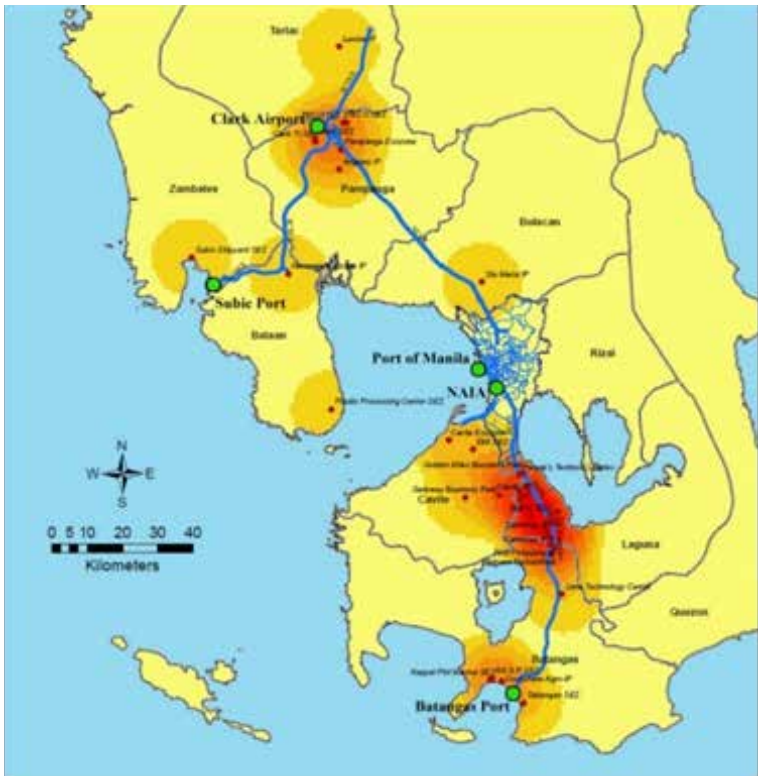

Figure 3. Concentration of economic zones
Source: JICA (2010)

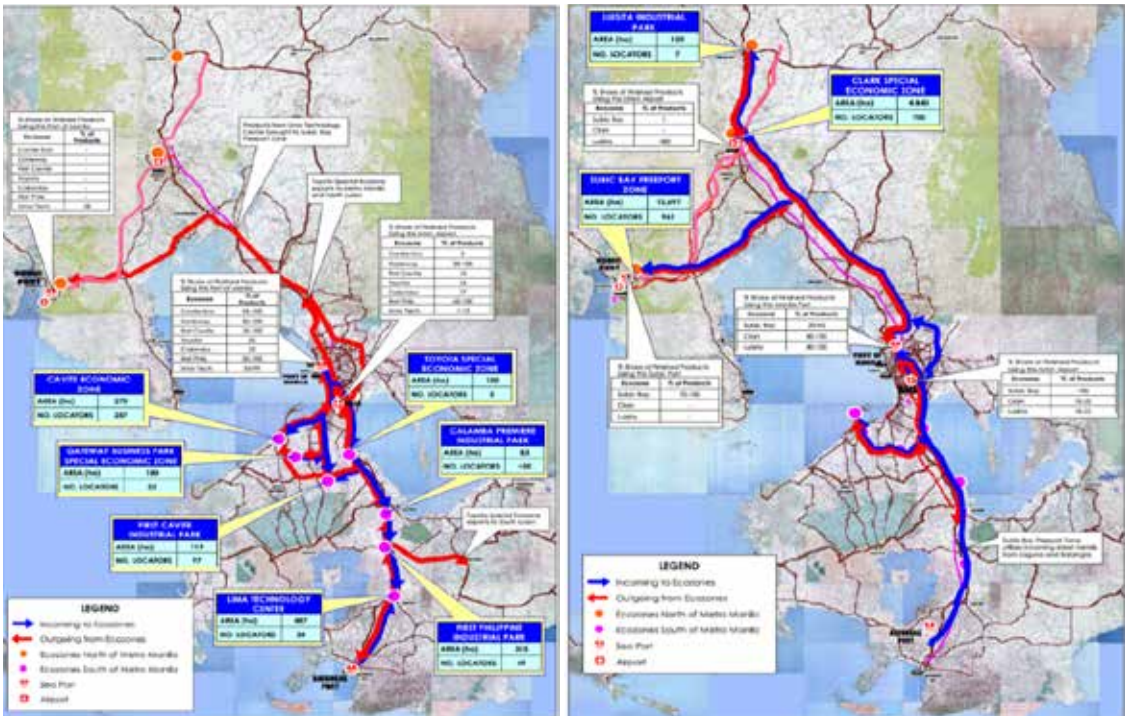

Figure 4. Logistics corridors used by economic zones

separations at intersections. With the severe increase in the volume of vehicles and interconnectivity issues on the existing expressways which are not yet presently functioning as a network, traffic congestion will remain a serious problem. In addition, most roads are not designed to accommodate large trucks or are not suitable for truck traffic due to physical constraints such as narrow road widths and low vertical clearances. It is also apparent that several roads are not structurally designed for larger trucks as can be observed from the rapid deterioration of pavements. In addition, most of the roads get flooded during medium and heavy downpour, mainly due to drainage problems.

Apart from issues relating to the road network, the lack of storage facilities that are supposed to support vital functions of the Port of Manila is another concern. The development of Inland Container Terminals (ICT) should be studied carefully to meet enhanced logistic services demand, especially in the light of what happened during the Manila City's total truck ban policy. The ICD should be connected with road, rail and inland waterway networks to serve as important nodes in the integrated logistics network.

Port congestion at Port of Manila

JICA (2013) stated that the usage rate at the Port of Manila is 98.2 percent of its actual capacity. Among the reasons stated by locators in the ecozones as to why the Port of Manila is the preferred choice to move their products are: 1) because of the small volume of import at Batangas and Subic Ports, container ships do not make ship calls knowing that the return trip will be empty, and 2) most trucking companies are located in Metro Manila, and thus there are objections among domestic trucking and logistic companies, port workers, and other concerned agencies to transfer operations at Batangas and Subic Ports.

In addition, inconsistent implementation of the truck ban policy creates confusion and complicates the problem on logistics. Such was the case of the Manila City's Total Truck Ban, enforced from February to September 2014, wherein large trucks were not allowed to enter Manila City during the day. The policy generated chaos among stakeholders, leading to total traffic gridlock and port congestion. The daytime truck ban resulted in a decline of throughput of cargoes and containers taken out of the port, the piling up of cargoes at the port awaiting movement, and the accumulation of empty containers as trucks containing empty containers were banned from travel (Patalinghug, et al., 2015).

Major ports located in flood susceptible areas

Figure 5 shows the overlay of flood susceptibility, economic zones and the logistics network revealing that the Port of Manila and NAIA are located in areas with medium susceptibility to flooding, whereas the alternative and underutilized seaports of Batangas and Subic are not susceptible to flooding at all. With regards to road transport, the northern portion of South Luzon Expressway (SLEx) indicates low to medium susceptibility to flooding, while the majority of North Luzon Expressway (NLEx) shows high susceptibility to flooding. Therefore, the ability of logistics facilities located in the economic zones to handle logistics operations will be greatly compromised in times of disasters, especially during flooding. This is largely because majority of the cargo to be shipped out would utilize the Port of Manila and NAIA. It is therefore necessary to examine existing logistics plans, and to recommend strategic policy measures on how logistics planning can be improved considering the impact of disasters.

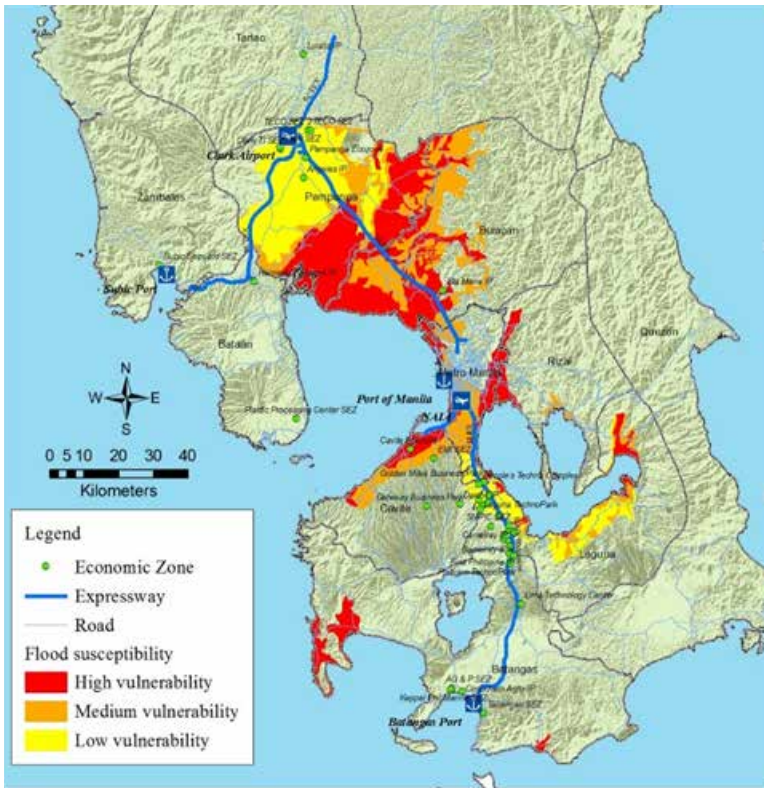

Figure 5. Overlay of flood-susceptibility and logistics network
Source: Castro (2015)

Strategic Plans for Improving Transport and Logistics

Development of the expressway network

Among the road infrastructure that are being implemented and planned to provide alternative transport networks is shown in Figure 6. It is necessary that these roads are designed to withstand the impacts of various hazards.

Utilization of alternate ports

Port functions can now be transferred to Subic and Clark with the recent physical infrastructure improvements; i.e., completion of STAR Tollway connected with South Luzon Expressway (SLEx), and Subic–Clark–Tarlac Expressway (SCTEx), combined with the North Luzon Expressway (NLEx) and the Tarlac–Pangasinan–La Union Expressway (TPLEx), which provide a direct and faster road transport alternative from/to Batangas and Subic Ports.

To encourage stakeholders to use Batangas and Subic Ports, it is necessary that the Port of Manila operate with capped capacities. The government should also make a policy or directive that freight going to/coming from the south of Manila should use Batangas Port and those from the north should use Subic Port. In addition, new pricing strategies such as reduced wharfage, berthing fees and vessel-related charges in Batangas and Subic ports should be introduced to encourage use of these alternate ports (Figure 7).

Development of an inland waterway transport

The Manila Bay–Pasig River–Laguna Lake (MAPALLA) Ferry System Project which would connect Metro Manila to its neighboring provinces through major waterways was studied by

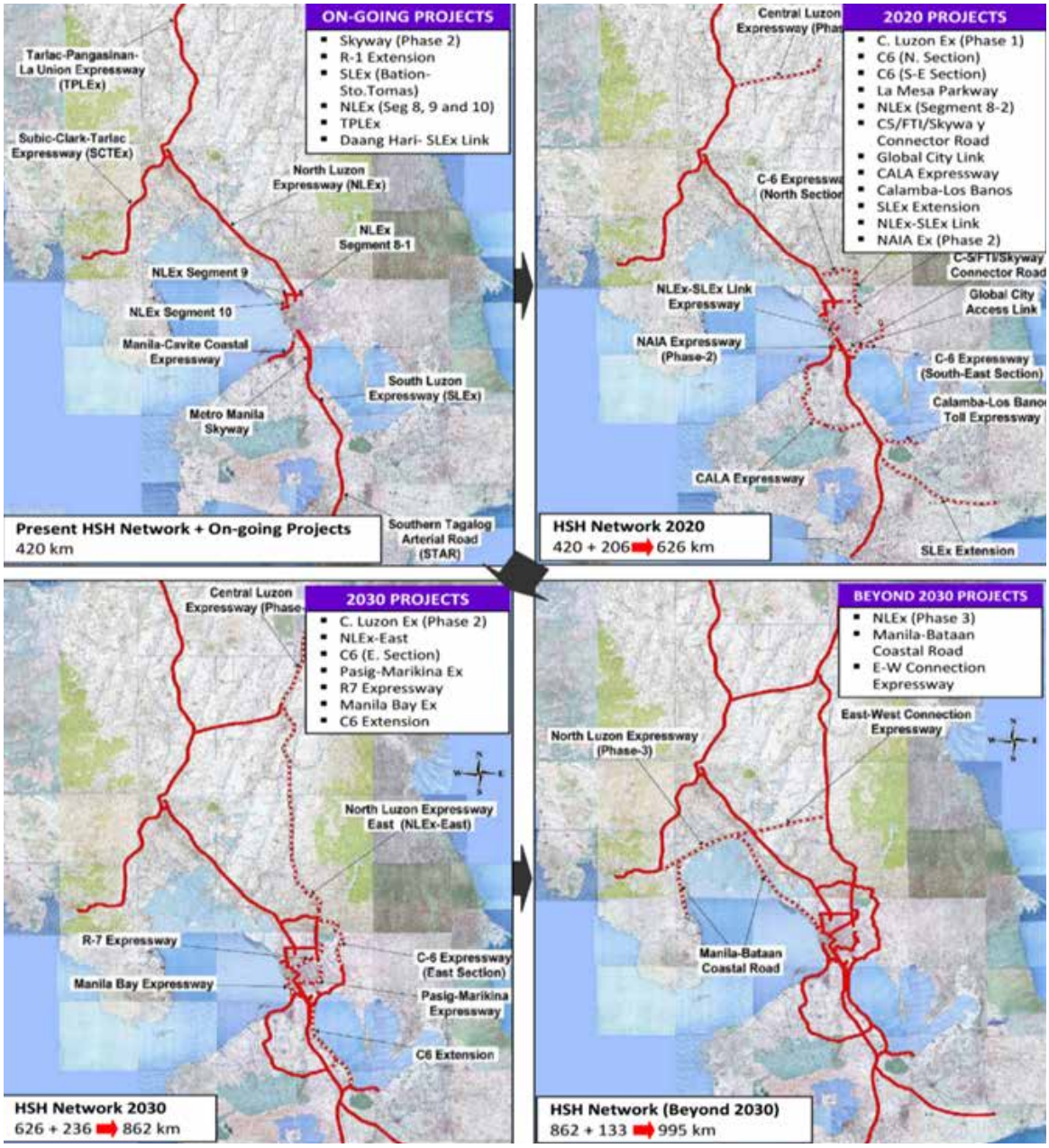

Figure 6. Development of expressway network
Source: JICA (2012)

DOTC. In essence, the MAPALLA Ferry System Project is an expansion of the Pasig River Ferry Services which was suspended in February 2011 due to the low volume of passengers, but was revived in 2015 under MMDA operations to serve as an alternative transport mode due to severe road traffic congestion and road constructions. The viability of a freight transportation using the MAPALLA system also needs to be studied. Because most of the economic zones in Laguna are just a few kilometers away from the Laguna Lake shoreline, a mode shift from truck transport to riverine transport via Laguna Lake and Pasig River might be possible. If implemented, this new riverine transport system can provide an alternative way of delivering and transporting goods without having to use the flood-susceptible SLEX (Figure 8).

Other logistics infrastructure initiatives

- Expansion of the Clark International Airport

The government plans to further develop Clark International Airport (CIA) as an alternative international gateway serving central Luzon. The CIA is currently in the process of expanding its facilities. This plan needs to include consideration of appropriate land transport connections between Clark and Metro Manila.

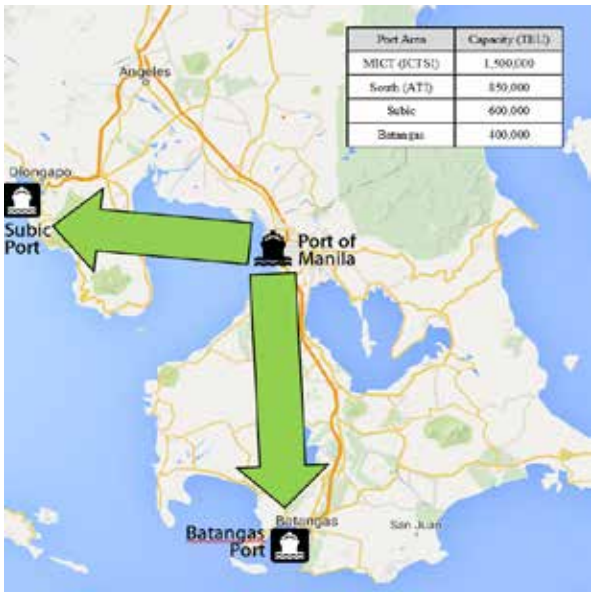

Figure 7. Transfer of port functions to Batangas and Subic Ports

- Revival of rail service

From 1998 to 2003, ICTSI operated a rail-based transport system between MICT and Calamba Inland Container Terminal (ICT), which was stopped due to losses. The system was revived on March 2015 to serve as an extension of the seaport operations of the MICT, and to function as a regional logistics hub that will service and support the operations of exporters and importers within and outside the economic zones in the Laguna–Batangas–Rizal–Quezon area. The ICT is located 58 kilometers from Metro Manila and will be further developed as a 24/7 state-of-the-art facility with cutting-edge terminal systems and equipment (PortCalls, 2015).

Figure 8. Manila Bay-Pasig River-Laguna Lake (MAPALLA) Ferry System

- New logistics centers

The development of logistics centers to meet enhanced logistic services demand is currently being considered by the government especially in the light of what happened during the Manila City's total truck ban policy, wherein a large number of empty containers were just sitting inside the ports. The logistics centers should be connected with road and inland waterway networks to serve as important nodes in the integrated logistics network.

Development of a Logistics Policy document

Unlike Japan, Korea, and Singapore which have well-defined comprehensive logistics policies, the Philippines is still without a specific logistics legislation. Therefore, there is a need to draft an intermodal transport and logistics policy document for the country detailing the various aspects of logistics including disaster reduction and management. The Logistics

Policy document would clearly establish the government's policies in the areas of urban, regional, and international logistics.

Conclusion

This paper presented a detailed analysis of transport and logistics in the Greater Manila Area based on the key aspects of logistics infrastructure and institutions. Logistics infrastructure is still lacking, particularly facilities that could ease domestic and international freight storage and movement. Because of the rapid growth of the economy, the challenge on logistics supply is on how to develop fast enough to meet the continually increasing demand for logistics services. In addition, government institutions are still fragmented with agencies' understanding of logistics based on their individual perspectives, and logistics service providers and shippers still suffering limited capability and technical understanding of logistics especially in times of disasters and emergencies. A holistic approach to logistics policy is imperative to integrate all logistics perspectives.

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JUN T. CASTRO is a licensed Civil Engineer and Environmental Planner. Having obtained both his Masteral and Doctoral Degrees at the Tokyo University of Mercantile Marine (now Tokyo University of Maritime Science and Technology). He has done several academic and practical studies on transport engineering, logistics, and transport planning in Japan and the Philippines. Castro started his career in traffic engineering at the National Center for Transportation Studies (NCTS) of the University of the Philippines in Diliman, and developed his expertise on transport and logistics systems and Geographic Information Systems (GIS) during his graduate studies in Japan. He is presently a Professor of the UP School of Urban and Regional Planning, and concurrently serving as the College Secretary of the School. Castro has been involved in a number of consulting works for JICA, ADB, AusAiD, among others, in the Philippines and the Asian region. His involvements not only focused on GIS and transport studies but also on intermodal logistics network systems and transport planning. He is an active member of the Transportation Science Society of the Philippines and is presently the Vice-President of the said organization.

Heritage and Conservation in the Light of Rural Community Planning: Cases on Climate Change Mitigation Strategies

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Abstract

In the 1990's tourism was still a nascent industry in the Philippines that few people fully understood and appreciated. But said industry has a major role in environmental, cultural and heritage protection. The present situation already indicates a high appreciation of tourism as a major socio-economic contributor through the concepts of sustainable tourism ecotourism and heritage conservation through tourism. However, said appreciation is still limited to conceptual level of knowledge focused on developing tourism products and corresponding services. There is still a need for the Filipinos to deepen their technical knowledge and skills in adequately managing and protecting natural and cultural heritage, which is even made more significant due to the threats of climate change. These include applied knowledge on carrying capacity, coastal, zoning and other concepts or ideas such as the Bruun Rule and Xeriscaping.

Key words Heritage, Conservation, Climate Change, Tourism, Sustainable Tourism, Ecotourism, Tourism Planning, Beach Management, Carrying Capacity, Coastal Zoning, Bruun Rule, Xeriscaping

Introduction

Sustainable tourism in the Philippines was little understood since the travel industry hardly made recognition as a major development sector. It was only in 1992 that the concepts of sustainable tourism and of ecotourism became an institutional mandate of the Philippine Department of Tourism (Libosada, 2000). The tourism industry was beset by numerous setbacks caused by external influences, such as political and peace and order influences, that very few people outside the travel trade sector fully appreciated its environmental and socio-economic influences. Neighboring Southeast Asian countries overtook the Philippines in terms of tourist arrivals, infrastructure development and services investments, with Thailand, Malaysia and Singapore already achieving more than 10 million arrivals in the mid 90's, and the Philippines hardly going past 2 million arrivals during the same time period. The domestic travel market was hardly recognized, with very few Filipinos travelling around the country beyond the VFR (visiting friends and relatives) pattern. This practice was sustained by several factors, such as depressed disposable income and time, and the lack of infrastructure and tourist facilities in the country.

However, by the turn of the millennium, the country's economy showed signs of improvement and two (2) major events catalyzed the unprecedented growth of the domestic travel market, which has grown to 40 million travels in 2014. These include the entry of low-cost carriers and the introduction of holiday economics which essentially enabled Filipinos to avail of quality travel time. By 2014, the foreign travel market also showed a modest growth that reached almost 5 million visitors. From a marginalized economic sector in the government bureaucracy that used to be lumped under "services", tourism was recognized as a major

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contributor, with an input of 7.8 percent, to the country's economy in 2014 (PSA-NSDB, 2015).

Sustainable tourism and ecotourism were also appreciated by the tourism stakeholders, albeit on a conceptual level. With a number of ecotourism sites identified, developed and successfully managed, an increasing number of individuals and institutions have been adopting ecotourism as a strategy to introduce more areas as new and potentially major tourist destinations. The appreciation, however of technical application of ecotourism remains a major constraint to many sites that could not be properly developed, as scientific and technical considerations are hardly understood by the stakeholders. These include wildlife watching, coastal area development and operation of ecotourism programs in mountains, caves and other natural features. The concept of Carrying Capacity is an often-considered concept in ecotourism development, but said capacity is seldom successfully formulated due to the lack of carrying capacity experts.

A number of local government units already have good knowledge of the concepts of zoning (e.g. setback, buffer) due to the required mandate of said units to implement such zoning concepts.

Tourism Link With Science and Social Issues

With the growth of tourism demand and subsequent destinations, infrastructure and services, people are starting to realize the important linkage of tourism to scientific studies and inputs as well as to social issues. Nowadays, tourism cannot just be introduced and developed in a location without the appropriate adherance to understanding the environmental dynamics, as well as the recognition to local social issues that may affect the tourism business.

Using ecotourism as a development tool in natural areas has provided the addition of values and justifications in introducing environmental and conservation programs such as the establishment of marine and terrestrial protected areas, wildlife protection and environmental heritage conservation. For non-environment related heritage sites, the term ecotourism may not be utilized and can be replaced by the terms "sustainable" or "responsible" tourism.

Ecotourism also provided the concrete representation for "nebulous" concepts such as biodiversity, environmental conservation and ecology to non-technical stakeholders, which enabled them to fully grasp the value of environment-based development and support ecotourism in their areas.

The science in ecotourism also provided a more intrinsic value to both tourists and local communities to look beyond the "beauty" of a coral reef or wildlife and appreciate their ecological values and ecosystem services. Ecotourism thus provided a very good vehicle to address economic growth that eventually cascades to environmental appreciation, respect, protection and ethical utilization.

Climate Change and Tourism

The phenomenon of climate change provided a bewildering and threatening presence to the tourism industry. Initially ambivalent to the issues of climate change as the natural phenomenon is primarily global in scale and very hard to comprehend, the tourism industry remained a curious spectator to the phenomenon. The recognition, however, of the potential impacts of climate change has been identified in the early years of climate change discussions, as the industry is largely dependent on climate situations and vulnerable to impacts or events caused by climate change.

The United Nations World Tourism Organization (UNWTO), in determining the roles and impacts of tourism in climate change, has recognized that the tourism industry contributes about 5% carbon dioxide emissions and that there is an urgent need for the tourism sector to adapt to the impacts of climate change (UNWTO, 2007).

Due to the relatively new character of the tourism industry in the Philippines, there was very little accumulated research, both on the travel industry and on climate change, and data that could have been utilized for climate change adaptation were simply not available. The Philippines had to learn by experience. While Typhoon Ondoy (Ketsana) in year 2009 proved to be a defining event of the realities of climate change and the vulnerability of the Philippines, it was the non-typhoon, low pressure event called Habagat 2 in the year 2012 that revealed that climate change can directly impact the tourism industry on a considerable scale, when one major hotel (Hotel Sofitel) in the bay area of Metro Manila was flooded and damaged by the event. The impact was attributed to climate change, as the existing breakwater and seawall failed to hold back the onrushing water.

Conversation with the management of one of the major resort properties in the Philippines (Pearl Farm Beach Resort) in Samal Island Davao del Norte in 2013 also revealed that the water level has been increasing; the accommodation units sited in water areas have started to be reached by high tide waters, necessitating the renovation and elevation of said units.

These are only two of the concrete examples that show how climate change has indeed started affecting the tourism sector in the Philippines. More areas that experience similar or varying degrees of impacts and coastal profiles may already be happening in different parts of the country.

Climate Change Impacting Heritage

The heritage aspect that is affected by climate change largely includes communities that are in danger of losing the natural heritage. Coastal communities may retreat inland and lose their social and economic linkages. Terrestrial inhabitants may abandon their livelihood and habitation sites as climate change may cause the local ecosystems to lose their services. Tourism, on the other hand, would also be deemed untenable due to degraded quality of the site.

For tourism to appropriately respond to the challanges of climate change, it has to recognize several things. Tourism is a global industry with global standards. By adopting standards designed to help mitigate current and future environmental threats, the tourism industry can provide global contributions to minimize foreseen impacts. An example would be the standardization of energy-using devices and equipment to minimize CO2 emissions.

For site development that will minimize the impacts of climate change-induced events, considerations should be given on the following:

- Lessen the intensity of impacts through site and facility design
- Minimize the possible impact through appriopriate zoning
- Minimize the length of time for impacts (e.g. drainage, flow system)
- Identify affected communities and including them in impact mitigation plans
- Decrease reliance on climate change-inducing technology

To further appreciate the position and role of tourism in climate change, one can refer to Table 1, indicating the possible local events that may occur and the corresponding roles of tourism either or both as a contributor and a solution provider.

Table 1. Local Events Caused by Climate Change and Roles of Tourism

Climate Change Impacts	Tourism as….		
	Spectator	Contributor	Solution Provider
Sea-level rise	X		
Flooding		X	X
Stronger Events	X		
Storm Surges		X	X
Drought	X	X	X
Coral Bleaching	X		
Eutrophication		X	X
Loss of species		X	X
Collapse of Ecosystems		X	X

For the tourism industry to protect itself and the natural heritage of the destination, much will still have to be understood, appreciated and applied by this sector. Most of the concepts are in the realms of the science community. There is thus a need for both tourism, science, and even social science to work together to help protect tourism, and at the macro level, the ecosystem services, natural features, as well as the local communities. Some of the concepts have to be effectively downloaded from the realms of science down to the sector at the forefront of dealing with climate change. These include discussions and researches on the following:

- Wave energy
- Wave energy dissipation and scouring
- Acidification
- Coral bleaching, planktons
- Coastal development paradigm repositioning (increase setback; frontage should be sand, not water)
- "The beach is the attraction, not the resort"
- More informed and engaged roles of local government units
- Bruun Rule
- Passive designs
- Xeriscaping

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About the Author

CARLOS M. LIBOSADA JR., Assistant Professor of the Asian Institute of Tourism, University of the Philippines, has authored a number of books in tourism, e. g., Tourism Development for LGUs, Ecotourism in the Philippines, Domestic Tourism, Introduction to Tourism, 26 Days Around the Philippines, Birdwatching in the Philippines, and Kayaking Philippines. He is president of Responsible Tourism For a Sustainable Philippines (NGO). Libosada has been an independent tourism consultant and some of his projects were: Angat Watershed Tourism Development Framework, Agusan Marsh Ecotourism Management Framework, Ecotourism Feasibility Study for Sohoton Natural Bridge National Park, Occheauteal Beach Tourism Management Plan (Sihanoukville Cambodia). He received his Bachelor of Science in Tourism from the University of the Philippines in 1989 and his Master of Science in Environmental Studies from Miriam College in 2004. His tourism websites are: www.tourismjobsonline.com, www.mytravel-asia.com, and his tourism blog is: www.travelcentralph.blogspot.com

Development of Support Model for Farmland Restoration after Flood Disasters in Hilly and Mountainous Areas: Cases Affected by Torrential Rainfall in Northern Kyushu, Japan

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Abstract

A considerable amount of farmland was destroyed by a flood disaster that struck in 2012 in Yame and Ukiha, in Fukuoka prefecture, northern part of the island of Kyushu, Japan. This paper is a case study of the volunteer farmland restoration activities that were carried out on the hilly and mountainous areas after the floods. The purpose of this study is to outline the activities in three regions and to show the character of the volunteer farmland restoration groups. Interview surveys were conducted with the manager of each volunteer group, and data on the process of forming volunteer groups, the monthly process and distribution of activities, facilities requirements, and intermediaries between affected farmers and volunteer activities were collected through field surveys. The surveys were carried out from June to September, 2014. It was found that conservation activities were being carried out in three regions before the year of the disaster. It is notable that Sansonjyuku, an established NPO in 1994, launched their activities in July, the month when the disaster struck. Activity areas by Sansonjyuku were unevenly distributed due to their experiences with volunteer activities in previous years. The other groups widely covered their areas because they carried out needs research on all local districts through ward mayors. Fifty to 75.9% support activities were intermediated by someone, and the ward mayors fulfilled this role more than 50% of the time.

Background

In recent years, torrential rainfall disasters exceeding expectations have frequently occurred. In the future, such disasters are expected to increase in frequency, so a need is rising to strengthen preparedness in each local community. Lately, preparedness for these types of disasters is not limited to just hard defenses such as river-related engineering works and fire and police emergency responses. In any local region, ensuring preparedness is integral to everyday life, and autonomous disaster response organizations are being formed in every local community to ensure expedient evacuation and restoration can be carried out after disaster strikes. It is this kind of local community resilience that needs further strengthening.

The local community functions of these farming and mountain villages, however, are weakening as a result of the declining population and the waning of agricultural business in Japan. It is assumed that deficient farm and forestry land management, as well as a lack of helping hands during times of disaster, is increasing the risks of disaster not only in farming villages but in urban areas as well. Hence, the conservation of farming and mountain villages and natural growth areas is a top priority in disaster prevention.

Against this backdrop, in Kurogi town, Hoshino village in the municipality of Yame city, and Ukiha city in Fukuoka Prefecture (Figure 1, Photo 1), volunteer activities were carried out

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to restore farm and forestry land following a torrential rainfall event in Northern Kyushu in July 2012 (Photo 2). These kinds of volunteer activities are rare. In Japan since around 2002, in times of major disaster it has become standard practice for the local social welfare councils to establish disaster volunteer centers within 72 hours of the disaster. After the center is established, disaster volunteers from in and around the affected regions gather together based on the initiative of individual volunteers, and these volunteers carry out restoration activities, which mainly specifically concentrate on repairing residences that were damaged by the disaster. Generally, within 1–2 months these activities wrap up and the disaster volunteer centers close. In daily life in the farming and mountain villages, however, restoration of agricultural facilities, such as farmland and waterways, becomes an issue. For the farmers, farmland does not just earn them money but is also a means to provide food for the household. For the elderly, moreover, it is a place that promotes health. Delays in the restoration of farmland make daily life itself difficult, and this leads to situations where people are forced to leave their villages. Currently, disaster volunteers under the local social welfare councils generally do not participate in farmland restoration work. There needs to be a mechanism that links the power of the volunteers in the cities, etc., with the farming villages that are feeling the effects of Japan's aging society and declining population.

Photo 1. Disaster photo of the torrential rainfall event in Northern Kyushu in July 2012 in Kasahara, Kurogi, Yame, Fukuoka, Japan

Figure 1. Locality map of Yame and Ukiha, Fukuoka prefecture, Kyushu, Japan

Aim

The aim of the current study is to conduct a survey in the form of group hearings on the experiences of volunteers from Yame and Ukiha cities concerning restoration activities on farm and forestry land following a torrential rainfall event in Northern Kyushu in July 2012. The results from the survey are used to sort the merits and challenges during volunteer activities, and from this the points requiring attention are organized so that the information can be made applicable to other regions and a proposal for a support model can be put forward for the restoration of farm and forestry land. This report was carried out after taking into account research on the state of damage to farmland and the formation and operation of volunteer organizations as published in the Journal of Disaster Research (Asahiro et al. 2015).

Method

For the current study, group hearings of people in charge of operating volunteer activities were conducted and the following two actions were carried out. The first was to categorize the "successful efforts" and "unsuccessful efforts." The second was to present this knowledge as a support model for the restoration of farm and forestry land. Details of the survey that was conducted can be found in Table 1. The survey was conducted with the cooperation of NPO-related parties and social welfare councils.

NPO Sansonjyuku conducted volunteers works that removed sediment from farmlands and water channels.

Tea fields restoration, pebble picking and leveling those ground.

Photo 2. Volunteers restoration activities on farm and forestry land

Table 1. Outline of Group Hearings Targeting Persons-In-Charge Who Operated Volunteer Activities to Support Restoration of Farm and Forestry Land

Date conducted	July 16, 2015 (Thursday): 9:00–14:00
Participants	NPO Ganbariyoruyo Hoshino: Person Y Ukiha City Office, Department of Agriculture & Forestry, Commerce and Tourism: Person K, Person N Yame City Social Welfare Council Kurogi Branch: Person K, Hoshino Branch: Person S NPO Sansonjyuku: Person K Graduate School of Design, Kyushu University 
Location	Yame City Hoshino General Public Health & Welfare Center Soyokaze "Examination Room"
Details	○ Arranging and ordering of experiences of cooperative assistance support activities according to the themes of "successful efforts" and "unsuccessful efforts" with an aim to create a collection of case-examples. ○ Exchange of opinions on the possibility of future empirical research on models.

Results

Concerning the overall participation of volunteers

As part of the discussion of the overall participation of volunteers, merits were identified concerning the dissemination of information (mainly through SNS), participation by groups, exchange activities prior to disasters, and improving the image of volunteerism. On the other hand, some issues were pointed out, such as management difficulty with a large number of volunteers, insufficient awareness on volunteerism, and post-restoration after work operations on property.

Concerning the situation of the local region

As part of the discussion of the situation in the local region, conversation took place on the merits of the advice, etc., from the ward mayor about the region's use of volunteers, which was a catalyst for a resurgence in the operation of coordinated activities —mainly carried out

through self- or mutual assistance— and the participation of volunteers. On the other hand, various problems were pointed out, such as the impact of disasters on the daily lives of the elderly with respect to health and farm work, the differences between victims of regions with damage and with no damage, the sharing of local information, and local leadership.

Concerning the operations of NPOs

When discussing the operations of NPOs, the main merits that were pointed out were how disaster volunteer centers relating to farmland restoration were established, how needs surveys made clear the needs of farmers, and how the repeat volunteers were appointed as site leaders. Conversely, the problems that were raised included how the scope of activities was too broad; how there were a lack of experienced people, local experts, and leaders among the volunteers; how the locals provided too much food for the volunteers; how there were accidents; and how the available tools were insufficient.

Concerning coordination with local government bodies, public works, and groups

When discussing coordination with local government bodies, public works, and groups, the main merit raised was how coordination of projects was carried out autonomously by the city of less than 500,000 yen in support disaster restoration and social welfare councils. Conversely, the problems raised included the insufficient knowledge and experience of workers, a shortage of workers, information sharing, and coordination with related groups.

Support models for restoration of farm and forestry land

Figure 2 shows the support model for farm and forestry land restoration that was developed under the current study. An explanation of the keywords is given below.

(a) Establishment of Rural Design Center (provisional name)

Rural Design Centers should be established. It would have infrastructure such as public transport in order that its location can easily be accessed from the city, especially in times of disaster. It is expected to function as a support center for the restoration of farmland, etc. In times of emergency, the social welfare council will establish a disaster volunteer center, which will attend to immediate needs as shelter, food, medicine. The RDC's functions are expected to continue after the completion of restoration and other work on houses, and it should cooperate and work with NPOs providing farmland restoration support. It is expected that this task will be undertaken by the NPO when it is able to function sufficiently, or it will be undertaken by the government if it is too difficult for any NPO to carry out.

As shown in the figure, activities during ordinary times will involve engaging in regional activities together with external participants or groups, and building and developing mechanisms of cooperation. In terms of human networks, in addition to connecting with volunteers and groups outside the local area, and with various farmers through needs surveys in the local area, it is necessary to secure and foster support personnel for volunteer activities through utilizing knowledge of the locality and neighborhood. Through these activities, it is necessary to develop volunteer leaders who can lead small groups of people made up of participants to carry out management of the work sites, so that technological expertise can be available when needed. It is preferable to create a system that enables utilization of specialists by farmers, administrators, NPOs, and contractors.

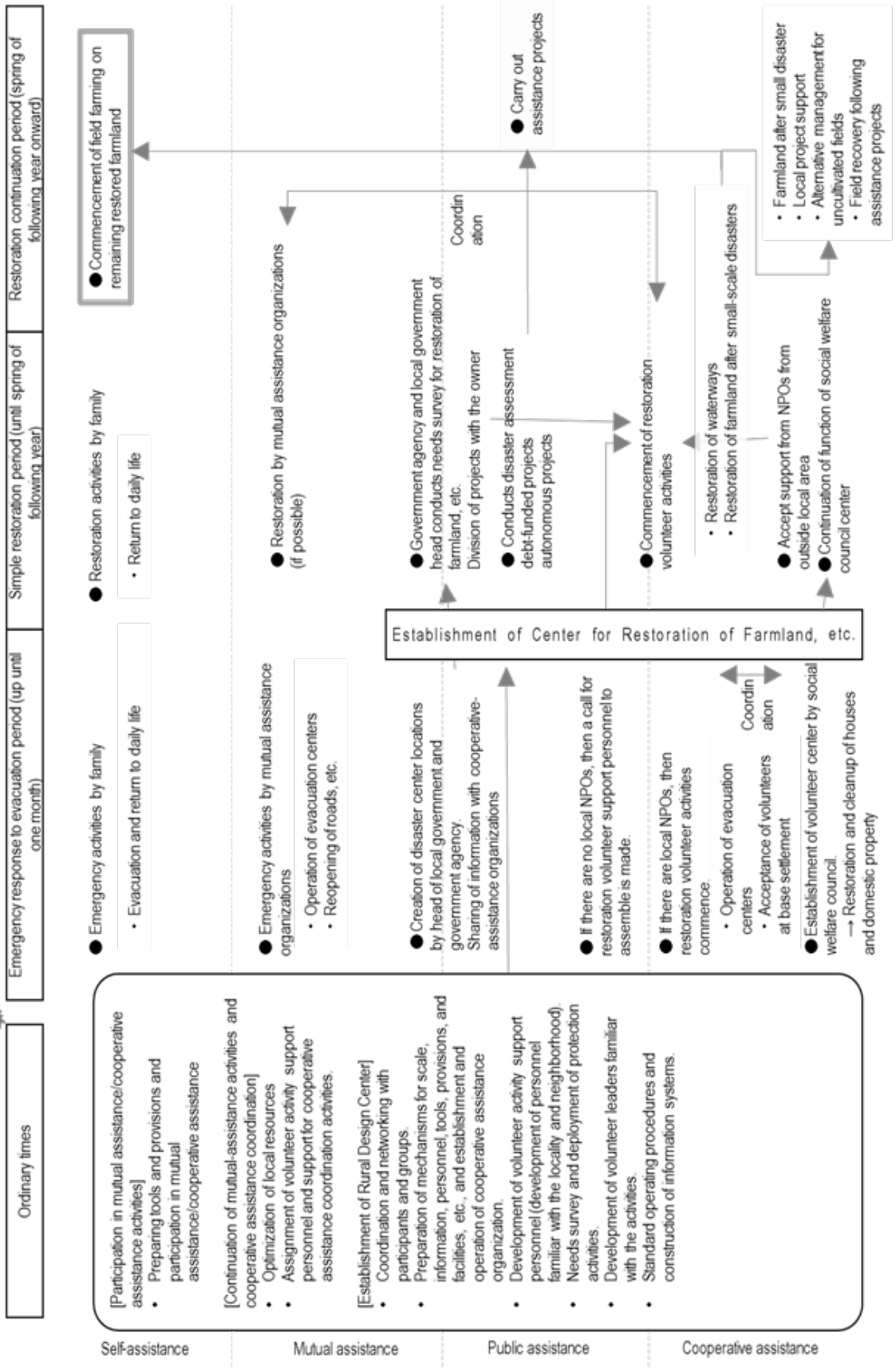

Figure 2. Support Model for Farm and Forestry Land Restoration

Generally, farmers do not have any idea how to obtain the support of volunteers for farm work during ordinary times and for restoration of farmland after disaster damage. Volunteers show similar thinking. The Rural Design Center designs a broad range of activities for the local area during ordinary times, and supports the improvement of community resilience.

(b) Volunteer activity support personnel

The skill that is most required from volunteer activity support personnel is knowledge of the locality and the neighborhood. When a local area is damaged by disaster, these personnel conduct needs surveys and support communication with the local authorities and cooperative support organizations.

(c) Volunteer leaders

Volunteer leaders are citizen volunteers with the ability to lead an activity group of 5–10 people. It is preferable for the leader to have practical experience working in the local area during ordinary times. In accordance with a dispatch request from the Rural Design Center, operational cooperation is provided according to a schedule of who can participate. In addition to being good at communicating with the other participants, other preferable skills are safety management with respect to work tasks and tools, keeping watch over everything, controlling progress, directing work, and recording activities. Ideally the person is able to drive a car, first aid, and has experience with various kinds of restoration work and technology.

(d) Establishment of a base settlement

A special characteristic of hilly and mountainous areas is the presence of narrow land in valleys. Therefore, when a disaster occurs, there is a high possibility of people getting isolated. For volunteer activities in such local areas, the people and materials need to be brought in together, and it is necessary to have a base facility from which to operate various activities throughout the local area. It is preferable that during ordinary times this facility operates as a service activity base that can accept urban citizens and support tourism, volunteer activities, or accommodation; or production, processing, or sales of agricultural or forestry products.

(e) Emergency response to evacuation period (up to one month)

This period is mainly for evacuation and emergency response via self-assistance, mutual assistance, and public assistance. If there is a cooperative assistance organization in the local area's base settlement, however, emergency response support will be carried out, such as support for operating an evacuation center or work to reopen roads. When a volunteer center is set up by the social welfare council for the restoration of houses, the cooperative assistance organization or the volunteer activity support personnel will accept volunteers and begin activities.

(f) Simple restoration period (until spring of the following year)

The restoration of farmland is important not only for the management and harvesting of agricultural produce planted in the affected year, but also for organizing the planting for the next year for disaster affected farmland and agricultural facilities. It is all well and good if restoration can take place via self-assistance, but when restoration is difficult, the farmer either requests restoration support via cooperative assistance or methods are employed for staging debt-funded projects directly controlled by the city or works that are autonomously carried out by the city. In particular, work carried out manually using light-weight machinery wielded by volunteers is effective for the restoration of waterways buried by mud, and the

removal of mud, rocks, and trees that have been washed onto farmland.

The Rural Design Center can change into a support center for farmland restoration and carry out such activities. In cases when there are NPOs in the affected region, it is preferable that they undertake the center's functions, but when there is no NPO it is necessary that a disaster volunteer center under a social welfare council or local government agency undertakes the center's functions, temporarily sets up as a new cooperative assistance organization, and provides the necessary response.

(g) Restoration continuation period (spring of following year onward)

From the fiscal year that follows the affected year onward, effective volunteer activities include field recovery on the restored farmland in addition to restoration of the farmland outside the scope of the assistance projects. Also, the network of volunteers who contributed after the disaster can be used to establish new revitalization efforts such as reopening annual events in the local area such as festivals. On the other hand, there are many cases of farmland being left uncultivated because assistance works are scheduled to occur in a few years. When left untilled for a number of years, it is difficult to recover a field, and it is preferable that alternative management be carried out by a local NPO, production union, or Rural Design Center. If it is difficult to continue cultivation because of advanced age, one option is for a production union that is coordinating with cooperative assistance to enter into a leasehold agreement with the farmer to operate the field. Restoration works are normally not sufficient for the restoration of farmland. It is well and good if restoration can be achieved through self-assistance, but cooperative assistance support is also effective.

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About the Author

KAZUO ASAHIRO has been involved in landscape conservation, especially with respect to countryside woodland planning and management. He did research studies on the status of community forests in Teknaf, Bangladesh, and on the support for farmland restoration after flooding disasters occurred in the hilly and mountainous areas of Japan. Together with M. Tani and H. Kanekiyo, he authored the research on the damage distribution to farmland in Yame City, Fukuoka Prefecture and the difficulties met in recovery, after heavy rains flooded the northern part of Kyushu in 2012. He authored the "BTCV Standards Leader Training Program for Environmental Conservation Volunteers in Japan," and the "The Analysis of Forest Crown by Determining Same Color Regions in Aerial Photograph Images of a Northern Kyushu Satoyama Rural Forest." For about 8 years, Asahiro was affiliated with the Department of Environmental Design, Kyushu Institute of Design. In 2003, he joined the Faculty of Design, Kyushu University. Asahiro is a member of several academic societies, namely: The Japanese Institute of Landscape Architecture; Association for Rural Planning; Japan Association for Landscape Ecology; Center for Environmental Information Science; The City Planning Institute of Japan; and the Architectural Institute of Japan.

The Challenge of Physical Activity in Disaster Preparedness and Post-disaster Interventions

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Abstract

Physical activities in leisure promote norms and behaviour that are important for coping with daily life, promote basic values through team sport activities, e. g., social cohesion and social integration. Recently, it is recognized as one of the approaches in the physical and psycho-social programs for disaster preparedness and post-disaster interventions. This paper presents cases in disaster-stricken countries where post-disaster activities utilized the power of physical activities in rebuilding communities. Post-disaster intervention is more than just simply distributing relief goods and building temporary shelters. The true challenge of the aftermath is in the necessary psycho-social intervention through physical activity to build internal coping mechanisms and resilience among affected individuals and communities.

Introduction

After survival, post-disaster activities primarily focus on rescue operations and basic needs. Thereafter, communities move towards renewal and empowerment, primarily focusing on material losses, social disruption and the psychological de-stressing/debriefing. Normally post-disaster responders would include only relief-aid workers and humanitarian staff. Recently, more responders who are into psychosocial interventions have been more visible at the core of reconstruction phase. This includes physical activity (PA) in post-disaster intervention which has been drawing international attention, leading to many discussions, programs and policies on issues like climate change, disaster preparedness, and mitigation strategies, most especially in rural communities.

Physical Activity in Post Disaster Interventions

Physical activity has always been equated with healthy active leisure lifestyles. As defined by the World Health Organization (WHO), PA is any bodily movement produced by skeletal muscles that requires energy expenditure – thus, the different forms of large muscle movements or activities undertaken while working, playing, carrying out daily life activities, travelling, and engaging in recreational pursuits like sports, dance, games and exercise for fitness. However, in post-disaster interventions, PA takes a different but definite form, especially for children and the youth.

A case in point was the 26 December 2003 earthquake in Bam, Iran, where interventions (in a pilot project) for 6-18 years old boys and girls needed to be addressed was realized through collaborative works initiated by the Swiss Academy for Development, UNICEF, and People in Need. It was hypothesized that mental emotional trauma-response is beyond the provision of basic material and technical needs. Generally, physical activities, sport and play in

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particular, are for purposes of psychosocial rehabilitation and strengthening the resiliency of children and youth in post disaster situations, where the specific goal was simply to improve the physical and mental well-being of the children and youth. Through physical activities, the group of Iranian children and youth was provided with useful leisure time performances that promoted norms and behaviour important for coping with daily life. The leisure time also promoted basic values through team sport activities such as the importance of respectful social cohesion and social integration. In addition, physical activities also provided a platform for the information and discussion of health issues, e.g., drug abuse, violence, HIV/AIDS, hygiene; provided support in capacity building and empowerment of local coaches and staff; and gave parents/relatives some relief and time to be on their own. To attain these, a lot of leisure sports (not competitive in nature) were scheduled in three different localities, either joint or separately for boys and girls: gymnastics, taekwondo, ping-pong, football, volleyball, basketball (Figure 1).

Figure 1. (left photo) Iranian girls playing football; (right photo) Playing basketball amidst the debris.
Source: Sport and Play for Traumatized Children and Youth: An assessment of a pilot-project in Bam, Iran, Swiss Academy for Development (SAD)

Interestingly, some responses from the children, parents and coaches showed positive changes after the sports activities. The coaches became the role models of the children and youth and in 2006, i.e., 3 years after the disaster, more than 300 children participated in sports activities. Especially the girls who were not into sports started to enjoy participating in physical activities and learned to socialize in co-education 'friendship circles'. Generally, the participants were able to cope with and eventually able to overcome issues on fairness and health as well as performing in safe open and covered spaces towards long term participation.

In Japan the Physical Activity Therapy program was also introduced. Although sport has long been used in the country as a post-disaster intervention activity it was found effective soon after the 2011 Honshu earthquake and tsunami.

In the Philippines, a project "Play it Forward" for 6-12 years old children was conducted after tropical storm Sendong ("Washi") hit Cagayan de Oro (CDO). The University of the Philippines (UP) - College of Human Kinetics (CHK) and the United Laboratories (UniLab) Foundation collaborated in conceptualizing and implementing a program to help the children experience the developmental and therapeutic benefits of play. More specifically, the developmental

objective was to improve the children's motor skills and control of their bodies by engaging in activities that require movement, balance and strength, eventually gaining confidence in using their bodies. They also learned and practiced safety procedures when playing in school, in their play space, home and community. The therapeutic objective was to provide time for the children to play, and let them have fun and free-playing experience. The intervention program, accomplished within 6 months, with 15 children per facilitator, had the following activities done once every 2 weeks for 1 hour and 30 minutes: arts, music, fitness testing and outdoor Filipino games, e.g., "piko" (Figure 2), "luksong tinik"or "luksong baka", "tagu-taguan", "tumbang preso", "patintero", "langit-lupa", "agawan-base", etc. Anthropometric (height, weight) and physical fitness tests – sit and reach test, step test (Figure 3), grip test, plank test, reaction time test – were also conducted to assess the physiologic benefits of the program on parameters that are needed in coping physically during disaster.

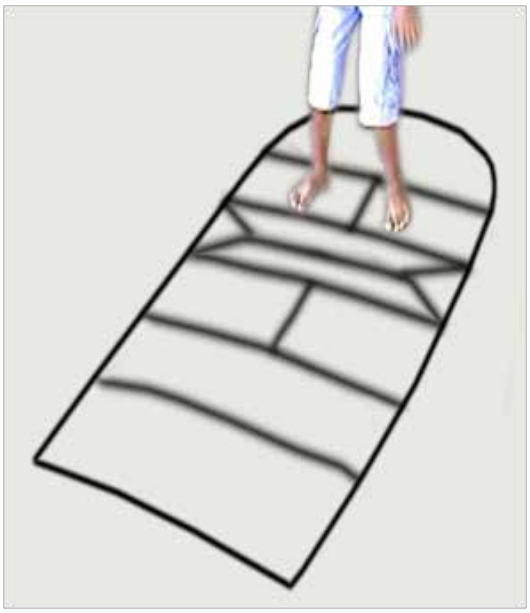

Figure 2. The "Piko", a Filipino version of hopscotch.
Source: Report on Research Agenda, College of Human Kinetics, 2014

Figure 3. Fitness Testing: Sit and Reach test (left photo), Step test (right photo).
Source: Report on Research Agenda, College of Human Kinetics, 2014.

Another case was after the 2013 earthquake in Bohol. Students of the UP College of Human Kinetics conducted a sports relief community recreation program for 200-400 children and adults, all survivors of the earthquake. Unlike the CDO program the Bohol post-earthquake program was only for two (2) days filled with ball games like basketball, football, and volleyball games. And other activities like Pilates, team-building games, Zumba, dance, art sessions, gymnastics, and yoga sessions. Collaboration was sought from the Local Government of Bilar, Bohol, Provincial Health Office, Mental Health and Psychosocial Support Cluster, Bohol Football Association and the IKA Soccer Team (Figure 4).

Figure 4. The "Duwa Ta, Bohol" (Let's Play): a sports relief and community recreation for Bohol Earthquake Survivors.
Source: Report on Research Agenda, College of Human Kinetics, 2014

Physical Activities as Tools for Disaster Preparedness

It has been established that community-based physical activities are therapeutic as well as developmental. It is important, therefore, to see physical activities as tools for preparedness before disaster takes place. For instance, in line with Typhoon Yolanda ("Haiyan") in Tacloban City, Leyte, a priest who runs daily for physical fitness was able to avoid flying objects by running faster. Then, he climbed onto a roof safely to avoid the storm surge. He shared his experience and stated that he did it, effortlessly. When one is physically fit, the body can have extra energy to perform during emergencies.

Preparedness can also mean readiness to help others. A case in point was that of a private school Physical Education teacher who facilitated some physical activities with children inside the Sto. Niño Church that served as an evacuation center during the natural calamity. A 3rd

case was a school principal, who was a former football teacher. He formed a team for children, who were looking for physical activities during the children's free time. Thus, physical fitness is critical for normalizing community life and community development, especially when emergencies strike.

During the same disaster, the displaced students of the University of the Philippines were taken in by the Diliman campus to continue their studies for the rest of the semester. These students were given psychosocial-related activities, most of which were expressive arts therapy-related. A non-verbal activity which was physical in nature, the Dance Movement Exploration (DME) was introduced, which assisted the students in de-stressing and coping from their post-disaster trauma. During the session the students were absorbed in the movements, obviously looking within and not minding the people around them. The expressions observed in their movements demonstrated the following: involvement of self in the situation (concentration / eye movement); grief/sorrow (body curled to center); willingness to forget the past (explosive movements / moving around / working with others). DME, as a new approach in discovering self in movement, helped the students in realizing their potentials in moving on after a major disaster experience, self-realization of their present situation and their capabilities to cope by themselves … with only the self who can heal them (Figure 6).

Figure 6. Dance Movement Exploration (DME) as a new approach in discovering self in movement.
Source: Report on Research Agenda, College of Human Kinetics, 2014

Conclusion

From the different cases presented, indeed, sport and play activities are critical to healthy development and are essential for optimal growth and learning of children and the youth. Providing them with the opportunity and a safe space to play help them to re-establish a sense of hope and normalcy – enhancing innate resilience and healthy development. Regularly-scheduled structured play activities such as sports, drama, music, and art, are vitally important in the emergency and post-conflict period because they enable children to process the events around them and resume normal childhood development.

Restoring the well-being of community members is of significance. Sports and games are widely recognized for the ability to enhance social interaction and innate resiliencies and healing processes. Organized sport and play activities, traditional games, dances, songs, and stories provide a structured environment that creates a sense of safety and stability, promotes social integration, reduces idle time for many young people, and enhances a sense of cultural identity. Thus, education plays a big role during and after conflict and emergencies. During these times, the rapid establishment of structured recreational activities for children can bring about a degree of normalcy as well as redefine youth roles.

Efforts are underway in the Philippine setting to involve people from all walks of life in preparing for disasters. For persons with disability (PWD) considerations in their participation in physical activities should be adaptive in nature. At a particular stage after a disaster, everyone should be involved no matter what their disabilities are. Inclusion should be applied, having as much as possible an activity or session that both types of persons can do and manage. With respect to activities, e.g., climbing and swimming, Edwin Domingo of the Department of Environment and Natural Resources, stated that the National Disaster Risk Reduction Management Council (NDRRMC), has already included swimming in their training programs, to better achieve the goal of having resiliency. Sports development programs should include recruitment of local coaches who are culturally- and gender-sensitive, with continuous education and support towards disaster preparedness and post-disaster interventions. Communities should provide safe sporting facilities. Schools and communities as well as parents should work hand in hand in providing programs, especially after-school programs.

To conclude, physical activity, particularly sport, has a potentially strategic role for enhancing public education and awareness about the environment as well as sustainable development. Physical activities are an important component of an enhanced quality of life, of which environmental and ecosystem health is an integral part. Finally, physical activities can catalyze and contribute to social and political change and be a bridging, mending and binding force that can play an important role in realizing sustainable development in the long run.

A ‘football’ made of plastic bags gathered from the debris after the 2003 Iran earthquake.
Source: Sport and Play for Traumatized Children and Youth: An assessment of a pilot-project in Bam, Iran, Swiss Academy for Development (SAD)

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Evidence-based Planning for Resilient Local Health Systems (rEBaP) in Yolanda-affected LGUs in Iloilo-Capiz-Cebu

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Abstract

The UNICEF-funded evidence-based planning for resilient local health systems (rEBaP) is being implemented in the Yolanda-affected local government units (LGUs) in Iloilo-Capiz-Cebu for the development of their Health Emergency Preparedness, Response, and Recovery Plans (HEPRRP) during disasters. There were a total of 19 LGUs (9 from Iloilo, 8 from Capiz, and 2 from Cebu) with 3 representative planners from each LGUs – the Municipal Health Officer (MHO), Municipal Planning and Development Officer (MPDO), and Municipal Disaster Recovery and Rehabilitation Management Officer (MDRRMO). It is premised on strategic approaches in disaster management and planning using the 6+1 WHO building blocks for a functional health system: Leadership and Governance, Health Service Delivery, Medicines and Technologies, Health Financing, Information and Research, Health Human Resources, and Community Resilience. The methodology involved four training modules for the planners : Psychosocial–Psychosocial Processing (PSP), Health Emergency Management System (HEMS) training, and two workshops that concentrated on hazards mapping, surge capacity assessments, and identification of gaps with corresponding evidence-based local strategies to achieve resilience during disaster-related emergencies. These 4 training modules were spread over a span of 8 months with coaching sessions after workshops 1 and 2 (April-November 2015). The HERPRRP plan was their main deliverable by December 2016. Local strategies employed by the LGU included Memorandum of Agreement with their Inter-Local Health Zones (ILHZ) members, sister-town partnerships, cloud computing for information storage, trainings for barangay health workers, youth, and teachers on community-based PSP, use of medicinal plants in their local barangays, and stocking of medicines and emergency supplies in caves (particularly in geographically-isolated and disadvantaged areas). All 19 LGUs were on track to submit their Sanggunian Bayan (SB) ratified HERPP plans by December 2015.

Background

Super Typhoon Haiyan, locally known as Yolanda, made landfall over Guiuan, Eastern Samar on the 8th of November 2013. With intensified sustained wind speeds of 235 kph, gusts of 250 kph[2] and a storm surge as high as 5 meters, it subsequently tore through the islands of Leyte, Samar, Eastern Samar, Northern Cebu and Panay Island[3], their coastal and inland areas

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[2]http://www.ndrrmc.gov.ph/attachments/article/1329/FINAL_REPORT_re_Effects_of_Typhoon_YOLANDA_(HAIYAN)_06-09NOV2013.pdf
[3]http://www.unicef.org/philippines/After_Yolanda.pdf

the hardest hit. Prior the occurrence of the Typhoon, these communities were already among the most vulnerable in the Philippines, with 40 per cent of children living in poverty[4].

Recorded as one of the most powerful tropical cyclones that entered the Philippine Area of Responsibility[1], the devastation ranged from the loss of more than 6,000 lives, the displacement of over 4.1 million including 1.7 million children, to the damage of infrastructure and livelihood[3]. Basic health services including routine immunization were disrupted due to the destruction of cold chain equipment and vaccines. There was a demand for maternal, neonatal, child health and nutrition services due to high fertility rates, especially among teenagers. Limited access to safe drinking water and food not only increased the risk of waterborne diseases but also highlighted the challenges on malnutrition. Access to basic social services also deteriorated[5].

The initial response following the aftermath of the Typhoon came from the residents of the affected communities and nearby provinces[2]. Despite the strong capacity of the Philippine Government in disaster preparedness, response and rehabilitation, assistance was given by the United Nations. The cluster system was activated, with United Nations Children's Fund (UNICEF) providing support and technical assistance to the government[4].

Resilience is the ability to withstand, adapt to, and recover from shocks and stresses in ways that support economic and social development, preserve integrity; and in ways that do not deepen vulnerability[3]. Aside from the immediate response through the global mobilization of health personnel, supply and financial aid, there remains a need to improve the ability of local health systems to withstand and recover from the impact of natural disasters. Building resilience and reducing the risk faced by communities from disasters is a key priority for UNICEF, as the Philippines is the third most disaster prone country in the world[4].

Stocktaking activities were conducted after the Typhoon so as to analyze experiences during health emergencies and determine the preparedness of local health systems for an immediate disaster response. Significant findings include insufficient human resource capabilities, poor local response and the absence of designated health emergency service coordinators in most Local Government Units (LGUs). Moreover, most LGUs did not have a Health Emergency Preparedness, Response and Rehabilitation Plan (HEPRRP). The Disaster Risk Reduction and Management Plan (DRRMP) was the general plan of the LGUs, wherein the component specific to health was limited only to the availability of medicines. Given these conditions, a robust HEPRRP is important in improving the resilience of local health systems and will consequently be integrated into the Municipal/Provincial/Regional DRRMP.

In response to the urgent need for feasible plans of action for resilience and health systems strengthening, the Evidence-based Planning for Resilient Local Health Systems (rEBaP) Project was initiated with the aim to support LGUs in formulating and strengthening their HEPRRPs, a key for an efficient and effective management of emergencies and disasters that will consequently decrease disaster-related morbidity and mortality, as well as the negative psychosocial effects of health emergencies. The Department of Health, as well as the different levels in the local government, has to formulate such plans so as to ensure efficient decision-making during all phases of emergencies or disasters[6].

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[4]http://www.unicef.org/philippines/Haiyan-4mo-report-web.pdf
[5]http://www.unicef.org/philippines/UNICEFPhilippines_Haiyan1yrProgressReport.pdf
[6]http://hems.doh.gov.ph/uploads/publication_attachments/550d06ef142de7f33fb172c8edac9de3e24a5938.pdf

The rEBaP Project was spearheaded by UNICEF together with 9 partners from the government, civil society organizations, and the academe. Interventions in the field of mental health and psychosocial support, health emergency management, evidence-based planning, coaching and mentoring, as well as monitoring and evaluation activities were implemented for 50 priority LGUs from Regions VI, VII and VIII.

A total of 19 cohorts were under the guidance of the University of the Philippines Visayas (UPV) in collaboration with the Department of Health – Regional Office VI (DOH-RO VI), as well as the Provincial Health Offices of Iloilo and Capiz. There were initially three priority LGUs in Iloilo: The coastal municipalities of Concepcion and Estancia, the former being the fifth landfall during the Typhoon; and Sara, a second class municipality favorable for farming and cattle-raising. As per the request of the Iloilo Provincial Health Officer II, however, the rest of the six municipalities of the Alliance of Northern Iloilo Health and Development (ANIHEAD) Inter-Local Health Zone (ILHZ) were included: Ajuy and Carles, one of the leading producers and suppliers of marine resources in the province; the agricultural towns of Balasan, Lemery, and San Dionisio; and Batad, a fifth class municipality. Eight priority LGUs were from Capiz: Ivisan, having the smallest land area in the province; the Municipalities of Panay and Pontevedra with aquaculture as their primary source of income, the latter known for milkfish production and processing; Pilar, the largest and richest fishing ground in Western Visayas; the second class municipality of Jamindan, one of the biggest municipalities in the province in terms of land area; Maayon, with abundant yet untapped mineral resources; and the agricultural communities of Panit-an and President Roxas. There were two priority LGUs in Cebu: the Municipalities of Daanbantayan and Bantayan, both first class municipalities with tourism as the major industry, and were respectively the third and fourth landfall during the Typhoon.

The rEBaP Process

The implementation of the rEBaP Project followed several carefully designed steps in order to achieve its objectives. These different processes were also properly documented in order to know the different elements of the project, which worked and which did not, as well as which needed to be developed further. These were developed to learn from the experience of piloting the project for future implementation. The project started with social preparation activities for each of the LGUs before proceeding to the implementation of the four different intervention modules; namely, Psychosocial Processing, Basic Health Emergency Management Training Course, Planning Workshop 1, and Planning Workshop 2. Coaching and mentoring activities were also done after the first planning workshop and after the second planning workshop.

Social Preparation

Social Preparation was done before the start of the different interventions. It is the first leap in building partnership with the LGU to mobilize, prepare, and set the tone for the social transformation process to take place in the community[7] .

Communications were given to each LGU prior the visit, indicating the presence of the Local Chief Executive (LCE), Municipal Health Officer (MHO), Municipal Planning and Development Coordinator (MPDC), and Municipal Disaster Risk Reduction and Management

[7]http://www.rafi.org.ph/institutional-development-planning/community-organizing/

Officer (MDRRMO). During the visit, LGU officials were given an overview of the formulation of the rEBaP Project after the stocktaking activities conducted by UNICEF. The importance of the HEPRRP was highlighted throughout the discussion, most especially with regard to its indicators in the LGU Scorecard. The different packages of interventions were introduced, namely, the Psychosocial Processing (PSP), Basic Health Emergency Disaster Management and Training Course (BHEDMTC), Planning Workshop 1, Planning Workshop 2, as well as the coaching and mentoring cycles.

In the social preparation activities, the Development Management Officers (DMOs) of the DOH played a vital role in this process by orienting the implementing partners to the profile and dynamics of the LGUs. During the visits to the LGUs, the LCE is asked to dedicate three planners to represent their municipality in the different intervention activities. It is explained to the LCE that the MHO, MDRRMO, and the MPDC may be the best people to represent the LGU due to the functions that they play in the unit. The MHO should be one of the planners since the output centralizes in health emergency. The MDRRMO is essential in addressing disaster-related concerns and integrating the HEPRRP into the DRRMP. The MPDC was also recommended to ensure the budget allocation of the plan. Some LCEs, however, signed other officials who were more adept at the planning process. It is important to note that the LCE was given the responsibility of assigning the three planners, as this translates to the ownership of the project.

Module 1: Psychosocial Processing. It was deemed that the process of planning for future disasters may involve revisiting experiences in past disasters; the most salient of which was that of Typhoon Yolanda. Because of this, it was thought that a module that would psychologically prepare the planners for the work ahead is necessary, and this necessitated the conduct of a module on Psychosocial Processing (PSP).

The PSP was facilitated by the Balik-Kalipay – Citizen's Network for Psychosocial Response (then known as CNET-PSR) to help the planners process and express traumatic experiences during Typhoon Yolanda and transform their stories toward a more hopeful and positive meaning through creative performances. Furthermore, planners would be able to understand the core principles of mental health and psychosocial support (MHPSS) as applied to self and community recovery by experiencing relaxation exercises as tools for stress management. It also aimed for the planners to have a deeper journey toward the self through reflections, understanding one's own virtues and values, and how important these processes are in self-care and ultimately in their roles as community planners.

Module 2: Basic Health Emergency Disaster Management Training Course. The University of the Philippines Manila – College of Public Health (UPM-CPH), in partnership with the Department of Health – Health Emergency Management Bureau (DOH-HEMB), conducted the Basic Health Emergency Disaster Management Training Course with the aim to give the planners an overview on health emergency management during disaster. The training course gave insights to non-health officials about the basic concepts, also discussing the importance of the Incident Command System (ICS) and Operation Center (OPCEN) when it comes to logistics and operation management.

The concept of the World Health Organization's six building blocks which are composed of Leadership and Governance, Health Financing, Information and Research, Medicines

and Technology, Health Workforce and Service delivery was introduced. UNICEF added Community Resilience, making it a 6+1 building block approach to focus on a community level. The participants were also given an overview of the cluster approach which includes Water and Sanitation Hygiene (WASH), Nutrition, Mental Health and Psychosocial Support (MHPSS), and Medical Services which is further subdivided into Maternal and Child Health, Injuries, Communicable Diseases and Life-Threatening Chronic Conditions.

Module 3: Planning Workshop 1. The Planning workshop 1 was conducted over three days for LGUs to develop the basis of their HEPRRP. What made the rEBaP process different was the focus on the context of the different LGUs – the HEPRRP crafted in the rEBaP process focused on the LGUs' unique disaster experiences, vulnerabilities, and existing capacities to cope with these vulnerabilities. These were the elements that were the focus during the first planning workshop.

The workshop used the disaster scenario approach to guide LGUs to assess their vulnerability to disasters. Planners examined their surge capacity to deliver health service in their locality and they developed evidence-based strategies in filling their gaps to prepare for and respond to a disaster.

Planners were taught the concept of resilience, and how it is being applied in health systems wherein inherent strength and adaptive capacity are critical to achieving resilience during disaster and emergencies. Core competencies of the building blocks were introduced for their health systems to coordinate a good response to an event. Core competencies may serve as a monitoring and evaluation for different building blocks to ensure the ability of the health system to respond. The principle of "all hazards approach" wherein in any type of disaster there are many similarities in the response, was discussed in order for them to come up with key areas for strengthening plans.

Different exercises were given to the planners for them to develop a sense of resiliency in health systems. They developed a disaster scenario where they validated the problems at different time points occurring in the affected population using their available resources like hazard maps, vulnerability profile, historical data and disaster reports within the last five years, health or disaster-related ordinances and policies, among other necessary information. They were also asked to provide surge capacity analysis for them to prepare for changes in different health care needs during normal operations and due to damage facilities, human resource shortfalls, shortage of supplies and access issues. Surge capacity can be described as "the ability to manage a sudden and unexpected increase in patient care that under normal circumstances would be severely challenged". Planners identified information using their existing capacities that will help predict the ability of the system to meet the demands of the impact of the disaster. Gaps in surge capacity result in a shortfall in service delivery following a disaster. These gaps were analyzed and addressed by a feasible strategy.

The first step of planning for health following a disaster is understanding the need for different health services at different timeframes. This concept helped the planners identify essential preventive action that will need to happen to avert future health problems. The services were organized according to clusters, health, WASH, nutrition, and MHPSS to assess the ability of the health system to respond with their surge capacity by area of responsibility. Health Services corresponds to direct medical services delivered at various levels of the health system. It is further subdivided into injuries, maternal and child health, communicable

diseases, and life-threatening chronic conditions. WASH relates to sanitation, access to safe water and other water-borne diseases. Nutrition focuses on food security, infants and young children feeding, and malnourished populations. MHPSS gives importance to stability of the mental health of the burdened victims, mental health patients and the responders. Other Services are services that do not fall into any of the categories above and tend to be either cross-cutting, the responsibility of other agencies, or services that are necessary as a result of the disaster. Cross-cutting refers to services that encompass the four clusters.

By the end of the workshop, planners were given expectations of the work to be completed before the next workshop. Support through coaching and mentoring would be offered after this module to further refine their strategies.

Module 4: Planning Workshop 2. The Planning workshop 2 was conducted over two days, and provided an opportunity to present and receive feedback on the proposed package of strategies. Prior to the workshop, a coaching and mentoring was done in their respective LGUs to further refine the strategies in addressing the gaps identified. This workshop has developed a robust monitoring and evaluation mechanism. It started incorporating the outputs into the HEPRRP template where they examined way forward to secure buy-in for the plan and build a resilient community and health system.

During the workshop, a panel of experts from DRR, WASH, Nutrition and MHPSS scrutinized the outputs of LGUs of their pre-assigned building blocks. Outputs were evaluated to ensure that the package of strategies to be incorporated in the HEPRRP is substantial in creating a resilient community, and suggestions were provided in order to improve these strategies. The discussion helped the planners to strengthen their arguments to secure buy in from other stakeholders to invest in the proposed strategies.

Another focus during the second planning workshop was the Monitoring and Evaluation (M & E). M & E is a critical component of a disaster plan to ensure that it would remain valid and effective. Planners were taught of the importance of drills and exercises of increasing complexity to continuously test, monitor and improve the plan. These tests using drills are also a part of the LGU scorecard for an operational HEPRRP. LGUs were given a course for them to be familiarized with the basic foundation of M&E, the use of core competencies to monitor HEPRRPs, and the design and evaluation of a basic drill. Exercises were given to ensure that the planners are knowledgeable of the basics of M&E. Planners learned the proper staff call-down drill and its evaluation. This helped other LGUs who lack formal protocols.

One of the end-goals of this project is for the LGUs to develop an evidence-based HEPRRP. Due to the inadequacy of the template from the guidelines of health emergency management, the rEBaP team has developed its own template for the use of its LGUS to ensure it is evidenced-based and responsive to local needs. Planners were familiarized to the template and they were provided necessary instructions in incorporating their analytical outputs during Planning Workshops 1 and 2 into their HEPRRP. Since most information is readily available, LGUs were focused to work on their Capacity Development Plan. Capacity Development Plan is where the strategies developed during Workshop 1 and later refined during the coaching sessions and Planning Workshop 2 are detailed into their component activities, given a timeframe, resources are detailed and responsibilities assigned.

After this module, another coaching and mentoring visit will take place to ensure that LGUs will design a solid and defensible package of strategies to be included in the HEPRRP.

This will also help them to present the comprehensive plan to stakeholders who are yet to be convinced of the importance of investing in the proposed strategies.

Coaching and Mentoring Cycles

Coaching and Mentoring sessions were conducted after each Planning Workshop so as to validate and refine the outputs of LGU Planners. A team of coaches composed of UPV faculty and DMOs conducted site visits during Coaching Cycle 1. The surge capacity analysis outputs were reviewed according to the 6+1 Building Blocks. The coaching process involved checking if all existing capacities have been specified and analyzing whether or not the strategies they formulated would address the gaps they have identified based on the impacts of disaster they have cited. The phrasing of entries was also critiqued.

Coaching Cycle 2 was done in two methods, primarily to ensure the completion of the HEPRRPs: site visits for Cebu LGUs and a write shop for Iloilo and Capiz LGUs. To facilitate an efficient flow of discussion, the coaching process was divided according to the sections in the HEPRRP. Short lectures on the Disaster Management Cycle of Risk Management, Principles of Planning and Disaster Preparedness and Recovery added further insights to supplement the HEPRRPs of the LGUs.

Outcomes

Table 1. Type of LGU Planners during the rEBaP Project Implementation

Designation	Number
MHO	18
MPDC	8
MDRRMO/MDRRMO-Designate/MDRRMO Staff	15
MPDC/MDRRMO	3
DTTB	1
Encoder	16
Others: PHN or Nurse, MCR, SBO, MEO, Medical Technologist	10

Table 1 shows the type of LGU planners involved during the implementation of the rEBaP Project. One (1) DTTB participated in lieu of the MHO. Three (3) officials were both the MPDC and MDRRMO of their respective municipalities. Ten (10) planners were not the target participants, but were selected by their respective LCEs to be part of the team as they were adept at the planning process. Sixteen (16) LGUs requested to include another member as their encoder during the Planning Workshops.

Each municipality should be well-represented during the activities. The attendance to the four modules was evaluated according to the total number of participants, LGUs and LGU teams with 3 or 4 representatives, as indicated in Table 2. The initial number of expected participants was 59 since there were already two LGUs with four members. The addition of 14 encoders increased the number of expected participants to 73 during Module 3. Two (2) LGU planners, however, were considered as dropouts due to their consistent absences since Module 1. Thus, the expected participants during Module 4 became 71. While the teams with 3 or 4 participants were 63% during Modules 1 and 2, and 89% during Modules 3 and 4, 100% of the LGUs were represented throughout the four modules.

Table 2. Attendance of rEBaP Municipalities during the Series of Interventions according to Different Indicators

Intervention	Indicator A	Indicator B	Indicator C
Module 1: Psychosocial Processing for Planners	86% (51/59)	100% (19/19)	63% (12/19)
Module 2: Basic Health Emergency Management Course	83% (49/59)	100% (19/19)	63% (12/19)
Module 3: Planning Workshop 1	90% (66/73)	100% (19/19)	89% (17/19)
Module 4: Planning Workshop 2	87% (62/71)	100% (19/19)	89% (17/19)

Indicator A: Percentage of LGU Planners present during the series of interventions
Indicator B: Percentage of LGUs present during the series of interventions
Indicator C: Percentage of LGUs with 3 or 4 representatives during the series of interventions

Table 3 shows the status of LGU outputs based on the following indicators: (1) Completed, or the inclusion of sections on preparedness, response and rehabilitation, along with monitoring and evaluation; (2) Approved, or signed by the LCE; (3) Budgeted in the AOP; (4) Integrated, or the consistency of the HEPRRP components with the DRR elements; (5) Disseminated, or

Table 3. Health Emergency Preparedness, Response and Rehabilitation Plan Status of rEBaP

LGU	Completed	Approved / Signed	Budgeted	Integrated	Disseminated	Tested
Ajuy	✓	✓	✓			
Balasan	✓					
Batad	✓					
Carles	✓	✓	✓			
Concepcion	✓	✓	✓			
Estancia	✓					
Lemery	✓	✓	✓			
San Dionisio	✓					
Sara	✓					
Ivisan	✓	✓	✓			
Jamindan	✓					
Maayon	✓	✓				
Panay	✓	✓	✓			
Panit-an	✓	✓	✓			
Pilar	✓		✓			
Pontevedra	✓	✓	✓			
President Roxas	✓	✓				
Bantayan	✓					
Daanbantayan	✓					

Municipalities Reported as of January 2016

the orientation of stakeholders through a forum; and (6) Tested, or the application of the plan during an actual disaster, emergency or drill. As the conduct of the package of interventions began during the third quarter of 2015, the target HEPRRP completion on the last week of November was no easy task. All 19 municipalities have submitted their outputs.

Other Activities and Next Steps

Institutionalization of rEBaP in the University of the Philippines

The institutionalization of rEBaP in the University of the Philippines involved faculty from the University of the Philippines Visayas (UPV) and the University of the Philippines Manila – School of Health Sciences (UPM-SHS). It was conducted to integrate the elements of health emergency management and evidence-based disaster planning in the UP System. Its curricular integration was discussed in three parts: (1) Major Course, (2) Master's Course, and (3) General Education Course. Along with this development of syllabi was the preparation of learning outcomes.

National Colloquium on Resilient Health Systems: The Experience of Yolanda-affected Municipalities

The highlights of the rEBaP Project accomplishments were presented during the National Colloquium on Resilient Local Health Systems: The Experience of Yolanda-affected Municipalities. The event aimed to disseminate and share learnings from the project, acknowledge and recognize contributions from the different LGUs and implementing partners, to turn over and endorse the project to DOH-HEMB, and to 'market' LGUs to possible donors for their HEPRRPs.

Around 220 LGU planners, partners, counterparts from government agencies and esteemed guests from INGOs participated. Keynote speakers delivered their messages on Building a Culture of Resilience. Representatives from Eastern Samar, Leyte, Iloilo and Capiz shared their Typhoon Yolanda experience, rEBaP journey and action plans. LGUs and implementing partners were recognized during the Awarding and Turnover Rites. A Gallery Walk showcasing the profiles of LGUs served as an avenue for gaining potential donors for HEPRRPs.

The UNICEF Yolanda Cohorts: Evidence-based Disaster Planning Two Years After

UNICEF Yolanda Cohorts: Evidence-based Disaster Planning Two Years After was held to introduce resilience and health systems strengthening through evidence-based planning, provide insights on disaster risk reduction and management, as well as disseminate and share project learnings and best practices.

The participants to this rEBaP Public Forum were faculty and students from the health sciences of various schools in Iloilo City. The concepts of Disaster Risk Reduction and Management, Evidence-based Planning and Health Emergency Management were introduced. The role of Psychosocial Processing in health emergencies was discussed. Guest speakers shared the best practices of their respective municipalities in evidence-based emergency planning. The program was concluded with a Pledge of Commitment or Declaration of Support for a Resilient Local Health System in Disasters, wherein the participants affixed their signatures on a commitment board.

A similar rEBaP Public Forum will be conducted in Roxas City, Capiz.

Lessons Learned

The Evidence-based Planning for Resilient Local Health Systems (rEBaP) sought to support 50 priority LGUs in 6 provinces and 3 regions in formulating and strengthening their HEPRRPs for an efficient and effective management of emergencies and disasters. The 19 HEPRRPs of the Iloilo-Capiz-Cebu cluster were produced through the support and technical assistance provided by the implementation of interventions in the field of mental or psychosocial support, health emergency management and evidence-based planning. Participation in the four modules, as well as good facilitation, were keys in the formulation of the plan. Coaching and mentoring activities, along with constant stakeholder coordination and follow-up, facilitated the timely completion of the outputs.

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Enhancing Human Security By Developing Resilient Post-Conflict Rural Communities

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Abstract

The 21-day conflict between the Armed Forces of the Philippines and the Moro National Liberation Front in Zamboanga City in September 2013 centered on the seven highly dense barangays of Rio Hondo, Sta. Barbara, Sta. Catalina, Zone IV, Mariki, Kasanyangan and Talon-Talon. The armed conflict left over 400 persons killed, many more injured, billions of pesos in losses as the local economy came to a halt, 10,000 residential and commercial establishments burned or damaged, and more than 110,000 internally displaced persons. How do we "build back better" and create resilient communities? The Zamboanga City Roadmap to Recovery and Rehabilitation recommends rehabilitating the denuded mangrove areas in Mariki, Talon-Talon, Mampang and Arena Blanco; delineation of a mangrove forest buffer to protect families from coastal surge; on-site redevelopment of the houses destroyed by the fire and artillery, this time with greater accessibility to services by improving local circulation and fixing the housing densities; resettlement of the coastal households exposed to tidal action to safer areas less than one kilometer away, with the approximation of their houses-on-stilts and restoration of access to their water-based livelihood. Priority is given to the most vulnerable displaced groups such as Badjao and Samal fishermen. Social infrastructure such as schools, health centers, day care centers, mosques, and madrasahs will be integrated in the settlements. The new communities will be more resilient because their exposure to tidal action and coastal surge is lessened; natural waterways and drainage are freed from obstruction, and their dwelling units are retrofitted to withstand coastal surge and strong winds. Protecting sea-dwelling families and the coastal environment enhances human security. The rehabilitation process ensures that conflict-affected barangays are integrated in the development of Zamboanga City, not isolated from it. The displaced families themselves are key to ensuring human security in a post-conflict area. Their participation determines the resilience of their communities against both natural and human disasters. The entire recovery process showcases that various ethnic, religious and socio-economic groups can peacefully co-exist through consultative planning and design of resilient settlements.

Location and Topography

The study site is Zamboanga City, a medium-sized but rapidly growing city located at the southernmost tip of the Zamboanga Peninsula in Mindanao. It is bounded on the west by the Sulu Sea, on the east by the Moro Gulf, on the north by Zamboanga Sibugay Province, and on the south by the Basilan Strait and the Celebes Sea. The total land area of Zamboanga City is 148,338.49 hectares or 1,483.38 square kilometers.

The overall topography of the city is rolling to steep. There are some flat lands, mostly narrow strips along the east coast. The urban center, occupying about 6,400 hectares, is mostly flat with a gentle slope in the interior, ranging from 0 to 8%. This urban center or urban core radiates from Rizal Park, across the Zamboanga City Hall, and comprises 4.3% of the total land area of the city.

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About 38,000 hectares of the city land have slopes between 18 and 30%, while some 52,000 hectares (or 30% of the total land area) have slopes of 30-50%. The highest registered elevation is 1,200 meters.

Urban Development and Settlement Pattern

The urban development of Zamboanga City has been propelled by its rapid population growth in the last two decades. Its population in 2010 was 807,129, with a population growth rate of 2.98% for 2000-2010. This rate is higher than the Philippine population growth rate of 1.90% for the same inter-census period. The population growth in Zamboanga City was driven mainly by in-migration from nearby towns and municipalities in Western Mindanao. The Zamboanga population is almost twice as large as the combined population of the four cities in the region, namely Pagadian, Dipolog, Isabela, and Dapitan.

The city plays a central role in the development of the Zamboanga Peninsula. In 1990, then President Corazon C. Aquino issued Executive Order No. 429 providing for the reorganization of the Administrative Regions in Mindanao (Office of the President of the Philippines Executive Order 429, 1990). The order designated Zamboanga City as the commercial and industrial center of the region, and Pagadian City the regional center. Since 1990, however, only a few regional offices have been fully transferred from Zamboanga City to Pagadian City. In consideration of this situation, Memorandum Circular 11 was issued in 2010 by Executive Secretary Paquito Ochoa, upon the authority of President Benigno Aguino III, directing a moratorium on the transfer of regional offices of all departments and agencies from Zamboanga City to Pagadian City (Office of the President of the Philippines Memorandum Circular No. 11, s, 2010).

Zamboanga has been officially classified a highly urbanized city since 1983. More than half (56.01%) of the residents of Zamboanga City live in urban areas (Philippine Statistics Authority 2010). The city has 30 urban barangays and 68 rural barangays. The urban barangays occupy a total land area of 6,782 hectares, which is only 4.57% of the city land area. This indicates a lopsided distribution of urbanization, in which urban development has occurred in less than five percent of the total area of the city. The growth of the city has generally occurred in emerging barangays, of which many were eventually reclassified from rural to urban barangays. These urban villages converge in the central business district, with quick access to business and employment activities. The airport and seaport are within 3 kilometers from the city hall in the urban core: the airport is 3 kilometers from city hall, while the port is less than a kilometer away from the city hall. In the last few decades, much of the urban development of Zamboanga City has occurred within the 7-km radius from the urban core, in only 20 of the 98 barangays of the city. This area has also been the preferred business location of investors.

Table 1. Census of Population and Projected Population (2011-2020)

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
807,129	831,181	855,950	881,457	907,724	934,774	962,630	991,316	1,020,857	1,051,278	1,082,606

Note: 2011-2020 figures are projected based on the average annual growth rate of 2.98% (2000-2010).
Source: City Planning and Development Office

Social Integration and Mix

In terms of social diversity, Zamboanga City is a melting pot of ethnicities and religious groups. Nearly four of every ten residents reported Zamboangueño-Chavacano as their ethnicity. The others belong to Tausug (22.2 percent), Bisaya (20.7 percent), Sama/Samal (4.4 percent), Yakan (3.4 percent), Sama Bangingi (2.9 percent), Hiligaynon/Ilonggo (1.8 percent), Tagalog (1.6 percent), Cebuano (0.9 percent), Subanen/Subanon (0.8 percent) (Census of Population 2010). In terms of religion, about 60.8 percent are Roman Catholics. The next largest religious affiliation is Islam, accounting for 34.2 percent of the population. This is followed by the Philippine Council of Evangelical Churches (2.0 percent), Iglesia ni Cristo (0.8 percent), and Seventh Day Adventist (0.4 percent).

These ethnic and religious groups appear to co-exist peacefully in the city. Certain barangays are the domain of ethnic groups, and this arrangement is respected by the local population and government. Social integration is manifested in the fact that there are few gated subdivisions in Zamboanga City, an impressive situation, given the social diversity of its 807,129 residents. Nearly 60 percent of the 175,050 households owned or amortized the lots they occupied. About 22.3 percent occupied lots, rent-free, with the consent of the owner; 12.2 percent rented the lots they occupied, and 3.6 percent occupied lots, rent-free, but without the consent of the owner. The rest (1.9%) gave no information on their tenure status (Census of Population 2010).

Land Use

The rapid urbanization of Zamboanga City has been sustained, as manifested in the land use change from agricultural or forest uses to non-agricultural and non-forest uses. The 2006 Comprehensive Land Use Plan shows that the size of timberland or forestland areas has declined since 1972. From 45% of the total land area classified as forestland, only 40% remained in 1983. At the same time, built up areas increased from 3,952 hectares in 1972 to 5,424 hectares in 1983, representing a 37% increase. In 2012, the built up areas expanded to 11,977 hectares, or 20% of the total land area (Zamboanga City Socio-Economic Profile 2014).

However, even as the urban areas are expanding, the rest of the barangays remain undeveloped raw land. In the 2012 land use distribution, the built up areas comprise only about 20 percent of the total land area. The rest of Zamboanga City is composed of forest or agricultural land, in addition to watershed areas, natural parks, protected areas, fishponds and saltbeds (Zamboanga City Socio-Economic Profile 2014).

In addition to the limits imposed by topography, land supply in Zamboanga City is constrained by the existence of proclaimed protected areas, both for the agriculture and environment sectors, as well as environmentally constrained areas. No urban development is allowed, for instance, in the 17,414-hectare Pasonanca Natural Park, which comprises 11.73% of the total land area of the city. However, the area designated as natural park is presently also used for other urban purposes, such as pockets of land for residential and commercial uses. Hence, mixed use of land is often practiced in Zamboanga City, as long as they are deemed compatible, or does not conflict, with the prescribed use or zone.

The 2013 land use profile of Zamboanga City lists a proposed watershed area of 33,516.23 hectares, which occupies 22.59% of the total city land area (Zamboanga City Land Use Profile 2013). Urban development in watershed areas is regulated by environment laws. However, as in other areas in the Philippines, settlements have been built indiscriminately in the middle of watersheds and floodplains.

Waterways and Drainage

The city has 16 rivers that drain to the Sulu Sea and the Moro Gulf. The most important rivers are the Tumaga, Manicahan, Curuan, Bolong, Culianan and Vitali Rivers in the east coast and the Ayala River in the west coast. The Siocon-Quiniput-Taguite-Tumaga basin occupies the southern half of the Zamboanga Peninsula and encompasses the city of Zamboanga. The overflow of rivers and creeks causes flooding during heavy rainfall. Deforestation in the uplands increases runoff to the lowland areas and triggers landslides. These flooding events are aggravated by inadequate drainage facilities, indiscriminate disposal of garbage to water bodies and encroachment of structures in waterways.

Settlements in the urban core are located in a floodplain, and the southern coastal barangays of Mariki, Rio Hondo, and Zone 4, Kasanyangan and Talon-Talon are marshlands, logponds, fishponds and mangrove areas. Coastal communities need to be protected against tidal action, the city being located in the tsunami- and storm surge-prone Moro Gulf area.

A Master Drainage Plan was prepared for Zamboanga City in 2014. The plan for the rehabilitation of the city drainage system includes the upgrading of existing systems and construction of additional collection lines for those which are not tapped to natural drainage ways (Zamboanga City Master Drainage Plan 2014). Existing lines which are already silted and restricting drainage flow will be de-clogged, while natural waterways will be dredged or desilted. According to the plan, natural waterways have to be brought back to their original widths, and drainage rights-of-way, including easements, need to be re-acquired (Zamboanga City Master Drainage Plan 2014). The drainage plan is critical for a city whose disaster risks include flooding and tidal action. Zamboanga City has one of the longest coastlines in the country, at 300 kilometers. This not only exposes coastal communities to flooding, tidal action and tsunami; the long coastline is also a security issue, opening the city in many fronts to criminal activities such as smuggling, kidnapping and abduction of persons who are taken to the nearby island provinces of Basilan and Sulu.

Study Sites

The study focuses on the resilience of fishing communities and sea-dwelling ethnic groups residing along the coast of an urbanizing city. These families live in what was to be "ground zero" of the Zamboanga armed conflict. This research describes how their vulnerabilities were addressed and transformed into strategies of resilience to both manmade and natural disasters. The strategies that were used can be potentially applied to similar highly urbanized cities in a fragile watershed.

The coastal residents are generally poor: the average monthly income of fishermen, for instance, is only P3,000 (Zamboanga City Roadmap to Recovery and Reconstruction 2014). Their means of livelihood are typically fishing, seaweed farming, aquaculture of bangus, tilapia and shrimp, fish drying, vending, trading, and buy and sell. A few are in government and private sector employment, mainly in sales and services. In the small barangay of Santa Barbara, the educated sector of the population work as nurses, office clerks, factory workers, sales ladies and messengers. Those without formal schooling are engaged in the selling of cigarettes, vegetables, fruits and cooked food, while a few drive pedicabs, tricycles and jeepneys. In the coastal barangays of Kasanyangan, Mariki and Rio Hondo, Talon-Talon and Santa Catalina, residents are reliant on fishing and aquaculture. Their fishpens and fishing boats moored across the points of entry of the MNLF insurgents were destroyed in the Zamboanga siege.

Barangay Mampang was directly affected by the siege as the MNLF Misuari faction rebels accessed Zamboanga City through its shores to trigger the conflict. To the east of Mampang is Arena Blanco, where military and police choke points were later set up. Both barangays are reliant on seaweed and cash crop farming, marine fishing, subsistence fishing, and animal husbandry. Because of its large area, Mampang incurred primary economic sector damages worth 3.79 million pesos and losses amounting to P4.01 million pesos (Post Conflict Needs Assessment Report 2013).

Tourism business in the affected barangays and the city in general was also affected as the area contains such landmarks as Fort Pilar Shrine, Old City Hall, Plaza Pershing, Plaza Rizal, Veterans Monument, Sunken Garden, as well as department stores, shopping malls, hotels, restaurants, schools, shipping line offices, banking institutions, hospitals and government offices.

The Siege

The 21-day conflict between the Armed Forces of the Philippines and the Moro National Liberation Front in Zamboanga City in September 2013 centered on the seven highly dense barangays of Rio Hondo, Sta. Barbara, Sta. Catalina, Zone IV, Mariki, Kasanyangan and Talon-Talon. On 9 September 2013, fighting broke out between a faction of the Moro National Liberation Front and the Armed Forces of the Philippines, affecting these villages and spreading to the nearby island province of Basilan. Majority of houses in the affected coastal settlements were totally damaged. The brunt of the damage occurred in Rio Hondo, particularly Bangkero, Pattah, Hongkong, Lupa-lupa, Kabingaan, and Laud-laud; Mariki, particularly Sahaya Water Village; and Kasanyangan, particularly Buggoc (Post Conflict Needs Assessment Report 2013). Most of these dwellings were houses-on-stilts.

On September 28, the government declared the uprising over. (Philippine Star, "The Zamboanga City Crisis"). The armed conflict left over 400 persons killed, many more injured, billions of pesos in losses as the local economy came to a halt, 10,000 residential and commercial establishments burned or damaged, and more than 110,000 internally displaced persons (Post Conflict Needs Assessment Report 2013). Soon after that, the arduous task of rehabilitating a damaged city began.

Z3R

After the conflict, Pres. Benigno Simeon Aquino III instructed the Department of Public Works and Highways (DPWH) Secretary Rogelio L. Singson to lead the rehabilitation and reconstruction of the affected areas. DPWH thereafter commissioned the UP Planning and Development Research Foundation (UP PLANADES) to prepare a roadmap for the recovery and reconstruction of Zamboanga City. This plan is called the Zamboanga City Roadmap to Recovery and Reconstruction, or Z3R.

The preparation of the roadmap entailed consultations and validation with many sectors. The PLANADES team worked closely with the Crisis Management Committee, particularly the Rehabilitation and Reconstruction Cluster of Zamboanga City. At the same time, discussions with affected groups provided inputs to the Z3R conceptual plan as well as the site development plans. The team provided technical advisory services in the proposed rehabilitation of roads and infrastructure as well as environmental and socio-economic interventions. Both the National Housing Authority and the Region IX office of DPWH facilitated the community consultations,

detailed design preparation, construction services procurement and management of component projects.

The resulting Z3R road map consisted of a conceptual plan, which was completed in November 2013, three months after the siege. The plan was shared and enhanced in a series of stakeholder reviews and public consultations in Zamboanga City. The conceptual plan was revised, and the fifth version was agreed upon by stakeholders in December 2013. The budget for the master conceptual plan was drawn up and presented to the national government, eventually becoming the basis for the budget allocation for the recovery of the city.

After the validation of the plan, engineers and architects drew up the detailed designs. This was followed by the implementation of the component projects, starting with the housing construction on site by the National Housing Authority, road project packages by the Department of Public Works and Highways, and establishment of security measures by the Task Force Zamboanga. Many of these activities were done simultaneously, in response to the urgency of rebuilding from the ruin.

Site preparation took longer than expected because of the negotiations with landowners. Even as the construction units had been procured and ready, engineers had to wait until the site was identified and ready. The preference for resettlement sites was inevitably for the urban core of the city, where trade and business activities flourished. This created some challenge for the government in identifying and acquiring lots for housing construction in a city where alienable and disposable land is limited.

In the spirit of transparency and fairness, beneficiary selection for the rehabilitation effort was reviewed by the Commission on Human Rights, as well as by the National Commission on Indigenous Peoples, such as for residents of Sumatra, an ancestral domain.

Build Back Better

The Zamboanga City Roadmap to Recovery and Reconstruction recommends, among others, rehabilitating the denuded mangrove areas in Mariki, Talon-Talon, Mampang and Arena Blanco. Moreover, a mangrove forest buffer is delineated in Rio Hondo and Mariki, starting from the edge of Lupa-lupa to as far seaward as may be allowed by the depth of the seabed, to protect families from coastal surge and tsunami (Zamboanga City Roadmap to Recovery and Reconstruction 2014). These mitigating measures are intended to protect both the households and the coastal environment from the impact of geohazards. The National Housing Authority will construct houses-on-stilts in the remaining area that is protected by the mangrove forest.

Local and national government had to strike a careful balance between preserving the traditional settlements of indigenous dwellers, often houses on stilts in coastal areas, and restructuring the dwelling units so that the families are protected against tsunamis and storm surges. Vulnerability is viewed in two fronts: on one hand, the families often have no secure tenure and rely on the natural resources around them for their livelihood; on the other hand, their locations have been determined as exposed to geohazards. Dealing with these vulnerabilities entailed on-site rehabilitation, whenever feasible, of the housing units that were in sites exposed to these hazards. In addition, the houses that were destroyed by the burning and bombing had to be rebuilt.

Zamboanga City prioritized retaining the traditional settlements of the indigenous communities, but decided to "build back better" by improving local circulation and fixing the

housing densities. Facilities were improved in order for families to have greater access this time to basic public services such as water, sanitation, and transportation.

A one-meter wide boardwalk for pedestrian movement is proposed, from the edge of Lupa-Lupa to the eastern portion of the Mariki settlement. The boardwalk borders the inner edge of the mangrove forest buffer and encircles Sahaya Water Village. The boardwalk will be mounted on piles to allow the ingress of the boats of the Badjao to their dwellings and the egress to the sea. This structure will also allow seawater to follow its natural course. The boardwalk is intended to facilitate internal mobility and at the same time to serve as a sort of boundary, keeping the settlements secure and "decrease the porosity" of the open coast of the city (Zamboanga City Roadmap to Recovery and Reconstruction 2014). In the long term, when there are enough funds for its complete construction, the boardwalk is planned to extend north towards Kasanyangan.

In certain cases it was necessary to resettle the residents living along the shoreline who are exposed to tidal action or who will be displaced by the delineation of the mangrove forest buffer. Settlements in the outlying coastal areas of Layag-layag in Barangay Talon-talon, Liya-liya in Barangay Mampang, and Sumatra in Barangay Mariki were particularly prone to tidal action. Although the houses in these areas were not burned, residents had to be relocated to a safer area in Barangay Kasanyangan, which was less than one kilometer away, with the approximation of their houses-on-stilts and restoration of access to their water-based livelihood.

Table 2. Estimated demand for housing in new sites for acquisition

Total demand (families who lost their homes to fire	7,248
Less: families that may be accommodated in redeveloped existing sites	2,931
Balance needing housing units in new sites	4,317
Less: Families opting for Housing Materials Assistance[1]	1,661
Net demand for new housing a. on land (net of housing on stilts) b. on stilts (based on the actual count of the LGU)	2,656 665 1,991

[1] Assumes that the houses along the Rio Hondo road and Fishpond road at the Proclamation No. 472 site will avail of Housing Materials Assistance
Source: Zamboanga City Roadmap to Recovery and Reconstruction 2014

Priority in the restoration of dwellings and livelihood was given to the most vulnerable displaced groups such as Badjao and Sama-Bangingi fishermen. They numbered more than 2,000 households, often with no formal tenure documents, or those who rented or shared the house with the owner. This made them among the most vulnerable among the dwellers.

The corresponding government action was to take the initial steps to ensure the security of tenure of these families and reduce their vulnerabilities. Towards this end, the Z3R Plan included measures to establish permanent settlements in safe areas, in coordination with the Zamboanga City Housing and Land Management Division Office and the National Housing Authority. City planners integrated the construction and repair of social infrastructure such as schools, health centers, day care centers, mosques, and madrasahs in the rehabilitated settlements.

Table 3. Housing beneficiaries, by ethnicity and barangay

Housing Program Beneficiaries	Mariki	Rio Hondo	Santa Barbara	Santa Catalina	Kasanyangan	Talon-Talon	Zone IV	Total
1. Sama-Bangingi/ Yakan (on stilts)	345 40%	814 40%	181 20%	164 20%	26 20%			1,530
2. Badjao (on stilts)	259 30%	408 20%						667
3. Formal settlers (for socialized housing	86 10%	202 10%	272 30%	327 40%			100 50%	897
4. Informal settlers	173 20%	612 30%	452 50%	327 40%	103 80%	47 100%	10 50%	1,724
Total	**863 100%**	**2,036 100%**	**905 100%**	**818 100%**	**129 100%**	**47 100%**	**20 100%**	**4,818 100%**

Source: Zamboanga City Roadmap to Recovery and Reconstruction 2014

Reducing vulnerability to coastal flooding required freeing natural waterways from obstruction, such as informal shanties and solid wastes from households. A large portion of Ayer Village, for instance, which was destroyed by fire, is located along a major waterway. Several houses were observed to be obstructing the flow of water. It was decided to revert this portion of Ayer Village into a waterway and relocate settlers to nearby sites.

The drainage plan of the urban area of Zamboanga City, completed also after the siege, covers the conflict-affected barangays. The drainage plan is implemented with the Z3R rehabilitation. The widening and improvement of roads with drainage facilities, along with the segregation of segments for expansion or extension, has started. The Department of Public Works and Highways is currently identifying estero-type waterways and other waterways for construction.

It was necessary to revisit the Barangay Development Plan of the affected barangays, especially in the attempt to recover livelihood activities and infrastructure. Planners reviewed the proposed programs and projects listed in the community plans. The intention was to support whatever barangay plan was in place and was approved by the barangay council, and not to start anew in terms of disaster recovery and rehabilitation.

The pre-conflict conditions were characterized by low-quality housing, including informal settlements, extremely high densities, poor sanitation, lack of usable open spaces, blocked waterways, flooding, and exposure to environmental and geo-hazards, all of which create a generally low grade urban environment. Recovery after the uprising logically entailed building back better from this situation.

Protecting both Sea-dwelling Families and the Environment

The Zamboanga City experience shows that protecting sea-dwelling families and the coastal environment enhances human security. Neither people nor the environment need be sacrificed or compromised for the other. By protecting both the households and the

environment simultaneously, the efforts are galvanized towards one objective, which is to enhance human security and resilience. What is unique about Zamboanga City is its post-conflict situation and recovery addressing both security and environment issues. The circumstances made it possible for the response to both natural and man-made disasters to have integrated, not separate measures.

The rehabilitation process ensures that conflict-affected barangays are integrated in the development of Zamboanga City, not isolated from it. The entire recovery process included consultation and collaboration activities among those directly affected by the siege. The recovery showed that various ethnic, religious and socio-economic groups can work together through consultative planning and design of resilient settlements, in manifestation of "one flag, one nation, one Zamboanga." The displaced families themselves are key to ensuring human security in a post-conflict area. Their participation determines the resilience of their communities against both natural and human disasters.

Conclusion: Building Resilience

The Hyogo Framework for Action defines resilience as "the capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure" (UNISDR, 2005b, 4).

In Zamboanga City, building resilient fishing communities and sea-dwelling ethnic groups required better recovery and reconstruction measures in place. The new communities are deemed more resilient because their exposure to tidal action and coastal surge is lessened. Dwelling units of affected families were retrofitted to withstand coastal surge and strong winds. The conflict-affected structures were rebuilt, on site and in resettlement areas, with a keen consideration of recovering precious livelihood.

In the long term, Zamboanga City planners intend to simultaneously develop growth areas in rural barangays, install basic services, and spawn income generation opportunities. Rural areas in a city must not be left behind, because development in either rural or urban area affects the other part of the urban-rural continuum. Rapid urbanization is typical of emerging Philippine cities. In these booming areas, land for resettlement or socialized housing must already be identified, zoned, and regulated by the local government. A resilient community is better able to recover from a disaster, whether natural or manmade. The community plans ahead of a disaster and not wait for it to strike. This makes them better prepared for the next one.

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About the Author

CARMELI C. CHAVES has extensive experience in socio-demographic research and evaluation, education and health sector analysis, planning and evaluation, settlements planning, participatory planning, social development project design and implementation, and training. She has established networks with government and non-government organizations and coordinated with community leaders on project implementation and assessment, including the introduction of policies at the local level. Chaves finished her undergraduate degree in Philosophy at the Ateneo de Manila University, her BA Sociology Honours at the University of Canterbury, and MA in Demography and MA in Urban and Regional Planning, both at the University of the Philippines. She ranked first in the 2001 Environmental Planning licensure exam. She is currently Assistant Professor at the University of the Philippines School of Urban and Regional Planning, where she is also Asia Program Coordinator of the Spatial Development for Regions in Growing Economies (SPRING) Program. Her current research and technical assistance involvement is a collaboration with the local government unit of Zamboanga City and UN Habitat. The project aims to promote sustainable, diversified, socially equal and thriving communities in economically viable ways through proper physical design, land use and environmental planning.

Human Capacity Building for Sustainable Development of Ifugao Rice Terraces in the Philippines and Noto's Satoyama Satomi in Japan

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Japan

Abstract

The Ifugao Rice Terraces (IRT) has been designated as a Globally Important Agricultural Heritage Systems (GIAHS). It is, however, under serious threat environmentally and socially due to lack of young farmers, predominance of unregulated tourism activities and the negative impacts of climate change. This has resulted in the deterioration of ecosystems services, including agricultural production, biodiversity, traditional knowledge and culture. Thus, there is an urgent need to develop the local human resources for sustainable develpment of IRT. The Satoyama Meister Training Program of Kanazawa University has succeeded in the capacity building of young people for the reactivation of the GIAHS designated Satoyama and Satoumi in Noto Peninsula of Japan, which also has been challenged by decreasing and aging population and the negative effects of climate change. The Ifugao Satoyama Meister Training Project (2013-2016) aims to share and impart the knowhow of the Noto Satoyama Meister Training Program to IRT. It recounts the experiences of Noto GIAHS, which have been successful in developing human resources that have imbibed the concepts of GIAHS and Satoyama for the revitalization of the local communities. This paper presents the current conditions and problems of the IRT. It outlines and discusses the joint collaboration of Kanazawa University with Philippine counterparts, i. e., Ifugao State University (IFSU), University of the Philippines-Open University (UPOU) and Ifugao Provincial Government, under the framework of the Technical Cooperation for Grassroots Projects of the Japan International Cooperation Agency (JICA).

Introduction

The hazards brought about by climate change to rural communities are varied, e.g., weather disaster, invasion of alien pests or agriculture and fishery problems. In order that communities may be resilient or immediately recover from the negative impacts of climate change, the human capacities of rural communities need to be strengthened. This may be achieved with a training program of its young members.

The Food and Agriculture Organization (FAO) launched the program for dynamic conservation of Globally Important Agricultural Heritage Systems (GIAHS) in 2002. The GIAHS is defined as remarkable land use systems and landscapes, which are rich in globally significant biological diversity evolving from the co-adaptation of a community with its environment and its needs and aspirations for sustainable development (FAO, 2002). So far a total of 35 GIAHS sites have been certifiedin the world. The Rice Terraces of Ifugao Province (IRT) in the Philippines was designated as GIAHS in 2005, and Noto Peninsula and Sado Island in 2011 for the first GIAHS site in Japan (Figures 1 and 2).

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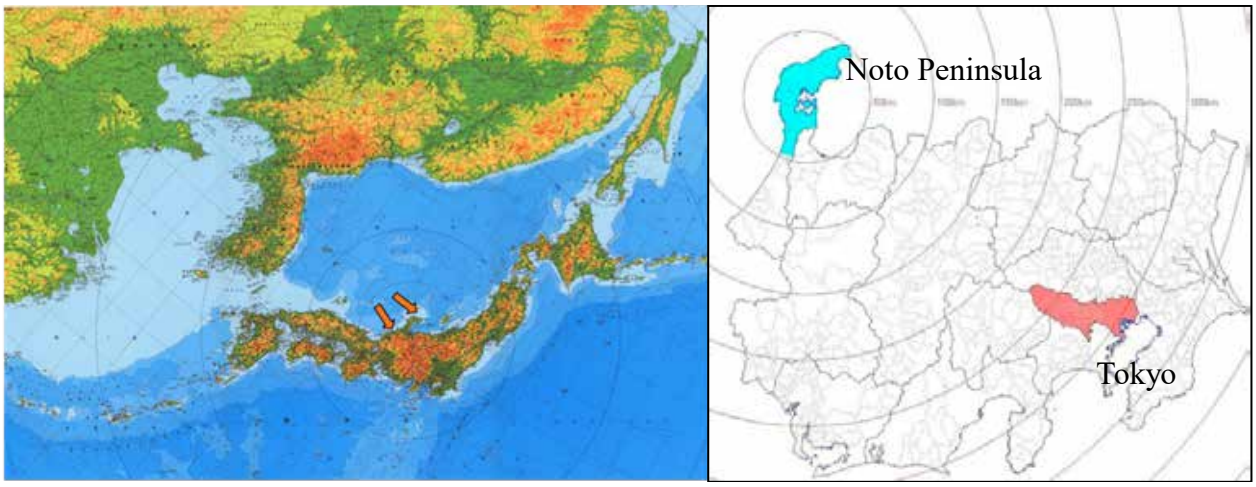

Figure 1. Locations of Noto Peninsula and Sado Island, Japan
(Source: Left photo from Toyama Prefecture, Japan; Right photo from Satoyama Satoumi Project, Kanazawa University)

Figure 2. Location of Ifugao Rice Terraces, Cordillera Region, Philippines
(Source: Left: photo by K. Nakamura; Right photo taken fromhttps://commons.wikimedia.org/wiki/File:Relief_Map_Of_The_Philippines.png)

Satoyama and Satoumi in Japan and JSSA

The Satoyama and Satoumi, traditional rural landscape and seascape, respectively, of Japan, has been sustainably managed for a long time by human activities; i.e., agriculture, forestry and fishery. As the Ifugao Rice Terraces (IRT) is on a mountain range and inland, this paper is about Satoyama only. Satoyama is considered to symbolize "the life in harmony with nature". The Satoyama, occupying 40-50% of Japan, 60-70% of Ishikawa Prefecture and almost all area of Noto Peninsula, however, is faced with two kinds of problems: first, destruction by development during the rapid economic growth period (mainly 1960-1980), and then undermanagement due to decreasing and aging population in rural communities today. Considering the "Satoyama problems", the Satoyama and Satoumi Assessment (JSSA) was carried out as an international project from 2007 to 2010 (Duraiappah et al., 2012, JSSA Summary in UNU homepage). The JSSA defined Satoyama internationally as "socio-ecological

production landscape" (SEPL). Satoyama is composed of mosaics of man-managed habitats (e.g., paddies, forests, ponds, stream), producing a bundle of ecosystem services (i.e., provisioning, regulating and cultural) for human well-being. JSSA also indicated that Satoyama has undergone significant decline over the last 50 years due to socio-economic situations, resulting in a drop of the resiliency of the communities and deterioration of habitats, providing ecosystem services.

The Satoyama Problems in Noto Peninsula, Japan

Population trend

"Noto's Satoyama and Satoumi"was designated as GIAHS in 2011, which indicates the richness of natural and cultural resources in Noto Peninsula. However, as in other Satoyama areas in rural Japan, Noto has been threatened by a decreasing and aging population (Figure 3). Even after the GIAHS designation, this negative trend still continues. The most serious problem is the lack of a young population in their 20-30s.

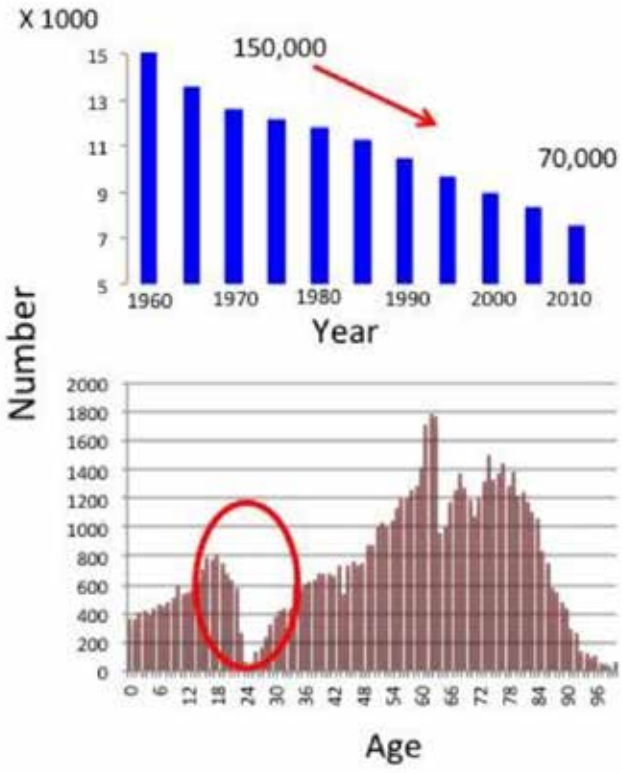

Figure 3. Population trend in Okunoto (notherrnmost of Noto Peninsula) area.
Top: change in population size from 1960 to 2010. Bottom: age distribution.
(Source: Satoyama Satoumi Project, Kanazawa University)

Biodiversity

This recent Satoyama problem has resulted in the undermanagement of Satoyama; i.e., the increase of abandoned paddies and unmanaged oak (Quercus variabilis and Q. serrata) forests and Japanese cedar plantations (Cryptomeria japonica). Uncontrolled Moso bamboo (Phyllostachys heterocycla) patches and "Kudzu" (weedy vine, Pueraria lobata) are expanding

and replacing the unmanaged cedar and oak forests. High biodiversity is maintained in the Satoyama, but is improperly managed through agricultural and forestry practices, causing moderate disturbances. Many common species inhabiting Satoyama, e.g., Japanese medaka fish (Oryzias latipes), fire flies (Luciola cruciata and L. lateralis), common black-spotted pond frog (Pelophylax nigromaculatus) and some wild flowers have been reported to be endangered in many areas of Japan. This recent biodiversity loss are caused by undermanagement and concrete-covered water channels in Satoyama. The extinction of the Japanese crested ibis (Nipponia nippon) and Oriental stork (Ciconia boyciana), both living mainly in Satoyama, from the 1960's were attributed to the impact of human activities; i.e., deterioration of Satoyama due to development, overexploitation, hunting and massive use of chemical pesticides.

Other biodiversity problems in recent Satoyama is the invasion of large mammals such as Japanese black bear (Ursus thibetanus), Japanese wild boar (Sus scrofa leucomystax), Japanese monkey (macaque) (Macaca fuscata fuscata) and Sika deer (Cervus nippon), which cause serious damages to the crops and forests in Satoyama. Before, when Satoyama had a high population density, these mammals stayed outside of Satoyama. However, today they invade the Satoyama areas, because of low and aged human population.

Loss of traditional culture

Due to the population problems, especially the absence of a young generation in Noto, it is getting difficult to transmit the traditional culture to the next generation. For example, "Aenokoto" is the rite where the farmer honors the deity of the rice plant with a feast, to express his gratitude for a good harvest. Aenokoto was also designated as a UNESCO Intangible Cultural Heritage. Recently, however, only a few aged men in their 70-80s, can perform this rite. Another festival which the Noto people are eager to hold is the "Kiriko (lantern) festival". Now, the number of hamlets which can hold the Kiriko festivals and the total number of the

Figure 4. Traditional "Kiriko" festival. Young men of Noto who migrated to urban areas to work and earn a living return to Noto participate in the festival.
(Source: Photo by Fumio Uno)

Kirikos who participate in the festivals are decreasing year by year due to the shortage of manpower, especially young men who can carry the Kirikos on their shoulders (Figure 4).

Meister Training Programs in Noto Peninsula

Kanazawa University started the Noto Satoyama Meister Training Program, initially funded by Japan's Ministry of Education, Culture and Sports for 5years (2007-2011). It was a program for the capacity building of young leaders, who lead the future of Noto Peninsula, with an eye on community development based on agricultural, forestry, and fisheries. Targeted trainees are both from the local community and from urban areas, aged up to 45, who aspire to lead the community in the future. Trainees from local communities in Noto included children of local farmers, business men, young employees of city and town offices, among others. Most trainees who came from the urban areas tried to settle in Noto. The Training Program aims to cultivate (1) eco-friendly farmers, foresters or fishermen, working in a biodiversity-conscious way, (2) entrepreneurs who will contribute to the secondary (processing) and tertiary (service business) industries for the primary industry products, (3) leaders who will create new businesses together with the communities by cooperating with the tourism and primary industries. Figure 5 shows the concept of human capacity building of the Noto Satoyama Meister Program, starting from biodiversity conservation for activating ecosystem services to environmentally friendly agriculture, forestry and fishery industries. This, in turn, ensured

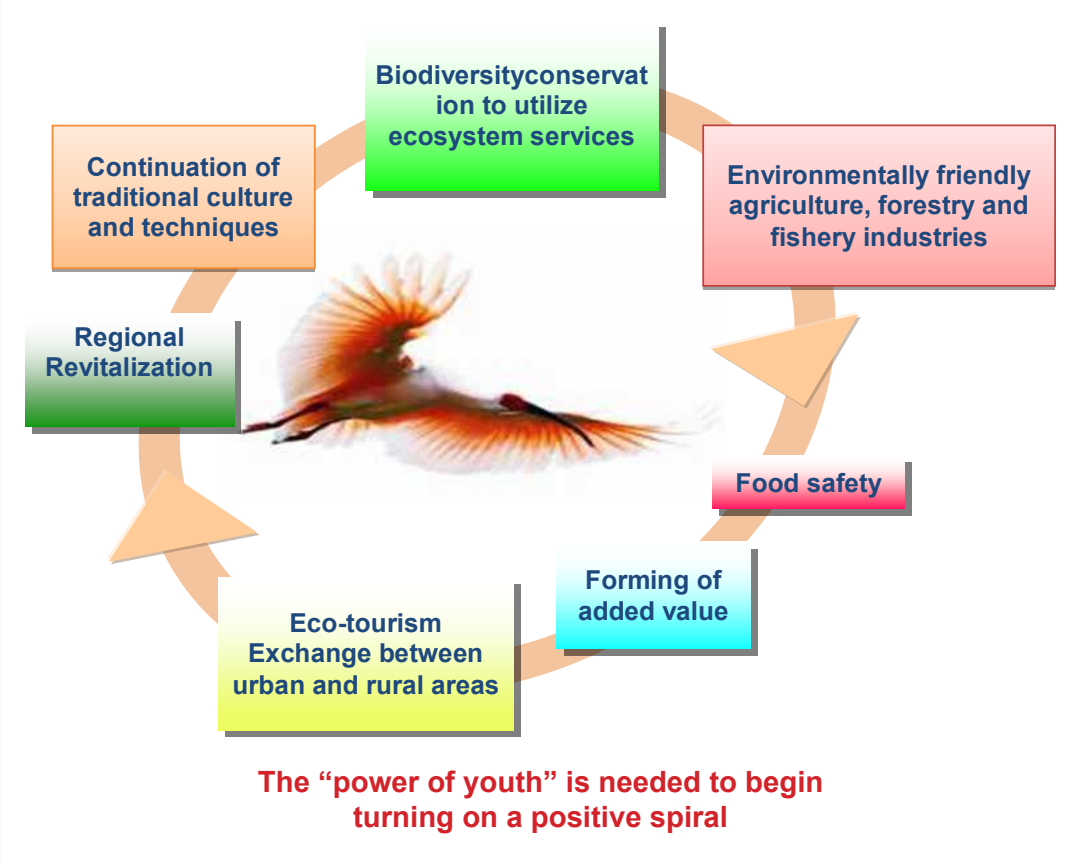

Figure 5. Concept of Human Capacity Building in Noto Satoyama Meister Program
(Source: Satoyama Satoumi Project, Kanazawa University)

a continuous food supply for the area and neighboring areas. With food safety, value-added activities were formed and eco-tourism, i.e., an urban-rural exchange, further revitalized the region in a positive spiral manner.

A two-year curriculum, the program provided lectures (e.g. biodiversity in paddy fields, farming and cultivation, business management, eco-tourism, information technology), practical training, on-site inspections of the areas involved and workshops with specialist guest lecturers. In these ways, the program met the needs of the meister participants, without limiting them to their special field of study. Thus, a diverse group of young people were nurtured to be able to carry out the revitalization of Satoyama and Satoumi. It proved to be quite effective to have the meister participants tutored individually by the five full-time doctoral degree members, for the completion of their graduation thesis. The meister program is characterized with intensive face to face mentoring system and thesis writing with final public presentation. The Program had 62 graduates, 14 of whom were from urban areas, and 12 youths out of 14 have settled in Noto.

With the success of the Noto Satoyama Satoumi Meister Program, the Program was extended for three years (2012-2015), aimed at developing the previous program. The characteristics of the improved program include: (1) Management of its own fund (50% from Kanazawa University and 50% from the local governments) and (2) Establishment of two satellite schools in Noto, and (3) Nurturing meister participants who can be active globally and locally. Despite the curriculum of only one year, both the tutoring system and the compulsory graduation thesis have made the program effective. The second Meister Program produced 66 graduates and 15 of whom were migrants from outside of Noto Peninsula. The Program was again successful, and it is expected to be extended for another three years from 2016 to 2018.

Ifugao Rice Terraces of the Philippines and ISMTP

The fourth International GIAHS Forum was held at Nanao City, Noto in May 2013, where a recommendation on the twinning of Globally Important Agricultural Heritage Systems (GIAHS) sites between developed and developing countries arose. This led to the twinning of the Ifugao Rice Terraces (IRT) of the Philippines with Noto's Satoyama Satoumi of Japan. The Philippines and Japan have a number of things in common, e.g., the existence of rice terraces, uncontrolled tourism, aging population and out-migration issues among rice terraces residents, non-mechanized farming labor and damage to rice terraces landscapes. The IRT was certified as a World Heritage by UNESCO in 1995 and a GIAHS by FAO in 2005. However, it was classified as a World Endangered Heritage in 2001, with the urgent need to stop the deterioration and then improve the situation toward sustainable development. As seen in Noto Satoyama Satoumi case, the common threats and challenges to GIAHS communities are the decreasing number of the young generation, an aging population and unregulated tourism. Human capacity building of young people is one of the key solutions to these challenges. It was given priority.

Fortunately, the IRT's Endangered Heritage designation was resolved in 2012. The general situation surrounding the IRT, however, cannot warrant optimism. Following the recommendation of International GIAHS Forum (2013), the agreement for implementation of Ifugao Satoyama Meister Training Program (ISMTP) was concluded in November 2013. Thereafter, the following activities were taken:

1. January 27, 2014, a Training Needs Assessment Workshop on ISMTP was held.
2. March 8, 2014, Ifugao GIAHS Support Committee was launched at Noto Airport, Japan.
3. March 25, 2014, ISMTP and Ifugao GIAHS Sustainable Development Committee (IGDC) were launched at the Ifugao State University (IFSU). 20 Trainees of the first batch of ISMTP were enrolled.
4. September 12-24, 2014, visit of ISMTP Delegation (3 IFSU workforce and 10 trainees) to Kanazawa and Noto for training and exchange.
5. January 2 2015, the Philippine-Japan Forum on "GLOCAL Innovators: Capacity Building for Sustainable Development and Human Well-being through GIAHS Twinning Program" was held at Baguio City. Trainees presented their researches during the Forum. Mentoring and workforce meetings took place.
6. February 14, 2015 ISMTP First Anniversary International Workshop at Kanazawa University
7. February 19, 2015, Final oral examination and public forum of the first batch trainees.
8. March 9, 2015, Graduation ceremonyof 14 successful trainees.
9. March 21, 2015, Ifugao GIAHS Support Committee was launched at Noto Airport, Japan.
10. April 23, 2015, 26 second batch trainees were enrolled.
11. September 27-October 3, 2015, visit of ISMTP Delegation (3 IFSU staffs and 5 first batch alumni and 15 second batch trainees) to Kanazawa and Noto Peninsula for training and exchange.
12. January 21, 2016 Philippine-Japan Forum on"Synergizing Research and Human Capacity Building for Sustainable Development" was held at IFSU, where trainees presented their researches by speed poster presentation.
13. February 11-12, 2016 ISMTP Second Anniversary International Workshop in Kanazawa University
14. February 15-16, 2016, Final oral examination and public forum of the second batch of trainees.
15. March 16, 2016, Graduation ceremony of the 21 successful graduates of the second batch trainees.
16. March 28, 2016, Ifugao GIAHS Support Committee was launched at Noto Airport, Japan.
17. Regular lectures, practices and field exercises were conducted monthly for both the first and second batches of trainees.

As in the Satoyama Meister Training Programs in Noto, both the tutoring system and the compulsory graduation thesis with oral presentation in public were also requested in ISMTP. The subjects of trainees' graduation research can be classified into five categories and examples of the trainees' themes (location names are omitted)

(1) Agriculture and cultivation
Shift of rice plant cultivation calendar in IRT under global warming
Characterization of heirloom rice varieties in Banaue
Cultivation of loach (yuyu) in the traditional rice terraces
Development of integrated rice-duck farming practices for the management of golden apple snail

(2) Agricultural processing and organic livestock raising

Development of instant babay good from Ifugao heirloom rice
Rice wine production using Ifugao Tinawon rice with different starter varieties
Enterprise of oyster and shiitake mushroom production
Free-range chicken-raising practice
Organic cross-bred swine production

(3) Environment and ecosystem, including global warming, biodiversity and alien pests
Mapping and assessment of endangered native fresh water shells
Assessment of kiwit, kuhol, and giant earthworm infestation in the rice terraces
Natural ways for controlling golden apple snails

(4) Traditional knowledge
Documentation of the "Luah" and "Punnok": an agricultural ritual endemic to Hapao, Hungduan, Ifugao
Mapping of the indigenous knowledge systems and practices (IKSPs) of the Tuwali's of Hungduan Ifugao toward the establishment of a Community Learning Center
Impact of the Satoyama Concept on the Level of Awareness of High School Students on IRT Sustainability
Rituals Associated with the Agricultural Rice Cycle of Hungduan, a FAO Declared GIAHS Site

(5) Eco-tourism
Eco-tourism promotion in Mayoyao: trends and prospects
Community based-tourism (CBT) for conserving GIAHS IRT
Ifugao Satoyama and museology

Conclusion

The reasons for the success of the Satoyama Meister Training Programs in Noto were that: (1) operational framework was established under close collaboration among the stakeholders, i.e., Kanazawa University, Ishikawa Provincial Government, cities and towns in Noto, and local farmers, businessmen and other stakeholders, (2) high variability of teaching staffs and trainees, (3) key concepts of the programs were well-designed: (a) Assess the values of Satoyama and Satoumi. Learn and experience the nature and culture of Noto from various perspectives; (b) Become familiar with ecology and ecosystem services. Kanazawa University's education and research results in Satoumi and Satoyama are utilized; (c) Understand the values of Noto's Satoyama and Satoumi from global perspectives. Each and every one is expected to become an ambassador of Noto as GIAHS; (d) Create a human network. Expand a network of people with diverse backgrounds and capabilities who share common interest in Satoyama and Satoumi.

Networking is vitally important. For instance, there were groups of farmers who imparted their knowledge to support other farms. In line with commercialization of products, where commercial linkages could be an issue, there should be some marketing education to help the people sell their products. The Satoyoma Satoumi of Japan facilitates the networks among people across local communities, regions, nations, and even the world.

Thus, the challenges and future directions could be seen as follows: (1) Japan through the Kanazawa University and other entities supports the launching of the ISMTP by adapting the applicable knowledge and experiences in Noto Peninsula to the Ifugao Rice Terraces; (2) Self-sustainability of the ISMTP should be established in the near future by IFSU, UPOU, local

government units and other stakeholders in Ifugao Rice Terraces; and (3) Bilateral relations and equal partnerships are important, e.g., in cost-sharing of the training program.

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RIZALITA R. EDPALINA joined Kanazawa University (KU) in 2008, as a JSPS-UNU postdoctoral research fellow under the Fellowship Program of the Japan Society for the Promotion of Science (JSPS) with research focuson Satoumi (coastal landscape) Ecological Project in Noto Peninsula. She is currently affiliated with KU as a Research Associate involved in the Satoyama and Satoumi Project and as the Coordinator of the 3-year JICA funded project, the Ifugao Satoyama Meister Training Program (ISMTP). She has over 25 years of extensive experience in Research and Development and government service, in delivering programs for environmental management. She has worked several years of combined research in molecular ecology, ecosystems management, and environmental protection in the Philippines, China and Japan. Her high value for education earned for her scholarships and fellowships in and out of the Philippines. She received a Baccalaureate and a Master of Science in Marine Biology in the Philippines. In 2005, she received a PhD in Fisheries (Marine Bioscience) from Hokkaido University, as a scholar of the Japanese Ministry of Education.

A Planning Perspective on the Socio-Entrepreneurial Venture of Rural Farming Communities through the Community-Supported Agriculture

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Abstract

The small-scale farmers in rural farming communities are continually struggling with food insecurity and widespread poverty. The Food and Agriculture Organization (FAO) estimated that approximately half of the hungry people globally settle and cultivate their own lands in smallholder farming communities while a fifth are landless and rely on farming. Many rural farmers are eking a living out of subsistence farming. However, small-scale farming persists as a prime source of livelihood in rural areas despite severe challenges of prolonged periods of drought and climate induced hazards such as floods and flashfloods, rain-induced landslides, and typhoons, among others. The rural farmers are also confronted with limited livelihood sources. This contributed to increasing risk of hunger and emergence of economic shocks such as the unanticipated decline in crop productivity, continuous increase in the prices of production inputs, switch in consumer demand, and stringent market legal requirements. The paper provides a planning perspective on a potential entrepreneurial venture for small-scale rural farmers through a social enterprise modality called Community Supported Agriculture (CSA). CSA highlights a trust-based sharing of responsibilities and risks between farmers and community members. The latter selflessly commits time and resources to engage and be physically involved in organic farming. CSA is a business model that can be adopted as a strategy for local economic development planning to transform rural farmers into conscientious and passionate farmer-entrepreneurs who steer their farms as social enterprises in a complex and dynamic rural environment amidst climate change.

Key words Community-supported agriculture, social enterprise, rural farming, local economic development planning, organic farming, rural farming communities, socio-entrepreneurial venture, farmer-entrepreneur

Introduction

In 2012, the Bureau of Agricultural Statistics (BAS) recorded that farmers belong to more than half (70%) of the rural poor in the Philippines. The rural farming communities usually experience severe poverty since majority heavily relies on subsistence farming as a primary source of livelihood. The International Fund for Agricultural Development (IFAD) classified small-scale farmers who are agrarian reform beneficiaries as among the poorest of the poor together with the indigenous peoples, landless workers, fishers, people in upland areas and women.

Rural areas became the enclaves of poverty due to a number of factors such as diminishing level of farm productivity and profitability, uneconomical size of farmlands; cultural practices that are damaging to forests and declining fish catch due to depleted fishing waters; underemployment and poor education, deprivation of access to employment opportunities; and lack of access to reasonably priced microcredit services and agricultural financial

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assistance. Aggravating these causes of poverty are the challenges of climate change that contributed to prolonged periods of drought and climate induced hazards. Thus, farmers and fishers are faced with an increasing risk of hunger given the occurrence of several economic shocks.

It is in this context that the small-scale farmers need to explore potential entrepreneurial venture to supplement the regular source of their income. A social enterprise modality called Community Supported Agriculture (CSA) can be an option. It emphasizes a strong farmer-community partnership in a complex and dynamic rural environment amidst climate change. Since CSA is not yet widely adopted in the Philippines, planning a CSA becomes essential especially in a rural environment where climate change greatly impact on the agricultural sector.

Facets of Community Supported Agriculture

Concepts and Philosophy

The United States Department of Agriculture (USDA) defines CSA as a community of individuals who pledge support to a farm operation so that the farmland becomes, either legally or spiritually, the community's farm, with the growers and consumers providing mutual support and sharing the risks and benefits of food production (Keyser, 2015). On the other hand, the European Handbook on CSA underscores the importance of partnership between a farm and consumers adhering to a principle of shared risks and rewards from farming (Jade, et.al. nd). The Rural Guide to CSA of the University of Wyoming (2013) classified CSA as a marketing model that involves regular procurement of share of the farm production from a producer throughout the production season. The Organic Manila, a supplier of organic products, emphasizes the importance of commitment between organic consumers and farmers in CSA towards consuming clean and healthy food. Given the many concepts of CSA, the study adheres to an operational definition of CSA as a trust-based sharing of responsibilities and risks between farmers and community members, with the latter selflessly committing time and resources to engage and be physically involved in organic farming.

CSA as a movement conforms to four (4) fundamental principles to include partnership, local, solidarity and producer/consumer tandem. CSA is anchored on formal partnership bound by a contract (oral or written) between farmers and consumers who mutually agreed to undertake exchange of produce and provide payment for the product, respectively, in a given period. CSA espouses the formation of a local food system, which involves direct transactions between farmers and consumers and where product is produced in close proximity to its place of consumption. In terms of solidarity, CSA exhibits singleness of purpose and "esprit de corps" in sharing risks and establishing a fair pricing system. The principle of producer/consumer tandem puts forward the direct person-to-person relationship involving mutual trust in the absence of intermediaries or hierarchy.

Emergence of CSA

The history of CSA movement can be traced to Kobe, Japan in mid-1960s through the Teikei Movement. It was a small, family-oriented local food movement initiated by women who were concerned about the use of pesticides in the farm, increase in processed and imported food products, loss of farmers due to migration, and reduction of farmland due to development. The movement defied conventional agriculture methods in farming.

In the late 1960s, the CSA model was adopted in Europe. The farmers and consumers were keen on addressing the industrialization of the food system. In 1984, the first CSA was created in Massachusetts, USA. This was attributed to the increasing awareness of the environmental movement, specifically in protecting the urban environment. Eight (8) years after, CSA was founded in North America where the farmers allowed their members to play key roles in administration and organization of the CSA. Since 2008, an international network such as Urgenci began to disseminate and exchange initiatives for small-scale CSA.

In the Philippines, the principle of CSA was documented to have started in the 50's at the community-level either in the form of a project or a social enterprise. For instance, a CSA project was carried out in March 2007 in Benguet. It involved 12 students and seven (7) farmers who cultivated consumers' preferred vegetables such as white potato, scorpio cabbage, broccoli and zucchini.

In the province of Laguna, the Municipality of Los Baños capitalizes on a healthy lifestyle movement called the Health Walk. In this movement, CSA is implemented through a joint project of three (3) entities: two restaurants, the Herb Republic and Café Antonio; and one (1) crop producer, the Daang Kalabaw Community Garden. The members (or also called subscribers) regularly receive through free delivery a mixed basket containing four kilograms of readily available farm produce such as vegetables, fruits and herbs.

In the Municipality of Capas in Tarlac Province, the Good Food Community (GFC) is a well-established social enterprise. It practices CSA that creates sustainable livelihoods for farmers, young entrepreneurs and social entrepreneurs.

Multifarious Identity of CSA

CSA is recognized for its multifarious identity. It is widely known as an organic/food movement which espouses local solidarity-based mutual beneficial partnership. It is also a locally based economic, social, production, marketing and business model that promotes social enterprise and grassroot entrepreneurship. Further, CSA is known to be a sustainable alternative distribution and financing systems in agriculture.

As an organic/food movement, CSA represents a community of advocates, mindful consumers, young professionals, entrepreneurs, volunteers, organic farmers, among others. These entities are bound with agreements and trust that enforce local solidarity-based partnership. As a socio-economic model, CSA involves the sharing of risks and benefits of food production between farmers/growers and willing consumers. It takes the form of an eco-social enterprise, which protects and conserves the ecological capital through organic farming. A social enterprise generally aims to provide social and environmental benefits to a local community.

The key actors in CSA are small farmers. They are engaged in grassroot entrepreneurship and intend to produce for home consumption as well as market surpluses given their high entrepreneurial state of mind.

The sustainability of CSA as an alternative distribution system underscores the fact that middlemen are eliminated in the supply chain and farmers consequently benefit economically from a reduced marketing and other transaction costs. As an alternative financing source, CSA focuses on the local community as a potential source of capital and investment for agricultural production.

Arrangements for CSA Functioning

CSA can be organized in several ways depending on the type of actors in the partnership and the motivation scheme. Generally, it can be categorized into two: subscription CSA and stakeholder CSA.

The subscription CSA can either be farmer-managed (farmer-driven or producer initiated CSA) or farmer-cooperative (multiple-producer CSA). A farmer-managed CSA is organized, maintained and managed by a farmer. He identifies and encourages potential members (subscribers/customers). This CSA arrangement is most common in the USA. Comparatively, a farmer-cooperative CSA is a variation of farmer-managed CSA, which involves a group of farmers. This type of CSA is typical in France.

The shareholder CSA can be categorized intro three (3) types namely, shareholder/subscriber (member-initiated CSA or shareholder CSA); farmer shareholder/cooperative (community/consumer driven); and organization-initiated CSA. In the shareholder/subscriber CSA, the CSA is organized and managed by the community or local residents, which engage the services of a farmer. The farmer shareholder CSA is the first CSA model adopted in CSA. It involves a partnership between farmers and local residents in the establishment and management of the CSA. Both may opt to own land, produce and distribute food. An organization such as business, church, schools, among others, may also form a CSA called the organization-initiated CSA.

How CSA Works: The Good Food Community as a Model

The Organization and its Partners. The GFC undertakes a program called Community Shared Agriculture (CShA)[2] which started on December 28, 2011. This initiative visualizes a national movement of socially aware and responsible consumers in partnership with organic farmers (producers). The latter are assured of getting fair share while engaged in sustainable methods of farming.

In a CShA, a sustainable community is the end result of the interaction between smallholder organic farmers and enlightened citizens. In this CSA arrangement, a member of the local community (subscriber) becomes a co-producer who commits to support farmers for a fixed period, ensuring them of a stable demand for their produce in spite of market and environmental risks. The subscriber receives from the partner-farmers weekly supply of fresh, organic, and seasonal shares of farm produce.

GFC has established network with over 60 smallholder partner farmers in the provinces of Benguet, Mountain Province and Tarlac. It supplies over 90 subscribers in Metro Manila. GFC also collaborates with an NGO named Sibol ng Agham at Teknolohiya (SIBAT) or Spring of Science and Technology. This entity provides technical support to the former in organic farming methods and practices. SIBAT also holds training sessions for organic farmers in bio-fertilizer production and other relevant topics on organic farming to include farmers' capacity building; (2) participatory technology development; (3) 11 technology modular trainings on sustainable agriculture technology development; (4) appropriate technologies on farm mechanization support; (5) social and cultural dimensions of agriculture; (6) program/project development cycle and processes; (7) organic marketing standards; and (8) organic enterprise development

[2]CShA is used by the author as abbreviation for Community Shared Agriculture to differentiate with CSA or Community Supported Agriculture.

and food processing, among others. Other assistance provided by SIBAT includes loans for seeds, netting, greenhouse construction, among others.

GFC also conducts tours for a fee to include visit to organic farms combined with lecture on permaculture design; and upland farms in Benguet and Mountain Province or lowland farms in the provinces of Tarlac and Nueva Ecija as well as organic backyard farms in Laguna.

The Organic Farm. GFC maintains an eight-hectare organic farm, the Mangarita Farm, in Barangay Manga, Dolores, Capas, Tarlac. The farmers do not use chemical pesticides in vegetable production. Organic farming commenced three years ago with farmers pursuing organic practices to generate additional income and ensure continuous supply of good food for good health. CShA becomes a family livelihood where women play an important role in farming while the men (husbands) perform rice farming.

Subscription to the CShA. The subscriber of GFC has an option to select a community hub where the produce of GFC are delivered. There are community hubs in the key cities of Metro Manila, which serve as the designated pick up points or drop off points every Saturday afternoon. These include Makati City, Quezon City, San Juan City, Pasig City, and Makati City. There is also a community hub in Laguna Province.

The subscriber can also establish his/her own hub within Metro Manila. However, a storage area for vegetable needs to be established to temporarily keep the vegetables from Tuesday to Wednesday. Minimums of six (6) subscriptions are allowed and should be coterminous with each other.

Once the subscriber has identified a community hub, he/she selects from the three (3) farm share options namely, bayong pambahay (domestic food basket), salad pack or juice pack. A bayong pambahay has approximately 3.5 kg of leafy and hearty vegetables (6-8 kinds of vegetables, a mix of leafy, hearty herbs and fruits), which is good for a family of four (4). A salad pack has approximately 0.5 kg of salad greens and the surprise fruit of the season (a mix of fresh salad greens, herb and fruit good for 1-2 servings). The juice pack contains larger cuts of leafy veggies with a lemon and a hearty veggie perfect for juicing a heavy bundle of green leafy vegetables. Table 1 shows the available farm share options with the corresponding price.

Table 1. Farm Share Options for Subscribers of GFC

Quantity	Farm Share Option	Price/Week(PhP)	Total(PhP)
	Bayong Pambahay for 12 weeks	480	
	Bayong Pambahay for 4 weeks	530	
	Salad Pack for 12 weeks	200	
	Salad Pack for 4 weeks	250	
	Juice Pack for 12 weeks	320	
	Juice Pack for 4 weeks	370	

Source: http://www.goodfoodcommunity.com//

A motorcycle delivery can be an option depending on the distance from the delivery hub. One delivery box can accommodate four (4) boxes (bayong). Vegetables can also be picked up every Tuesday at around 2:00 p.m. Delivery will be continuous until the last delivery day. Nevertheless, the subscriber can skip or pause subscription on 12 noon of Saturday before the next delivery day.

The vegetables can be stored at the hubs until Wednesday only due to the highly perishable nature of organic vegetables. The hubs can decide on what to do with the unclaimed vegetables.

Payment Scheme. Subscription can regularly run for a period of 12 weeks or three (3) months. However, subscriber has an option to buy in four-week installments (Figure 1). At an

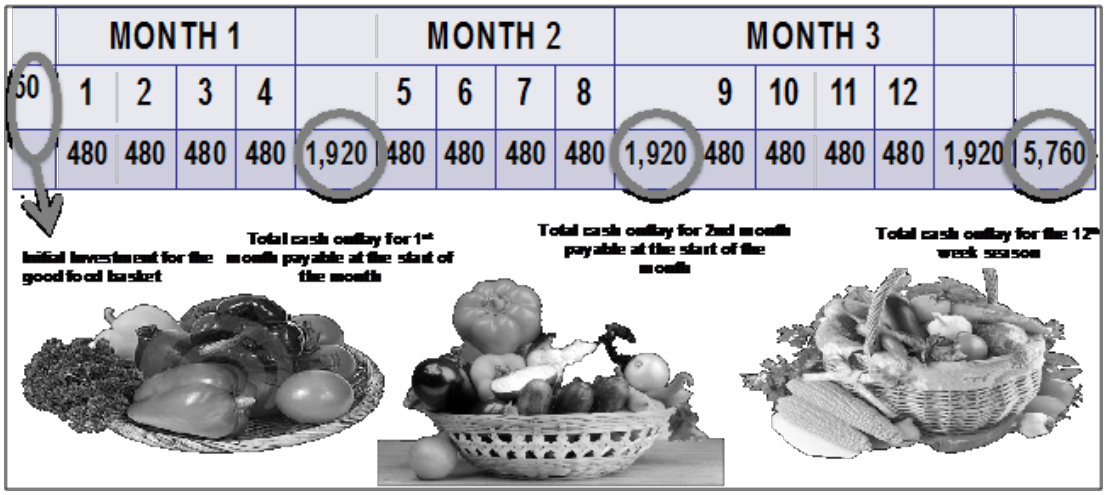

Figure 1. Subscription Scheme
Source of basic data: http://www.goodfoodcommunity.com//

initial investment of PhP50 or US$1.07 (US$1 = PhP46.91 as of December 2015) for the cost of a food basket, monthly installment can be pegged at PhP480 (US$10.23). This yields a total of PhP5,760 or ~US$123 for a three (3) month subscription. The payment can be deposited in a designated bank. The subscriber notifies GFC of the payment through e-mail and uploading of the proof of payment or bank deposit.

Benefits of CSA

Given GFC as a CSA model in the Philippines, the benefits of CSA are evident both at the supply and demand sides. The former pertains to the local farmer-entrepreneurs while the latter represents the members of the local community (also known as the subscribers, consumers, partners or buyers).

At the supply side, the farmers are assured of advance payment for their produce enabling them to efficiently plan the cropping season and avoid potential risks in production due to lack of operating funds. Farmers are also guaranteed of the price for their produce since pricing is mutually agreed with the buyers. The direct food requirements of the consumers become known to the farmer providing the latter with the information on how to prepare his cropping calendar that suits the daily food requirement of the consumers. Social cohesion is strengthened since the community develops a sense of responsibility in helping the farmers uplift their economic condition.

In terms of the demand side, the members of the local communities know the source of the fresh and nutritious food that they consume and how these food crops are cultivated. Since CSA enhances the local food system, consumers incur less transportation and energy costs in acquiring food. Since the produce are delivered to consumers, there will be less packaging materials that reduce local waste and ecologically sensitive farming is promoted. Local economic development (LED) is also supported due to contribution to employment and improvement in local spending. For the latter, the money circulates only within the local community and does not flow to supermarkets and other commercial entities in the food chain. The members of the community have the opportunity to be exposed to educational and recreational aspects of farm production. They can learn how crops are grown, the costs involved and the production methods as well as practices.

Integrating Socio-entrepreneurial Dimension of Community Supported Agriculture in Local Economic Development Planning

Basic Guiding Principles

When we plan CSA for local economic development (LED), the following interrelated principles have to be taken into account; namely, climate smart agriculture, socio-entrepreneurial behavior and thinking as well as participatory development planning (Figure 2). LED as defined by the Philippine Department of the Interior and Local Government (DILG) is "the process by which actors within LGUs (barangays, municipalities, cities, and provinces) work collectively with the result that there are improved conditions for economic growth, employment generation, and quality of life for all. It also promotes optimization of usually scarce resources in an area; integration barangay, municipal, and provincial plans and priorities with regional and national plans from the bottom upwards; and citizen participation and consensus building among stakeholders" (DILG, 2003). LED is anchored on the principles of balanced economic growth with social and gender equity, sustainability, peace and cultural responsibility; multi-stakeholder partnership; private sector as the engine of employment and growth; LGU as enabler; as well as transparency and accountability.

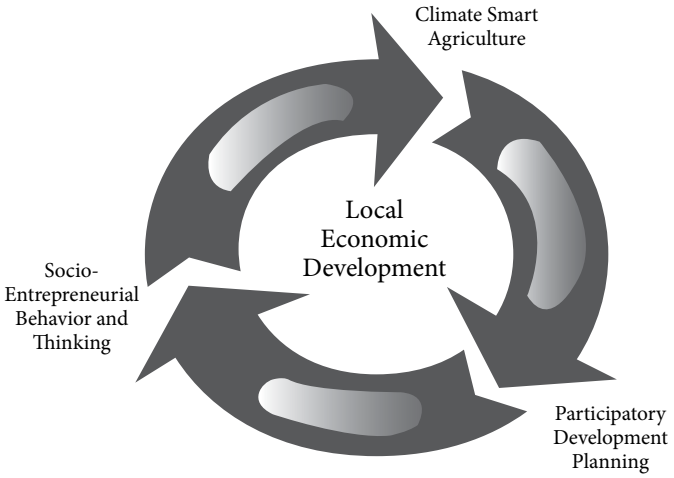

Figure 2. Basic Guiding Principles when Planning CSA for LED
Source: Author's construct

CSA as a Climate Smart Agriculture (CSmA)[3] Strategy. CSmA focuses on "landscape approaches involving the integrated planning of land, agriculture, forests, fisheries and water to ensure synergies are captured." (Rudinas, et.al, 2013). It is a mechanism to address the link among food security, adaptation and mitigation. The Philippine Department of Agriculture (DA) identifies the promotion of organic agriculture (biodynamic farming) as a CSmA strategy. Organic farming is the real essence of CSA and consistent with the goal of the Organic Agriculture Act of 2010 (RA 10068) to encourage farmers to shift from conventional to organic agriculture. The big challenge of the Philippines is that Filipinos have a relatively low level of organic literacy. This is also based on the fact that the country still has only a few advocates, specialists and adoptors of organic farming.

The organic farming focus of CSA makes it a climate change adaptation (CCA) and mitigation strategy based on the following reasons given by Wani, et.al., 2013:

a) It maintains long-term soil fertility and overcomes micronutrient deficiency;

b) It reduces energy loss for both animal and machine and risk of crop failure;

c) It promotes the healthy use of soil, water, and air, as well as minimizes all forms of gaseous pollution that may result from agricultural practices;

d) It is highly adaptive to climatic change due to application of traditional skills, farmers' knowledge, soil fertility building techniques and a high degree of diversity;

e) It recycles wastes of plant and animal origin in order to return nutrients to the land, thus minimizing the use of non-renewable resources;

f) It reduces global warming by lowering emission of greenhouse gases which lead to temperature rise;

g) It enhances biological diversity within the whole system and increases soil biological activity; and

h) It minimizes indiscriminate use of pesticides, which affect human and animal health, biodiversity of wildlife, etc., and cause environmental pollution.

Social Entrepreneurship and the Need for Entrepreneurial Function. CSA has to be operated by social entrepreneurs who have the commitment to undertake explicit and central social mission of addressing social and environmental problems; improve the well-being of the poor; create and sustain social value; and engage in a process of continuous innovation, adaptation and learning. A social entrepreneur knows the needs of the community and how resources can be tapped to address these. Social entrepreneurs are said to be rare breeds and possess exceptional behavior. Thus, a social entrepreneur should be a mass recruiter of advocates of local economic development by engaging in entrepreneurial ventures.

In the Philippines, the government supports social entrepreneurship through a bill to be enacted by Congress called the Social Value Bill. This bill calls for the following: a) tax exemptions for accredited social enterprises; b) tax exemptions to social investors contributing to social enterprises; c) a Social Enterprise Council to be created attached to the DTI, with a National Centre for Social Enterprise Development to provide training, research and to manage a program for improved access to markets for social enterprise; d) a program

[3]CSmA is used by the author as abbreviation for Climate Smart Agriculture to differentiate with CSA or Community Supported Agriculture.

on social entrepreneurship in school; e) special credit windows with banks to lend to social enterprises at concessional rates; and f) a social enterprise marketing assistance program and information network.

Participatory Development Planning. Planning CSA for LED necessitates the harmonization of multi-stakeholder interests in a given local community. Planning should involve the famers, community members, local government agencies, academic community, private sectors, volunteers, among others.

Planning CSA for Local Economic Development

Based on an extensive review of literature on CSA formation, planning CSA for LED may involve four (4) phases (Figure 3): a) Phase 1 – Capital Asset Inventory and Assessment; b) Phase 2 – Vision Development and Stakeholder Motivation; c) Phase 3 - Local Development Strategy Identification for Sustained CSA; and d) Phase 4 – Monitoring and Evaluation for Sustained Partnership.

Phase 1: Capital Asset Inventory and Assessment

Analyze local capital assets. The inventory and assessment of capital assets revolves around five (5) types of assets to include human capital, social capital, natural capital, physical capital, and financial capital.

Human capital refers to the skills, knowledge, health and wellbeing of potential producers and members (subscribers) who can be motivated to participate in CSA. Producers and subscribers should possess technical skills and decision-making capabilities. The latter will be very useful during consultation meetings and discussions.

Social capital involves social resources including informal networks, membership of formalized groups and relationships of trust that facilitate cooperation (e.g., with other farmers or community groups).

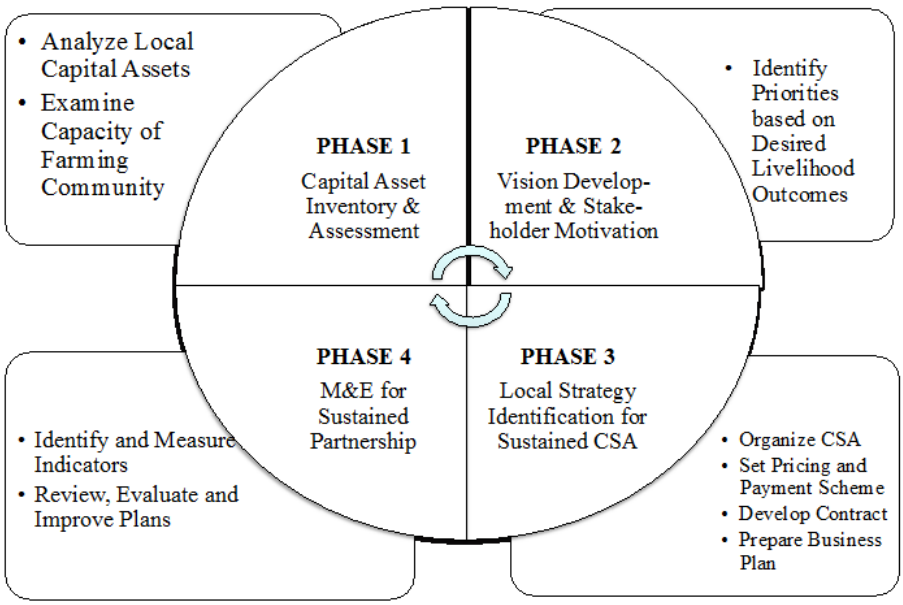

Figure 3. Planning CSA for Local Economic Development
Source: Author's construct

Natural capital focuses on the quality and quantity of natural resources available to the CSA initiatives, including land, water and soil quality.

Physical capital covers land availability, existence of organic (biodynamic farming community), basic infrastructure such as irrigation and on-farm sanitation, offices and buildings, computers and communications technology, tools, vehicles and other equipment.

Financial capital includes the availability of financial resources including savings, credit, and income from farm sales of goods and services to include provision of training to members.

Examine capacity of farming community. The capacity of the farming community can be determined based on their access to social, human, physical, financial and natural capital or assets. It also involves the examination of their ability to put these to productive use; the different strategies they adopt (and how they use their assets) in pursuit of their priorities; the policies, institutions and processes that shape their access to assets and opportunities; the context in which they live, and factors affecting vulnerability to shocks and stresses.

It is also necessary that existing initiatives related to CSA have to be examined to include the core model of production, duration of business, income generated, land area, type of location, members and employees.

Phase 2: Vision Development and Stakeholder Motivation

Identify priorities based on desired livelihood outcomes**.** The vision of the organization should be based on the anticipated outcomes of the livelihood or social enterprise. Close consideration of the fulfillment of social mission is necessary to address both social and environmental problems.

Establish CSA goals, objectives and targets. The goals, objectives and targets are formulated based on the vision of the social enterprise. The goals may include the fostering of a partnership between producers (prefer growing food) and local community (opts to eat good food with the latter supporting a local farm). The objective and targets revolve around the establishment of a fair pricing system agreed upon by both consumers and producers; provision of support to small farms and fresh food for the consumers; protection of biodiversity through efficient organic farming; increasing access to organic and local food by low income households; sustaining culture; community and a sense of belonging; and reviving culinary traditions, among others.

Phase 3: Local Development Strategy Identification for Sustained CSA

Organize the CSA. The initial activity in organizing a CSA is to define the CSA functioning arrangement, whether it is a Subscription CSA or Stakeholder CSA. Supporting activities include finding a willing farmer and forming a group of consumers (subscribers).

A willing farmer can be identified in agricultural meetings or networks of farmers. These are a good venue to impart how CSA provides a more reliable and assured market for their produce. The existing networks of farmers offer information on farmers who already sell directly to consumers.

Potential farmers, young and new farmers per se, for CSA can also be found in agricultural colleges. They can be tapped as apprentice farmers to be trained and supported by an experienced farmer outside the CSA.

In forming a group of consumers (subscribers), a farmer-led CSA can opt to network with existing community groups, local environmental organizations, business groups, religious

institutions, community action organizations, health food stores, fit ness centers, schools, civic organizations and others, to look for potential members. Schools and other community centers are potential farmers in a CSA. It is advised to start establishing a relationship with known individuals such as friends, family, neighbors and colleagues, among others. Newsletters and meetings of these existing entities can be tapped to disseminate information about CSA and recruit members.

A core group can be organized consisting of farmer(s) and consumer members who will serve as owners, workers, and partners of farmers. It handles the formation of CSA and it does not intervene with farm-based decisions since these are taken care of by the farmers.

The formation of a core group requires the accomplishment of activities such as need identification, finding cultivable or existing land/advertisement for land, and gathering support. These activities are described as follows:

- *Need Identification.* The needs of the farmers should be identified to include labor requirements, capital at the beginning of the planting season and a reliable market. On the other hand, the consumers require affordable organic food for family consumption.
- *Value Formation.* The statement of value of the group has to be formulated. All the members should agree on the values considering its consistency with the vision, goals and objectives.
- *CSA Models Analysis.* There is also a need to study prior to the core group formation different CSA models; identify values, principles, approaches and methods which can be adopted; present them to the group; and adopt the best model that will fit the organization.
- *Land Identification for CSA.* The products that will be supplied by the organization determine the quantity and quality of land for CSA. Consider putting up CSA on land owned by schools, local government, churches, railways, gardens, parks, universities and farms. Potential landowners can be impressed if they know the benefits from CSA.
- *Support Establishment***.** There is a need to determine both the technical and financial requirements of the CSA organization. A volunteer is necessary in marketing the CSA. Print and on-line information dissemination create an edge in marketing the organization. Explore partnership with potential partners by talking to them, understanding what they want, and connecting with them regularly.

Establish Fair Share Pricing and Payment Scheme. Pricing for CSA produce is set depending on the length of production season. The European Handbook on CSA identifies fair pricing schemes based on the market price, market value pricing, real costs of farming based on community commitment, deliberate contributions and similar models pricing.

Pricing may follow the price that people usually pay for a box of vegetables bought in the market or comparable distribution channels. The market value pricing is based on the annual costs of production divided by the amount of spending on vegetables. The member share can also be calculated by determining the cost of production (seeds, seedlings, tools and equipment, labor, among others) to be divided among the number of current or potential members. Another pricing modality is based on the members' decision as to what they can afford to contribute to or share with the organization. The European Handbook on CSA also emphasizes that this method supports creativity, freedom, solidarity and inclusion of low-income members. In this approach, the total budgetary requirement is presented to the

community, and the members secretly bid their preferred price. Bidding is repeated until the budget is met. Pricing can also be based on other CSA models with similar scope, membership, land area, among others.

Payment for CSA produce can be weekly, monthly, seasonal or annual. This is decided upon, depending on the convenience and practicality of the farmers and the consumers. Weekly payment offers the least commitment of consumers to the farmers and may become unreliable when the risks of production are experienced. Farmers are better secured if payment is on a monthly basis. It will not provide the necessary budget for the beginning of the year but may be more convenient to consumers. Seasonal payment represents a higher commitment of consumers to the farmers and can be easily administered especially if payment is on installment basis. With the highest commitment to farm, an annual payment scheme is the most advantageous to farmers, but may be less preferred by consumers.

Payment can be on cash basis, bank transfer or cheques. Cash payment is considered as the most complicated and poses the highest risk requiring both consumers and producers to meet at least once. Bank transfer may be costly because of transfer charges but is considered as the easiest payment mode. Cheque payment provides security to the farmer. Nevertheless, the payment is released to the bank account of the farmers only at specified times (i.e., monthly, weekly, etc.).

Product Distribution Modality. There are different ways to distribute the produce of CSA. The farmers pack the produce in individual boxes of standard size with known weight of the share and deliver them to the selected outlet or hub. Farmers can also deliver all shares to the outlet with the individual boxes packed at the pick-up point or each consumer picks up his share at the designated hub. Consumers can also collect shares at the farm individually or collectively.

Develop Contract and Implement. The contract should stipulate the roles of the CSA partnership. It also includes the terms of contract; delivery/pick-up scheme; production mechanisms and methodology; payment arrangement and terms; among others.

Prepare Business Plan and Measure Viability. The business plan for the CSA is jointly prepared by farmer and consumer. It defines the components of capital expenditures to include land, equipment, tools, capital, irrigation, among others; labor expenses such as payment for farmer and worker benefits and compensation; operating expenses such as seeds, plants, water, taxes, fuel, supplies, among others. The potential level of income from the operation should also be determined and deducted from costs to determine if operating costs can be recovered. The viability of the CSA as a social enterprise can be gauged in terms of income generation capability, recovery period of capital investment, proportion of benefits and costs, ability to meet short- and long-term obligations, among others.

Phase 4: Monitoring and Evaluation (M&E) for Sustained Partnership

Identify and Measure M&E Indicators for CSA. The continuous assessment of the implementation of CSA is necessary, taking into account the agreed schedules of CSA undertaking, accomplishment of objectives and targets and the fulfillment of roles of the partnership. M&E indicators involve measurement and assessment of outputs, outcomes and impact indicators.

Review, Evaluate and Improve Plans. The plan of the CSA is reviewed, evaluated and improved based on the identified issues and concerns, challenges, and pitfalls.

The greatest challenges that both the consumers and producers are faced with are the need to ***C**are for the earth, **S**incerely care for people and **A**dvocate fair share.*

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Rural Areas and Climate Change: Disaster Risk Prevention Strategies

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Abstract

Considering that rural areas host most of the highly vulnerable population, it has been one of the faces of the Department of Environment and Natural Resources (DENR) through the Environmental Management Bureau's (EMB) project and activities. In virtue of integrating climate change into developmental plans, EMB has been a leading body in training different organizations on climate proofing in order to analyze the hazards posed by this change in the climatic pattern. Climate proofing is a process based tool utilized in order to understand the risks and opportunities presented by the change in the climate pattern, which is essential in developing a strategy for a more resilient and sustainable community. An example of activities which involved capacity building on climate proofing is the Ecotown Project on different rural as well as the River Basin Management Master Plans. Climate proofing also aids in the development of disaster prevention and climate adaptation strategies.

Introduction

The Philippines is prone to natural hazards and disasters as the country is situated in the Pacific ring of fire. The existence of climate change has increased the climate related hazards and the vulnerability of the communities in both urban and rural areas. Rural communities pose more natural properties than the urban which provides more opportunities to experience natural contrivances, both beneficial such as resources and risks like natural hazards and disasters. Another distinctive characteristic of rural communities is that they are inhabited by most of the country's vulnerable population such as farming, coastal, mountainous, and rural poor communities. The emergence of climate change has increased the intensity, frequency, and number of natural hazards which also increased the exposure of the already vulnerable population. (Figure 1.)

Disaster Risk and Reduction Management and Climate Change Adaptation

In order to address this higher level of vulnerability, the Philippine Disaster Risk Reduction and Management (DRRM) act was established to build safer, adaptive, and resilient communities toward sustainable development. There has been no smooth understanding on the Climate Change Adaptation (CCA) in relation to the DRRM, considering that it is already critical to address the concerns of the latter, and much more so to simultaneously address the concerns of the former. In the Philippines, DRRM and CCA evolved separately and have distinct policy frameworks.

Like the DRRM act, the National Climate Change Action Plan (NCCAP) was established aiming to build adaptive capacities and resilience of vulnerable sectors in line with the sustainable development. NCCAP identifies 7 strategic priorities: (1) Climate-friendly industries and services; (2) Sustainable energy; (3) Knowledge and capacity development; (4) Food

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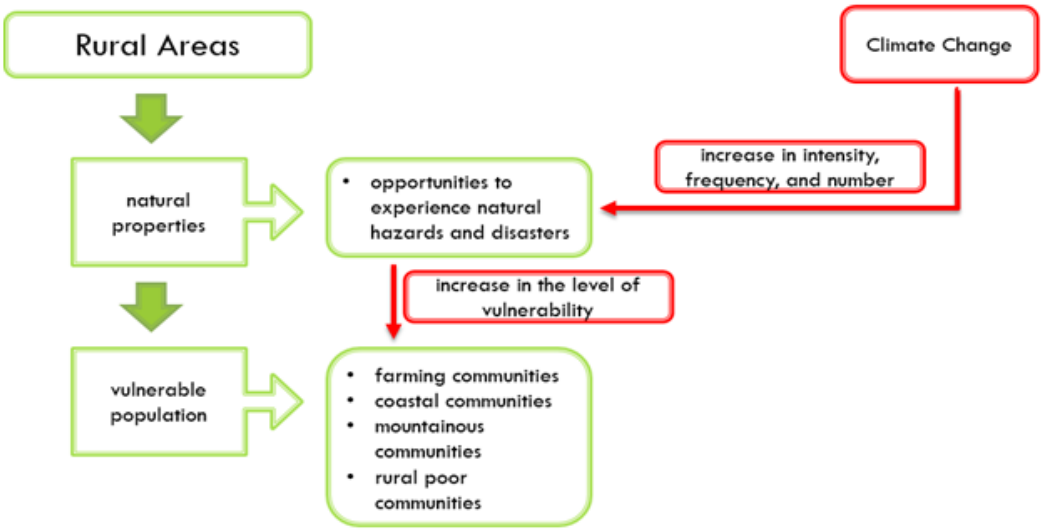

Figure 1. The effect of climate change in the natural properties of rural communities

security; (5) Water sufficiency; (6) Environmental and ecological stability; and (7) Human security. The two last priorities are the converging points of the DRRM and NCCAP.

Climate Proofing and Climate Lens

Being in the lead agency for protecting and enhancing the quality of the environment toward the public welfare, the Environmental Management Bureau (EMB), through its Climate Change Division, has taken part into building capacities and ensuring that these developmental efforts consider the climate change scenarios or impacts to minimize various threats. This is achieved through climate proofing which is the modification of existing and future projects addressing the impacts of climate change. Another is the application of the climate lens in the developmental efforts of the rural communities. Climate lens refers to a systematic approach which aims to incorporate/integrate climate change scenarios in to existing and/or new planning approaches. This involves three general steps which are related to the particular tool or objective of the community: (1) Identification of vulnerabilities, risks, and opportunities; (2) Identification of adaptation options; and (3) Selection of adaptation measures (Figure 2). In applying the climate lens, primarily, the goals must be parallel to the 7 strategic priorities of the NCCAP. Secondly, there is a need to identify the impact of the climate change on the particular goal and area. Lastly, the focal agencies can be named to lend or send assistance to handle the climate change impact. The application of climate lens in planning approaches is the first step in ensuring that climate-associated risks are considered on developmental plans.

Figure 2. General steps in applying climate lens on developmental plans

Mainstreaming Climate Change Adaptation

Climate proofing is the modification of existing and future projects so that they are resilient to impacts from climate change and/or do not contribute to increased vulnerability of the project goals and objectives. The process involving four basic steps namely; (1) vulnerability assessment, (2) identification of adaptation options, (3) selection of adaptation options, and (4) development of a monitoring and evaluation plan, aims to mainstream CCA into developmental plans and to build resilience towards risks and hazards that are climate related (Figure 3).

Figure 3. Basic steps in mainstreaming climate change adaptation into developmental plans

Vulnerability assessment refers to the analysis of the level of exposure and sensitivity of the system of interest towards a particular climate change impact. It is important for the rural communities to consider the needs and produce of the affected stakeholders. This means an accorded understanding for the identified climate change impacts to the goals of the communities and the changes in plan. By this, the general picture of the level of exposure of the system of interest can be obtained, together with the level of sensitivity and the potential impact of climate change. Eventually, the adaptive capacity then surfaces, leading further to the knowledge of the level of vulnerability (Figure 4).

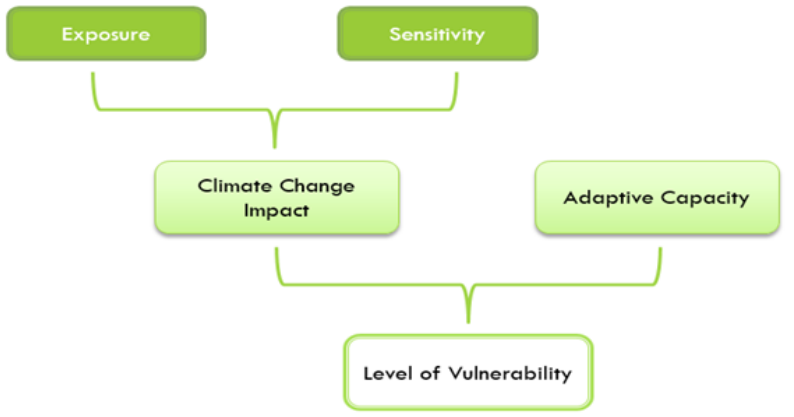

Figure 4. Outline for determining the level of vulnerability of a system of interest towards climate change impact

	A	B	C
System of Interest	Climate Variability	Sensitivity	Adaptive Capacity
1. Coral Reef	• Increase in sea level temperature	• Corals are sensitive to temperature • 30% of Corals are in good condition	• Establishment of marine protected areas

Figure 5. An example of vulnerability assessment involving coral reefs as system of interest

An example of vulnerability assessment brings in the information on the system of interest (e.g., Coral reefs), the certain climate change impact (e.g., Increase in sea level temperature), the level of sensitivity of the system of interest (e.g., Corals are sensitive to temperature and only 30% are in good condition), and its current adaptive capacity (e.g., Establishment of marine-protected areas) (Figure 5).

After determining the level of vulnerability of the system of interest, the *identification of adaptation options* follows (Figure 6). For rural communities, the adaptation options lead to the reduction of the exposure and sensitivity of the system of interest, or reveal the type of historic and current climate condition depending on its strong relationships with other projects and plans. The process of Identifying Adaptation Options looks first into something important, which is to prioritize and identify entry points of the adaptation options. One good entry point is the Comprehensive Land Use Plan or the River Basin Master plan. Next is to consider the time scale of activities. After generating the time scale, trying of various strategies follows. This step can reduce exposure and sensitivity, leading to building or enhancing the current adaptive capacity of the system of interest. The last step in identifying adaptation options is to let those strategies revolve within the existing tools, technology, policies, programs, plans, regulations or incentives.

Figure 6. Steps for identification of climate change adaptation measures

These adaptation options must be evaluated (Figure 7) in order to prioritize measures and steps needed by rural communities. Evaluation is done by looking into the effectiveness or how the option reduces levels of vulnerability and exposure of the system of interest. The cost of intervention, as part of evaluation, covers both economic and non-economic costs. The last part of the evaluation is the feasibility of the adaptation options that consider the administrative, financial, technical and legal resources of the rural community. Hence, the ***most feasible adaptation option is selected***.

Figure 7. Criteria for evaluation of adaptation options

Climate Change is a continuous process. In order to build resilient rural communities, there is the necessity to develop ***a monitoring and evaluation framework*** to ensure that the adaptation options would continue to address the ever changing climate pattern (Figure 8). In preparing a monitoring and evaluation framework, it is important to define the indicators that reflect the changes and results of the intervention. These indicators can be validated if they are specific, measurable, attainable, relevant, and time bound (S-M-A-R-T). Climate change does not stop on administrative borders. It is important for the rural communities to take into consideration the ecosystems, specifically in risk relevant areas such as coastal strips and floodways, in observing the results of certain adaptation plans. The indicator must describe a result chain or the over-all impact of the intervention on the total resilience of the community.

Figure 8. Steps in preparing a monitoring and evaluation framework in order to build and ensure resilience of the selected adaptation option

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Development of Rural Roads and Resiliency of Local Communities

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Abstract

Traditionally, roads are classified based on administrative obligation (i.e., national, provincial, city, or barangay road) or on function (i.e., arterial, collector, or local). However, there is an even more basic classification of roads other than administrative or functional, that which is based on the location of the roads. Urban roads are those that are found in so-called urbanized areas or areas that are significantly built up or developed such as those found in many cities and municipalities. Rural roads are those found in less developed areas such as agricultural lands, mountains, and other areas (OECD, 1999). In terms of Philippine administrative classification, rural roads may be classified as national, provincial, city, municipal or barangay and functionally they can be arterial, feeder, or local. Roads, in general, play a critical role in economic and community development by linking production and consumption areas as well as facilitate access to services. It has been established that steady economic growth can be achieved through an efficient transport system and among the identified critical drivers for economic growth are roads (Regidor, 2013). However, roads serve multiple functions in rural communities, particularly when these are the only access to education, health services, markets, employment, and other social services. It had been observed that in some rural areas that the authors visited, road carriageways are also used as pedestrian paths of school children and women who do not know how to drive or have no private means of transportation. This emphasizes the role of rural roads to provide equal opportunities to all stakeholders. Rural roads are also considered as lifelines, providing protection to communities by facilitating emergency response operations, including evacuations in time of natural calamities. Thus, these roads need to be resilient in the midst of natural disasters such as typhoons and earthquakes in order for the very same communities that use them to be able to recover quickly from such calamities. This paper attempts to document the functions of rural roads in the Philippines, based on secondary data sources. It then proceeds to present challenges in the development of rural roads in the Philippines and discuss innovative modalities in the development and maintenance of rural roads.

Definition and Functions of Rural Roads

Roads may be classified according to its location. Urban roads are those that are found in so-called urbanized areas or areas that are significantly built-up or developed such as those found in many cities and municipalities. Rural roads are those found in less developed areas such as agricultural lands, mountains, and other areas (OECD, 1999).

Using this classification, rural roads play a critical role in economic and community development by linking production and consumption areas as well as facilitate access to

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services. It has been established that steady economic growth can be achieved through an efficient transport system and among the identified critical drivers for economic growth are roads (Regidor, 2013). Rural roads also enhance community development and well-being by providing access to education, health services, markets, employment, and other social services. It had been observed that in some rural areas that the authors visited, road carriageways are also used as pedestrian paths of school children and adults who do not know how to drive or have no private means of transportation. The photos shown below illustrate the importance of a well-planned and resilient rural road infrastructure is to the well-being of children. The photo on the left shows a young child returning home from school using the concrete barrier at the edge of a rural road which has recently been subjected to rock falls. In contrast, the photo on the right showcases a good example of a well-planned rural road where the sidewalk is consciously developed into a pedestrian walkway for schoolchildren.

Rural roads are also considered as lifelines, providing protection to communities by facilitating emergency response operations, including evacuations in time of natural calamities.

Figure 1. Use of rural roads by children going to school in Cebu

Thus, these roads need to be resilient in the midst of natural disasters such as typhoons and earthquakes in order for the very same communities that use them to be able to recover quickly from such calamities. Experience during Typhoon Haiyan in 2013 emphasized the importance of the restoration of passable roads for relief and rescue operations as the Department of Public Works and Highways endeavored to clear and open the 36 roads rendered impassable by the typhoon.

In 2012, the Department of Tourism (DOT) and National Anti-Poverty Commission (NAPC) developed concepts involving the linking of communities into clusters that are made a part of a larger economic cluster. This is illustrated in Figure 1, with Cebu province used as an example. The larger economic cluster is defined by major transport facilities such as airports, seaports, and industrial or commercial centers. Economic activities at the community level include agriculture, fisheries, small-scale industries and tourism which are linked by rural roads.

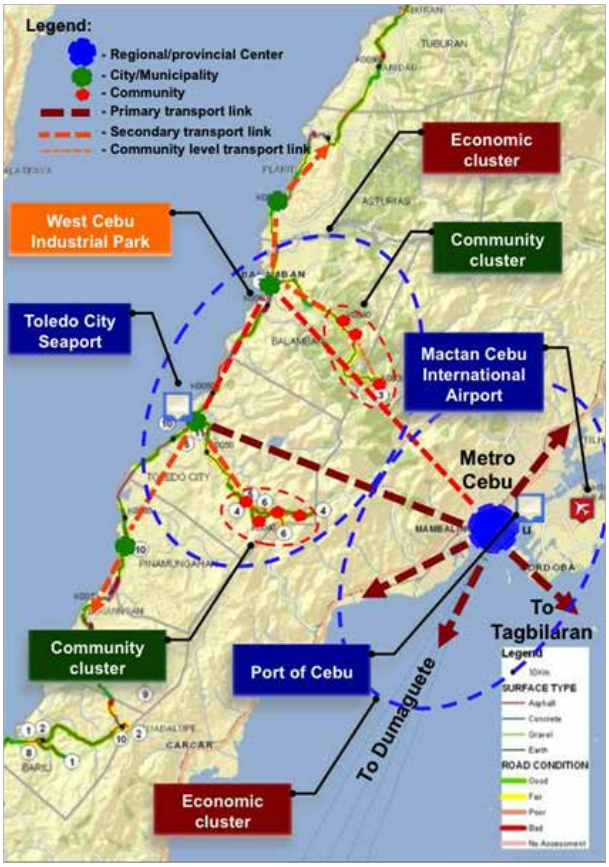


Figure 2. Economic and community clusters linked by transport infrastructure (Regidor, 2013)

The National Economic Development Authority (NEDA) has classified priority development areas throughout the country according to three categories (WB, 2014), namely:

Category 1: Areas with high poverty incidence but with low absolute numbers of poor people. It is necessary to invest in social protection, health and education in these areas and accessibility is required to achieve the same welfare levels as developed areas. Roads will provide the opportunities to take advantage of economic growth.

Category 2: Rapidly developing areas such as cities that attract poor people (i.e., migration). Infrastructure including roads should make transport in these areas more efficient (i.e., should not constrain growth). Roads would also help expand or extend opportunities to neighboring areas.

Category 3: Hazardous areas or areas that are highly vulnerable to disasters such as earthquakes, typhoons, etc. Transport infrastructure like roads and bridges in these areas need to be "disaster-proof" or "climate-proof" as part of an increased awareness for adaptation and the need for redundant infrastructure as a way of making the overall road network resilient.

Most rural roads will fall under categories 1 and 3 and serve a dual role of stimulating economic development and facilitating relief operations in times of disaster. And while resilience is ideally required everywhere, it is most relevant for areas in Category 3. In areas that are highly vulnerable to disasters such as earthquakes and typhoons, all-weather roads

and bridges are required to ensure accessibility and transport system redundancy. According to Faiz (2012), prompt delivery of relief in areas affected by disaster can be facilitated with the existence of well-engineered rural roads.

Development of Rural Roads in the Philippines

Roads in the Philippines are usually classified according to the government entities administering them. They are classified as national roads, provincial roads, city roads, municipal roads, and barangay roads. National roads are either arterial or secondary. Arterial roads, also known as primary roads, are continuous roads that form part of the main trunk system leading to either primary centers such as major cities and airports or all roads connecting to the primary centers. National roads are classified by function into the following:

a. North-South Backbone – form the main trunkline from northernmost Luzon down to Southern Mindanao, interconnecting major islands;

b. East-West Laterals – roads traversing the backbone and across the islands (about 100 km apart);

c. Other roads of strategic importance – provide direct access to important centers and areas vital for regional development and emergencies.

On the other hand, national secondary roads are those that complement national arterial roads to provide access to other main population and production centers. A summary of the different classifications with their respective descriptions is given in Table 1.

Table 1. Administrative Road Classification in the Philippines

Road	Description	Administrative Responsibility
National -Arterial -Secondary	Continuous in extent, form part of the main trunk line system; all roads leading to national ports, seaports, parks or coast-to-coast roads	Design, construction, management and maintenance by national government through the Department of Public Works and Highways (DPWH)
Provincial	Those roads that connect one municipality to another municipality and to National Arterial or Secondary Roads; other road as designated by the Province through legislation	Design, construction, and maintenance under the Provincial Engineering Offices (PEOs)
City	Major streets in the city if not provincial or national road; other roads designated by City through legislation	Planning, design, construction and maintenance under city engineering offices
Municipal	Those roads/streets within the municipal town, if not provincial or national roads; other roads designated through local registration	Planning, design, construction and maintenance under municipal engineering offices
Barangay	Classified as penetration roads or farm-to-market roads connecting barangays with each other and to road network of the area; other roads designated by local council.	Routine maintenance by Barangay council through the Barangay Road Maintenance Committee (also referred to as Committee on Public Works/ Infrastructure)

(Source: Maintenance Study in the Philippines, International Labor Organization, 2006)

Hence, in the Philippines, rural roads may also be categorized as national roads when these are located in rural areas. In such instances, the national government is charged with the responsibility of the development and maintenance of these roads. However, it is noted that community level links are predominantly through rural roads that may be provincial, city, municipal and barangay roads which constitute an estimated 78% of the total road network in the country (excluding national and city roads) with road conditions varying widely from 6.59% paved for barangay roads to 31.30 % for provincial roads (Table 2).

Table 2. State of Philippine Road Network

Classification	Total	Unpaved	Paved	% of total road network	% Paved
*** National Road**	**31,597.679**	**6,154.239**	**25,443.440**	**14.69%**	**80.52%**
- National Arterial	16,056.470	1,581.130	14,475.340	7.47%	90.15%
- National Secondary	15,541.209	4,573.109	10,968.100	7.23%	70.57%
Provincial Road	**31,233.230**	**21,457.630**	**9,775.600**	**14.52%**	**31.30%**
City Roads	**14,739.385**	**5,537.614**	**9,201.771**	**6.85%**	**62.43%**
**** Municipal Roads**	**15,816.000**	**10,422.000**	**5,394.000**	**7.35%**	**34.10%**
**** Barangay Roads**	**121,702.000**	**113,682.000**	**8,020.000**	**56.58%**	**6.59%**
TOTAL	**215,088.294**	**157,253.483**	**57,834.811**	**100.00%**	**26.89%**
* Based on 2012 Road Condition Data					
** As of 2002					

Challenges of Rural Development in the Philippines

There are two main challenges in the efficient and timely development of resilient rural roads in the Philippines: 1) limited financial capacity of local government units, and 2) variation in the quality of roads due to design, construction, and maintenance standards and practices across various political jurisdictions in the country.

Limited Financial Capacity of Local Government Units

As outlined in the table above, the administrative responsibility of the development and maintenance of these roads falls on the local government units, which are composed of provinces, cities, and municipalities whose financial resources are limited and shared among various public services provision. Based on the 2011 Accomplishment Report of the Bureau of Local Government Finance[3] LGUs derive their incomes largely from their Internal Revenue Allocation (IRA)[4] at 65%, followed by local tax revenues at 20%.

On the expenditure side, the LGUs spent 45% of their total budget on General Public Services which include 'expenditures for services that are indispensable to the existence of an organized LGU. These include executive and legislative services; overall financial and

[3]Government unit under the Department of Finance which is the focal agency for local finance which includes among its many mandates 1) to assist in the formulation and implementation of policies on local government revenue administration and fund management and 2) Exercise administrative, technical supervision and coordination over the treasury and assessment operation of local government;

[4]Share of the LGU of the total national revenues from taxes, allocated based on its land area and population

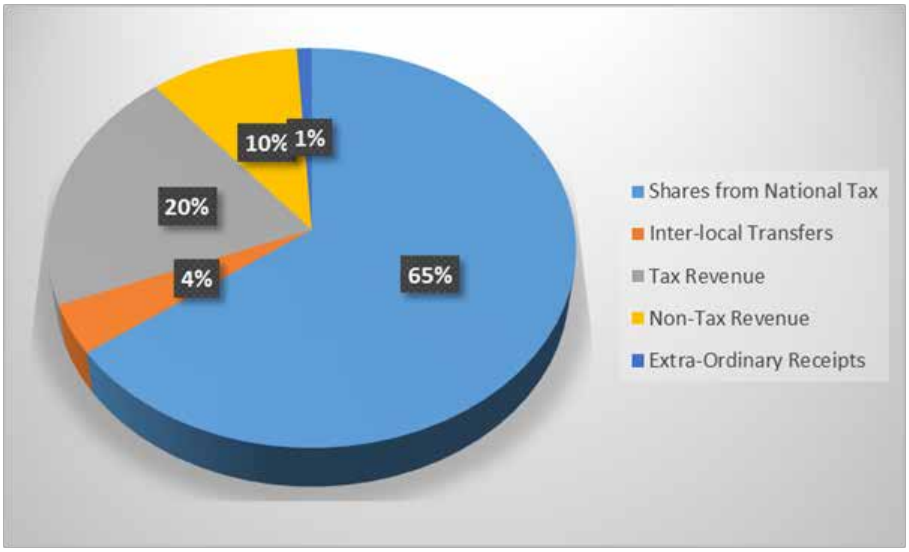


Figure 3. Income Profile of Local Government Units (2011)
(Source: 2011 BLGF Accomplishment Report)

fiscal services; the civil service; planning; conduct of foreign affairs; general research; public order and safety; and centralized services. These exclude general administration, regulation, research and other services of departments that can be identified directly under each specific sector'[5]. Economic Services which 'covers sector expenditures for activities directed in promotion, enhancement and the attainment of desired economic growth', by which road infrastructure development may be funded, gets only 16% of the budget. With constrained financial constraint of LGUs, construction of rural roads is hampered.

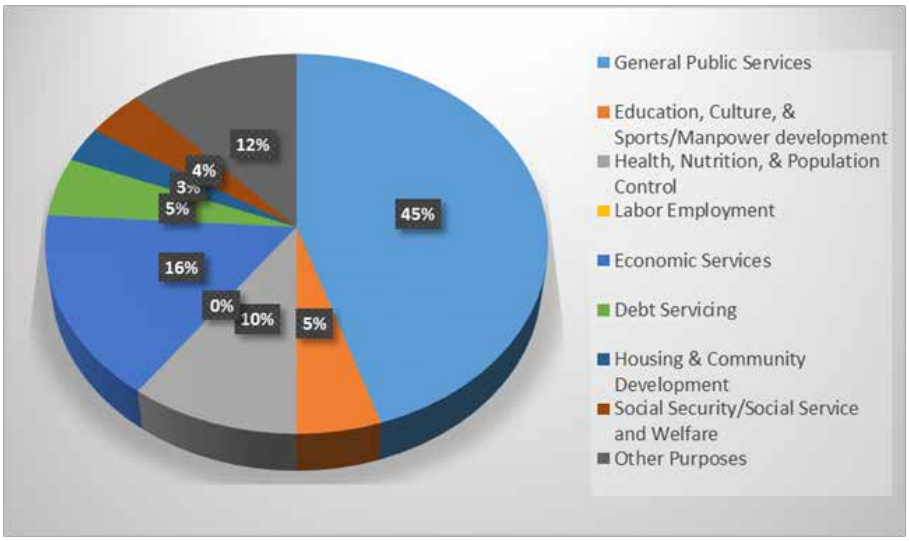


Figure 4. Expenditure Profile of Local Government Units (2011)
Source: 2011 BLGF Accomplishment Report

[5]Statement of Receipts and Expenditures Manual, Bureau of Local Government Finance, Department of Finance

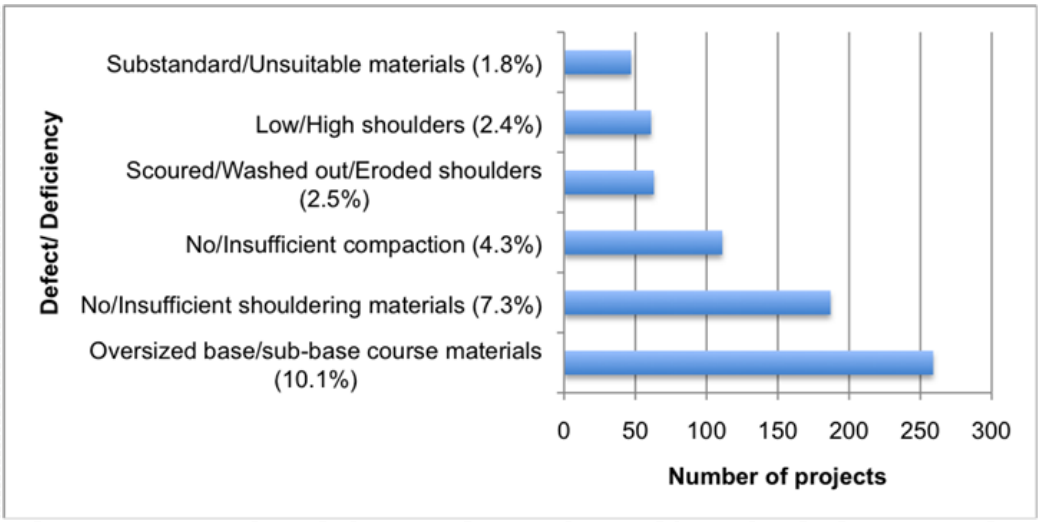
Variation in design, construction, and maintenance standards and practices across jurisdictions

As discussed previously in this paper, the Department of Public Works and Highways (DPWH) is the main government agency that is mandated to construct, and maintain national highways. As such, in keeping with its mandate, it is the lead agency in setting technical standards for the development of sound road infrastructure. There are no extant official issuances of the DPWH pertaining to the use of any manual though there are heavy references (and an apparent dependence) on AASHTO in the DPWH design manual (i.e., red book). Other references used by the Agency include the 1) Transport Research Laboratory (1993) Overseas Road Note 31, 2) Asphalt Institute, Asphalt Overlays for Highway and Street Rehabilitation, Manual Series No. 17, (MS-17), and 3) Japan Road Association (1989) Manual for Asphalt Pavements.

In 2011, the DPWH issued Department Order No. 22, prescribing the minimum thickness and widths of national roads for both ACP and PCCP. The order also specifies the procedure for computing the cumulative equivalent single axle load for heavy vehicles considered in the estimation of the design load. This issuance is currently used by the DPWH for all roads under its jurisdiction, especially for new projects and roads being rehabilitated.

However, despite the established standard adopted by DPWH, several construction issues on national roads have been identified. The figure below shows statistics on the results of the assessment of 2,559 roads during the maintenance stage where problems attributed to the construction stage are manifested.

The most common problem is over-sized base and sub-base materials used in the projects. Significant, too, are substandard/unsuitable materials. Although local government units are wont to adopt the DPWH standards in road construction, implementation may be found wanting. Moreover, there is lack of a robust management system that would allow LGUs to conduct assessments towards identification and prioritization of maintenance work for local roads.



Explanatory note: Out of a total of 2,559 roads, 10.1% (259 roads) were found to have oversized base/sub-base course materials.

Figure 5. Frequency distribution of defects/deficiencies of base, sub-base and shoulders for 2,559 roads in 2012 (DPWH, 2013)

Innovative Modalities of Rural Road Development and Implications to Communities

To address the issue of insufficient funds for road development in the Philippines, two public financing modalities have been implemented in the Philippines, namely the establishment of the Motor Vehicles Users Charge (MVUC) fund and the undertaking of the Convergence Project between the Department of Tourism (DOT) and the Department of Public Works and Highways (DPWH). The details of these are articulated below.

Motor Vehicle User's Charge Fund (MVUC)

In 2000, the Motor Vehicle Users' Charge (MVUC) Fund was established through Republic Act 8794 as a result of two studies conducted in the late 1990s[6] which attributed the poor quality of the national roads to the meagre road preservation budget granted to the Department of Public Works and Highways (DPWH) for road preservation. The MVUC is aimed at providing additional financing to ensure sustainable road maintenance and the minimization of air pollution from mobile sources. The monies collected from vehicle registration fees and truck overloading penalties are allocated and deposited into four (4) special trust accounts: 1) Special Road Support Fund (80%), 2) Special Local Road Fund (5%), 3) Special Road Safety Fund (7.5%), and 4) Special Vehicle Pollution Control Fund (7.5%). As can be seen, the SLRF has the lowest share of the MVUC fund. In 2015, the total SLR fund was PhP1.237B, to be shared by 17 regions. Each region has several provinces and cities and allocation for each is determined by the formula shown below:

$$LGU\ allocation = Annual\ SLRF(0.30PI+0.20VHI+0.50RLI)$$

where PI = performance index, VHI = vehicle population index, RLI = Road length index

The performance index currently being used in the determination of LGU allocation is the Seal of Good Housekeeping[7] implemented by the Department of Interior and Local Government (DILG)[8].

Convergence Project between the Department of Tourism (DOT) and the Department of Public Works and Highways (DPWH)

Recognizing the fact that most roads leading to tourism destinations are most often provincial, municipal road or even barangay roads where the problem of inadequate financial resources is more pronounced, the Department of Tourism (DOT) and Department of Public Works and Highways (DPWH) entered into a Memorandum of Agreement (MOA) on January 20, 2012. Under the terms of the 'Convergence Program for Enhancing Tourism Access', DPWH will finance and construct the roads leading to prime tourist destinations identified by DOT through its Tourism Master Plan. As of 2015, it is estimated that about 4,000 kilometers of tourism roads have been built. However, the Convergence Program will end this year, reducing yet another option for improving rural roads.

[6]ADB-funded Philippine Transport Strategy Study (PTSS), 1997 and WB-funded Better Roads Philippines (BRP), 1999

[7]The Seal of Good Housekeeping monitors and awards LGUs with good performance in internal housekeeping specifically in the areas of local legislation, development planning, resource generation, and resource allocation.

[8]Interview with RBS on February 9, 2015

Conclusion

The paper has emphasized the role of rural roads to provide equal opportunities to all stakeholders. However, development has been hampered by limited financial resources of local government units and a weakness in adapting and enforcing national standards for the design, construction, and maintenance of rural roads across jurisdictions. This weakness can be addressed with a more proactive stance in both the national and local levels. At the national level, the challenge for promoting national standards fall upon the DPWH and should be propagated through its District Engineering Offices, which are supposed to be in contact with LGUs and should be resources for consultations pertaining to rural road design, construction and maintenance. At the local level, cities and municipalities should strive to coordinate with the DPWH in order to comply with national standards for rural roads. These, however, should not limit LGUs to seek out other references for rural road development particularly for roads that do not require national highway standards due to their functions. That is, most farm to market roads need not be designed according to national highway standards but based on rural road standards that are more appropriate for the volume and characteristics of traffic that will be using such roads.

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Climate Change and Crop Production in Vietnam

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Abstract

Climate change has been accelerated with clear evidences in Vietnam. According to climate change scenarios, the annual mean temperature in Vietnam would increase by 1.1 – 3.6oC in 2100 while the sea level would rise by 65-100 cm and extreme weather events would happen more frequently (MONRE, 2009). Climate change will probably result in flooding, declines in cultivated areas and decrease in crop yields, thus placing a great challenge for food security in Vietnam. Several adaptation measures for crop production such as the changes in crop structure and crop calendar, the introduction of new varieties and farming techniques, and improved irrigation systems have been applied and the initial successes have been recorded. In order to more actively respond to climate change and mitigate its induced negative impacts on crop production, it is very necessary to enhance the adapting capacity and implement more adaptation measures in the coming time.

Key words Climate change, crop production, impacts, coping strategy, Vietnam

Introduction

Vietnam is an agriculture-based country as agriculture is the commanding sector of the national economy, encompassing close to twenty percent of the GDP. At present around three-quarters of the total population are living in the rural areas and dependent on agriculture and other related activities, and around 50% of the labor force still work in the agricultural sector. Within this sector, crop production accounts for 63% of íts GDP and occupies 65% of the agricultural sector's labor force, and contributes more than 60% of export turnover. Agriculture, especially crop production, therefore plays a very important role in the national economy of Vietnam. By the same token, agriculture in Vietnam, especially crop production, is most likely to be undermined by the effects of climate change. Vietnam is one of the most vulnerable nations in the world given its very long coastline, high dependence on agriculture, and low levels of development (per capita income is still one of the lowest in Asia). In a recent report by the World Bank, the authors noted that Vietnam may be one of the top 5 countries likely to be most affected by sea level rise in particular, with "potentially catastrophic" consequences (Dasgupta et. al., 2007).

Climate change has been accelerated with clear evidences in Vietnam. For 50 years from 1951 to 2000, the annual average temperature increased by 0.7°C and the sea level rose by 20cm and the natural calamities such as typhoons, floods and droughts happen more often (MONRE, 2008). According to the climate change scenarios developed by MONRE in 2009, the

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annual mean temperature in Vietnam would increase by 1.1 – 3.60C in 2100 while the sea level would rise by 65-100 cm and extreme weather events would more frequently happen. Climate change will probably result in flooding, declines in cultivated areas and decrease in crop yields, thus placing a great challenge for crop production in Vietnam, especially in Red and Mekong river deltas. Under such circumstance, several questions have arisen such as: How would climate change affect the crop production?; and What have the Vietnamese government and farm households done for adaptation of crop production with climate change? This paper aims to provide the understanding of climate change situation, its impacts on crop production and the adaptation measures taken in crop production in Vietnam.

Overview of Crop Production and Climate Change in Vietnam

Crop production in Vietnam

Vietnam is a long narrow country with a total land area of 320,000 km^2 consisting of an extensive coastline of 3,260km. Three quarters of its territory is covered by hills and mountains, with elevations between 100 and 3400m. The remaining area is the plain consisting of two major river deltas (the Red River Delta in the north and the Mekong River Delta in the south) with extremely fertile lowland areas and dense populations.

Vietnam's agriculture is traditionally characterized by the integration of crop and livestock such as rice, corn, potato, vegetable, pig, buffalo, cattle and poultry. The crop production makes around 70% of total agricultural output and the rest comes from livestock sector (General Statistics Office, 2014). Among seven geographic regions in the country, agriculture is concentrated in the two densely populous deltas with rice as the dominant crop and with pigs as the most common animal.

Within crop production, food crops account for 55.5% of total value of agricultural output, while industrial and perennial crops, and fruit and vegetables account for 27.6% and 16.8%, respectively (GSO, 2014). Rice is the main food crop, accounting for 85% of total cultivated land and around 40% of total output value of food crops. Rice is mainly produced by wet rice cultivation in the Red and Mekong River Deltas. Other important food crops include maize, sweet potatoes and cassava.

Coffee is the most important industrial crop in Vietnam. The yields of coffee amount to about 1,300 kilograms per hectare, which is twice the world's average. Apart from coffee, other important industrial and perennial crops are rubber, sugarcane, groundnut, soybean, tea and pepper. Vietnam is a large exporter of coffee, pepper, and cashew nut in the world (Table 1).

Table 1. Crop Production in Vietnam in 2013

Crop		Total Area (thousand hectares)	Total Production (thousand tons)
Annual Crop	1. Rice	7902.8	44039.1
	2. Maize	1172.5	5193.5
Perennial Crop	1. Coffee	635.1	1292.4
	2. Rubber	955.5	863.8
	3. Pepper	67.9	152.3
	4. Cashew nut	310.8	1190.9
	5. Tea	128.1	216.9

Source: Vietnam GSO, 2014 and FAOSTAT

Climate change in Vietnam

Climate change has affected Vietnam with clear evidence in the increase in temperature, downward precipitation, sea level rise and increase in extreme weather events.

Increase in temperature

The annual average temperature in Vietnam increased by 0.1°C per decade from 1900 to 2000, and 0.7°C during 1951–2000, or 0.14°C per decade, suggesting that temperature rose faster in the latter half of the century. Summertime has become hotter in recent years, with the average monthly temperature increasing at 0.1–0.3°C per decade. According to the projection of the Ministry of Natural Resources and Environment (MONRE) in 2009, the temperature in most regions in Vietnam will increase by 1 – 1.40°C, the highest (1.4-1.5°C) in North Central region and the lowest (0.8°C) in Central Highland region by 2050. By 2100, the temperature will increase by between 1.1 – 3.6°C, but vary by region. In the north, the temperature will probably increase by 1.6 – 3.3°C. In the central region, especially in the North Central, the temperature will increase by 1.9 – 3.6°C (highest increase in Vietnam). In the south and central highland, the temperature will increase by 1.1-2.6°C, the lowest in the country (Table 2).

Table 2. Changes in annual mean temperature and annual rainfall relative to 1980-1999 period

Climatic region	Changes in annual mean temperature (°C)			Changes in annual rainfall (%)		
	2020	2050	2100	2020	2050	2100
Northwest	0.5	1.2 - 1.3	1.7 - 3.3	1.4 - 1.6	3.6 - 3.7	4.8 - 9.3
Northeast	0.5	1.2 - 1.3	1.7 - 3.2	1.4 - 1.7	3.6 - 3.8	4.8 - 9.3
North Delta	0.5	1.2 - 1.3	1.6 - 3.1	1.6	3.9 - 3.8	5.2 - 10.1
North Central	0.6	1.4 - 1.5	1.9 - 3.6	1.5 - 1.8	3.8 - 3.7	5.0 - 9.7
South Central	0.4	0.9 - 1.0	1.2 - 2.4	0.7	1.6 - 1.7	2.2 - 4.1
Central Highland	0.3	0.8	1.1 - 2.1	0.3	0.7	1.0 - 1.8
South	0.4	1.0	1.4 - 2.6	0.3	0.7	1.0 - 1.9

Note: based on the low and high emission scenarios
Source: MONRE, 2009

Downward precipitation

In most areas of Vietnam, average monthly rainfall has decreased, particularly between the months of July and August, and has increased between September and November. Rainfall intensity has also increased considerably. Wide regional variations in rainfall have been recorded, but the annual volume has remained largely stable. However, the localized intensity and unpredictability of the rainfall has increased, causing severe floods. In the coming time, Vietnam's rainfall pattern will be greatly affected by the Southwest monsoon. A recent study on Vietnam's future rainfall showed that annual rainfall in most areas would increase by 5–10% toward the end of this century (Cuong 2008). Southern Vietnam would become drier (ADB, 2009).

Table 3. Projection of sea level rise in Vietnam from 2020 to 2100 (compared with period 1988-1999)

Scenario	Years								
	2020	2030	2040	2050	2060	2070	2080	2090	2100
Low (B1)	11	17	23	28	35	42	50	57	65
Medium (B2)	23	17	23	30	37	46	54	64	75
High (A1F1)	12	17	24	33	44	57	71	86	100

Source: MONRE, 2009

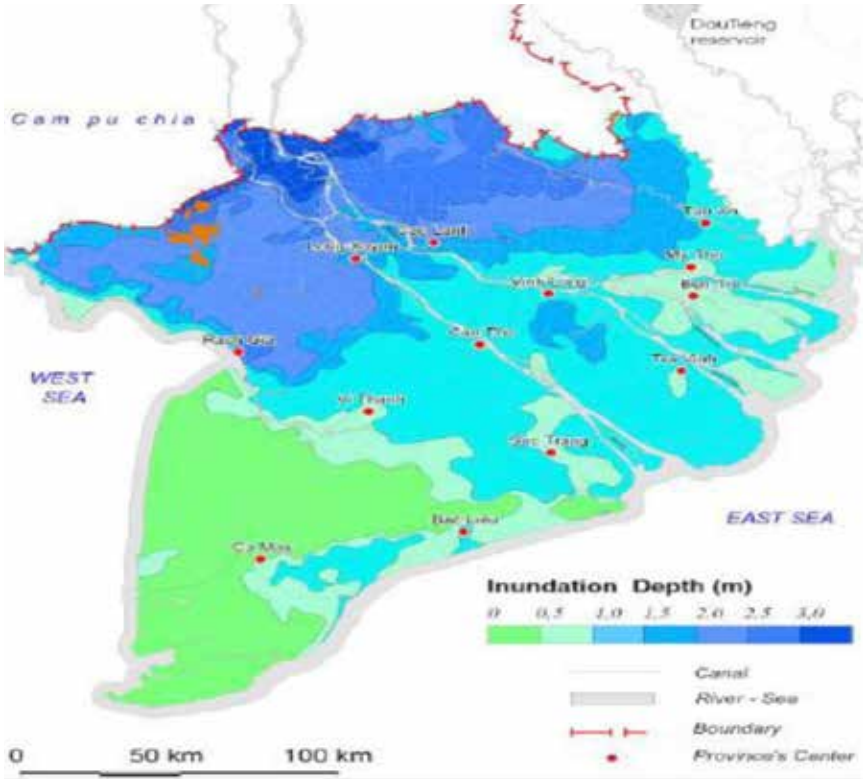

Figure 1. Sea Level Rise of 3.0 Meters over Current Conditions to 2050
Source : IFPRI, 2011

Sea level rise

The sea level in Vietnam has risen between 2.5 to 3.0cms per decade in the last 50 years, but with regional variations. Compared to the duration 1980-1999, the estimation of MONRE (2009) based on the greenhouse gas emission scenarios show that the sea level in Vietnam will rise by 28-33cm in mid-21st century and rise by 65-100cm by the end of 21st century (Table 3 and Figure 1).

Increase in extreme weather events

Extreme events in Vietnam take the form of typhoons, droughts and flooding, as well as heat waves. Over the last 50 years, the peak month for typhoon has shifted and most of the storms now occur later in the year. Typhoons also tended to move to lower latitudes. The

Figure 2. Drought and Flooding in Vietnam
Source: MONRE Vietnam, 2012

effect of El Niño/Southern Oscillation (ENSO) has become stronger in various parts of Viet Nam. Droughts and floods now occur with greater frequency than before and affect most of the central coastal provinces. In the northern lowland part of the country, heat waves occur mainly in the summer, while in the south they occur in the spring-summer period (Cuong 2008). There have been more droughts in the south in recent years, which have tended to last longer (Figure 2).

In 2007-2009, there have been unusual weather patterns including storms, floods, and drought affecting tens of thousands of people across the country. In the central provinces, local people observed the heavier rainfall during the main flooding season at the end of 2007 and mid-2009. In the south of the country, Ho Chi Minh City was hit in November 2007 and October 2009 by the worst high tides in 48 years. This destroyed some 40 sections of the dyke around the city. And in northern Vietnam, the National Hydrometeorological Forecasting Centre reported that a sustained cold spell in early 2008 lasted for an unprecedented 38 days, beating the previous record of 31 days that was set in 1989. Temperatures dropped below 10°C, and reached -2 °C in the Northern mountainous areas of Vietnam (Figure 3).

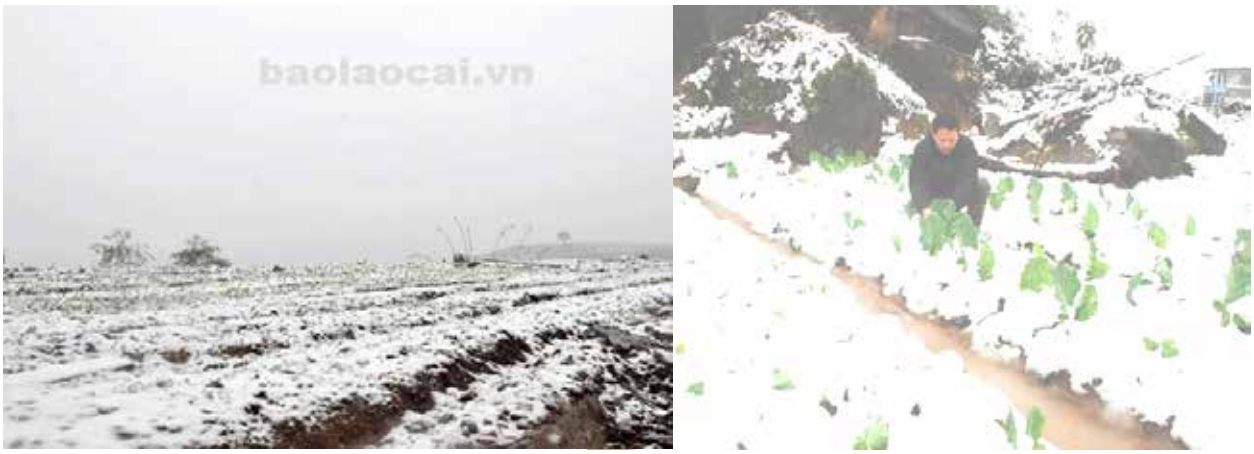

Figure 3. Heavy snow in Sapa – Vietnam in 2013 (after 52 years)
Source: Lao Cai Newspaper, 2013

Impact of climate change on crop production in Vietnam

According to IFAD (2011), the climate change will affect the arable land areas, change cropping patterns and calendar, increase crop pest and diseases and thus decrease in crop yields, and others (Table 4).

Impact of climate change on arable land

According to the World Bank report (2007), Vietnam is one of the most affected countries in the world with respect to sea level rise. With 1m sea level rise scenario, Vietnam is the second to the most affected country (after Bahamas), with close to 10% of its area affected. According to Vice Minister Dao Xuan Hoc of the Ministry of Agricultural and Rural Development (MARD), in a workshop on climate change in Vietnam in Aug 2009 (SGGP online, 2009), if the sea level rise is 1 meter, 0.3-0.5 million hectares in the Red River delta will be flooded, and 90% of the land area in Mekong River delta will be flooded continuously for 4-5 months. It is estimated that around 2 million hectares of the total 4 million hectares of rice land areas will be flooded.

In addition to flooding, the increased salinization is also a big concern for the arable land in Vietnam due to the sea level rise. The combination of more drought in the dry season (usually from December to April in the south) and the sea water traveling higher up the rivers increase the amount of salt in the water and brings the salted water into areas not previously affected by salinization. In total, it is estimated that 1.5-2.0 million hectares of paddy land in the Mekong Delta and 0.3-0.5 million hectares in the Red River Delta would be unusable due to flood and salinization if the sea level rises to one meter.

Impact of climate change on crop yield

In Vietnam, the Dynamic-Ecological simulation model, a tool developed by the DINAS-COAST consortium, predicts a decrease in spring rice yield of 2.4% by 2020 and 11.6% by 2070 under the A1B scenario, i. e., due to the change in temperature and rainfall, occurrence of extreme weather and changes in soil conditions. Summer rice will be less sensitive to climate impact than spring rice, but the yield will also decrease by 4.5% by 2070. Rice planted in northern and central Vietnam will be affected more than rice grown in the southern part of the country. In the case of maize, the projected decrease in yield is smaller than that of

Table 4. Potential Climate Impacts by Climatic regions on crop production

REGION	POTENTIAL IMPACTS
Nothern Mountains	Area for (subtropical) winter crops reduced; tropical crops adapted to higher altitude Cropping patterns and calendars adjusted to higher temperature conditions Increase in crop pests and disease Increase in production costs; productivity and crop quality loss Increased moisture stress and demand for irrigation Increase in soil loss
Red River Delta	Shift from (subtropical) winter crops In long-term, cropping patterns and calendars adjusted to higher temperature conditions Increase in production costs; productivity and crop quality loss Salinization of soils/irrigation water Conversion of agriculture land (displacement from sea level rise)
Central Coast	In medium-term, cropping patterns and calendars adjusted to higher temperature conditions Increase in production costs from increased volumes and duration of irrigation Increase in crop pests and disease Increased moisture stress and demand for irrigation
Central Highlands	Adjust cropping patterns & calendars to higher temperature and increased variability of rainfall Increase in production costs, especially high value crops (coffee, rubber) Opportunity to increase tropical crops, especially industrial crops Increase in crop pests and disease
South (Southeast and Mekong River Delta)	Increased moisture stress and demand for irrigation especially in rice Increase in production costs from increased volumes and duration of irrigation SLR: salinization of soils/irrigation water and salt water inundation; long term loss of 20%-50% rice lands Conversion of agriculture land (displacement from sea level rise), long term Increased salt water intrusion and potential large area industrial contamination from storm surges

Source: IFAD, 2011

rice. However, across the region, the projection is that maize grown in northern areas will experience increased yield while maize grown in central and southern areas will have reduced yields. (Table 5.)

Impacts on food security and trade of agricultural commodity

The projected decline in potential yield and total production of rice in some Asian countries and in Vietnam caused by climate change could have a significant effect on food security and trade in agricultural commodities, hence on economic growth and stability (Matthews et. al., 1995). If the negative impacts on Vietnam's agricultural production continue, with the increasing population, it is very likely that thousands of people in Vietnam will be left unable to produce or purchase sufficient food. Food insecurity and loss of livelihood are likely

Table 5. Yield change of Rice and Maize in Vietnam in percent (comparison with base year, 1980 – 1990)

	2020 (%)	2050 (%)	2070 (%)
Spring rice	**-2.4**	**-8.4**	**-11.6**
- Hanoi	-3.7	-12.5	-16.5
- Da Nang	-2.4	-6.8	-10.3
- Ho Chi Minh	-1.1	-6.0	-8.1
Summer rice	**-0.8**	**-3.2**	**-4.5**
- Hanoi	-1.0	-3.7	-5.0
- Da Nang	-1.2	-4.2	-5.7
- Ho Chi Minh	-0.2	-1.7	-2.8
Maize	**-0.53**	**-0.77**	**-1.87**
- Hanoi	+0.7	+7.2	+7.1
- Da Nang	-0.7	-3.1	-4.2
- Ho Chi Minh	-1.6	-6.4	-8.5

Source: ADB, 2009

to be exacerbated further by the loss of arable land and fisheries to inundation and coastal erosion in low-lying areas. More people will be at risk of hunger and malnutrition, which will cause more deaths. The possibility of local conflicts may increase. On the supply side, future farming will be a challenge, as farmers will need to adapt to new farming technologies (that is, heat-tolerant and pest resistant crop varieties, drought-resistant and water logging-resistant crops, adjusted planting dates, and others). If these technologies are not available and readily accessible to farmers, it is likely that agricultural productivity will decline in Vietnam.

Table 6. Potential impacts of Climate Change on three main crops by 2030 and 2050, using MONRE's medium emission scenario (A1B, B2 of IPCC)

Item	Up to 2030		Up to 2050	
	Quantity (1000 ton)	Rate (%)	Quantity (1000 ton)	Rate (%)
Rice	-2031.87	-8.37	-3699.97	-15.24
1. Reduction due to natural disaster	- 65.27	-0.18	- 65.27	-0.18
2. Reduction due to change in potential yield	1966.6	-8.10	-3634.7	-14.97
- Spring rice	-1222.8	-7.93	-2159.3	-14.01
- Summer rice	-743.8	-8.40	-1475.4	-16.66
Maize	-500.4	-18.71	-880.4	-32.91
Soybean	-14.38	-3.51	-37.01	-9.0

Source: Nguyen Van Viet, 2011

Adaptation for Crop Production with Climate Change in Vietnam

Formulation of government programs to respond to climate change

Climate change and its serious impact on economic development and agricultural production has been highly considered by the Vietnamese government and a series of programs and projects on mitigation and adaptation to climate changes has been implemented (Table 7). On 16 Nov 2007, the Prime Minister issued decision 172/2007/QD TTg to approve the National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020. Vietnam also established the National Action Plan for climate change issues, which is carried out by the Hydro-meteorological Service (HMS). In July 2008, the National Target Program was established to respond to climate change (Decision 158/QD-TTg Dec 2008). In 2011, the National Climate Change Strategy was approved by the Vietnamese Prime Minister.

The National Target Program (NTP) to Respond to Climate Change (NTP-RCC) is the umbrella program and guiding framework of the government of Vietnam, in its efforts on adaptation and mitigation of climate change risk. The Ministry of Natural Resources and Environment developed the program and is responsible for its implementation. The current

Table 7. NTP-RCC: General implementation arrangement

Ministry of Natural Resources and Environment	• Coordinate NTP, develop annual work plan and budget • Guide and assist ministries/sectors/provinces to develop/implement action plans • Monitor, evaluate and draw lessons (thru MONRE in Provinces) • Coordinate communications and dissemination • Develop and implement MONRE's action plan
Ministry of Planning and Investment (MPI)	• Lead and coordinate efforts to mainstream climate change into Socio-economic development plan (SEDP) process • With MONRE, develop monitoring and evaluation mechanism for NTP • Develop and implement MPI's action plan
Ministries, line agencies, other government authorities	• Develop and implement action plans to respond to climate change • Carry out activities assigned by the NTP • Participate in common activities under the direction of NTP Steering Committee
People's Committees of Provinces and Cities	• Develop and implement action plans to respond to climate change • Organize the implementation of NTP approved activities • Ensure correct and efficient use of NTP fund allocations and mobilize additional resources • Carry out monitoring and evaluation as defined in the NTP and periodically report on progress
Social Organizations, NGOs, and Enterprises	• Actively participate in climate change response activities according to function and role • Support information, education and communication for climate change response • Mobilize communities for active participation, expansion and dissemination of experience • Implement/participate in the NTP and action plans of Ministries, sectors and localities

program, which covers the periods from 2009-2015 has the global objective of (1) assessing potential impacts of climate change; (2) ensuring that climate change response action plan is developed by each sectors; (3) initiating effort to move the country towards a low-carbon economy; and (4) contributing to global efforts for the mitigation of GHGs. The implementation arrangement in NTP-RCC is also clarified in Table 7.

The Ministry of Agricultural and Rural Development (MARD) also approved the Action Program Framework to respond to climate change for agricultural sector from 2008 – 2020 (Decision 2730/QD-BNN-KHCN). In 2011, MARD issued its Actions Plan to Respond to Climate Changes of the Agricultural and Rural Development in Period 2011-2015 and Vision to 2150 (RCC-ARD). In RCC-ARD, MARD establishes priorities for the next four years. The overall objective of the Action Plan is to improve the climate change response capacity of the agricultural and rural development sector in order to (i) minimize climate change-related damages; (ii) reduce the agricultural sectors greenhouse gas emissions; (iii) protect the lives of people exposed to climate risk and sea level rise related natural disasters; and (iv) create opportunities for sustainable agriculture and rural development within the context of climate change. Priority thematic areas within the Plan include protection of populations and agricultural lands in the coastal zones; stabilizing agriculture, forestry and salt production; ensuring food security (especially, rice production); the safety and integrity of the dyke system and other productive infrastructure important for agricultural production; natural disaster prevention and control; and economic growth that reduces both poverty and greenhouse gas emissions.

Mobilization of national resources and ODA support for climate change in agricultural and rural development

The implementation of the NTP and other related activities on climate change need a huge resource (total cost over the period for implementation of the NTP is estimated at 1,965 billion VND). Therefore, the Vietnamese government tried to mobilize the resources including the ODA support for implementing the activities related to climate changes, especially in agricultural and rural development (Table 8). Based on a review of a database compiled by the World Bank on climate change investments in Vietnam, around US$1.37 billion has been pledged to climate change activities over 25 years between 1992 and 2017. More than 55% of these resources have been in the form of loans. Including Government of Vietnam funds, 51% of total resources committed have been designated for climate change adaptation, 46% for mitigation and 3% for capacity-building, awareness- raising and institutional support.

Assistance from the governments for the farm-level production practice and financial management

To mitigate the impacts of climate change, the governments (at national and local levels) have implemented assistance programs for farm-level production, especially after disasters due to calamities. In 2007, 30 tons of maize varieties and 62,156 tons of vegetable varieties were freely delivered to farm households after disasters occurred in Thanh Hoa, Nghe An, Ha Tinh, Quang Binh, Thua Thien Hue, Ninh Binh, Ha Nam, Hoa Binh, Phu Tho và Son La. In October 2009, Quang Ngai province delivered 500 tons of rice varieties and 11.6 tons of hybrid maize varieties to farm households in typhoon-affected localities. These were farm households of the 2009-2010 winter-spring crop season production. In addition, Ha Tinh province set up in 2009 the plan to support 100% of the varieties' cost to the farm households if they planted the crops following the crop calendar of the province, but then the crops were destroyed

Table 8. Recent Climate change funding by ODA and the Government of Vietnam activities ending 2010-2017

Themes or sub-themes	No. of Projects and Activities	Value in USD
Adaptation-General	5	43,878,788
Adaptation- Agriculture/Forestry/Fisheries	8	6,510,000
Adaptation-Water/Urban	4	1,941,790
Adaptation-Social/Economic	2	185,000
Adaptation-Natural Disasters	5	108,577,500
Adaptation-Coastal	2	4,700,000
Adaptation-Mekong Delta	4	182,900,000
Current situation/trend in Climate Change	3	-
National Science and Technological Program	9	-
Capacity Strengthening-General	9	5,970,000
Capacity Strengthening -Agriculture/Fisheries	2	-
Capacity Strengthening- Energy	1	-
Capacity Strengthening-Industry/Urban	2	-
Capacity Strengthening-Natural Disasters	2	450,000
Capacity Strengthening- Community-level	2	6,289,450
Awareness Raising	2	-
Mainstreaming	4	3,650,000
Low Carbon Growth Planning	1	-
Mitigation-General	2	405,000
Mitigation-Agriculture	4	5,348,600
Reducing Emissions from Deforestation and Forest Degradation (REDD)	12	17,032,000
Mitigation-Energy-Power Sector	2	-
Mitigation-Energy-Renewables	2	240,800,000
Mitigation-Energy-Energy Efficiency	10	66,975,000
Mitigation-Industry	1	2,600,000
Mitigation-Urban	1	9,800,000
Mitigation-Transport	2	9,800,000
Financial Mechanisms-General	3	1,500,000
Total	98	819,313,128

Source: IFAD, 2011

due to typhoon or floods. In 2008, Hanoi authority granted free provisions of 47.9 tons of crop varieties to farm households after heavy rainfall and flooding. In 2005, Department of Agricultural and Rural Development (DARD) of Hai Phong provided free delivery of 4.5 tons of vegetable seeds to farm households to help overcome the severe impacts of disasters. Since 1998, EU has supported around £10 million worth of programs (40 in all) to implement activities for mitigating the impacts of calamities, such as typhoons, floods, landfalls, for the most vulnerable regions of Vietnam (Vietbao, 23/09/2009). The Vietnam government also

established the Fund for Disaster Prevention & Mitigation, and Fund for Typhoon and Foods Prevention and Mitigation.

National and local authorities are beginning to integrate climate resilient policies into wider programmes. In some areas of the deltas, dykes are being strengthened or heightened, mangroves are being planted to improve protection from storm surges, and some homes are being built on bamboo stilts. In some cases women and children are learning to swim and life jackets are being issued.

The Vietnamese government also launched the pilot farm insurance program. Under the plan, poor farming households will receive a subsidy of up to 100% of the insurance premium. Support to other farming households will be 60%. The percentage for agricultural production organizations will be 50%. There are three main categories of cover, including cultivated crops (rice), domestic animals (buffalo, cows, pigs and poultry) and aquaculture (tra and basa fish, black tiger shrimp and white-leg shrimp). Under the program, rice insurance is offered in seven provinces; livestock insurance in nine provinces; fish and shrimp hatchery insurance in five provinces.

Technological development

Technological adaptation options have been proposed and developed in Vietnam for crop development (to increase tolerance of crop varieties) and improvement in weather and climate information systems (to provide weather forecasts).

The development of new crop varieties including types, cultivars and hybrids, has the potential to provide crop choices better suited to temperature, moisture and other conditions associated with climate change. This involves the development of plant varieties that are more tolerant to such climatic conditions as heat or drought through conventional breeding, cloning and genetic engineering. After 10 years of research, Vietnamese researchers in the Maize Research Institute have successfully developed the maize variety LVN-15 for drought tolerance and disease resistance. Researchers in the Agricultural Genetic Institute of Vietnam also succeeded in developing Soybean DT-2008, which is drought tolerant after 6 research years. Researchers in Can Tho University have created the pomelo and orange varieties for salt tolerance. Many crop varieties have been currently tested by Vietnamese researchers, with the support of the Vietnamese government, on drought, salt tolerance and pest and disease resistance, and will introduce the same to farmers.

For weather and climate information systems, the Hydro-meteorological Service established the National Office for Climate Change and Ozone Protection (NOCCOP). This is responsible for the national work co-ordination on climate change, the construction of national policies on impacts of climate change, and the encouragement of international co-operation regarding climate change issues. NOCCOP has access to HMS's extensive network of hydro-meteorological stations, including 83 synoptic, 86 climatological, 90 hydrological, 163 stage measuring, 21 marine, 50 aquatic environmental and 20 atmospheric environmental stations. These stations are distributed over the entire area of Vietnam. This network provides climate information for planning activities in agriculture, forestry, fisheries, construction, transportation, industry and health.

Changes in farm production practices

Farm production adaptations include farm-level decisions with respect to farm production, land use, land topography, irrigation, and the timing of operations. Farmers in Vietnam have

quite actively responded to climate change impacts in recent years. In the North, the long duration growing crops were replaced with the short duration growing crops due to climate change (since the plantation of short duration growing crops can help avoid heavy rainfall, floods or cold wind, and can better resist pests and diseases. As a result, the crop yield has become higher in recent years). The farmers also cultivated more soybean, potato, hybrid maize, etc., partly due to more frequent drought occurrences. The farmers were also proactive at storing seeds and experimenting with new crops, like vegetables or fodder grass, that they hoped might be more resistant to weather changes.

In the South, although some new rice varieties with salt tolerance have been introduced to farmers, the areas of those new varieties are still limited as their yield is low. The new farming systems such as the shrimp – rice model has been implemented by farm households and proved to be quite efficient. The shrimp – rice model has developed quite rapidly in 7 coastal provinces in the South (Figure 4).

Due to the climate change, farmers in Vietnam have also changed their crop timing. Farmers in the North grow spring rice later than before. Farmers in the South also adjusted the time of growing rice to avoid the possible flood and unusual climate phenomenon. Farmers in the north, especially in the Red River delta have currently changed their cultivation customs, from planting rice to sowing rice, in order to save labor cost and to shorten the growing duration.

Recommendation for Better Adaptation with Climate Change for Crop Production in Vietnam

Despite the significant preliminary achievements, Vietnam faces many challenges in adaptation to climate change for its crop production. This is because crop production in Vietnam is still heavily dependent on natural conditions, such as weather and natural topography. There are many existing constraints for adaptations such as the shortage of weather forecasting in Vietnam, farmers' inadequate awareness of climate change and its impacts, the limited research capacity in developing new crop varieties with better tolerance, and lack of community-based adaptation. Therefore, for better adaptation to climate changes for the crop production, it is necessary to implement several measures as follows:

- Continue to develop and implement climate change adaptation mechanisms and policies for crop production; mainstreaming climate smart, participatory local planning and implementation for crop production into socio-economic development planning processes.

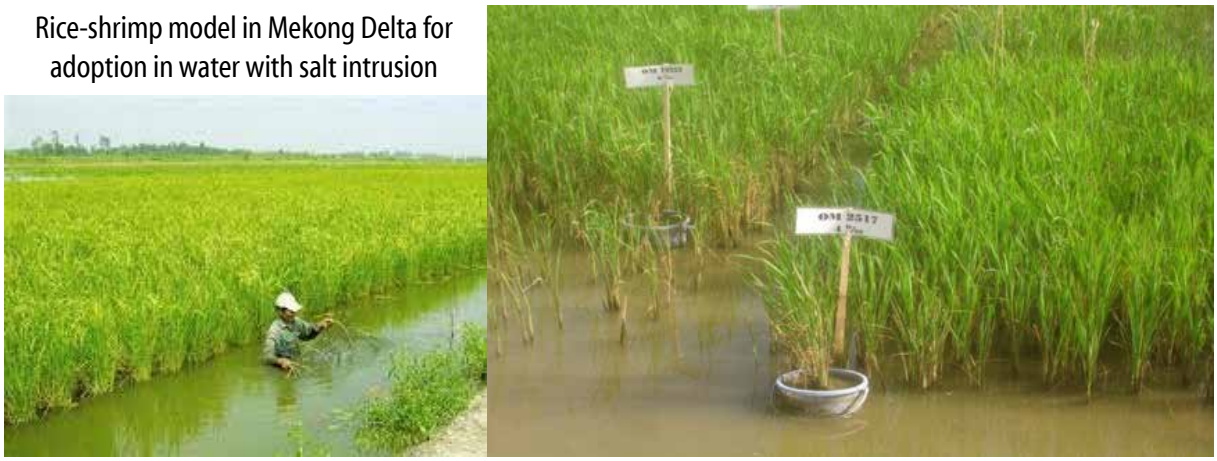

Figure 4. Research for new rice varieties tolerant to salinity
Source: Directorate Fishery, 2015

- Set agricultural research and development priorities for creating new crop varieties (with better tolerance and resistance to droughts, floods, salinity, pests and diseases that could happen more often due to climate change, etc.), and farming practices (irrigation methods, cultivation techniques/models, crop rotation) that are suited to the changing climate condition.
- Enhance the dissemination and education of climate changes and its impacts and adaptation needs for crop production to farm households.
- Adjust to the growing seasons and sowing seasons to meet the changing climate conditions and adopting new, more suitable cultivation practices (e.g., planting distances, fertilizer application, weed control, plowing, post-harvest straw mulching, pest control, crop rotation, and others).
- Adapt extension and technology transfer strategies, methodologies and expenditures, in order to increase coverage of services, make service more responsive to farmers' needs, and in order to have more effective adaptation to climate changes in crop production.
- Expand farmers' access to credit for small investments associated with changing crops and varieties, such as purchase of varieties, other inputs, facilities, etc., and providing more reliable crop insurance for farm households.

Table 9. Summary of Farm Households' Main Coping Strategies for Crop Production

Type of Risk coping strategy	Type of farmer applying the strategy	% of farm HHs applying the strategy
Self-insurance with in households		
- Restructure crop production	Middle and better-off HH	10%
- Re-transplant rice	All households	100%
- Rent pumps to deal with floods	Middle and better-off HH	90%
- Keep some seeds in reserve for replant later	All households	100%
- Use more fertilizer and pesticides	All households	100%
- Reduce unnecessary input items	All households	100%
- Carryout technical-advice from extension staff	All households	100%
Support from outsider		
- Support from government	All households	100%
- Exchange labor with neighbors	All households	100%
- Support from relatives and friends	n.a	n.a
Use of financial services		
- Borrow from relative, friends and moneylenders	All households	40%
- Borrow from banks	Middle and better-off HH Poor HH borrow from VBSP	20-40%
- Buy input and pay later	Poor and middle HH	100%
- Use insurance service	all households	50-60%

Sources: Microfinance Opportunities, 2007

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Lecturers
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Formerly the Institute of Environmental Planning, the School of Urban and Regional Planning was established in 1965 through Republic Act 4341 as an academic unit of University of the Philippines. Its establishment was in consonance with the declared policy of government to assist in the study and solution of development problems and facilitate the realization of development goals. In 1971, more and more students with social science backgrounds were entering the Master in Environmental Planning (MEP) program, in contrast with the predominance of architects and engineers in the early years. The need to strengthen the program to cope with this new trend was felt. In 1974, the MEP program was revised, establishing a Master in Urban and Regional Planning (MURP). This was changed to a Master of Arts in Urban and Regional Planning (MAURP) in 1981 and the PhD program in Urban and Regional Planning was launched in 1982. In response to the growing demand for more professional planners in the country, the School pursued the adoption of a diploma course in urban and regional planning ten years after. This opened the door wider to government employees and officials in answering the call for more competent planners. From 1992, activities and programs for teaching, training, research, and extension services were all geared toward assisting local government units in the preparation of their Comprehensive Land Use Plans (CLUP), as well as the development of a pool of professional planners at the local level. Today, the School offers the graduate Diploma, Master of Arts and Doctor of Philosophy programs following the ladder structure. As the only graduate school of environmental planning in the Philippines, the School has been at the forefront of development planning efforts in the country since its inception. The School actively engages in research in cooperation with government and private institutions. Its areas of interest cover the growth patterns, distributions, and implications of population and employment; land use change and policy in urban, regional and other areas: shelter and related settlement planning, environmental management, transport planning; and infrastructure development. The School encourages its graduate students to publish their significant research works in the Journal of Urban and Regional Planning, its peer-reviewed academic journal, in line with the University's thrust on outcome-based education. With respect to training and extension services, the School regularly conducts the Special Course on Urban and Regional Planning (SCURP), launched in 1977, in response to the need for government agencies to prepare long-term plans. It designs and implements short courses on subject areas related to planning, including customized programs, to disseminate new analytical tools in planning. The School is active in maintaining a strong working relationship with many government inter-agency committees and legislative bodies. Much of its research, training and extension works help improve the quality of planning both at the national and local levels of government. The School is currently headed by Professor Mario R. delos Reyes.