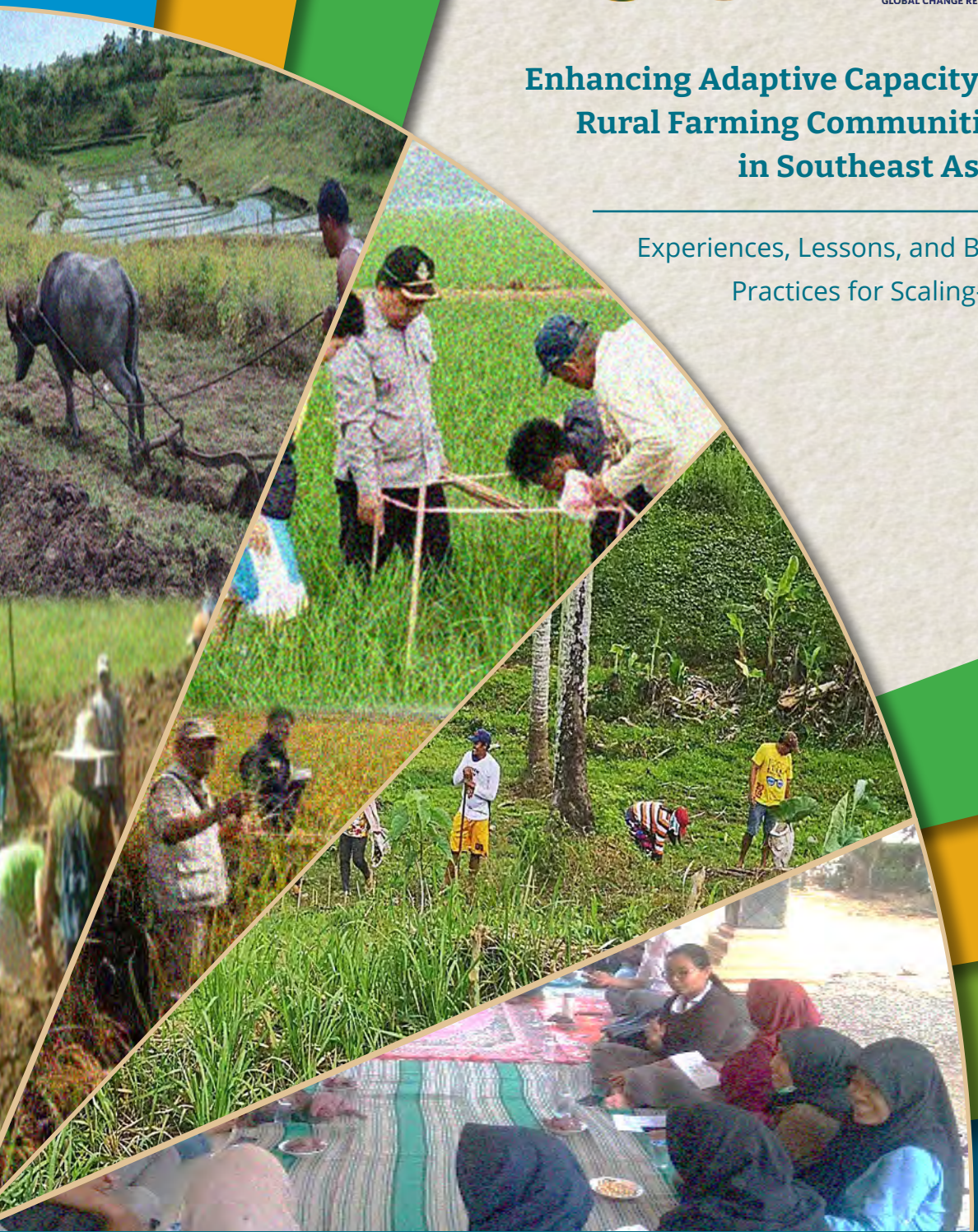
Enhancing Adaptive Capacity of Rural Farming Communities in Southeast Asia:

Experiences, Lessons, and Best Practices for Scaling-up



ASIA-PACIFIC NETWORK FOR GLOBAL CHANGE RESEARCH

Enhancing Adaptive Capacity of Rural Farming Communities in Southeast Asia: Experiences, Lessons, and Best Practices for Scaling-up

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Institute of Agroforestry (IAF)
College of Forestry and Natural Resources
University of the Philippines Los Baños
College, Laguna
PHILIPPINES

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Experiences, Lessons, and Best Practices for Scaling-up

PREFACE

Developing countries are considered as most vulnerable to climate change impacts, while the agriculture sector, particularly smallholder farmers, are the most vulnerable sectors because of their limited technical, social, and financial capacities, as well as their geographical locations. A number of capacity development initiatives have been implemented by academic and research institutions to build and/or enhance the adaptive capacity of the smallholder farmers in Southeast Asia.

This publication highlights the selected APN-funded capacity development initiatives in the region, with emphasis on the best practices, lessons learned and outcomes for possible replication, adoption and scaling-up in the region. The salient features and highlights of these programs were gathered from the project reports and publications of the selected APN-funded capacity development projects. These projects were likewise featured in a webinar, where the project leaders and collaborators confirmed the significant contributions and outcomes of their projects towards enhancing the local adaptive capacity of the rural farming communities. We have high hopes that this communication material will help inspire other research and development organizations, as well as national and local governments to scale-up and upscale these capacity development initiatives.

Leila D. Landicho
Ma. Armie Janica P. Ramirez
Institute of Agroforestry
College of Forestry and Natural Resources
University of the Philippines Los Baños
College, Laguna
PHILIPPINES

ACKNOWLEDGMENT

The project collaborators acknowledge the Project Leaders and collaborators of the APN-funded capacity development projects for sharing their capacity development experiences in a Webinar, and expressing their interest and willingness to become part of this publication. These are: (a) CBA2015-09NSY Comia; (b) CBA2014-13NSY Carandang; (c) CBA2013-10NSY Visco; (d) CBA2011-13NSY Tolentino; (e) CBA2011-10NSY Penalba; (f) CBA2012-12NSY Cruz; (g) CBA2017-01MY Ho; (h) CBA2019- 05NSY Do; (i) CBA2019-01NSY Landicho; (j) CBA2018-09SY Perdinan; (k) CBA2017-03MY Pulhin.

The local partners of the different APN-funded capacity development projects are also recognized for sharing their testimonies about the significant contributions of these projects in enhancing their capacity for climate change adaptation, and improving the delivery of research and development services. Truly, their insights could inspire other local communities to engage in a multisectoral collaboration for capacity development.

The staff members of the Institute of Agroforestry - College of Forestry and Natural Resources, University of the Philippines also played key roles in organizing the Webinar on Enhancing the Adaptive Capacity of Rural Communities in Southeast Asia. Their logistics and technical support contributed to the success of the online event.

Finally, the project collaborators would like to thank the Asia-Pacific Network for Global Change Research (APN) for providing the funds to implement the project activities such as the webinar, and the development of knowledge products and communication materials such as the video of different APN-funded projects in Southeast Asia, and this publication.

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INTRODUCTION

With more than 10% contribution to the gross domestic product, and the creation of jobs for more than one-third of the working population in the region (Zhai & Zhuang, 2009), agriculture, therefore, is vital in the economy of Southeast Asia. However, Zhai & Zhuang (2009), noted, that nearly three-fourths of the poor in Southeast Asia reside in rural areas, with agriculture as their main economic activity. According to Mikolajczyk et al. (2021), an estimate of 100 million smallholder farmers are actively engaged in the production of staple crops (i.e. maize, rice and wheat) and other high-value crops such as cacao and coffee. Agriculture, however, is vulnerable to numerous challenges such as market and policy uncertainties, natural hazards and calamities, and most recently, climate change.

Given the crucial role of agriculture in the economy, and its vulnerability to climate change impacts and other stressors, there is an urgent need to invest on measures that would help enhance the adaptive capacity and resilience of the agriculture sector, particularly the smallholder farmers. Among these include the promotion of climate-smart agriculture (Sebastian and Bernardo, 2019); agroforestry (Landicho et al., 2016; Landicho et al., 2021); conservation farming techniques (Cruz et al., 2016; De Luna, 2018); rainwater harvesting (Landicho et al., 2022); and, training, awareness-raising and capability-building programs (Carandang et al., 2014; Landicho et al., 2019).

The Asia-Pacific Network for Global Change Research (APN) has invested on supporting regional collaborative research and capacity development programs aimed at improving understanding of global change and its implications, while contributing to a sound scientific basis for policy-making; enhancing the capacity of scientists, policy makers and practitioners to assess global change issues, and explore options to resolve issues towards achieving sustainability; and, strengthening interactions among scientists and policymakers.

This publication aims to: (a) highlight climate change adaptation strategies developed by the selected APN-funded capacity development projects in Southeast Asia; (b) showcase the outcomes and impacts of the selected APN-funded capacity development projects; (c) synthesize significant experiences and lessons; and, (d) disseminate the communication material to local policy makers, research and extension institutions, national government agencies, and other development organizations.

Capacity Development of Local Climate Change Communicators in Vulnerable Upland Communities in Southeast Asia

BACKGROUND

Recognizing the need to build the capacity of key stakeholder groups in communicating the different issues about climate change and the potential climate change adaptation strategies for vulnerable upland farming communities, this capacity development project was initiated by the Southeast Asian Network for Agroforestry Education (SEANAFE). SEANAFE engaged the collaborWation of the four country networks, namely: Philippine Agroforestry Education and Research Network (PAFERN); Indonesia Network for Agroforestry Education (INAFE); Lao Network for Agroforestry Education (LaoNAFE); and, the Vietnam Network for Agroforestry Education (VNAFE).

This capacity development project aimed to: a) develop the capabilities of at least 15 farmer-leaders as climate change communicators in the selected upland farming communities in each of the four collaborating country networks; b) build the knowledge and skills of local agricultural technicians and farmer-trainors about the science of climate change (i.e. issues, causes, impacts to agricultural production, health and the environment, appropriate climate change adaptation strategies); c) produce easy-to-learn and farmer-friendly information materials about climate change; d) create public awareness about climate change through the leadership of the trained local climate change communicators; and, e) develop a policy brief on capacity development for climate change adaptation in Southeast Asia.

The project activities ran for one year (June 2014 to June 2015) with a funding support of US$40000 from APN and in-kind counterparts from SEANAFE and collaborating country networks.

THE PROJECT TEAM

Dr. Wilfredo M. Carandang
Project Leader
Southeast Asian Network for Agroforestry Education (SEANAFE), and
Professor, University of the Philippines Los Baños, Philippines,
wmcarandang@up.edu.ph

Dr. Bao Huy Collaborator
Vietnam Network for Agroforestry Education (VNAFE) and
Lecturer, Tay Nguyen University, Vietnam
baohuy.frem@gmail.com

Dr. Christine Wulandari
Collaborator
Indonesia Network for Agroforestry Education (INAFE), and
Lecturer, University of Lampung, Indonesia
chs.wulandari@gmail.com

Dr. Roberto G. Visco
Collaborator
Philippine Agroforestry Education and Research Network (PAFERN) and,
Professor, University of the Philippines Los Baños, Philippines
rgvisco@up.edu.ph

Dr. Anoulom Vilayphone
Collaborator
Lao Network for Agroforestry Education (LaoNAFE) and,
Lecturer, National University of Laos, Vientiane, Lao PDR

PROJECT ACTIVITIES

1. National Training of Local Climate Change Communicators

This training aimed to develop the knowledge, skills, and attitude of the local farmers and agricultural technicians on climate change. Lecture-discussion by experts dwelled on the science of climate change with emphasis on the causes, evidence, and impacts on agricultural production; agriculture-related climate change adaptation strategies; and, principles of communication. Through a workshop session, this training also provided an opportunity for the trainees to articulate their own ideas and concepts about climate change and climate change adaptation strategies being practiced in their farms. A cross-farm visit was also organized to enable the farmers to observe the different climate change adaptation strategies that are being practiced by the farmers within the locality. A planning session concluded the training, which focused on the preparations for organizing the local climate change awareness program.

Overall, the national training programs have trained 107 farmers and technicians: 30 in Indonesia; 24 in Lao PDR; 20 in the Philippines; and, 33 in Vietnam.

Figure 1. Lecture-discussions, workshops and field visits are among the methodologies employed by the agroforestry lecturers during the National Training on Climate Change Adaptation Strategies (Photo credit: CBA2014-13NSY Carandang)

2. Local Climate Change Awareness Program

This activity was organized to create public awareness about climate change, particularly its causes and impacts, as well as the different climate change adaptation and mitigation strategies that are being practiced by the farmers, local government units, and the academe. This event provided a venue for the trained local climate change communicators to re-echo the learning that they have gained from the National Training of Local Climate Change Communicators; and, exhibit and display the easy-to-learn, simple, and farmer-friendly information materials about climate change adaptation strategies, which they have produced for information dissemination.

The local climate change awareness programs in each of the four collaborating country networks of SEANAFE were attended by the students, faculty members, representatives from the local government units, and the selected upland farmers. A total of 214 individuals participated in this event: 40 in Indonesia, 42 in Lao PDR, 97 in the Philippines, and 35 in Vietnam.

Figure 2. Representatives from different stakeholder groups (i.e. farmng communities, academe, students, and local governments) joined the Local Climate Change Awareness Programs organized in Lao PDR, Philippines, Indonesia and Vietnam
(Photo credit: CBA2014-13NSY Carandang)

3. Production and dissemination of climate change information materials

Central to communicating climate change-related information are relevant, simple, and easy-to-learn information materials to gain appreciation and create awareness among the different stakeholders. The project collaborators in the four country networks, in partnership with the trained local climate change communicators, produced simple climate change information materials in various forms. These include posters and calendar highlighting the causes and impacts of climate change in Indonesia; bookmarks and posters produced by the local climate change communicators and brochures featuring the causes and impacts of climate change and the role of agroforestry in climate change adaptation and mitigation in the Philippines; leaflets and posters highlighting the role of trees in climate change mitigation and adaptation in Lao PDR; and, posters showcasing the different climate change adaptation strategies in Vietnam.

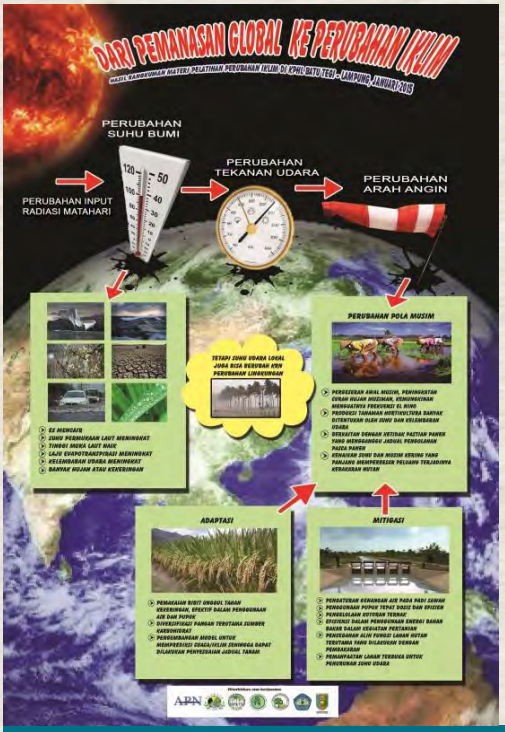

Figure 3a. Communication materials produced in Indonesia
(Photo credit: CBA2014-13NSY Carandang)

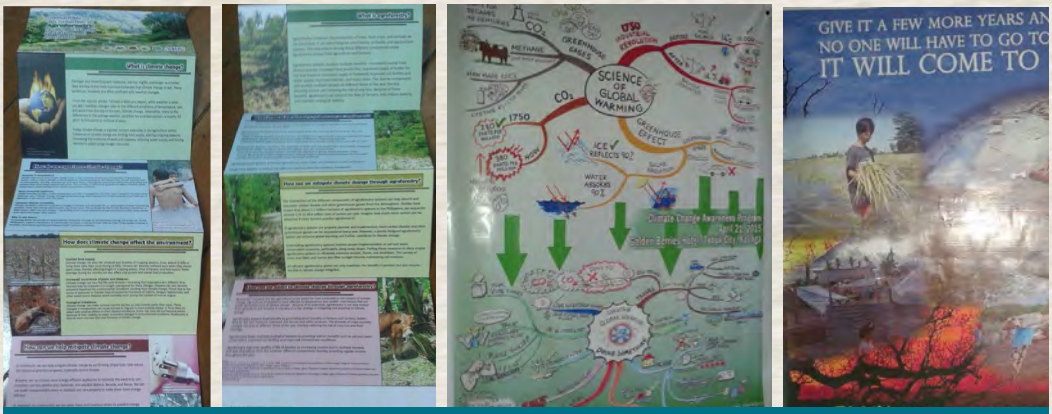

Figure 3b. Communication materials produced in Philippines
(Photo credit: CBA2014-13NSY Carandang)

Figure 3c. Communication materials produced in Vietnam
(Photo credit: CBA2014-13NSY Carandang)

Figure 3d. Communication materials produced in Lao PDR
(Photo credit: CBA2014-13NSY Carandang)

4. Development of a policy brief for capacity development

Recognizing that climate change is indeed real, and that millions of smallholder upland farmers in Southeast Asia are faced with the negative impacts of climate change in their agricultural production, the project collaborators developed a Policy Brief Towards Enhancing the Adaptive Capacities for Climate Change Adaptation of Upland Farming Communities in Southeast Asia. This policy brief aimed to serve as the instrument of project collaborators, concerned groups, and stakeholders in lobbying with the local policy makers for mainstreaming climate change adaptation in their local development programs. The policy brief called for the: a) creation of a multistakeholder local climate change team who would develop a plan for enhancing adaptive capacities of upland farming communities; b) mainstreaming agroforestry in the development programs of local government units whose majority of the land area is classified as uplands; c) enhancing human, social, natural, and financial capitals/assets of smallholder farmers for climate change adaptation; d) awareness raising on climate change adaptation; and, e) integration of woody perennials on-farms for climate change mitigation.

SIGNIFICANT CONTRIBUTIONS

1. This project trained about 60 farmers and agricultural technicians in the upland communities in Indonesia, Lao PDR, Vietnam, and the Philippines. The training of local climate change communicators focused not only on the issues and impacts of climate change and adaptation strategies, but more importantly, on building the communication and presentation skills of the selected farmers and agricultural technicians, who would become the communicators and disseminators of various aspects of climate change in their respective areas.

2. This project provided an opportunity to inform and educate the different stakeholders, particularly the local governments, students, and farmers about the causes and impacts of climate change and the strategies that could be adopted to adapt to climate change impacts.

3. The project collaborators also produced information materials about climate change in the form of posters, flyers, and brochures. These were distributed and used during the implementation of the local climate change awareness programs.

4. The policy brief that was developed by the project collaborators could serve as the policy instrument of the four collaborating countries and agroforestry networks, in lobbying with their local and national policy makers about the mainstreaming of climate change adaptation in their local and national development programs, respectively.

BEST PRACTICES

1. Capacity development of farmers and local technicians in communicating climate change issues and adaptation strategies. Communication is indeed an effective strategy in creating awareness about climate change and technology interventions for climate change adaptation and mitigation.

2. Engaging collaboration of SEANAFE country member-networks. This strategy has fostered stronger regional collaboration of agroforestry institutions, and promoted exchange of country-level expertise and experiences.

3. Active involvement of local state universities in the project implementation ensured a more efficient project implementation and follow-up activities, and enhanced their capacity for development programs related to climate change adaptation.

4. Development of science-based policy brief for local government units.

LESSONS LEARNED

1. The essence of a collaborative project is anchored on the active and genuine participation of the local partners and stakeholders.

2. Capacity development for climate change adaptation requires multidisciplinary and integrated approaches. Hence, active participation of the local communities including the local government units is crucial.

3. Institutionalization of policies is the key to sustain the project initiatives on climate change adaptation.

4. Awareness is a prerequisite and an essential component in promoting and enhancing climate change adaptation. Farming communities and local government units will not respond or take action unless they are well-informed about the issues, impacts, and potential strategies for climate change adaptation.

"Through the leadership of Dr. Eduardo T. Bagtang, the President of the then Kalinga State College (now the Kalinga State University), the Philippine Agroforestry Education and Research Network (PAFERN) and the Asia-Pacific Network for Global Change Research (APN) entered into Agreement in January 2014, to conduct a training on climate change adaptation strategies for farmers, students and teaching staff, who are the potential climate change communicators. This partnership strengthened the University's commitment to its contribution to addressing the ill-effects of climate change. Through this initiative, the University revived its program on Bachelor of Science in Environmental Science in 2018. Indeed, the Kalinga State University with APN and PAFERN contributed much to developing instruction, research, extension and production programs with humble contributions to climate change mitigation."

- Dr. Roberto Rodolfo, Vice-President for Academics and Student Development, Kalinga State University, Tabuk, Kalinga, Philippines

Communicating and Operationalizing Site-Specific Climate Change Adaptation Strategies in Selected Upland Communities in Southeast Asia

BACKGROUND

With the Philippine Agroforestry Education and Research Network (PAFERN) as the lead institution, this capacity development project engaged the collaboration of two country network members of the Southeast Asian Network for Agroforestry Education (SEANAFE), namely: the Indonesia Network for Agroforestry Education (INAFE) and the Vietnam Network for Agroforestry Education (VNAFE). This project aimed to: a) promote localized training of farmers on the most appropriate climate change adaptation strategies based on the type of agricultural production system and the prevailing climate; b) establish partnership with the local development organizations to help institutionalize site-specific climate change adaptation strategies among the farming communities; c) implement community projects showcasing various climate change adaptation strategies; and, d) produce information materials that would aid in the dissemination of best practices for climate change adaptation.

This project was implemented for one year (June 2013 to June 2014) with a funding support of US$36000.

THE PROJECT TEAM

Dr. Roberto G. Visco
Project Leader
Philippine Agroforestry Education and Research Network (PAFERN) and,
Professor, University of the Philippines Los Baños, Philippines
rgvisco@up.edu.ph

Dr. Bao Huy Collaborator
Vietnam Network for Agroforestry Education (VNAFE) and
Lecturer, Tay Nguyen University, Vietnam
baohuy.frem@gmail.com

Dr. Christine Wulandari
Collaborator
Indonesia Network for Agroforestry Education (INAFE), and
Lecturer, University of Lampung, Indonesia
chs.wulandari@gmail.com

PROJECT ACTIVITIES

1. National Training of Local Climate Change Communicators

Training of farmer-trainers on site-specific climate change adaptation strategies aimed to equip them with the knowledge and skills in employing appropriate climate change adaptation strategies in their respective communities. Twenty-five (25) farmer-trainers from upland communities in each of the three collaborating countries were trained on the concepts of climate change and the different climate change adaptation strategies such as agroforestry, organic agriculture, and rainforestation, among others. The farmer-trainers' observed evidences of climate change as well as its impacts on their agricultural production were elicited through a workshop. A field visit was also organized highlighting the climate change adaptation strategies which could be adopted in their farms and communities. As an output, the farmer-trainers developed their action plans of integrating appropriate climate change adaptation strategies for their communities.

2. Forum with the local government units

Participated in by the local government units, this forum was organized to create awareness among the local policy makers about the growing concern on climate change and its impacts to the farming sector. This forum also served as a venue to present the recent trends in climate change and its impacts on agricultural production, as articulated by the farmers during the farmers' training; discuss mechanisms and strategies that will help enhance adaptive capacities of the farming communities; and, initiate drafting local policies or programs that will help institutionalize climate change adaptation among the farming sector. This event was attended by 20 participants in each of the three collaborating countries.

3. Establishment of a community project showcasing appropriate climate change adaptation strategies

One (1) on-site demonstration farm was established in each of the three collaborating countries to showcase the most appropriate climate change adaptation strategies considering the socioeconomic and biophysical conditions of the community. In Indonesia, the community project was established in West Lampung District with an altitude ranging between 500-1000 meters above sea level and with Type A climate. Temperature regimes range from hot on the coastal plain to cold in hilly areas. Rainfall is between 2500 to 3000 mm per year in Balalau and Sumberjaya District. The farmers cultivate coffee, cacao, rubber, jackfruit, and avocado. They also raise fish, goats, and chickens. However, change in the rainfall and temperature patterns has affected the planting and harvesting calendar, as well as the quality and volume of crop production.

To address these problems, the farmers' group in Air Pakuan and Harapan Lestari established agrisilvipasture technology, with goat as the livestock component and existing fruit trees such as coffee, cacao, jackfruit, and avocado as woody perennials. Meanwhile, silvofishery was established by Haparan Lestari in Simpangsari Village, taking advantage of water sources from the rivers and creeks. A nursery was also established by Rukum Lestari HKm as additional source of income.

Figure 4a. Agrisilvipasture, silvofishery and nursery establishment are among the community projects that were established in Indonesia to enhance adaptive capacity of smallholder farmers (Photo credit: CBA2013-10NSY Visco)

Barangay Pinukpuk is one of the upland villages in Tabuk, Kalinga, Philippines. The farms are generally situated in areas with steep slopes. Majority of the people are engaged in farming as their primary source of livelihood, with vegetables as the dominant crops. However, the farmers have observed rotting of vegetable crops because of the long dry season. The farmers have also observed increasing pest incidence. Consequently, the farmers spend extra costs for the additional farm inputs such as chemical pesticides to control insect pests.

Meanwhile, the hotter temperature during the dry season stresses the vegetable crops and thus, were observed to have stunted growth. This is particularly true considering that the general agricultural landscape in the province is rainfed. Thus, any change in rainfall pattern certainly affects crop production. Given these scenarios, the community projects that were put up in the site were as follows: a) Establishment of water catchment which could serve as water source during the dry season. The overflowing water from the creek could be diverted to the water catchment during the dry season when water is very abundant; b) Establishment of hedgerows and planting native fruit-bearing trees along the alleys to control soil erosion; and, c) Construction of vermicomposting which could serve as the source of organic fertilizers.

Figure 4b. Water catchment, integration of indigenous trees, and vermicomposting are among the highlights of the community projects established in Kalinga, Philippines (Photo credit: CBA2013-10NSY Visco)

In Vietnam, Bu N Dor Village, which belongs to Quang Tam Commune, Tuy Duc District in Dak Nong Province, was selected as the on-site demonstration area. The topography of the area is mainly mountainous with a slope ranging from 15-20o and is about 870 meters above sea level. The average temperature is 22.2C while the average rainfall is 2.413mm with a maximum rainfall of 106mm. Rainy season prevails in March until November. The main stream is the stream system Dak R'Lap, Dak R'Tih, Dak Lung Dak Long, hence watershed management is necessary. Bu N'Dor Village occupies a land area of 818 hectares for agricultural production. It has a total of 395 households. Among the crops cultivated are paddy rice (14 has), shifting cultivation area (146 has), rubber (100 has), coffee (328 has), and cashew (230 has).

As in other communities in Southeast Asia, Bu N'Dor farmers have already been experiencing climate change impacts such as increasing incidence of pests particularly in farms with monoculture; reduced growth and productivity of coffee and cashew; change in the distribution, growth, and seasonality of non-timber forest products, aquatic products in rivers and streams; flooding and landslides; and, soil erosion and land degradation in shifting cultivation due the change in rainfall intensity.

Among the features of the demonstration area that were established in the project site were: a) integration of coffee, cashew, rubber, and macadamia; b) planting of new coffee varieties (TR 4-9, 11, 13); c) growing vegetables on a small-scale level; d) agroforestry development using crop combination of *Litsea sinensis*, *Cassia siamea*, durian, avocado, and jackfruit; and, e) growing of acacia and Cassia siamea as windbreaks.

SIGNIFICANT CONTRIBUTIONS

1. This capacity development project has actively engaged the junior researchers and lecturers of the collaborating institutions in project implementation. Thus, this has promoted mentoring and capacity development of early career scientists.

2. Enhanced the collaboration of three member-networks of SEANAFE, and therefore, provided an opportunity for SEANAFE to become active and operational.

3. Served as an opportunity to establish or strengthen partnership between the academe and the local government units.

4. The establishment of community projects served as a show window of technologies and climate change adaptation strategies for possible adoption of other farmers.

BEST PRACTICES

1. Active involvement of the farmers in the identification of evidences and impacts of climate change based on their observations and experiences.

2. Creating awareness among the farming communities and local government units about climate change – its causes, impacts, and adaptation strategies.

3. Establishment of demonstration areas showcasing climate change adaptation strategies that are appropriate to the socioeconomic and biophysical conditions of the community.

4. Scientist-farmer/practitioner partnership in the identification of workable climate change adaptation strategies.

LESSONS LEARNED

1. The conduct of cross-farm visits is an effective mechanism of farmer-to-farmer transfer of knowledge. This is because of their actual observation of the agroforestry technologies and climate change adaptation strategies and direct interaction with the other farmers.

2. Good collaboration with local government units is necessary to ensure the success of the project.

3. Engagement of the local colleges and universities in project implementation as the link and provider of technical expertise to the local communities.

4. Eliciting farmers' recognition about issues of climate change and climate change impacts on their agricultural production.

5. The project cycle should be longer than one year specifically for on-site agroforestry projects with long cycle of woody perennial component.

"The integration of pepper, jackfruit and coffee in our farming systems has generated additional income to the farmers. Market price of coffee is stable, while that of jackfruit and pepper sometimes fluctuates. With the impacts of climate change, I have realized that single cropping of coffee may not be an effective farming system. Instead, the integration of other fruit tree crops such as jackfruit, durian, avocado and pepper would help farmers adapt to climate change impacts. With crop diversification, the farmers will have multiple products and sources of farm income. When one crop fails, the other crops could compensate for the loss of the other crop."

– Farmer-Cooperator, Bu Nor Village, Quang Tam Commune, Vietnam

Institutionalizing Agroforestry for Climate Change Adaptation through Local Capacity and Policy Development in Southeast Asia

BACKGROUND

Earlier research and capacity development initiatives of the Southeast Asian Network for Agroforestry Education (SEANAFE) and a number of literature point out the relevance of agroforestry as a key strategy for climate change mitigation and adaptation. Agroforestry is a land-use management system which deliberately combines the production of short-term agricultural crops and woody perennials and/or livestock and aquatic resources, in the same piece of land, for the twin purpose of socioeconomic productivity and ecological stability. Building from the lessons of these initiatives, five country member-networks of SEANAFE, namely: Indonesia Network for Agroforestry Education (INAFE), Lao Network for Agroforestry Education (LaoNAFE), Philippine Agroforestry Education and Research Network (PAFERN), Thailand Network for Agroforestry Education (ThaiNAFE), Malaysia Network for Agroforestry Education (MANAFE), and Vietnam Network for Agroforestry Education (VNAFE) worked together for the implementation of this capacity development project.

This capacity development project aimed to strengthen the agroforestry capacities of junior agroforestry lecturers, community development workers, and agricultural technicians; and, mainstream agroforestry in the development programs of the local government units in each of the six collaborating countries through policy development.

With PAFERN as the lead institution, this capacity development project was implemented for one year (June 2011 to June 2012) with a funding support of US$35000.

THE PROJECT TEAM

Dr. Lutgarda L. Tolentino
Project Leader
Philippine Agroforestry Education and Research Network (PAFERN) and,
Director-Institute of Agroforestry, University of the Philippines Los Baños
lutgardatolentino@gmail.com

Dr. Christine Wulandari
Collaborator
Indonesia Network for Agroforestry Education (INAFE) and,
Lecturer, University of Lampung, Indonesia
chs.wulandari@gmail.com

Dr. Anoulom Vilayphone
Collaborator
Lao Network for Agroforestry Education (LaoNAFE) and,
Lecture, National University of Laos, Lao PDR
anoulomv@yahoo.com

Dr. Awang Noor Ghani
Collaborator
Malaysia Network for Agroforestry Education (MANAFE) and,
Lecturer, Universitas Putra Malaysia

Dr. Bao Huy Collaborator
Vietnam Network for Agroforestry Education (VNAFE) and,
Lecturer, Tay Nguyen University
baohuy.frem@gmail.com

Dr. Pramoth Kheowvongsri
Collaborator
Thailand Network for Agroforestry Education, Thailand
pramoth.k@psu.ac.th

PROJECT ACTIVITIES

1. National Training on Climate Change Adaptation Strategies

This training was conducted in the six collaborating countries with the aim of enhancing the knowledge and skills of the junior agroforestry lecturers and agricultural technicians/ extension workers from the local governments about the issue on climate change and the appropriate climate change adaptation strategies which could be applied in their home institutions, or share with the upland farming communities in their respective areas. A total of 114 junior lecturers and agricultural extension workers were trained on climate change adaptation strategies: 22 in Vietnam, 17 in Indonesia, 16 in Lao PDR, 24 in the Philippines, 15 in Malaysia, and 20 in Thailand. The output of each participant was an indicative plan of promoting climate change adaptation strategies in their respective universities and partner communities.

Figure 5. Junior agroforestry lecturers served as the participants of the National Training on Climate Change Adaptation in Indonesia (a), Philippines (b), Vietnam (c), and Lao PDR (d)
(Photo credit: CBA2011-13NSY Tolentino)

2.Documentation of climate change adaptation strategies of selected upland farmers

This component assessed the understanding and awareness of selected agroforestry practitioners and upland farmers on the issue of climate change and its impacts to their agricultural production systems; identified the indications and evidences of climate change based on the experiences and observations of the agroforestry practitioners and upland farmers in their agricultural production; identified the impacts or effects of climate change on the agricultural production of the selected respondent-upland farmers; analyzed the different mechanisms and strategies that are being employed by the agroforestry practitioners/upland farmers in coping with the impacts of climate change; and, formulated recommendations to the concerned national and local development organizations as regards the adoption of appropriate and sound climate change mitigation and adaptation strategies. The project collaborators that carried out this project component were Thailand, Malaysia, Indonesia, and the Philippines. The data were gathered through direct interviews and focus group discussions.

The documentation of climate change adaptation strategies was undertaken in selected upland farms in the Philippines (represented by two municipalities in Northern Luzon; one municipality in Southern Luzon; one municipality in the Visayas; and one municipality in Mindanao). In Indonesia, the documentation focused on the upland farms in Lampung Province, which is represented by a forest park, Wan Abdur Rahman Forest Park; Bandar Lampung Municipal, which represents a conservation forest; Register 22 Way Waya in Central Lampung, which represents a preserved forest; and a People's Forest in Sungai Langka, South Lampung District. Meanwhile, Thainafe documented the climate change adaptation strategies of farmers representing the upland farms in Eastern Thailand, Northern Thailand, and Southern Thailand.

3. Policy dialogue on agroforestry

Three (3) countries were selected to organize the policy dialogue based on the status of agroforestry development activities. These include the Philippines, Vietnam, and Lao PDR. Each of the three project collaborators convened the different agroforestry stakeholders (e.g. policy makers, lecturers, researchers and extension workers, representatives from the national government agencies/ministries such as the Department/Ministry of Agriculture, Department/Ministry of Environment, Department of Agrarian Reform, private industries, and non-government organizations). A one-day roundtable discussion/workshop enabled the project collaborators to present the current state of agroforestry adoption and promotion in their respective countries; discuss the facilitating and constraining factors as well as opportunities in promoting agroforestry; and craft a plan of action that would pave the way for the institutionalization of agroforestry as a development strategy. The participants also deliberated on the different issues and concerns confronting the agroforestry promotion and institutionalization efforts; and the possible solutions or alternatives to be able to move forward or advance the state of agroforestry promotion. Specifically, the policy dialogue in the Philippines yielded a draft Executive Order which calls for the institutionalization of agroforestry as a development strategy.

Figure 6. Key staff from the national government agencies and local governments were convened in a policy forum to discuss the role of agroforestry in climate change adaptation and mitigation, and in sustainable upland development (Photo credit: CBA2011-13NSY Tolentino)

SIGNIFICANT CONTRIBUTIONS

1. This capacity development project provided opportunities for training young researchers and faculty members about climate change and adaptation strategies, including agroforestry.

2. Provided a venue to create awareness among the local and national agencies about agroforestry.

3. Produced science-based information about the evidences and impacts of climate change on agricultural production of the smallholder farmers, which could be used by the local and national policy makers in drafting appropriate policies and programs for mainstreaming climate change adaptation program in their local development programs.

4. Enhanced research collaboration of selected member-universities of SEANAFE. These universities could capitalize on this partnership for future collaborative research and development projects.

BEST PRACTICES

1. Capacity development of young researchers of the academe and agricultural technicians of local government units.

2. Eliciting observations of climate change and actual experiences of the farmers on the impacts of climate change on their agricultural production.

3. Academe as the lead implementing institution.

4. Creating awareness among the national and local development organizations about agroforestry and its roles in climate change adaptation and mitigation.

LESSONS LEARNED

1. Collaborators' common concern for climate change adaptation and mitigation and their recognition of agroforestry as a key strategy facilitated the project conceptualization and smooth implementation.

2. Engaging stakeholders that are actively involved in promoting agroforestry as a development strategy facilitates lobbying initiatives.

3. Involving young researchers and lecturers in development initiatives such as this project, do not only address capacity development, but more importantly, will pave the way for the sustainability of initiatives.

Enhancing Climate Risk Resilience through Human Security Development and Capacity-Building in the Province of Aurora, Philippines

BACKGROUND

International and national policies and programs on climate change adaptation are already in place. The local government units are at the forefront of translating these policies and programs into local action. Recognizing the crucial role of the local government units in developing local climate change action programs, a team from the University of the Philippines Los Baños Interdisciplinary Studies Center on Integrated Natural Resources and Environment Management (UPLB-INREM) implemented a capacity development project for the provincial and selected municipal offices of Aurora Province in Central Luzon, Philippines.

This capacity development project engaged the LGU personnel in the actual preparation of their LCCAP; participatory assessment of the vulnerability, risks, and impacts in the eight municipalities of Aurora; design of appropriate local climate change adaptation programs to reduce climate risks; and in enhancing resilience of services from ecosystems and social structure to different climate risks.

This project was implemented from July 2017 to January 2020 with a funding support of US$71500.

THE PROJECT TEAM

Dr. Juan M. Pulhin [1]
Project Leader
jmpulhin@up.edu.ph

Collaborators:

Dr. Rex Victor O. Cruz [1]
rocruz@up.edu.ph

Dr. Danesto B. Anacio [1]
dbanacio@yahoo.com

Dr. Wilfredo M. Carandang [1]
wmcarandang@up.edu.ph

Dr. Florencia B. Pulhin [1]
yaybpulhin@yahoo.com

Dr. Rose Jane J. Peras [3]
rjperas@up.edu.ph

Prof. Maricel A Tapia [3]
matapia@up.edu.ph

Dr. Josephine E. Garcia [3]
jegarcia4@up.edu.ph

Dr. Catherine C. de Luna [2]
ccdeluna@up.edu.ph

Dr. Lorena L. Sabino [3]
llsabino@up.edu.ph

Dr. Vida Q. Carandang [3]
vqcarandang@up.edu.ph

Dr. Dixon T. Gevana [1]
dtgevana@up.edu.ph

Dr. Cristino L. Tiburan [1]
cltiburan@up.edu.ph

For. Nico Almarines [3]
nralmarines@up.edu.ph

Prof. Liezl B. Grefalda [3]
lbgrefalda@up.edu.ph

Ms. Aileen S. Peria [3]
asperia@up.edu.ph

For. Leonardo Barua [3]
ldbarua@up.edu.ph

[1] Interdisciplinary Studies Center on Integrated Natural Resources and Environment Management, and College of Forestry and Natural Resources, University of the Philippines Los Baños, College, Laguna, PHILIPPINES

[2] Interdisciplinary Studies Center on Integrated Natural Resources and Environment Management, University of the Philippines Los Baños, College, Laguna, PHILIPPINES

[3] College of Forestry and Natural Resources, University of the Philippines Los Baños, College, Laguna, PHILIPPINES

PROJECT ACTIVITIES

1. Project kick-off

This activity provided a venue to orient the different stakeholders about the project and the expected outputs; conduct situational analysis that delved on the status of ecosystem services, problems, drivers of change and solutions; and, present the project to the Sangguniang Bayan to seek support with regard to the formulation of LCCAP in the selected municipalities.

2. Training on Climate and Disaster Risk Assessment (CDRA)

Being a prerequisite activity to the formulation of LCCAP, the LGU personnel were trained on CDRA, particularly on the Participatory Approaches for Risk and Vulnerability Assessment and Gender Analysis.

3. Institutional capacity analysis

Using the Climate Resilience Framework formulated by Friend and MacClyne (2012) and Tyler and Moench (2012), the project team conducted an institutional capacity analysis with 58 members of the Technical Working Group as respondents. The respondents were in-charge of the disaster risk reduction and management for each municipality in Aurora Province. The assessment centered on the indicators of institutional characteristics, namely: Access Rights and Entitlements, Information Flows, Decision-Making Processes, and Application of New Knowledge. Meanwhile, the capacity of the institutions to manage disaster risks was measured using the following indicators: Capacity to Anticipate Risk, Capacity to Respond, and Capacity to Recover and Change.

4. Participatory risk and vulnerability assessment

Municipal officers and graduate students were trained on the following topics: Stakeholder Analysis, Risk Identification, Impact and Adaptation Assessment, and Gender Analysis. Results of this assessment were incorporated in the CDRA.

5. Formulation of LCCAP

Eight (8) municipalities of Aurora Province were able to prepare their respective LCCAP through the technical backstopping of the UPLB team. LCCAP is a strategy that describes measures and policies of a local government to reduce greenhouse gas emissions as its mitigation action and increase the community's resilience to the impacts of climate change as the adaptation actions.

6. Technical and policy forum

Organized jointly by the UPLB-INREM and the Climate Change Commission of the Philippines, this policy forum provided the opportunity to present the current issues and challenges associated with CDRA and LCCAP preparation; discuss the strengths and limitations of the current CDRA and LCCAP guidelines and processes based on the experiences of the different stakeholders; agree on key strategies to develop unified policies and guidelines that will hasten the preparation of CDRA and LCCAP by the LGUs; and, formulate an action plan towards the issuance of a joint government policy guidelines for a speedy preparation of a simplified, science-based, and more responsive CDRA and LCCAP.

Figure 7. Participatory processes towards the formulation of LCCAP in Aurora Province
(Photo credit: CBA2017-03MY Pulhin)

SIGNIFICANT CONTRIBUTIONS

1. Enhanced the capacity of LGU to acquire data, implement research, conduct land capability classification, and assess vulnerability and risks associated with future climate scenarios.

2. The project paved the way for the formulation of LCCAP in the eight municipalities of Aurora Province. LCCAP signified the LGUs' commitment to implement mitigation and adaptation actions for climate change.

3. The project harnessed the active engagement of the LGU personnel in assessing vulnerability and risks of their respective municipalities, which served as basis in the formulation of LCCAP.

4. The project has gained the commitment of the Provincial Government of Aurora to capacitate its personnel in crafting LCCAP by providing counterpart funds.

BEST PRACTICES

1. Integrating science-based approaches and methodologies in vulnerability and risk assessment, institutional capacity assessment, and the formulation of LCCAP.

2. Targeting the right people through the involvement of LGU personnel in-charge of the disaster risk reduction and management.

3. Counterpart funds from the Provincial Government of Aurora which led to the expansion of capacity-building activities for LGU personnel.

4. Multidisciplinary composition of the project team which helped implement holistic approaches in project implementation.

LESSONS LEARNED

(Villamayor et al., 2022)

1. Collaborative process is key approach to building adaptive capacity, particularly in technical initiatives such as CDRA and LCCAP. It takes time, however, to realize the project outputs and outcomes.

2. Strong partnership between the UPLB-INREM and Aurora LGUs, built on a formal arrangement through a Memorandum of Agreement, ensured an efficient mobilization of human and materials resources for project implementation.

3. Technical capacities take time and patience to develop, which may lead to collaborative inertia. This can be addressed by recalibrating strategies and managing LGU expectations.

4. Climate change adaptation planning is a development-oriented function towards achieving human security and risk resilience. Thus, LGUs, which are at the forefront of the local development processes must be innovative, exercise anticipatory capacities, and recognize the traditional and local practices that survived the changing times.

Testimonies from local partner in Philippines

"We would like to thank the University of the Philippines Los Banos, for providing assistance to the Municipality of Dingalan in the Province of Aurora, in crafting the local climate change action plan. A Memorandum of Agreement was signed by the Provincial Government of Aurora to assist all the municipalities in the Province to craft a 10-year plan, integrating the Local Climate Change Action Plan (LCCAP). Through the LCCAP, all relevant data would be used towards community's disaster preparedness. Part of the LCCAP of Dingalan Municipality is to forecast future scenarios, and other potential risks brought about by climate change. This initiative contributed to ensuring disaster preparedness of Dingalenos. Indeed, proactive leaders and communities are key to secure the lives of the community members in the event of disasters and climate change."

– Hon. Sherwin Taay, Municipal Mayor-Dingalan, Aurora, Philippines

On-the-Ground Promotion of Climate Change Adaptation Strategies via the Establishment of Agroforestry Learning Laboratories (ALLs) in Southeast Asia

BACKGROUND

Led by the Philippine Agroforestry Education and Research Network (PAFERN), through the University of the Philippines Los Baños-Institute of Agroforestry (UPLB-IAF), this capacity development project aimed to promote climate change adaptation strategies through the establishment of Agroforestry Learning Laboratories (ALLs). The ALLs showcase the different agroforestry systems and technologies that could help smallholder farmers cope and/or adapt to the impacts of climate change. This capacity development project was implemented in three countries in Southeast Asia, namely: Philippines, Indonesia, and Vietnam and was spearheaded by the collaborators from the UPLB-IAF, Lampung University, and Tay Nguyen University, respectively. Each collaborating institution selected upland farming communities as local partners and pilot sites of ALLs. Cross-farm visits were organized prior to the establishment of ALLs to provide opportunities for the community members to observe and learn about the different agroforestry systems from other farmers and practitioners.

This capacity development project was implemented in June 2014 to June 2015, with a funding support of US$43000.

THE PROJECT TEAM

Dr. Reynaldo A. Comia
Director-Institute of Agroforestry, College of Forestry and Natural Resources, University of the Philippines Los Baños
racom@yahoo.com

Dr .Leila D. Landicho
University Researcher, Institute of Agroforestry, College of Forestry and Natural Resources,
ldlandicho@up.edu.ph

Dr. Bao Huy
Lecturer, Tay Nguyen University baohuy.
frem@gmail.com

Dr. Christine Wulandari
Lecturer, University of Lampung, chs.
wulandari@gmail.com

1. Cross-farm visits

Cross-farm visits were organized to expose the upland farmers to the different agroforestry practices and climate change adaptation strategies that are being employed by other farmers in nearby communities, for possible application in their own farms. Three (3) cross-farm visits were organized in the Philippines. The farmers in Nueva Vizcaya Province visited the agroforestry farms in Vista Hills, Bayombong, Nueva Vizcaya, while those from Benguet Province visited the agroforestry farms with organic farming practices in Wangal, La Trinidad, Benguet. Meanwhile, the farmers from Quezon Province visited the agroforestry farms in Silang, Cavite, which specifically showcase the 1:9 agroforestry system. In Indonesia, 12 farmers from the CF subgroup in Batu Tegi KPH conducted their cross-farm visits in West Lampung District. During the visit, the head of the groups discussed with BW and KWT Melati groups and then visited and observed the coffee plantation and processing. In Vietnam, 12 participants, including 10 key farmers and 2 staff members visited the neighboring villages in Quang Tan and Quang Tam Communes, Tuy Duc District.

Figure 8. Cross-farm visits organized by the project collaborators showcase different agroforestry systems and practices in the Philippines, Indonesia and Vietnam
(Photo credit: CBA2015-09NSY Comia)

2. Establishment of ALLs

One ALL in each of the three upland farming communities was established in the Philippines. The first site showcases a vegetable-based agroforestry system, which is located in Barangay Concepcion Banahaw, Sariaya, Quezon. Approximately half hectare area showcases fruit tree-based multistorey agroforestry system with vegetable crops as the understorey. Vegetable trellising is one of the unique features of agriculture/farming in this community. The intervention made by the project team was to integrate high value fruit trees around the farm which could serve as additional source of income in the long-term and at the same time, serve as potential trellis of the vegetables. The fruit tree species include coffee, lanzones, rambutan, and jackfruit.. The second site showcases an alley cropping system, which is located in Barangay Masoc, Bayombong, Nueva Vizcaya, which is designed for gentle to sloping farms. The importance of contouring is highlighted in this demonstration farm, utilizing Gliricidia sepium as the contour hedgerows while alleys are planted to vegetable crops. In addition, the community has established a small water impounding facility to demonstrate the collection of rainwater during the rainy season, which can later on be used to water the crops during the dry season. The third site highlights the integration of fruit trees and root crops in the alley cropping system, which is located in Barangay Baayan, Tublay, Benguet.

Figure 9a. Rainwater harvesting and contour farming are among the technologies being showcased in the agroforestry demonstration plots in the Philippines
(Photo credit: CBA2015-09NSY Comia)

In Vietnam, the ALLs were established in Bu Nor Village in Quang Tam Commune, Tuy Duc District, Dak Nong Province in the central highlands of Vietnam. The ALLs are mainly hilly area with an elevation of 700-1000 masl and 15-200 slope. The mean annual rainfall is 2400 mm with a dry season of three months and mean annual temperature of 22.20C. The area is being maintained by the M-Nong indigenous people. The ALLs are characterized with paddy rice, shifting cultivation area, and integrated with rubber, coffee, and cashew. The Vietnam team formed a board to manage the ALLS which consist of 14 key farmers, two staff of the commune and two staff of the district. New cultivation models that are adaptive to climate change were integrated in the ALLs, including planting of high quality avocado, coffee, and annual crops, and cow production as well.

Figure 9b. Integration of high value fruit trees such as avocado, coffee and annual crops are among the highlights of the agroforestry learning laboratory in Vietnam
(Photo credit: CBA2015-09NSY Comia)

In Indonesia, the goat farm was established as a demonstration site to increase the farmers' income in Gabungan Kelompok Tani of Wana Tani Lestari, Talang Jakarta, Pekon Datar Lebuay, Tanggamus District. Establishment of the goat farm was also seen as a climate change adaptation strategy in the region because of the high potential of forage/grasses from state forests and clan forests. The farmers can likewise produce organic fertilizers from the goat manure, which can be used in their crop production activities. The goat pens were constructed in Talang Jakarta at the backyard of the house of farmer groups committee on behalf of Mr. Wastim. This goat pen is located at UTM coordinate point of x: 0471714 and y: 9423047 with an elevation of 309 meters above sea level. Talang Jakarta is located outside the forest area and administratively located in the Datar Lebuay Pekon, Air Naningan Subdistrict, Tanggamus District. Currently, the farmer-cooperators are maintaining a total of 12 heads of goat.

Aquasilviculture is another agroforestry system that was established as a climate change adaptation strategy. The gurame fish aquaculture was introduced to the members of the Gapoktan community in Sumber Bandung Village, subdistrict of Pagelaran Utara, Pringsewu District to lessen the dependence of the farmers to the forest areas particularly in Register 22 Way Waya. Activities of agrosilvofishery held by INAFEUNILA around the management area of Unit Pengelola Teknis Daerah (UPTD) KPH Batutegi especially with Gapoktan Sumber Makmur became one alternative to raise the community's income by helping gurame fish aquaculture. Availability of water resources and the natural food of gurame that is kajer/ tales species would be more beneficial if used by making it as gurame aquaculture.

Figure 9c Agrisivipasture (a) and agrisilfishery (b) are among the agroforestry systems being showcased in the learning laboratory in Indonesia
(Photo credit: CBA2015-09NSY Comia)

SIGNIFICANT CONTRIBUTIONS

1. Established demonstration farms that are strategically located in the upland communities and serve as show window for other farmers.

2. The learning laboratories for agroforestry did not only showcase the agroforestry technologies per se, but more importantly, the economic potentials of these agroforestry systems and technologies.

3. Trained and exposed 8w9 upland farmers to agroforestry farms showcasing different agroforestry systems and technologies.

BEST PRACTICES

1. Cross-farm visits showcasing agroforestry systems with potential replication and adoption in the partner communities.

2. Active engagement of the local government units and state colleges and universities which could pave the way for the sustained agroforestry adoption and replication in adjoining communities.

3. Establishment of agroforestry systems with economic potentials.

4. Community need-based technology interventions.

5. Tapping the local state universities as partner in the implementation of capacity development activities among the upland farming communities for an efficient project implementation and monitoring of activities.

LESSONS LEARNED

1. Cross-farm visit is an effective mechanism of farmer-to-farmer transfer of knowledge. This is because of their actual observation of the agroforestry technologies and climate change adaptation strategies and direct interaction with the other farmers.

2. Establishment of community demonstration farm showcasing the silvipastoral system is an effective climate adaptation strategy. This is because of the increased revenues from goat farming and therefore, the higher chances that this will be sustained by the community.

3. Teamwork is an important component in the establishment and maintenance of the community demonstration farm.

4. The essence of a collaborative activity or project is anchored on the active and genuine participation of the different stakeholders.

5. Capacity development for climate change adaptation requires multidisciplinary and integrated approaches.

6. Engagement of the local colleges and universities in the project implementation as the link and provider of technical expertise to the local communities.

7. The project cycle should be longer than one year specifically for on-site agroforestry projects with long cycle of woody perennial component.

8. Farmer-to-farmer approach in teaching and training is an effective approach in technology transfer.

9. Good and strong management of the collaborating communities at the village level to help sustain project initiatives.

10. Establishment of climate change adaptation strategies should be based on the needs of the farmers and the observed climate change impacts on the community to ensure commitment from the farmers in terms of maintenance.

11. Actual establishment of ALLs provide a show window of agroforestry and other climate change adaptation strategies to enhance technology adoption.

"The silvofishery project that was established, through the assistance of the team from the University of Lampung, was beneficial to the community members. This project did not only provide additional food source, but also improved farmers' income. The integration of the fishponds also maximized the full potentials of the agroforestry system. We hope that more silvofishery projects would be established in the community to ensure sustainable development of the forest communities."

– Mr. Heru Puji Subagyom Extension Worker, Sumber Makmur Farmers' Group, Lampung, Indonesia

Enhancing the LGU Capacity for Implementing Conservation Farming Village as a Strategy for Climate Change Adaptation and Sustainable Upland Environment

BACKGROUND

The Conservation Farming Village (CFV) Program was conceptualized and implemented in 2007 to set in place enabling conditions for the engagement of upland farming communities in sustainable and resilient agroforestry-based livelihoods that promote stability of the ecosystems from uplands to lowlands, and economic viability of upland farmers. CFV is a strategy for transforming mindsets and skills, and for building on the assets of the upland farmers for the sustainable use of land and other natural resources. Further, CFV recognizes the critical roles of local government units (LGU), academe, and concerned national government agencies (NGA) in providing technical and logistical support.

Building from the lessons and experiences of the CFV Program, which harnessed the active engagement of the state colleges and universities and the local government units (LGUs) in five provinces, namely: Davao Oriental, Ifugao, Albay, Negros Oriental, and Quezon, the team from the University of the Philippines Los Baños-College of Forestry and Natural Resources, replicated the program in 15 provinces in the country, through this APN-funded capacity development project.

This project aimed to build the capacities of the LGU executives and their technical personnel in undertaking upland development programs and strategies; and, facilitate the adoption and implementation of science and technology-based sloping land management technologies, including agroforestry systems towards sustainable upland development and climate change adaptation.

The project was implemented in 2012-2013 with a funding support of US$45000.

THE PROJECT TEAM

Dr. Rex Victor O. Cruz
Project Leader
Professor, College of Forestry and Natural Resources, University of the Philippines Los Baños
rvocruz@up.edu.ph

Collaborators:

Dr. Wilfredo M. Carandang
Professor, College of Forestry and Natural Resources, University of the Philippines Los Baños
wmcarandang@up.edu.ph

Dr. Vida Q. Carandang
Associate Professor, College of Forestry and Natural Resources, University of the Philippines Los Baños
vqcarandang@up.edu.ph

Dr. Catherine C. de Luna
University Researcher, College of Forestry and Natural Resources, University of the Philippines Los Baños
ccdeluna@up.edu.ph

Prof. Nathaniel F. Dimog
Assistant Professor, Ifugao State University
ndimog@yahoo.com

Dr. Antonio P. Payonga
Professor, Bicol University College of Agriculture and Forestry
appayonga@yahoo.com

Prof. Santiago B. Utzurrum
Assistant Professor, Silliman University
dalakit_61@yahoo.com

Dr. Danilo B. Pacoy
Professor, University of Southeastern Philippines
dannypacs@yahoo.com

Project Researcher:

Genevieve A. Galapia
Environmental Forestry Program, College of Forestry and Natural Resources

1. Organization of the Project Management Teams

The partner state colleges and universities (SCUs) of the pilot CFV Program, namely: Bicol University College of Agriculture and Forestry (BUCAF), Silliman University (SU), University of Southeastern Philippines (USeP), Ifugao State University (IFSU), and the University of the Philippines Los Banos-College of Forestry and Natural Resources (UPLB-CFNR) organized themselves into five clusters and facilitated the project implementation, monitoring, modification and evaluation in the target 15 provinces. The five clusters, include the four provinces in Region IVA (CALABARZON); three provinces in Bicol Region; three provinces in Northern Luzon; four provinces in Visayas; and three provinces in Mindanao.

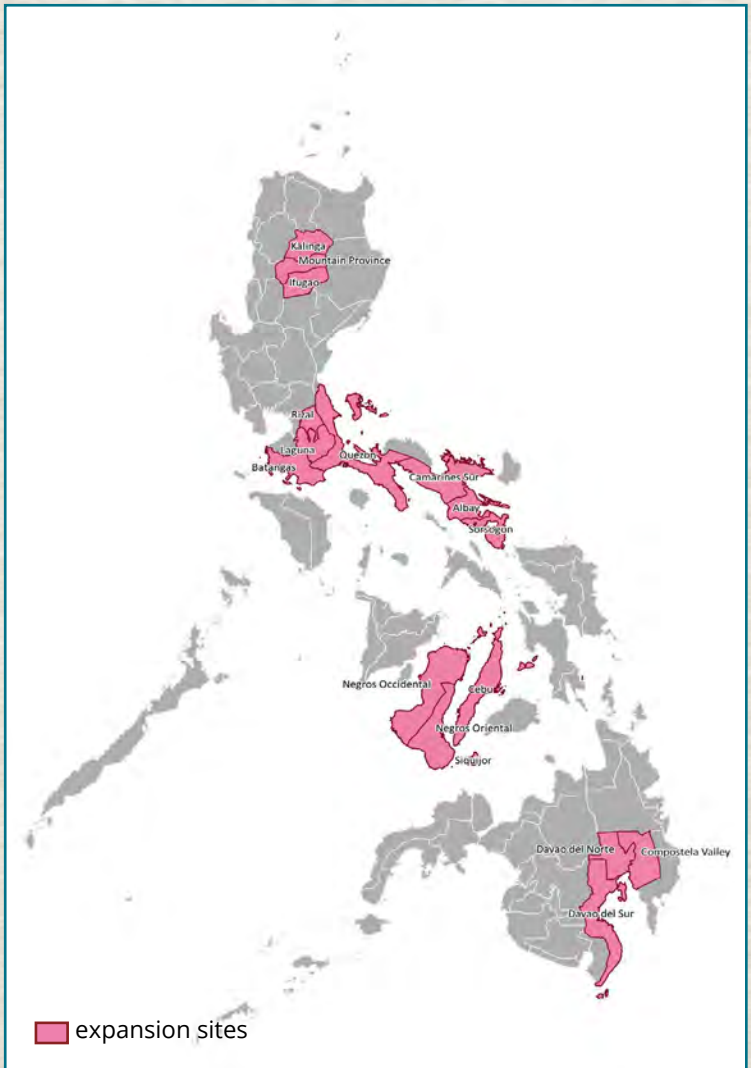

Figure 10. Expansion sites of CFV in 15 target provinces

2. Training of LGU Personnel and Upland Farmers

Based on the results of the training needs assessment, the team organized a training course on "CFV as a Strategy for Climate Change Adaptation and Sustainable Upland Development" in each of the five clusters. This training course discussed the concepts and principles of climate change and sustainable upland development; characterized the different technologies that are being espoused by CFV; described the approaches to technology promotion and utilization; demonstrated the establishment and maintenance of various sloping land management technologies; and identified appropriate sloping land management technologies that would be implemented in the upland farmers' farm and/or technicians' places of work.

A total of 272 participants from the upland farming communities and LGUs across the five clusters attended the training course. Part of the training activity is a cross-visit to the pilot sites of CFV primarily to showcase the conservation farming technologies and practices employed in the different model farms, and to provide the opportunity for the farmer-volunteers to share their experiences in the establishment of these conservation farming practices.

At the village level, the farmer/LGU-trainees conducted re-echo training to the other technicians and upland farmers. The village-level training centered on sloping land management, agroforestry, pest management, CFV, construction and use of A-frame, and farm planning. The re-echo training was participated by 118 upland farmers across the five clusters.

Figure 11. 272 LGU technicians and selected upland farmers participated the training course on "CFV as a Strategy for Climate Change Adaptation and Sustainable Upland Development" across the 15 target provinces

(Photo credits: CBA2012-12NSY Cruz)

3. Establishment of model farms

Seeing the viability and workability of any agricultural technology is a one of the factors that help farmers decide whether to adopt such technology innovation. A total of 18 model farms were established in the five clusters: three (3) in the CALABARZON Cluster; three (3) in Bicol Region Cluster; three (3) in Mindanao Cluster; five (5) in Northern Luzon Cluster; and, four (4) in the Visayas Cluster.

The project team used the Agroforestry Land Capability Mapping Schemes (ALCAMS) in determining the capability of the land for agroforestry, and in identifying the most appropriate agroforestry model, particularly the cropping combination and soil and water conservation measures. ALCAMS, a planning tool that was developed by the UPLB Agroforestry Program, is a methodology of assessing the capability of a particular area for agroforestry, based on the three variables, namely: slope, existing vegetation or land use and soil fertility. Results of ALCAMS indicate that the farms intended as demonstration areas in the project clusters were classified as conditionally capable for agroforestry. Thus, soil and water conservation measures (i.e. terracing, mulching, the establishment of contour hedgerows, drainage canals) were established to maximize the full potentials of the proposed agroforestry model farms.

Figure 12. Model farms in Ligao, Albay (a), Panabo, Davao del Norte (b), General Nakar, Quezon (c), and La Libertad, Negros Oriental (d) (Photo credits: CBA2012-12NSY Cruz)

SIGNIFICANT CONTRIBUTIONS

1. This capacity development project has scaled up the lessons and experiences of the pilot CFV program to 15 provinces, thereby, building the technical capabilities and appreciation of 272 LGU technicians and upland farmers in agroforestry, conservation farming, and sloping land management.

2. This project strengthened the partnership among the five state colleges and universities, namely: UPLB, IFSU, SU, UsEP, and BUCAF to work towards the replication of CFV in other provinces, and share their technical expertise, as well.

3. This project enhanced the awareness among LGUs on their crucial role in providing adequate enabling conditions for sustainable upland development through CFV.

4. This project gave way for the partnership between the CFV Project Team and the Fostering Education and Environment for Development (FEED), a non-government organization that is engaged in promoting sustainable upland development.

5. This project harnessed the knowledge and skills of Farmer-Volunteers from the pilot CFV sites in training other farmers from different upland farming communities. Thus, promoting farmer-to-farmer training, a training approach which is considered by many development workers as an effective approach in technology transfer and adoption among the farmers.

BEST PRACTICES AND LESSONS LEARNED

1. Effective transformation of skills and practices of upland farmers is founded on the transformation of their mindsets and perspectives as well as of the LGUs, academe, NGAs on the interconnections of farming and other human systems to ecosystems and environment.

2. Engagement of mayors and other local executive officials as champions of CFV creates opportunities for more directed and adequate financial and logistical support of the LGUs to upland farming communities.

3. The active engagement of the LGUs and upland farmers provided an opportunity for them to recognize the challenges and opportunities for sustainable upland development, and elicit their participation and commitment all throughout the project implementation.

4. Selection of target villages, which are adjacent to the local state colleges and universities could pave the way for the sustainability of project initiatives—the SUCs being the source of technical expertise and assistance, and a potential catalyst of development projects.

5. The CFV program provides a model, which showcases the value of integrating the collective efforts of the LGUs, SCUs, and the local communities in promoting sustainable upland development, and in building the local capacity for climate change adaptation.

6. This project highlights the value of building from the lessons and experiences of previous projects that delved into promoting sustainable upland development. Recognizing the lessons of previous sustainable upland development projects ensures a smooth and efficient project implementation.

7. The use of ALCAMS before the establishment of agroforestry farms provided a science-based approach in identifying the agroforestry systems and soil and water conservation measures that are most appropriate to the site conditions.

8. This project confirms that the LGUs should be at the forefront in promoting sustainable upland development. The success of any upland development efforts rely on the LGUs' recognition of their responsibility as the primary facilitator in building the capacity of local communities, particularly in terms of resource mobilization and provision of institutional support system.

"Contour farming prevents soil erosion. The soil also becomes more fertile. Hence, we no longer use inorganic fertilizers. We have also observed that the crop yield has improved. We continue to maintain the contour farms up to now, despite the limited farm labor and manpower. We are doing this, because farming is our main source of income. Recognizing the potentials and contributions of contour farming in stabilizing the soil, and improving soil fertility, we also encourage other farmers to adopt the technologies being espoused by the Conservation Farming Villages (CFV) Program. Using farmer-to-farmer training approach, we have so far trained 1000 farmers in 20 upland villages in Ligao City."

– Mr. Rolando Binan, Farmer-Trainer/Farmer-Volunteer, Barangay Oma-oma, Ligao City

Using Indigenous Knowledge to Enhance Community Resilience to Climate Change in the Mountainous Region of Vietnam

BACKGROUND

Harnessing the indigenous knowledge system of the local communities contributes to building community resilience. Considering that the northern region of Vietnam is comprised mainly of indigenous people, the research team believed that mainstreaming indigenous knowledge system in the science and policy dimensions should be emphasized. Hence, the team from the Thai Nguyen University of Agriculture and Forestry (TUAF) and the Agriculture and Forestry Research & Development Center for Mountainous Region (ADC) collaborated to build the capacity of the researchers, civil society organizations, government officials, and policy makers in promoting indigenous knowledge in climate change resilience practices. Specifically, this capacity development project aimed to improve the capacity of early career researchers and NorthNet member-organizations on indigenous knowledge research; increase the capacity of the local communities on the use of indigenous knowledge in their climate change adaptation practices; and, gain support from the policy makers and government officials in recognizing indigenous knowledge in their climate change adaptation plans and programs.

This project was implemented from August 2017 to July 2019 with a fund support of US$69,489.

THE PROJECT TEAM

Dr. Ho Ngoc Son
Project Leader
Thai Nguyen University of Agriculture and Forestry
hongocson@tuaf.edu.vn

Ha Thi Hoa
Collaborator
Thai Nguyen University of Agriculture and Forestry
hoadhnl@gmail.com

Luu Thi Thu Giang
Collaborator
Thai Nguyen University of Agriculture and Forestry
luuthithugiang@gmail.com

Dong Thi Linh Chi Project Assistant
Thai Nguyen University of Agriculture and Forestry

PROJECT ACTIVITIES

1. Training-workshop on indigenous knowledge and climate change research

This activity emphasized the significance of indigenous knowledge in addressing climate change impacts. The training participants were also given an opportunity to share their experiences, concepts of indigenous knowledge, and climate change adaptation measures of the local communities. An important output of this training-workshop is a research tool, which was pre-tested during the field activity.

(Photo credit: CBA2017-01MY-Ho)

2. Field research on indigenous knowledge

This research centered on the documentation of indigenous knowledge system and experiences of the ethnic minorities in Phuc Loc Commune, Ba Be District on climate change and extreme weather events and the adaptation strategies that they employ. About 80 local people from four villages participated in the field research. Research results were used to develop the guidelines for documentation of indigenous knowledge and their use as climate change adaptation strategies for the second year of the project.

(Photo credit: CBA2017-01MY-Ho)

3. Providing research grants to early career researchers

The research grant amounting to $2000 was awarded to researchers of TUAF. Their researches delved on “Gender roles and utilization of indigenous knowledge for climate change adaptation among the ethnic minorities in Bac Kan Province” and “The role of indigenous knowledge in climate change adaptation of ethnic minorities in the northern mountainous area: Case of Tay people in Bac Kan Province”.

4. Piloting the local climate change adaptation practices in selected communities

Three (3) local practices were piloted in the selected communities as a result of the training-workshop. These include: (a) planting of green mungbean, a drought-resistant crop, which is often used in traditional dishes; (b) raising of H'mong black-boned chicken, which is cold resistant, less susceptible to diseases, and produces high quality meat; and, (c) intercropping of local banana variety with Khoi Tia (*Ardisia silvestris* Pitard). The local variety of banana requires less maintenance and is appropriate for sloping lands. On the other hand, the leaf of Khoi Tia, a medicinal plant, is a source of tannin and glycoside for pharmacology. It is also used as a traditional medicine for abdominal ailments. Hence, it can serve as additional source of household income. The local communities were trained on these three models of climate change adaptation practices. Eight (8) households were selected to engage in the production of 800 black-boned chickens while mungbean production was established in a 1-hectare area. Meanwhile, a 2-hectare area was allotted for the intercropping of Khoi Tia and local banana variety.

Figure 13. Planting of green mungbean, raising of H'mong black-boned chicken, and intercropping of local banana with Khoi Tia are among the indigenous practices that were piloted in the local communities (Photo credit: CBA2017-01MY-Ho)

5. Development of information materials and policy briefs

To enhance information dissemination, the project collaborators produced information materials such as leaflets and posters to create awareness among the different stakeholders about the role of indigenous knowledge on climate change adaptation. Meanwhile, the team also produced a policy brief, which was designed for local government officials and policy makers.

6. Dissemination of project outputs via paper presentation and publication

Even prior to the project termination, the project team has been actively disseminating their research results. Three (3) papers were published in an international refereed journal and in a conference proceeding. Meanwhile, a book entitled "Using Indigenous Knowledge in Agroecological and Climate Change Resilience Practices" was also published by the Agriculture Publishing House.

SIGNIFICANT CONTRIBUTIONS

1. Built the research capacity of early career researchers on indigenous knowledge and climate change adaptation through the conduct of trainings and workshops and the provision of research grants which encouraged them to focus their researches on indigenous knowledge systems.

2. This project served as a vehicle towards promoting indigenous knowledge and climate change adaptation strategies that are appropriate to the existing conditions of the local communities and with economic potentials for the households. Eight (8) households were engaged in black-boned chicken production while a 2-hectare farm was developed to demonstrate the intercropping of banana and Khoi Tia and another 1-hectare farm for the mungbean cultivation. A total of 680 members of local communities were trained and involved in the identification of indigenous knowledge practices for climate change adaptation.

3. This project also paved the way for creating awareness among the different stakeholders, particularly the policy makers on the potentials of indigenous knowledge for climate change adaptation and resilience building via the different means of information dissemination.

4. The project has generated a number of information materials such as leaflets and posters for information dissemination, as well as scientific papers and journal articles which can be used as reference by the academic and scientific community in validating, promoting, and scaling-up the adoption of indigenous knowledge systems and practices for climate change adaptation.

BEST PRACTICES

1. Capacity development of early career researchers from various sectors such as universities, research institutes, and civil society organizations.

2. This capacity development project employed an applied research and put emphasis on the research and development components. Research results served as basis in piloting climate change adaptation practices that are appropriate to the local communities.

3. Active engagement of the local communities in the identification of indigenous agricultural practices for climate change adaptation.

4. Activities of the project created awareness among the different stakeholders particularly the policy makers about the significance of indigenous knowledge and practices for climate change adaptation.

LESSONS LEARNED

1. This capacity development project has proven the need to promote climate change adaptation strategies that would not only address the impacts of climate change in agricultural production, but more importantly, would generate income and economic benefits to the ethnic/local communities.

2. There is always value of integrating research in any capacity development activity. Conducting research will help identify the most appropriate intervention and/or climate change adaptation strategy to a particular local community.

3. Piloting the indigenous agricultural practices as climate change adaptation strategies in the selected local communities serves as a show window for other farm households to recognize the workability and viability of the interventions and therefore, would help promote wider adoption.

4. Establishing networks with non-government organizations and other civil society organizations contributes to effective project implementation. Thus, this project validates that partnership and collaboration matters in organizing any capacity development initiative.

Enhancing Capacity for Public Communities to Use Renewable Energy (Biogas) from Livestock Wastes

BACKGROUND

Climate change is real. As such, various types of farm-related climate change adaptation strategies are being promoted to enhance community's resilience and adaptive capacity. Tapping renewable energy from livestock wastes is one of the less-explored technologies for climate change adaptation. Considering that livestock production is one of the major livelihoods in Nghe An Province in Vietnam, a research team from Vietnam, Thailand, and Japan collaborated to implement a capacity development project that aimed to strengthen the capacity of the local communities in producing renewable energy from livestock wastes for climate change adaptation. Specifically, it aimed to evaluate public awareness of application and implementation of PREW; raise awareness of stakeholder of opportunities and application of PREW and strengthen capacity of local managers for climate change adaptation; and, implement communication activities on PREW for society.

Led by the Electric Power University in Vietnam, this capacity development project ran for one year with a funding support of $39995.

THE PROJECT TEAM

Dr. Do Thu Nga
Project Leader
Electric Power University, Vietnam
dothu_nga2005@yahoo.com

Dr. Nguyen Huu Duc
Collaborator
Electric Power University, Vietnam

Dr. Dinh Duc Truong
Collaborator
National Economics University, Vietnam

Dr. Wilawan Khanitchaidecha
Collaborator
Naresuan University, Thailand

Dr. Le Thi Thoa
Deutsche Gesellschaft fü Internationale Zusammenarbeit (GIZ)

PROJECT ACTIVITIES

1. Stakeholder Analysis

Assessing the stakeholders' perceptions about PREW, the team conducted stakeholder analysis to identify the key target groups involved in the implementation of PREW in Vietnam. This was followed by a roundtable meeting among the identified stakeholders representing the central ministries, NGOs, province and district authorities, universities and experts from Thailand, Japan, and Vietnam. This activity served as a venue to determine the knowledge gaps, issues, and current policies on agricultural wastes and PREW. It also served as an opportunity to consult the stakeholders about the content of the questionnaire.

2. Design and dissemination of communication materials for livestock farmers

The team organized a training course for local farmers and managers aimed at raising awareness about PREW. A total of 80 livestock households and local managers participated in the training course. Furthermore, communication materials about PREW were disseminated to about 400 farmers in Bac Giang, Bac Ninh, Nghe An, and Nam Dinh Province. These materials were disseminated through the district officers of the Department of Agriculture and Rural Development, Department of Trade and Industry, Department of Planning and Investment, and the Department of Natural Resources and Environment.

3. Development and dissemination of a policy brief

A policy brief was developed by the research team. This policy was disseminated to the state ministries, 10 provinces, 20 environmental and development NGOs and research institutes in Vietnam. This policy brief contains, among others, the policy recommendations toward sustainable use of livestock wastes as source of renewable energy in Vietnam.

Figure 14. Communication materials and policy briefs are disseminated by the project collaborators through training programs and forums

(Photo credit: CBA2019-05SY-Do)

SIGNIFICANT CONTRIBUTIONS

1. This project has raised awareness, enhanced capacity for stakeholders and informed decision-making in APN member countries to contribute partly ASEAN renewable energy target.

2. The project evaluated social awareness of the roles, benefits, advantages, and challenges in the production of renewable energy from livestock wastes, contributing to reducing greenhouse gases. Training courses were organized to raise awareness of livestock farmers of benefits and application of renewable energy production from animal wastes (including information on supporting policies).

3. Training courses on climate change and renewable energy production from livestock wastes were given to strengthen capacity of local managers.

4. Policy brief and the social awareness assessment report are valuable materials to the policy makers and managers. Project results and implications were disseminated to national and sectoral decision makers and universities for promoting policies to encourage renewable energy from livestock wastes. Five (5) peer-reviewed papers have been developed and published to sharing worldwide the results of this CapAble Project.

BEST PRACTICES

1. Collaboration of researchers from Japan, Thailand, and Vietnam promoted a transboundary collaboration.

2. Communicating research results to the policy makers through the development and dissemination of the policy brief and to the scientific community by publication in refereed scientific journals.

3. Capacity-building and creating awareness among the different stakeholders about the potentials of livestock wastes as source of renewable energy for climate change adaptation.

LESSONS LEARNED

1. Making the stakeholders aware about the potentials and benefits of livestock wastes as source of renewable energy, provides opportunities for them to appreciate and recognize the technology that would help local communities in climate change adaptation.

2. Production of a policy brief that is anchored on science-based evidences will help policy makers in coming up with sound decisions on tapping livestock wastes as renewable energy source.

3. This project has shown the potentials of a zero-waste technology which addresses both the economic (being the source of renewable energy) and ecological (reuse and recycling of agricultural wastes; renewable energy) dimensions.

4. This capacity development project showcases the viability of multidisciplinary and diverse collaboration and partnership (with a North-South collaboration) towards a common goal of enhancing climate change adaptation.

"Backyard swine production is a traditional livestock production in the village. Many community members are engaged in swine production. As such, we are used to foul smells and flies around the community. We do recognize this problem, and the health implication that it may bring. However, such issue has yet to be resolved, until such time, when the capacity development project of the Electric Power University came in. At first, we have attended a training on biogas digester. We have realized that the use of biogas digester will help us solve the negative environmental impact of backyard swine production, and at the same time, will help us tap the renewable energy from the livestock wastes. Biogas is used for cooking and lighting, and therefore, it saves household expenses for electricity and gas." – Ms. Quynh Hong, farmer-cooperator

"When the biogas digester became operational, there are no more foul odors and flies around the village. The biogas has been very beneficial to the household. We have 12 pigs, and the energy we get from the biogas digester, helps us to save half of our energy requirement for cooking." – Mr. Cao Viet Bac, farmer-cooperator

Climate Smart Actions "Saung Iklim" for Smallholder Farmers in Subang District, West Java, Indonesia

BACKGROUND

Access to and adequate knowledge on climatic data among smallholder farmers is an essential component of building their capacity for climate change adaptation. As such, this capacity development project worked on the utilization of climatic data through Climate Smart Action "Saung Iklim" to target stakeholders including the agricultural extension workers and farmers to improve their farm management. "Saung Iklim" refers to a place where people can learn about the use of climatic information in their farm-related activities.

This project aimed to enhance the capacity of Tim Iklim composed of local government, extension workers, farmers' groups, and universities, including the rice farmers in Subang District. Specifically, this project aimed to: a) improve the knowledge and capacity of Tim Iklim on the use of crop simulation model; 2) provide climatic driven tools to enhance farmers' capacity; 3) provide support to Tim Iklim in the application of climate-smart actions; 4) enhance awareness of farmers and extension workers to collect and document farmer-related issues using the digital reporting system; and, 5) propose recommendations for the implementation of climate- smart actions in the future.

This project was implemented in 2016-2017.

THE PROJECT TEAM

Dr. Perdinan
Project Leader
Bogor Agricultural University
Bogor, Indonesia

Shavrina Octaviana
Collaborator
Bogor Agricultural University
Bogor, Indonesia

Yon Sugiarto
Collaborator
Bogor Agricultural University
Bogor, Indonesia

Yonvitner Yonvitner
Collaborator
Bogor Agricultural University
Bogor, Indonesia

PROJECT ACTIVITIES

1. Training on Climate Risk Management

About 25-30 participants representing the stakeholder groups (local government, extension officers, and farmers) were trained on managing climate risks that affect their on-farm production. The training focused on the use of crop simulation models such as Aqua Crop and DSSAT to identify the potential impacts of climate fluctuation on rice productivity. A step-by-step procedure on simulating rice production was highlighted in the training modules.

(Photo credit: CBA2018-09SY-Perdinan)

2. Development of training modules

In partnership with the farmers and extension workers, the project team developed a number of training modules related to climate risk management. These were: a) Module on Interpreting Climate Risk Maps, b) Module of Tim Iklim for Farmers' Association, c) Use of Aqua Crop Model to Simulate Rice Productivity, d) Use of DSSAT Model, e) Field Observations, and f) Utilization of Website of Tim Iklim.

(Photo credit: CBA2018-09SY-Perdinan)

3. Dissemination of Tim Iklim activities via website

The project team developed a website designed to store and disseminate information about the project activities, highlight articles, and papers published related to the project activities; training modules developed; database of crop model simulations; and agricultural impact surveys. The website can be accessed using this link https://pi-dev.co.id/timiklim/.

4. Establishment of demonstration plots

Demonstration plots were established to observe the plant phenology during the crop growth cycle. Meanwhile, daily rainfall, air temperature, air humidity, and evapotranspiration were among the climate parameters that were also observed. These demonstration plots were put up in the rice fields of five sub-districts, namely: Binong (0.35 ha), Pagaden (0.13 ha), Pamanukan (0.20 ha), Purwadadi (0.12 ha), and Cijambe (0.30 ha).

Figure 15. Demonstration plots established in selected rice fields to observe rice phenology
(Photo credit: CBA2018-09SY-Perdinan)

SIGNIFICANT CONTRIBUTIONS

1. Equipped Tim Iklim (a group composed of different stakeholders such as the local governments, extension workers, farmer groups, and universities) with proper tools to enhance the farmers' capacity to utilize climate information in managing their farm activities.

2. Trained stakeholders on the use of crop simulation models such as Aqua Crop and DSSAT as tools in managing climate risks.

3. Established five demonstration plots to showcase the capability of the simulation models, as well as the importance of observing crop phenology for farm management.

4. Developed digital media, crop simulation database, and learning modules as an approach to fully utilize the new knowledge generated by this capacity development project.

BEST PRACTICES

1. Development of training modules on the different topics, which served as supplemental references of the participants.

2. Introduction and use of science-based digital technology particularly on crop simulation models and on-farm technology trials through the establishment of demonstration plots.

3. Engagement of different stakeholders such as local governments, extension workers, and farmers, who are at the forefront of agricultural production and are experiencing the impacts of climate change.

4. Wide dissemination about the project and research results via website.

LESSONS LEARNED

1. The modules that were developed facilitated the planning, management, monitoring and evaluation of farming practices.

2. Accessibility and availability of production inputs facilitated the establishment of the demonstration plots.

3. This project served as an opportunity for the different stakeholders to recognize the significance of climate information in farm management practices.

4. Because of the positive outcomes, the climate information and crop simulation models were integrated by the Ministry of Agriculture and the Tim Iklim in their institutional website for wider dissemination.

"Saung Iklim is fully supported by the Indonesian government and the Asia-Pacific Network for Global Change Research (APN) as a collaborative project in Subang District, West Java, Indonesia. It became a valuable program for smallholder farmers, as it applies climate agricultural model to climate-smart actions. Through Saung Iklim, the smallholder farmers began to realize the impacts of climate change on their rice production. It has built farmers' capacity by adopting climate-smart options in their agricultural management. This project trained the smallholder farmers to access their production in different climate scenarios. As a young researcher, I was able to recognize the different perspectives in agricultural management, through this project. Indeed, the valuable experiences with the local farmers, inspired me to build a local farmer-based platform, called WarungLur, which helps smallholder farmers access the large-scale market for agriculture products."

– Mr. Raden Eliasar Prabowo, Researcher-Institut Pertanian Bogor, Bogor, Indonesia

Awareness Raising and Capacity-Building on Alternative Water Management for Communal Irrigators' Association in the Philippines

BACKGROUND

In 2008 and 2009, strong typhoons hit many areas of Luzon causing crop damages of about PhP15-20 billion, while the long dry spell caused about PhP12 billion of damage to agriculture in 2010 (www.ndcc.com). Knowledge and skills about irrigation water supply management and utilization of climate forecast are critical in the light of climate disturbances. Uptake of alternative adaptation measures to cope with irrigation-related problems will therefore depend on the knowledge and capability of individual farmers and the organized Community Irrigators' Associations (CIAs). CIAs are associations of farmers within a contiguous area by a communal irrigation system. They are the key actors in water management.

This participatory action research, which was implemented in the provinces of Rizal, Quezon, and Batangas aimed to improve farmers' awareness and skills in irrigation water management and climate forecast application. Specifically, it assessed the irrigation water management practices of selected CIAs in the three provinces, including the problems encountered; conducted lectures and workshops on alternative water management strategies and social mobilization; assisted CIAs in preparing alternative water management and institutional development plans for optimum irrigation water allocation, particularly during extreme weather events; and, recommended measures to replicate good practices in other areas of the country.

With the University of the Philippines Los Baños as the implementing institution, this capacity development project ran for one year (2011-2012) with a funding support of US$30000.

THE PROJECT TEAM

Dr. Linda Penalba
Project Leader
University of the Philippines Los Banos
lmpenalba@gmail.com

Dulce D. Elazegui
Collaborator
University of the Philippines Los Baños
dulceelazegui@yahoo.com

Roger A. Luyun, Jr.
Collaborator
University of the Philippines Los Baños
raluyunjr@uplb.edu.ph

Pompe Sta. Cruz
Collaborator
University of the Philippines Los Baños, Philippines,
pompestacruz@yahoo.com

Balbino C. Geronimo
Collaborator
University of the Philippines Los Baños, Philippines,
albingeronimo@yahoo.com

PROJECT ACTIVITIES

1. Situational analysis

Profiling of potential partner CIAs in the provinces of Laguna, Rizal, Batangas, and Quezon revolved around collecting baseline information such as water management practices and experiences during extreme weather events, water management and rice production practices, social mobilization schemes, farmers' knowledge on alternative technologies, and problems and adaptation measures. From the analysis, five CIAs were selected as partners, namely: San Juan Communal Irrigators' Association and Quilo-Quilo South Irrigators' Association in Batangas; San Lorenzo Multipurpose Cooperative in Rizal; Callejon-Del Valle Irrigators' Association; and Tubig Biyaya Irrigators' Association in Quezon.

2. Vulnerability assessment

Through focus group discussion and key informant interviews, the project team assessed the vulnerability of CIAs based on the following indicators: level of knowledge and skills on alternative water management strategies and rice production practices, cropping systems, water management policies, extent of cooperation and commitment regarding the organization and management of irrigation systems, attitudes and perceptions about water scheduling, financial status, and problems encountered on water management. Along with the secondary data related to irrigation development and management programs and policies of the local government units and the National Irrigation Administration, including the response measures to extreme weather events, the data gathered from the CIAs were used as basis in assessing the vulnerability of the study sites to irrigation water allocation problems and the adaptation of various rice production systems.

3. Awareness raising and capacity-building

Members of the CIAs were trained on the following topics: rice production and water use, alternative wetting and drying of aerobic rice, operation and maintenance of communal irrigation system, effective water management under environmental conditions, and assessing the feasibility of alternative water sources. A total of 207 farmers participated in the five seminar-workshops organized by the project team.

4. Water management and institutional development planning

With technical guidance from the project team, the five CIAs crafted their water management and institutional development plans based on the existing biophysical, agroclimatic, and socioeconomic conditions of the study sites and the results of vulnerability assessment. The plans were presented by the five CIAs to the other CIAs and a panel of invited resource persons for their inputs on the technical and management aspects of water management. Among the plans that were developed were as follows:

5. Water management and institutional development planning

Among the plans that were developed were as follows:

- Installation of Shallow Tube Wells (STWs) and construction of Small Water Impounding Facilities to increase the water supply and minimize conflicts within the CIA;
- Planting of alternative crops (for rice) such as vegetables and white corn which have lower water demand;
- Strengthen the information and education campaign towards improving the appreciation of CIA members on the policies and proper water management strategies;
- Engaging the local governments, private companies, and youth volunteers in the reforestation of watershed;
- Construction of check dams (sabo dams) upstream to catch silts and prevent them from reaching the main dam; and
- Dredging the silts in the dam to increase storage capacity.

6. Implementation, monitoring and evaluation of water management and institutional development plans

The five CIAs initiated the implementation of their respective water management and institutional development plans by mobilizing their members into different working committees. Meanwhile, the project team has been monitoring the CIAs' activities to assess the effectiveness of the technical and social mobilization strategies.

7. Dissemination and outreach

The project team came up with policy briefs, journal articles, technical papers, and a Handbook on Irrigation Management Planning for Communal Irrigation System in the Philippines. These were disseminated to the different CIAs, local government units, NIA, and other stakeholders.

SIGNIFICANT CONTRIBUTIONS

1. This capacity development project has developed the technical capabilities of the CIAs about rice production and effective water management systems and strategies and enhanced their skills in project planning and management.

2. The CIAs and CIS have become aware about their level of vulnerability in terms of the different indicators. This awareness could have led them to actively participate in the succeeding project activities.

BEST PRACTICES

1. Use of participatory approach in vulnerability assessment.

2. Active engagement of the CIAs in project implementation, particularly in succeeding project planning activities.

3. Development of policy briefs, which served as the instrument for lobbying with the local government units.

Establishment of Rainwater Harvesting Facilities in Selected Upland Farming Communities in Albay Province, Philippines

BACKGROUND

The upland farming communities in the Philippines are among the vulnerable sectors to climate change impacts. Their farms are generally rainfed, and therefore, any change in the rainfall pattern significantly affects their agricultural production activities. Water scarcity is a common and perennial problem. These problems were articulated by the farmers in the upland farming communities in Albay Province, Philippines.

This capacity development project aimed at enhancing the climate change adaptation strategies of upland farmers in Albay Province, Bicol Region through the establishment of rainwater harvesting ponds. Specifically, it aimed to: a) develop farmers' knowledge and skills in soil and water conservation, rainwater harvesting, and agroforestry; b) establish at least five rainwater harvesting ponds in each landscape (cluster) in three upland farming communities in Albay Province, Bicol Region; c) develop a monitoring tool that will assess the RWHF performance; d) document the lessons and experiences in project implementation; and, e) develop a Manual for the Establishment of Rainwater Harvesting Facility in Upland Farming Communities in the Philippines. The RAINWATER Project was implemented in Barangay Palanas, Guinobatan; Barangay Malama, Ligao City; and Barangay Balinad, Polangui, all in Albay Province. The project was facilitated by the project team from the University of the Philippines Los Baños through the Institute of Agroforestry, Institute of Renewable Natural Resources, Bicol University College of Agriculture and Forestry, local government units, and farming communities. A total of 11 rainwater harvesting ponds were established through the collective action of the upland farmers in the three partner communities.

The project was implemented for 18 months (August 2020 to April 2021) with a funding support of $24500.

THE PROJECT TEAM

Dr. Leila D. Landicho
Project Leader
Institute of Agroforestry, College of Forestry and Natural Resources, University of the Philippines Los Baños
ldlandicho@up.edu.ph

For. Rowena Esperanza D. Cabahug
Collaborator
Institute of Agroforestry, College of Forestry and Natural Resources, University of the Philippines Los Baños
rdcabahug@up.edu.ph

For. Romnick S. Baliton
Collaborator
Institute of Renewable Natural Resources, College of Forestry and Natural Resources, University of the Philippines Los Baños
rsbaliton@up.edu.ph

Engr. Alberto B. Gonzales
Collaborator
Department of Forestry, Bicol University College of Agriculture and Forestry
abgonzales@up.edu.ph

PROJECT ACTIVITIES

1. Project Stakeholders' Orientation

Participated in by the representatives from the local government units and farming communities, this orientation provided an opportunity to discuss the methodologies and processes involved in project implementation; discuss the project deliverables; plan for the succeeding project activities; and provide a venue for the formation of the Local Project Facilitating Team.

2. Cross-farm visits

Fifteen (15) farmers each from the partner communities and representatives from the local government units had a chance to learn about the agroforestry and soil and water conservation practices of one of the pilot sites of Conservation Farming Villages (CFV) Program, located in Barangay Oma-oma, Ligao City, Albay (Figure 4). Building from the lessons of previous capacity building projects (Landicho et al 2009), the project collaborators believed that farmers learn from other farmers, as they share similar symbols and experiences. These upland farmers visited the farms being managed by the members of the CFV Farmers' Association, showcasing the different agroforestry systems such as the alley cropping system and multistorey system and the community-managed rainwater harvesting facility established in a nearby community. This facility showcases the viability of rainwater harvesting, where a number of rice farmers are benefitting from rainwater collection, specifically during the dry season.

Figure 16. The site of the Conservation Farming Village (CFV) Program showcasing alley cropping in Ligao City, and the USAID-funded rainwater harvesting project in Polangui, Albay served as the sites of the cross-farm visit (Photo credit: CBA2019-01NSYLandicho)

3. Selection of sites for the establishment of RWHF

The project collaborators and the Local Project Facilitating Team conducted a preliminary assessment of the potential sites where RWHFs would be established. The selection of sites for RWHFs was done based on the following considerations: number of farmers that would benefit from the facility; accessibility of the farm where the RWHF would be established to serve as the show window to other farmers and development workers; willingness of the farmer-cooperators to manage and maintain the facility and share the resource with other farmers within the farm clusters to facilitate project monitoring; and, land tenure or ownership of the land where the facility would be established to ensure sustainability.

4. Soil texture analysis

Soil samples were collected from the 11 sites to determine the soil texture. Determining the texture and porosity would serve as basis in deciding whether to install plastic lining to prevent water dissipation and evapotranspiration and to ensure the efficient water collection and storage of the RWHFs.

5. Participatory planning for the establishment of RWHFs

The community members, particularly the farmer-cooperators and the "would-be" farmer-beneficiaries of the RWHFs were convened into a meeting to discuss in detail the establishment of RWHFs; present the sites that were selected for RWHF establishment; decide on the logistics arrangements, including the farmers' arrangements on the establishment and maintenance of RWHF; identify the tools and materials needed for the establishment; and, finalize schedule of actual establishment. This activity was done to ensure that the farmers would develop their sense of ownership on the project, and thus, would serve as a vehicle to sustain the project initiatives.

6. On-site technical training and consultation on the establishment of RWHFs

The project collaborators tapped the expertise of key persons involved in the establishment of RWHFs in Bicol Region. Two (2) engineers from the Regional Office of the Department of Agriculture in Bicol Region, provided their technical expertise in the appropriate design of RWHFs in the three partner communities. The design of the ponds was based on the type of dominant crops and the farm size. These two factors determine the optimum volume of water for collection, storage, and distribution in each cluster of farms. Hence, for Barangay Palanas with about 10-20 farmer-beneficiaries and with rice as the dominant crop, the type of rainwater harvesting pond that is appropriate to the site was a "dam type" with a dimension of 30m x 10m x 2m for each cluster of farms. Similarly, "dam type" type of RWHF pond was designed for Barangay Malama with rice as the dominant crop as well. However, since the intended users of the resource is only 3-4 farmers, the pond's dimension was 8m x 10m x 2m. In Barangay Balinad, on the other hand, the "embankment type" of pond was designed with a dimension of 5m x 10m x 2m.

7. Establishment of RWHFs

The establishment of rainwater harvesting ponds took longer than planned. The actual establishment commenced in February 2020 and was projected to be completed by April 2020. However, due to a number of factors (i.e. typhoons, monsoon rains, COVID-19), the establishment of the ponds was extended until the end of the project period in 2021. Using collective action or locally called as the "bayanihan system", the upland farmers were able to construct the 11 ponds: two (2) in Barangay Palanas; four (4) in Barangay Malama; and five (5) in Barangay Balinad.

Figure 17. Rainwater harvesting ponds differ in each site in terms of size and structure. These were established by the upland farmers, harnessing their collection action (bayanihan)
(Photo credit: CBA2019-01NSY Landicho)

8. Periodic monitoring of RWHFs

Monitoring of RWHFs is necessary to assess the status of the ponds based on their effectiveness in terms of addressing the problem on water scarcity in the selected cluster of farms; efficiency in terms of water collection and storage/retention; and, durability and stability in terms of withstanding the effects of erosion around the area, winds and heavy rains considering that the sites are typhoon-belt area. Furthermore, monitoring revolves around the execution of arrangements and agreements made during the planning stage, such as the arrangements among the beneficiaries and farmer-cooperators concerning the establishment of the ponds, distribution, and use of water from the pond, as well as monitoring and maintenance of the ponds. Likewise, issues, concerns, and problems encountered all throughout the establishment and maintenance of the ponds and distribution and utilization of rainwater collected from the farm were also recorded in the project monitoring.

9. Integration of soil and water conservation measures and agroforestry system

Sustaining the RWHFs is an utmost concern shared by the project collaborators, local partners, and the farming communities. Hence, the need to integrate measures that would help conserve and manage the soil and water resources, while at the same time, capitalizing on the RWHF for crop diversification to ensure food security and provide additional income to the upland farmers. Thus, integration of appropriate soil and water conservation measures and the development of agroforestry systems have become an important aspect of the RAINWATER Project.

In Barangay Palanas, the upland farmers, through the technical assistance of the agricultural technician, have established an agroforestry system, integrating mulberry (*Moros nigra*) as hedgerow species and dragon fruit (*Hylocereus undatus*) as alley crop, in the alley/hedgerow cropping system. Mulberry, being a woody perennial, serves as the permanent crop and planted as contour hedgerows. On the other hand, the dragon fruit, which is a medium-term crop is planted along the alleys, together with annual vegetable crops. Aside from their suitability to the site, mulberry and dragon fruit provide economic potentials, being high-value crops. Furthermore, mulberry wine is being produced in Bicol Region, and therefore, Barangay Palanas could be a potential supplier of raw materials to the processors. The vegetable crops would serve as food source of the upland farmers.

In Barangay Malama, the sloping farms around the ponds were developed into contour farms, where kakawate (*Gliricidia sepium*) serves as the hedgerow and lemon (*Citrus limon*), cacao, (*Theobroma cacao*), turmeric (*Curcuma longa*) and vegetable crops serve as the alley crops. Lemon, cacao, and turmeric are among the high-value crop species in Albay. Lemon is integrated in farms with open areas, as this species is light-demanding. On the other hand, cacao is integrated in farms/areas under coconut. Vegetable crops are source of food of the households and other community members. *Gliricidia sepium* offers a number of potentials including soil fertility restoration (being a nitrogen-fixing tree species), a source of fuelwood, particularly the prunings; and, as source of feeds for the livestock, particularly the leaves. The leaves could also be used as botanical pesticides.

In Barangay Balinad, the steep areas around the ponds will be developed into contour farms with *Gliricidia sepium* as the contour hedgerows. The farm is mostly planted with corn under coconut. Hence, another high-value crop, cacao, will be integrated along the farm boundaries to provide protection and production functions.

10. Development of a booklet highlighting the experiences and lessons in the establishment of rainwater harvesting ponds.

The booklet showcases the viability of small-scale rainwater harvesting ponds in the uplands; serve as a vehicle of disseminating the lessons and experiences that were generated from the project implementation; and building on these lessons and experiences; replicate the project in other upland farming communities in the Philippines.

SIGNIFICANT CONTRIBUTIONS

1. The rainwater harvesting ponds have improved crop production in the three project sites. In Barangay Palanas, the farmers used to cultivate rice in one cropping season only, usually during the rainy season when rainwater is available. With the efficient rainwater collection and storage of the two ponds, at least 20 farmers began cultivating rice during the dry season – enabling them to engage in rice production in two cropping seasons.

2. The rainwater harvesting ponds served as a motivation for the upland farmers to expand their areas of cultivation. In Barangay Malama, one farmer was able to expand his rice production area while three farmer-cooperators were able to integrate additional cash crops to maximize the availability and use of rainwater from the ponds. Similarly, a farmer-cooperator began cultivating the idle lands around the rainwater harvesting ponds.

3. The establishment of rainwater harvesting ponds paved the way for the adoption of agroforestry systems and technologies in the sloping agricultural production areas of the upland farmers. Given the marginal conditions of the upland farming communities, agroforestry is considered an appropriate land use management system. The integration of soil and water conservation measures such as contour hedgerows is an appropriate strategy to prevent soil erosion in the sloping areas, which are oftentimes, the sites that are cultivated by the smallholder farmers. Integrating SWC measures in upland farming does not only control soil erosion in the sloping areas and conserve soil nutrients that are needed by the crops, but more importantly, helps protect the ponds from being damaged by the soil and debris from the sloping areas around them.

4. Because of the availability of water, the upland farmers in Barangay Palanas have established a 5000 m^2 agroforestry farm, which combines mulberry and dragon fruit.

5. This project has initiated building the capacity of young community members and youth leaders in project coordination and monitoring. The escalation of COVID-19 cases restricted the mobility and travels of the project collaborators. Thus, the local community members and agricultural technicians were tapped to conduct project monitoring and coordination of field activities.

6. This project has further developed collaboration of the local state college (Bicol University College of Agriculture and Forestry), local government units, and the farming communities.

7. From the experiences and lessons in project implementation, the project collaborators have come up with a proposed framework for the implementation of extension projects under the new normal.

BEST PRACTICES

1. Active engagement of the local government units and farming communities in project implementation.

2. Process documentation in all aspects of project implementation.

3. Capacity development of young community members/youth leaders and agricultural technicians in project monitoring and coordination.

4. Tapping experts on rainwater harvesting from the Department of Agriculture.

5. Development of a booklet highlighting the experiences and lessons in the establishment of rainwater harvesting ponds.

LESSONS LEARNED

1. The cross-farm visits and on-site training on agroforestry and soil and water conservation that were organized by the team served as a mechanism for the farmers in the three project sites to appreciate and recognize the importance of soil and water conservation and rainwater harvesting in upland farming.

2. The spirit of collective action or "bayanihan system" is essential in a more efficient establishment of rainwater harvesting facilities. Barrameda and Barrameda (2011) define bayanihan as any voluntary communal effort to achieve a common goal. It is a common practice in the Philippine towns where community members help their neighbours move to a new place, repair homes, or build communal infrastructures. As in other community-based development projects, the cooperation and spirit of "working together" played a key role in completing the RWHF establishment in the three project sites. This element is crucial, particularly for development projects which are in the "pilot stage" and have limited funding support. The establishment of rainwater harvesting ponds is a tedious process. Through their collective action, the smallholder farmers were able to establish 11 rainwater harvesting ponds: (i) two (2) in Barangay Palanas with a dimension of 30m x 10m x 2m; (ii) four (4) in Barangay Malama with a dimension of 10m x 8m x 2m; and five (5) in Barangay Balinad with a dimension of 5m x 7m x 2m.

3. Resource sharing is an important component in any community development project and serves as a mechanism to develop a sense of project ownership among the stakeholders. Unlike the traditional projects where everything is given out by the project implementors and funding agencies, and local organizations and farming communities are merely considered as "beneficiaries", this capacity development project showed the relevance of counterparts from the local government units and the three partner communities. For instance, the LGUs provided vegetable seeds for the establishment of agroforestry systems/models and engaged the agricultural technicians in the project without additional compensation. The farming communities, on the other hand, provided labour in the establishment of RWHFs and agroforestry systems as their counterpart. Sharing of resources and efforts enables the local stakeholders to value the project, develop a sense of project ownership, and paves the way for the sustainability of the project initiatives.

4. Addressing the expressed/felt-need of the communities guarantee their commitment and engagement in the project activities. Since agriculture is their main livelihood, the three farming communities were in dire need of water sources that will provide irrigation to sustain their agricultural production even during the dry season. This need was expressed in 2018 when a study was conducted in the three farming communities (Landicho, 2018). Since the project's inception, the farmers and the local leaders have extended their support and active engagement in the project activities. Despite the pandemic and natural disasters brought about by typhoons in 2020, the farmers were persistent in completing the establishment of RWHFs.

5. Support of the local government units at various levels helps facilitate the smooth project implementation in the three project sites. The active involvement of the Office of the Municipal/City Agriculturist, through their agricultural technicians in the three project sites, helped mobilize the farmers in all stages of project implementation and closely monitored the status of project implementation. Furthermore, mobilizing the Local Multisectoral Team through the leadership of the agricultural technicians representing the Office of the Municipal/City Agriculturists in the three local government units.

6. Regular communication of the project collaborators via electronic mail and other forms of social media is key to sustain the project implementation despite the travel restrictions and face-to-face interactions brought about by the pandemic.

7. Tapping the locals as the local or on-site monitors is both capacity development and a project facilitating opportunity. These on-site monitors served as the link between the farmers and the collaborators since the agricultural technicians, whose municipalities were also on lockdown, were restricted to do fieldwork. The local/on-site monitors organized the field activities, coordinated with the collaborators for logistics and technical concerns, and monitored the progress of RWHF establishment. These local/on-site monitors were also tapped to conduct periodic monitoring using the monitoring tool that was developed by the project collaborators. Engaging the youth in field monitoring did not only facilitate project implementation but also provided an opportunity to enhance their capacities coordinating and monitoring the project as well as enhancing their communication skills.

"Rainwater harvesting facilities have provided significant contributions to Barangay Palanas, Guinobatan, Albay. These facilities enabled the farmers to cultivate rice in two cropping seasons, and diversity crop production because of the availability of water. In our previous cropping seasons, we have observed the yellowing of rice plants because of the lack of water. But, because of these rainwater harvesting facilities, the rice performance and yield have improved. These are indeed, a big help to the farm productivity and income of the farmers. We wish more facilities would be established in the village to help more smallholder farmers."

- Ms. Carolina Obnialla, Barangay Chairman, Palanas, Guinobatan, Albay-Philippines)

SYNTHESIS OF LESSONS AND BEST PRACTICES

As we all know, the Southeast Asia is one of the regions, which is reportedly vulnerable to the impacts of climate change. This could be the reason why a number of proposals for enhancing adaptive capacity and resilience emanate from the region, particularly from the Philippines, Vietnam and Indonesia. The capacity development projects featured in this publication are just few of the many projects that were funded by APN along climate change adaptation and mitigation and building community resilience in Southeast Asia.

It is worth noting that all of the capacity development projects highlighted in this publication considered collaboration and partnership at the core of their projects. At the forefront of these partnerships are agricultural and forestry universities as the source of technical expertise. The collaboration or partnership is either between the university (as the source of technical expertise and catalyst of the capacity development programs) and the local government units (which have the capacity to execute and institutionalize local policies, and provide basic social services to the communities); between the university and the local farming communities (who are the direct beneficiaries and stakeholders of all these capacity development projects) and/or all– university, local government units and local farming communities.

These capacity development projects have varying strategies and approaches. Some projects centered on training and building the technical capabilities of the service providers, particularly the local governments, state colleges and universities, as in the case of the projects that (a) trained students and farmers to become local climate change communicators; (b) equipped the local government units to develop climate change action plans; and, (c) enhanced the knowledge and skills of state colleges and universities and local government units in exploring basket of climate change adaptation strategies.

Other projects put emphasis on promoting nature-based and sustainable farming techniques that helped the farming communities cope and adapt to climate change impacts. These include the promotion of (a) conservation farming techniques via the Conservation Farming Village program; (b) agroforestry, through the establishment of Learning Laboratory for Agroforestry; (c) renewable energy from livestock in the form of biogas;

(d) indigenous agricultural practices; and, (e) rainwater harvesting. These projects did not only provide training activities, but more importantly, set-up demonstration plots and model farms to showcase the workability and viability of these technologies. Some projects utilized digital technology for more proactive solutions to agricultural uncertainties brought about by climate change, as emphasized in the Saung-Iklim project in Indonesia.

Indeed, these capacity development projects have generated a number of tangible outputs: numerous farmers, LGU personnel, and junior researchers and lecturers trained on various aspects related to climate change adaptation and mitigation (agroforestry, climate change adaptation strategies, indigenous agricultural practices, tapping biogas, CDRA, development of local climate change action plans, and effective irrigation management); developed policy briefs; developed model farms and demonstration plots; and contributed to the advancement of science through paper presentations and scientific journal articles.

These outputs paved the way for an enhanced social and human capital development of different stakeholders and science-based decision-making by the policy makers, as highlighted by the testimonies of the local chief executive in Aurora Province, Philippines. Hence, strengthening the policy-science linkage. Furthermore, the outputs have led to the adoption of sustainable farming techniques and technologies, as reflected in the testimonies of the farmers in Albay Province, Philippines and Vietnam; as well as knowledge generation and advancement of science as mentioned by the local partner-universities in the Philippines and Indonesia. As shown in the figure below, these outcomes would certainly contribute to attaining the potential impact of an enhanced adaptive capacity and resilience of rural farming communities in Southeast Asia.

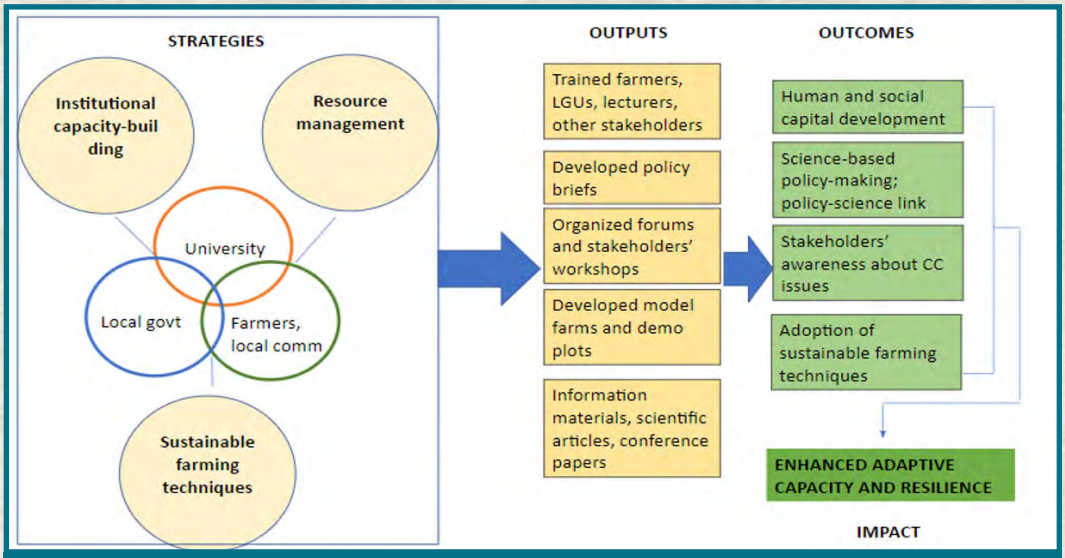

Figure 18. Theory of change of the APN-funded capacity development projects towards enhancing adaptive capacity of rural farming communities in Southeast Asia

Important lessons were distilled from the experiences of the APN-funded capacity development projects. These lessons could serve as guide for other universities and development organizations that are interested to engage in enhancing the adaptive capacity of rural farming communities.

1. **Essence of collaboration in facilitating smooth project implementation, achievement of project goals and objectives, and sustaining project initiatives.**

   The APN-funded capacity development projects confirmed that putting emphasis on collaboration facilitates effective and efficient project implementation as this strategy promotes sharing of expertise and resources, and integration of all efforts. The importance of collaboration and partnerships at various levels and sectors, is highlighted in a number of community-based development projects across Asia (Landicho, Cabahug & de Luna, 2009; Cruz et al., 2014; Minkyung, Ye-Chang & So-Hee, 2018; Frimadani, Yonariza & Yuerlits, 2018; Pinthukas, 2018; Tuan, 2018).

2. **Addressing the needs of farmers and local communities is of utmost importance.**

   The genuine and sincere participation of the local communities is harnessed when the development programs are centered on their felt needs. It also develops their sense of ownership in all of the project undertakings.

3. **Promoting policy-science linkage facilitates the institution of local policies that are supportive of the initiatives of the capacity development programs, which could lead to the sustainability and scaling-up of the project initiatives.**

   Developing science-based evidences, and organizing policy forum and consultations are among the strategies that make policy-makers become aware about the issues and problems, and thereby, encourage them to take policy actions that could help address these problems.

4. **Awareness-raising among the different stakeholders is an essential component of any capacity development program.**

   Making stakeholders aware about the issues and problems brought about by climate change and other stressors, as well as opportunities that could be tapped to address the impacts, would prompt them to take action. Otherwise, the concerned stakeholders may just "do nothing" about the issue or problem.

5. **Building model farms and demonstration plots showcase the workability and viability of agricultural technologies and innovations, which could serve as vehicle for technology adoption.**

   As we all know, farmers and practitioners would only adopt a particular technology or innovation if they see for themselves the viability of these technologies.

6. **Universities leading the multisectoral collaboration is significant as they do not only have the technical expertise, but the mandate to reach out and build the capacities of relevant stakeholders.**

   In multisectoral partnerships, the active role of the local government units (LGUs) should be harnessed to ensure the sustainability of the project initiatives. Literature has pointed out the crucial role of the LGUs in promoting sustainable natural resource management in the Philippines (Landicho & Dizon, 2020; Cruz et al., 2018; de Luna, 2018; Landicho et al., 2017).

7. **Engaging actively the local communities and partners helps ensure the sustainability project implementation, as well as the project initiatives.**

   As argued by Conde and Lonsdale (2006), in the process of engaging the stakeholders, their adaptive capacity is being developed because people are given the time to strengthen networks, knowledge, resources and the willingness to find solutions (Catacutan & Tanui, 2007).

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