Final Report[1]

(September 2019 to February 2021)

Project Reference Number: CBA2019-01SYLandicho

Project Title: Establishment of Rainwater Harvesting Facilities in Selected Upland Farming Communities in Albay Province, Philippines (RAINWATER)

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

1. Project information

1.1 Project duration

RAINWATER is a one-year project, which officially started on September 1, 2019 and should end officially on August 30, 2020. However, because of the COVID-19 pandemic, the project was extended at "no-additional cost' until February 28, 2021.

1.2 Funding, collaborators and key organizations involved

1.2.1 Funding

This project operated through the funding support from APN, amounting to US$24500. In addition, the collaborators' institutions provide in-kind counterpart in the form of the official time and services rendered by the collaborators in the project without additional compensation. The Institute of Agroforestry, University of the Philippines Los Banos (UPLB), provided the project leadership, administrative support as well as office space, equipment (i.e. computer, cameras, printer) and other supplies that are needed in carrying out the research activities. Meanwhile, the Institute of Renewable Natural Resources, UPLB and the Bicol University College of Agriculture and Forestry provided their expertise in the person of the projects collaborators, without additional compensation.

1.2.2. Collaborators

This project is composed of five collaborators as follows:

Dr. Leila D. Landicho, a University Researcher of the Institute of Agroforestry, UPLB, and is specializing on agriculture and community development, served as the Project Leader
For. Rowena Esperanza D. Cabahug, a University Researcher of the Institute of Agroforestry, UPLB, and specializes on forestry, served as a Collaborator
For. Romnick S. Baliton, an Assistant Professor of the Institute of Renewable Natural Resources, UPLB and specializes on silviculture and agroforestry, served as a Collaborator
Engr. Alberto B. Gonzales, an Associate Professor of the Bicol University College of Agriculture and Forestry, who specializes on watershed management, served as a Collaborator

1.2.3 Key organizations involved

Besides the UPLB and Bicol University College of Agriculture and Forestry, as the key institutions implementing this project, the local government units of Ligao City, Albay; Guinobatan, Albay; and, Polangui, Albay served as the local partners of the project, specifically through the Office of the Municipal/City Agriculturist. The key leaders of the three communities, namely: Barangay Malama, Ligao City; Barangay Palanas, Guinobatan; and, Barangay Balinad, Polangui were also actively engaged in project planning and implementation.

2. Project summary

Please summarize the original goals and objectives of the project and what has been achieved in relation to these (200 words)

This capacity development project, which we call RAINWATER, primarily aims to enhance the upland farmers' capacity to adapt to climate change through the establishment of rainwater harvesting facilities (RWHFs). Specifically, it aims to: a) develop farmers' knowledge and skills in soil and water conservation, rainwater harvesting and agroforestry; b) establish at least five (5) RWHFs in each landscape (cluster) in three upland farming communities in Albay Province, Bicol Region; c) develop a monitoring tool that will assess the RWH 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 project collaborators and local partners have achieved significant accomplishments vis-à-vis the set goals and objectives. These are as follows:

a) Trained 30 farmers (10 farmers each from the partner communities) on agroforestry and soil and water conservation through hands-on training and orientation; and another set 30 farmers via farmer-to-farmer training cum cross-farm visits
b) Trained 45 farmers per site on the establishment of rainwater harvesting facilities appropriate in their areas
c) Established 11 RWHFs: two (2) RWHFs with dimension of 30mx10mx2m in Barangay Palanas, Guinobatan, Albay; four (4) RWHFs with dimension of 8mx10mx2m in Barangay Malama, Ligao City; and five (5) RWHFs with dimension of 5mx7.5mx2m in Barangay Balinad, Polangui
d) Developed a monitoring tool used to assess the performance of thr RWHFs
e) Produced a Manual entitled "Establishment of Rainwater Harvesting Facilities iin Selected Upland Farming Communities in Albay Provinces, Philippines: Lessons and Experiences"
f) Produced a video highlighting the processes involved in the establishment of rainwater harvesting facilities in the three project sites
g) Socioeconomic and biophysical profile of the three partner communities

Please indicate the project's current status:

☐ Complete

☐ Proceeding according to work plan and logical framework matrix

☐ Ahead of schedule

☐ Behind schedule

☐ Proceeding with some modifications (Please specify): Click or tap here to enter text.

2.1 Title for level-2 sub-heading

Brief description of any achievements you would like to highlight

2.1.1 Title for level-3 sub-heading (if any)

Please follow the format in this template. You are requested to refrain from changing the layout and format.

3. Project activities

Reporting period: September 2019 to February 2021

3.1 Activities completed

The RAINWATER Project has accomplished the following activities:

a) *Project Stakeholders' Orientation*. As a kick-off activity of the project, the collaborators have convened the representatives from the Office of the Municipal Agriculturist of the three local government units (in Ligao City, Guinobatan and Polangui, Albay), the key leaders of the upland farming communities (in Barangay Palanas, Guinobatan; Malama, Ligao City; and, Balinad, Polangui) primarily to discuss the details of the project, particularly the methodologies, activities, deliverables and institutional arrangements. This meeting also provided an opportunity to form the Local Multisectoral Team, composed of the six local representatives, and the collaborators, particularly the collaborator from the Bicol University College of Agriculture and Forestry, a state university in the province of Albay. This activity was conducted on October 22, 2019 at the Bicol University College of Agriculture and Forestry.

Figures 1 and 2. Representatives from the upland farming communities and local government units were formed into Local Multisectoral Team, together with the project collaborators

b) *Cross-Farm Visit cum Farmer-to-Farmer Training on Agroforestry and Soil and Water Conservation*. 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. Building from the lessons of previous capacity-building projects, the project collaborators believed that farmers learn from other farmers, as they share similar symbols and experiences. The selected farmer-trainers/farmer-volunteers of the said CFV Program served as the resource persons. The farmers highlighted the importance of the Alley Cropping system that CFV farmer-adoptors in Barangay Oma-oma generally practice. Alley cropping system allows the steep farms to be cultivated by establishing contour lines and planting leguminous shrubs as contour hedgerows. The alleys are planted with cash crops, while the upper most

portion of the farm is planted with woody perennials of various species. Another agroforestry system that farmers adopt is the Multistorey System, which is composed of different layers or strata of woody perennials. The farmer-participants were able to see and observe for themselves the two types of agroforestry systems in the CFV Site (Figures 3 and 4). In addition, the farmer-participants were able to observe the rainwater harvesting facility that was established in another upland community in Barangay La Medalla, Polangui, Albay. This facility showcases the viability of rainwater harvesting facility, where a number of rice farmers are benefitting from the rainwater collection, especially during the dry season. This training cum cross-farm visit was conducted on November 23, 2019.

Farmer-participants were taught on how to use the A-frame in establishing contour lines of steep farms

This alley cropping system showcases the use of Gliricidia sepium as contour hedgerows, while cash crops are planted along the alleys

Multistorey system is another type of agroforestry system that prevails in Barangay Oma-oma, Ligao City

Rainwater harvesting facility in Barangay La Medalla, Polangui, Albay

c) *Socioeconomic and biophysical characterization of the three communities*. Using survey questionnaire and farm visits, the socioeconomic and biophysical characteristics of the three partner communities were determined. The farm household survey that was conducted prior to the project implementation was updated. Table 1 shows that agriculture or farming is an activity of both male and female. The farmers in the three sites were apparently the second-generation of farmers considering their mean age of 46. Almost all (92%) were married, with a mean household size of four (4). Majority (84%) of the farmers reported farming as their primary source of household income. Many (31%) of the farmers derived an estimated annual farm income ranging from Php10000-20000.

Table 1. Socioeconomic characteristics of farmers in the three partner communities in Albay Province.

VARIABLES	FREQUENCY OF RESPONSES FROM FARMER-RESPONDENTS IN THE THREE COMMUNITIES			TOTAL	
	Palanas	Malama	Balinad	Total	%
	n=77	n=85	n=63	n=225	
Sex					
Male	64	21	23	108	48
Female	13	64	40	117	52
Mean age	49	48	42	46	
Civil status					
Single	4	1	1	6	3
Married	70	79	58	207	92
Widow	3	5	4	12	5
Mean household size	4.15	5	4	4	
Sources of income					
Farming	65	67	58	190	84
Non-farm	0	7	0	7	3
Farming+off-farm	7	4	2	13	6
Farming+non-farm	5	3	2	10	4
Farming+non-farm+off-farm	0	4	1	5	2
Estimated annual farm income					
<10000	33	17	5	55	24
10000-20000	22	32	16	70	31
21000-30000	11	10	23	44	20
31000-40000	5	15	12	32	14
41000-50000	5	8	6	19	8
No answer	1	3	0	4	2

Meanwhile, Table 2 shows that the upland farmers in the three farming communities were smallholder farmers with an mean farm size ranging fron 1.27 to 2.02 hectares. The farmers in Barangay Palanas, Guinobatan had generally bigger farm sizes, than those in Barangay Balinad, Polangui, and Barangay Malama, Ligao City. Their farms were flat to steep slopes and were all (100%) rainfed. Among the short-term crops that are being produced include root crops (57%); cereals such as rice and corn (55%); and vegetables (35%). Most (86%) of them also grow fruit trees as additional food and income source for the family. Almost all (93%) raised livestock.

Table 2. Biophysical characteristics of the farms being managed and cultivated by the farmer-respondents in the three partner communities in Albay Province.

VARIABLES	FREQUENCY OF RESPONSES FROM FARMER-RESPONDENTS IN THE THREE COMMUNITIES			TOTAL	
	Palanas	Malama	Balinad	Total	%
	n=77	n=85	n=63	n=225	
Mean farm size (in has)	2.02	1.7	1.27	1.67	
Farm area that is developed (in has)					
<1	52	37	13	102	45
1`-3	22	44	42	108	48
3.01-5	2	3	5	10	7
Topography *					
Rolling	20	5	18	43	19
Steep	21	42	44	107	48
Flat	46	60	40	146	65
Source of water for irrigation*					
Spring	5	45	39	89	39
River	6	16	0	22	10
Rainfed	77	85	63	225	100
Irrigation	2	1	1	4	2
Farm components*					
Vegetables	7	34	38	79	35
Root crops	43	49	37	129	57
Cereal	33	57	34	124	55
Coconut	25		39	64	28
Banana	15	11	35	61	27
Fruit trees	77	85	31	193	86
Forest trees	36	25	27	88	39
Livestock	77	80	52	209	93

**multiple responses*

Similar with other upland farming communities in the Philippines, the farmer-respondents in the three partner communities are confronted with a number of problems and challenges in agricultural production, particularly during this period where climate variability exists. Since all of their farms were rainfed, any change in the rainfall pattern affects their crop production – from planting to the production phases. During dry season and long dry spell, they usually left their farms idle because of the unavailability of water. Furthermore, Albay Province is a typhoon-belt area, and hence, during the rainy and typhoon seasons, most of their crops are being damaged as mentioned by 89% of the farmers. As such, most (75%) of them usually experienced low farm productivity.

Table 3. Problems being encountered by the farmer-respondents in agricultural production

PROBLEMS	FREQUENCY OF RESPONSES FROM FARMER-RESPONDENTS IN THE THREE COMMUNITIES			TOTAL	%
	Palanas	Malama	Balinad		
	n=77	n=85	n=63		
Lack of water for irrigation during the dry season	77	85	63	225	100
Heavy rains damaged crops	77	80	43	200	89
Changed in the cropping season because of erratic change in the rainfall pattern	72	65	30	167	74
Increasing prices of farm inputs	27	52	33	112	50
Low farm productivity	34	71	63	168	75

d) *Preliminary assessment and selection of the sites for RWHF*. The potential sites for the RWHF were assessed and selected based on the following criteria:

- *number of farmers who would benefit from the facility*—as much as possible, not only the farmer-cooperator but farmers in adjoining farms should benefit from the RWHF. Hence, the sites that were selected represent a particular cluster of farms/farmers.
- *accessibility of the farm where the RWHF would be established* – this criterion was considered so that other farmers and/or development workers would be able to see the workability and usefulness of the facility, and would later on adopt the technology. In addition, if RWHFs are accessible, then this would facilitate regular monitoring and maintenance of the facility.
- *willingness of the farmer to serve as farmer-cooperator* – the establishment of RWHF, particularly the pond, would utilize a big chunk of the farmers' farm. In addition, the farmer would render additional time and effort in the establishment and maintenance of the RWHF. Thus, farmers' willingness to allocate part of his farm; establish, and maintain RWHF; and, willingness to share the water collected from the pond to the adjoining farms are among the major considerations.
- *Ownership of the land where the facility would be established*. As much as possible, the site where the ponds would be established should be owned by the farmer-cooperator. This is so, because the RWHFs are intended to support the agricultural production activities of the farmers over a longer time period, such that the future generation of farmers would also benefit from the facility.

Based on the above criteria, a total of 11 sites were selected for the establishment of RWHF. Per budgetary allocation, each partner community is allocated with Php150,000 for the establishment of RWHF. Table 1 shows that four sites were selected in Barangay Malama, Ligao City, five (5) in Barangay Balinad, Polangui; and, two (2) in Barangay Palanas, Guinobatan. The number of sites differ in each partner community, depending on the size of the RHWF that were established. The size of the RHWF was computed based on the number of adjoining farms that would benefit from the pond, the kind of crops that are being cultivated by the farmers, and the budgetary allocation. For instance, in Barangay Malama, where the estimated farm size ranges from 1.0-2.0 ha, and rice is the dominant

crop, a dimension of 8mx10mx2m was proposed for an efficient rainwater collection of about 160m^3, which can be used by 6-8 farmers in each cluster. In the case of Barangay Balinad, on the other hand, the estimated farm size is less than one hectare, which are planted mostly to vegetable crops, a dimension of 5mx7.5mx2m was proposed to catch rainwater of about 75m^3, which can be used by 6-8 farmers. Meanwhile, in Barangay Palanas, where the estimated farm size ranges fro 1.50-2.00 hectares, and are planted mainly to rice, a bigger pond was proposed having a dimension of 30mx10mx2m to collect rainwater of about 600m^3, which can be used by 10-20 farmers. Initially, the project collaborators targeted the establishment of five (5) ponds per community. However, only 11 ponds were established based on the following concerns:

a) The size of the pond matters depending on the type of crops being cultivated, and the farm size. In the case of Barangay Palanas, for instance, two big ponds measuring a dimension of 30mx10mx2m is more efficient in rainwater collection and distribution to rice farms of the farmer-cooperator and adjoining farms, rather than constructing small ponds with minimum size of 5mx7.5mx2m. Similarly, the ponds in Barangay Malama, with a dimension of 10mx8mx2m were constructed in four clusters to efficiently collect and utilize the rainwater. For Barangay Balinad, where farmers are engaged in vegetable production, the minimum pond size was established, and hence, five ponds in five clusters were constructed. the dimension of the five ponds in Barangay Balinad.
b) Budget requirements. Each of the three partner communities has equal budget allotment for the establishment of rainwater harvesting ponds. While the dimensions and number of ponds differ across the three sites, their budget allocation remained equal.

Table 1. Distribution of sites for RWHF establishment in the three partner communities.

Partner community	Cluster and farmer-cooperator	Dimension	Crops planted	Estimated farm size of farmer-cooperator and adjoining farms (in ha)
Barangay Malama, Ligao City	Mr. Alberto Pinoy (low elevation)	8mx10mx2m	Rice, vegetables	1.0 -2.0
	Ms. Alicia Canavarel (mid-elevation)	8mx10mx2m	Rice, root crops, vegetables	1.0
	Mr. Imperial (high elevation)	8mx10mx2m	Rice, vegetables, root crops	1.0
	Ms. Delia Mendoza (high elevation)	8mx10mx2m	Rice, vegetables, root crops	1.0-2.00
Barangay Palanas, Guinobatan	Mr. Edgardo Martillan (High elevation)	30mx10mx2m	Rice, vegetables	2.00 – 3.00
	Mr. Eller Sabolboro (Highh elevation)	30mx10mx2m	Rice, vegetables	2.00 – 3.00
Barangay Balinad, Polangui	Mr. Rodolfo Bulolan (high elevation)	5mx7.5mx2m	Vegetables, corn	1.00 – 2.00
	Mr. Junel (high elevation)	5mx7.5x2m	Vegetables, corn	1.00 – 2.00
	Mr. Elmer Ciervo (high elevation)	5mx7.5mx2m	Vegetables	1.00 – 2.00

	Mr. George Calingasion (mid elevation)	5mx7.5mx2m	Vegetables	1.00 – 2.00
	Mr. Jomar Ciervo (mid elevation)	5mx7.5mx2m	Vegetables	1.0-2.00

e) *Soil texture analysis*. Soil samples were collected from the 11 sites to determine the texture and porosity. The farmer-cooperators were given an orientation on how to collect soil samples. This is one way of building their technical capacity. Determining the texture and porosity would serve as basis in deciding whether to install plastics to prevent water dissipation and evapotranspiration, to ensure the RWHFs' efficient water collection and storage. Results indicate that soil samples in Barangay Malama and Barangay Palanas were porous and clayey which suggesta better water holding capacity. On the other hand, soil textural analysis in Barangay Balinad indicate less porous soil. Thus, installation of plastics in the RWHFs was deemed appropriate.

f) *Participatory planning for the establishment and maintenance of RWHF* . The community members, particularly the farmer-cooperators and the "would-be" farmer-beneficiaries of the RWHFs were convened into a meetingon January 24-26, 2020 to: a) discuss in detail the establishment of RWHFs; b) present the sites that were selected for RWHF establishment; c) decide on the logistics arrangements, including the farmers' arrangements on the establishment and maintenance of RWHF; d) identify the tools and materials needed for the establishment; and e) 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. The farmers, with the guidance of the project collaborators came up with the following decisions:

On the actual establishment

- The community members, particularly the farmer-beneficiaries have all agreed on the sites that were selected for RWHF establishment
- The community members agreed that they would establish the RWHFs through their collection action or "bayanihan" system. One RWHF would be established by a group all at a time to ensure a more effective and efficient outputs. On the other hand, the project collaborators would provide food allowance to the farmers all throughout the period of establishment
- Tools and materials that are necessary in the establishment of RWHFs, including rental of carabaos and plows, would be provided by the project collaborators
- The project collaborators, together with the local experts from the Regional Office of the Department of Agriculture, would provide technical assistance during the establishment of the ponds

On the monitoring and maintenance

- The project collaborators would devise a monitoring tool that would be used by the field staff for the periodic monitoring of technical and social aspects
- The farmer-cooperators would take the lead in maintaining the ponds. But, the other farmer-beneficiaries should also provide assistance whenever necessary
- The farmer-cooperators and farmer-beneficiaries, with the assistance of the Local Multisectoral Team, would design a set of agreements as regards the specific responsibilities of the farmer-cooperators and farmer-beneficiaries in the maintenance of the ponds.

Participatory planning for the establishment and maintenance of RWHFs in the three partner communities

g) On-site Technical Consultation and Orientation on the Establishment of Rainwater Harvesting Ponds

The project collaborators coordinated with the Department of Agriculture-Regional Field Unit V in Naga City, Camarines Sur and tapped two engineers who have the technical expertise in the establishment of rainwater harvesting ponds. These two engineers were deployed in the three partner communities prior to the actual establishment of the rainwater harvesting ponds, primarily to: a)provide technical guidance in terms of the dimension, type of rainwater harvesting ponds that would established; and b) provide an orientation to the farmer-volunteers on the processes that should be undertaken in the establishment of ponds.

Local experts providing technical advice and guidelines on the establishment of RWHF

h. Establishment of RWHFs

The establishment of rainwater harvesting ponds took longer than planned. The actual establishment commenced in February 2020 and was planned to be completed by April 2020. However, because of a number of factors (i.e. typhoons, monsoon rains, COVID-19), the establishment of the pond was extended until the end of the project period in 2021. Using the 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.

Barangay Balinad, Polangui

In Barangay Balinad, Polangui, the establishment of the ponds were done by a maximum of 10 upland farmers. These are the farmers who have expressed their willingness to participate in the establishment of four ponds in different clusters (Figure 7). The farmers did a manual construction of the ponds using the tools provided by the project such as hoe, shovel, and digging bars. In addition to the farm tools provided by the project collaborators, the farmers have also utilized their existing tools. Because of their previous experience of rapid loss of water from the ponds, three of the RWH ponds were covered with UV plastics.

Figure 7. Establishment of RWHFs in in Barangay Balinad, Polangui

These ponds were repaired after being damaged by the typhoons. A more durable type of RWH ponds were established to ensure a more efficient and effective rainwater collection and storage, and to make the ponds more functional and sustainable, given the geographic conditions of Barangay Balinad. Figure 8 shows the reconstructed ponds with cement and boulders to efficiently hold rainwater, flushboard to control the rapid flow of water; distilling box to filter the soil and debris from the road and upper areas of the pond, and outlet or discharge canal for water distribution to adjoining farms.

Figure 8. Reconstructed ponds in in Barangay Balinad, Polangui

Barangay Malama, Ligao City

In Barangay Malama, where bigger dimension of "dam type" ponds were established, the farmers had to use carabao and plows to facilitate soil excavation, and to make the soil more compact (Figure 9). A group of 12 farmers shared their efforts in constructing the ponds in four clusters using their "bayanihan system".

Figure 9. Establishment of RWHFs in the lower, mid and high elevation clusters in Barangay Malama, Ligao City

To secure the area, farmers in Barangay Malama have fenced their ponds with cyclone wire, with *Gliricidia sepium* as live posts for climbing crops, at the same time would help restore soil fertility (Figure 10)_. In addition, available spaces around the ponds were planted with cover crops to stabilize the soil and serve as additional food and income source of the household. Since the completion in May 2020, the ponds have already been collecting and storing water. However, it was observed that three of the ponds have inefficient water storage. Hence, upon the technical advice from experts, these ponds were repaired.. One pond was installed with a plastic lining; and outlets of two other ponds were repaired to ensure an efficient flow and storage of rainwater.

Figure 10. The ponds in Barangay Malama have been collecting rainwater since May 2020. The ponds are also fenced with Gliricida sepium as live posts

Barangay Palanas, Guinobatan

In Barangay Palanas, Guinobatan, two big "dam type" ponds measuring 30mx10mx2m were established that would cater to about 15-20 farmers each. These big ponds were established for a more realistic and efficient water collection and utilization, considering the farm sizes and the type of crops being cultivated by the farmers. Because of the relative bigger pond size and soil condition, the community members had to use carabao and plows to excavate the soil, and make the soil more compact. It took them three months to complete the first pond. Since the completion of the first pond in April 2020, it has collected rainwater during the first rain event in May 2020. The water was retained until present. The farmer-cooperator capitalized on the efficient water storage, hence, he has integrated fishes in the pond to serve as additional food and income source. Meanwhile, the second pond which was completed in August 2020, through the collective efforts of the community members, has also become functional until present (Figure 11).

Figure 11. The RWHFsin Barangay Palanas have been collecting rainwater and has efficiently stored the water until present. The farmer-cooperator has incorporated fishes in the pond

i. Integration of Soil and Water Conservation Measures and Agroforestry Systems

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.

Soil and water conservation measures are appropriate strategies 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 would not only control soil erosion in the sloping areas and conserve soil nutrients that are needed by the crops, but more importantly would protect the ponds from being damaged by the soil and debris from the sloping areas around them.

Meanwhile, a number of studies have shown that agroforestry offers potentials in enhancing the socioeconomic productivity of the farmers because of the diverse crop components (*Tolentino, et al 2010; Cunningham et al2003; Landicho et al 2016*), while at the same time addresses the ecological dimension (*Baliton et al 2020; Baliton et al 2017; Palma and Carandang, 2014; Casas et al 2014*). Agroforestry is a dynamic, ecologically-based natural resource management system that deliberately combines woody perennials with herbaceous crops and/or animals either in some form of spatial arrangements or temporal sequence on the same land, with the aim of diversifying and sustaining production for increased social, economic and environmental benefits (*Leakey as cited in Feature Essay, 2007; Lundgren and Raintree, 1983*).

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 crops, in the alley/hedgerow cropping system (Figure 12). Mulberry, being a woody perennial, serves as the permanent crop, and are planted as contour hedgerows. On the other hand, the dragon fruit, which is a medium-term crops are planted along the alleys, together with annual vegetable crops. Besides their suitability to the site, mulberry and dragon fruit provides 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.

Figure 12. Establishment of contour hedgerows in Barangay Palanas, Guinobatan, with mulberry as hedgerow crop anddragon fruit as alley cropcollecting rainwater and has efficiently stored the water until present. The farmer-

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 (Figure 13). Lemon is integrated in farms with open areas, as this species is light-demanding. On the other hand, cacao is integrated in farmers/areas under coconut. Vegetable crops are source of food of the household 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 a source of feeds for the livestock, particularly the leaves. The leaves could also be used as botanical pesticides.

Figure 13. Establishment of contour hedgerows in Barangay Malama, Ligao City, with kakawate as hedgerow crop and lemon and vegetle crops as alley crops.collecting rainwater and has efficiently stored the water until present.

In Barangay Balinad, the steep areas around the ponds will be developed into contour farms with *Gliricidia sepium* as the contour hedgerows (Figure 14). The farm is dominated by corn under coconut, and hence, another high-value crop, Cacao, will be integrated along the farm boundaries, to provide protection and production functions.

Figure 14. Integration of kakawate as hedgerows in corn areaator has incorporated fishes in the pond

j. Periodic Monitoring of RWHFs

Monitoring of the RWHFs is necessary to assess the status of the ponds based on the 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 also revolves around the execution of arrangements and agreements made during the planning stage, such as the arrangements among the beneficiaries and farmer-cooperators as regards the establishment of the ponds, distribution and use of water from the pond, as well as the 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 are also recorded in the project monitoring.

Indeed, periodic monitoring allowed the project collaborators and local partners to address the problems being encountered by the partner farming communities. These include among others the following:

a) Repair of the ponds that were damaged by the typhoons
b) Repair of the ponds which were reportedly inefficient in water storage and collection
c) Integration of soil and water conservation measures to address soil erosion in sloping areas around the ponds
d) Installation of cyclone wires around the pond for safety of children and community members
e) Revisiting farmers' arrangements in the maintenance of the ponds

Because of the escalating cases of COVID-19 especially during the period of March-December 2020, the project collaborators have tapped the local farmers, particularly the youth, and the agricultural technicians to conduct periodic monitoring of the RWHFs. Tapping the locals provided a number of advantages. These include: a) their proximity and accessibility to the project sites, particularly to the cluster of farms where ponds were established; b) they serve as the link between the community and the local partners and project collaborators, particularly in channeling issues and concerns, and facilitating field activities, especially during the pandemic when travels and gatherings are highly restricted; and, c) this mechanism provided an opportunity to build and/or strengthen their capacity for project monitoring and follow-up and communications.

The periodic monitoring of the ponds is usually done every major rain event to measure the water collected and stored in the ponds. A monitoring tool, designed by the project collaborators, is found in Appendix A.

k. Publication of a Booklet entitled "Establishment of Rainwater Harvesting Facilities in Selected Upland Farming Communities in Albay Province, Philippines: Lessons and Experiences"

This publication highlights the processes undertaken by the project collaborators in the establishment of RWHFs in the three partner communities. The siginificant experiences and important lessons that were distilled from project implementation are also highlighted in the publication primarily to serve as reference and guide of the local government units and other development workers who wish to implement similar undertaking in the upland farming communities. This publication showcases the viability and possibility of making irrigation water available to the smallholder upland farmers throughout the year. Furthermore, this publication to inspire the local government units and other organizations to collaborate and create opportunities for enhancing the adaptive capacities of smallholder farmers. A total of 100 copies of the publication was produced for dissemination among the local government units, farming communities and non-government organizations.

l. ***Video production about the "Establishment of Rainwater Harvesting Facilities in Selected Upland Farming Communities in Albay Province, Philippines***"

The video was produced to intensify the information dissemination about the lessons and experiences of the RAINWATER Project. Video production was deemed as necessary in the current time of pandemic, where most of the learning activities are online. The project collaborators also intend to share this video with the webpages and social media accounts of the collaborating institutions for wider dissemination.

m. Presentation of project accomplishments to the three partner local government units

As part of their exit from the project sites, the project collaborators organized a virtual presentation of the project accomplishments, particularly the lessons and experiences generated by the 18-month project implementation. It also provided an opportunity to launch the booklet and video about the "Establishment of Rainwater Harvesting Facilities in Selected Upland Farming Communities in Albay Province, Philippines: Lessons and Experiences". The representatives from the local government units expressed their appreciation and gratitude to the Rainwater Project for making irrigation water available to the upland farmers in the three communities. They also expressed hopes that this initiative will be replicated in other upland barangays within their respective municipalities to help improve farm productivity of the smallholder farmers.

Figure 15. Participants of the Virtual Project Exit Meeting

3.2 Adjustments or changes to the timeline of activities (if any)

The project collaborators have adjusted the project timeline as a result of the escalating COVID-19 cases in the country. The five-month lockdowns have caused delays in the establishment of RWHFs, regular monitoring from the project collaborators; workshop for the development of "Manual for the Establishment of Rainwater Harvesting Facilities in Upland Farming Communities in the Phlippines"; and, the dialogue with local government units to share the lessons and experiences of the project implementation. Technically, the project should end on August 30, 2020. However, because of the aforementioned concerns, the project collaborators' request for a 'no-cost' extension until February 28, 2021 was approved by the APN. Below are the adjustments in the project timeline.

SCHEDULE	ACTIVITY	REMARKS
2nd week of September 2019	Project Collaborators' Meeting	Completed
1st-4th week of October 2019	Coordination with the selected upland farming communities and local government units	Completed
	Secondary data gathering	Completed
1st to 4th week of November 2019	Socioeconomic and biophysical characterization through household survey and key informant interviews	Completed
	Problem identification and prioritization of RWH options through Focus Group Discussion	
1st – 3rd week of December 2019	On-site training on soil and water conservation, RWH and agroforestry	Organized cross-farm visits with farmers as lecturers; completed
1st – 4th week of January 2020	Drafting of the Monitoring Tool	Under review

SCHEDULE	ACTIVITY	REMARKS
1st – 2nd week of February 2020	On-site training and demonstration on the establishment of RWHF	Completed
June to July 2020	Continuation of the establishment of RWHF	Completed
3rd week of June to December 2020	Project Monitoring	Completed
January to February 2021	Development of a Manual for the Establishment of RWHF through a workshop	Completed
February 2021	Presentation of outputs to the local government units	Completed
March 2021	Submission of financial and technical reports to APN	Technical report – completed; financial report; on-going

3.3 Challenges or issues

The major challenge being faced by the project collaborators is the COVID-19, which practically delayed the project implementation. The escalating cases of COVID-19 has resulted to lockdowns, which prevented the UPLB-based collaborators to conduct regular monitoring of the project. The farmers were at the early stages of the establishment of RWHFs when COVID-19 hit the country. The farmers had to stay home per order by the village officials. There was practically very limited field activity during the period of mid-March until the end of May 2020. Furthermore, being in a typhoon-belt province, the three consecutive strong typhoons that hit the area between September to October 2020, and the monsoon rains that caused heavy rains in December 2020 until half of January 2021, have hampered the field activities, and have even damaged the physical structures of the rainwater harvesting ponds.

The project collaborators employed strategies to address these concerns. These are as follows:

a) *Regular communication of the project collaborators* via electronic mail and other forms of social media
b) *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. Constant communication and close coordination are being done as regards the field activities, and these are being relayed to the key leaders of the partner communities
c) *Tapping the local farmers and youth leaders of the three communities to serve as the Local or On-Site Monitors.* These On-Site Monitors served as the link between the farmers and the collaborators, especially so that the agricultural technicians, whose municipalities were also on lockdowns, were restricted to do fieldworks. The Local/On-Site Monitors coordinate the field activities, coordinate with the collaborators for logistics and technical concerns, and monitor the progress of the RWHF establishment. These Local/On-Site Monitors would also be tapped to conduct periodic monitoring using the Monitoring Tool that was developed by the project collaborators. Engaging these youth in the field monitoring did not only facilitate the project implementation, but also provided an

opportunity to enhance their capacities in project coordination and monitoring, and enhancing their communication skills as well. In Barangay Balinad, the Local/On-Site Monitor is the President of the 4H-Youth Club, while the Barangay Secretary was tapped as the Local Monitor in Barangay Malama. In Barangay Palanas, the President of Sangguniang Kabataan (Youth Organization) was also engaged as the Local Monitor.

3.4 Lessons Distilled from Project Implementation

a) *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 focal persons/Agricultural Technicians in the three partner communities, helped mobilize the farmers in all stages of project implementation, and closely monitored the status of project implementation.

b) *Regular communication of the project collaborators* via electronic mail and other forms of social media is a key to sustain the project implementation despite the travel restrictions and face-to-face interactions brought about by the pandemic. The diverse means of communications ensured that the project implementation is on-track and issues and problems arising from the project implementation are immediately being addressed.

c) *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. Constant communication and close coordination are being done as regards the field activities, and these are being relayed to the key leaders of the partner communities

d) *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, especially so that the agricultural technicians, whose municipalities were also on lockdowns, were restricted to do fieldworks. The Local/On-Site Monitors coordinate the field activities, coordinate with the collaborators for logistics and technical concerns, and monitor the progress of the RWHF establishment. These Local/On-Site Monitors would also be tapped to conduct periodic monitoring using the Monitoring Tool that was developed by the project collaborators. Engaging these youth in the field monitoring did not only facilitate the project implementation, but also provided an opportunity to enhance their capacities in project coordination and monitoring, and enhancing their communication skills as well. In Barangay Balinad, the Local/On-Site Monitor is the President of the 4H-Youth Club, while the Barangay Secretary was tapped as the Local Monitor in Barangay Malama. In Barangay Palanas, the President of Sangguniang Kabataan (Youth Organization) was also engaged as the Local Monitor.

e) *Establishment of rainwater harvesting facilities is site*-specific. There is no standard size type, and even processes in establishing rainwater harvesting facilities in the upland farming communities. The size and type of the rainwater harvesting ponds depends on the existing local conditions, particularly the size of the farms being cultivated by the farmers, the type of crops that are being cultivated, the geographical conditions of the

community and farms therein, the number of farmer-beneficiaries that would use the resource; and, the willingness and commitment of the community members to engage in the establishment and maintenance of the facility. In the case of Barangay Palanas, Guinobatan, where the dominant crop is rice – a water-demanding crop; and, where a number of adjoining farms are being considered as among the farmer-beneficiaries, the size of the pond that was constructed is about three times the size of the ponds in the two other project sites. In this way, the water collection, storage and distribution would be more effective and efficient. Hence, only two ponds were constructed given the budgetary requirements.

f) *The spirit of collective action or "bayanihan system" is essential in a more efficient establishment of the rainwater harvesting facilities.* As in other community-based development projects, the cooperation and spirit of "working together" played a key role towards the completion of the RWHF establishment. This element is essential particularly for development projects which are in the "pilot stage" and have limited funding support.

g) *Resource sharing is an important ingredient 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 has shown the relevance of counterparting from the local government units and the three partner communities. For instance, the LGUs have provided the vegetable seeds in the establishment of agroforestry systems/models, and engaged the Agricultural Technicians in the project without additional compensation. The farming communities, on the other hand, have provided labor 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.

h) *Capacity development is a two-way, interacting process, which enables the project partners to "learn together"*. As a learning process, capacity development is seen as an interaction between the project collaborators and the local communities. The local communities are not seen as merely recipients of support, but more importantly as active partners in project implementation. The creative ideas, suggestions and decisions of the local communities are respected, considered and are accommodated by the project collaborators, even to the extent of modifying and adjusting the project targets. The project collaborators have also learned from the real field experiences of the farmers and the technicians. As such, capacity development is not only "learning from one another", but also "learning together".

i) *Addressing the expressed/felt-need of the communities guarantee their commitment and engagement in the project activities*. Because agriculture is their main livelihood, the three farming communities are in dire need for water source 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 been extending their support and active engagement in the project activities. Despite the pandemic and natural disasters brought about by typhoons in 2020, the farmers pursued to complete the establishment of the RWHFs.

j) *Openness to embrace the opportunity of being a partner to the project on establishment of RWHF among the three communities*. This was evidently facilitated by the observed trust and belief of the farmers to the Agricultural Technicians – an indication of already an existing functional, strong working relationship among them in view of the sustained visibility of the LGUs through farming and livelihood assistance programs delivered at various events.

k) *Sustainability and functionality of the installed RWH structures given the test of time in view of structural deterioration, inactive participation of some farmer-beneficiaries in the continued maintenance and monitoring, including climate change and uncontrolled watershed threats, among others remain a challenge that demand attention from the LGUs and farmer-beneficiaries themselves*. These are all realities in the upland farming environment and for which their capacity have initially been developed.

l) *Market-driven selection of crops and perennial species for both hedgerows and alleys, combined with their known soil, climatic requirements, availability and observed growth and production performance in the different project areas are clearly employed*. While the productivity of selected perennial crops has yet to be achieved after several years, there is consciousness for such considerations among partner farmer-beneficiaries, about the economic potentials of these perennial crops

m) *Rainwater harvesting and utilization at times where most abundant and needed respectively, facilitates the long term development and adoption of agroforestry technology that is appropriate for the three upland farming communities in Albay Province.* In Barangay Palanas, for instance, the farmers used to cultivate rice in one cropping season only. However, with the efficient collection and storage of rainwater harvesting ponds, they have just begun cultivating rice for two cropping seasons. In Barangay Balinad, on the other hand, the farmers did not pursue cultivating the sloping areas around their coconut farms because of the lack of water. But with the establishment of rainwater harvesting ponds, these farmers have started cultivating these idle lands with agricultural crops.

n) *Documentation of lessons and experiences in this RWHF project, particularly those of personal accounts by the farmers themselves promote dissemination towards adoption of the practice*/technology. Some of the farmers openly express their appreciation of the immediate as well as the potential impacts these RWHF and agroforestry could bring to their overall farm and livelihood conditions, bringing about both the economic and ecological improvements.

o) *RWHFs, as demonstrated in this project seems to be so modest and practical, yet immensely significant and useful for the upland farming communities in the three project sites.* Given additional resources, this could be replicated in other LGUs in Albay and other provinces of Bicol Region of similar farming and environmental conditions.

4. List of project deliverables to date

1. Trained 45 farmers on agroforestry, soil and water conservation and rainwater harvesting
2. Developed a monitoring tool that would be used in periodic monitoring and after-project monitoring
3. Socioeconomic and biophysical characteristics of the partner communities
4. Established 11 rainwater harvesting facilities
5. Formed Local Multisectoral Teams
6. Produced a Manual for the Establishment of Rainwater Havesting Facilities in Upland Farming Communities in the Philippines: Lessons and Experiences
7. Produced a Video about the RAINWATER Project
8. Presented the project accomplishments via a Project Exit Meeting with the local government units in the three project sites

5. List of pending project deliverables

None

6. Future directions

The need for a rainwater harvesting facility was expressed by the farmers in the three partner communities. As such, there is a higher probability that these farmers would be able to sustain this project initiative, as these rainwater harvesting ponds would help address their problem on water scarcity especially during the dry season. This is the value of implementing need-driven project. There is certainty that the partner communities would be able to develop their sense of project ownership, which would pave the way for a more sustained RWHFs. Furthermore, the formation of the Local Multisectoral Team, with the agricultural technicians directly assigned in the partner communities taking the facilitative role, there is a higher chance that these rainwater harvesting ponds would be maintained properly by the farmer-cooperators and farmer-beneficiaries.

Testimonies from the farmer-cooperators indicate the significant contributions of the rainwater harvesting ponds, as follows:

- In Barangay Palanas, the farmers used to cultivate rice in one cropping season only – mainly during the rainy season. However, with the construction of the rainwater harvesting ponds, the source of irrigation water has become available all year-round. The water availability enabled the farmer-cooperator and other adjoining rice farmers to cultivate rice in two cropping seasons. Furthermore, the farmer-cooperator in the said village was able to integrate fish in the ponds, which provided additional source of food and income to the household.
- In Barangay Malama, the availability of rainwater in the ponds encouraged the farmer-cooperators to expand their rice production areas, and develop the sloping areas into contour hedgerow farms. These sloping areas used to be idle because of the unavailability of water to irrigate the crops. Integration of fish in the pond was also initiated by one

farmer-cooperator, with the end view of distributing fingerlings to the three other farmer-cooperaotors to maximize the utilization of the rainwater harvesting ponds.

- In Barangay Balinad, the farmers recognized the importance and utility of the rainwater harvesting ponds, as they would no longer have to wait for the rain to cultivate crops. They would no longer have to walk for long to get water from the source. The establishment of rainwater harvesting ponds also enabled them to make the idle lands productive. One farmer-cooperator was encouraged to cultivate the sloping areas which was left idle for many years because of the lack of water. In February 2021, the farmer began cultivating corn in the said area, with a plan of diversifying the crops. The sloping area was also began to be contoured to prevent soil erosion.

At a broader level, this capacity development project is in line with Republic Act 6716 otherwise known as the Rainwater Collector and Springs Development Act of 1989 which calls for the establishment of rainwater collection facilities in all of the barangays (communities) in the Philippines. This law is being executed by the Departent of Interior Local Government (DILG) through its Memorandum Circular No. 76, Series of 2017. Thus, the lessons and experiences of this APN-funded project, which would be shared and disseminated to the officials of the local government units, could serve as their reference and model in establishing simple and cost-effective rainwater collection ponds, particularly in farming communities.

Acknowledgement

The project collaborators acknowledge the upland farmers in Barangay Malama, Ligao City; Barangay Palanas, Guinobatan; and, Barangay Balinad, Polangui for their enthusiasm and collective efforts in establishing rainwater harvesting ponds, soil and water conservation measures, and agroforestry in the selected sites and farms in their communities. The LGUs, particularly the Office of the Municipal Agriculturist in Polangui and Guinobatan, and the Office of the City Agriculturist in Ligao City, through their Agricultural Technicians as representatives, are likewise recognized for their untiring technical and logistics support that led to the smooth project implementation. The Local Monitors from the three upland farming communities are highly acknowledged for serving as the link between the communities and the project collaborators and LGU Agricultural Technicians during the pandemic where travel restrictions were imposed. The institutions being represented by the project collaborators -- University of the Philippines Los Banos-College of Forestry and Natural Resources, particularly the Institute of Agroforestry and the Institute of Renewable Natural Resources; and, the Bicol University College of Agriculture and Forestry are also recognized for allowing the project collaborators render their services to the project on their official time, and for the logistics and technical assistance to the project implementation. Finally, the project collaborators would like to thank the Asia-Pacific Network for Global Change Research (APN) for the funding support to carry out this project.

APPENDIX 1. ESTABLISHMENT OF RAINWATER HARVESTING FACILITIES IN SELECTED UPLAND FARMING COMMUNITIES IN ALBAY PROVINCE, BICOL REGION, PHILIPPINES

MONITORING SHEET

A. BASIC INFORMATION

PROJECT SITE (Barangay, Municipality)	NAME OF FARMER-COOPERATOR	SIZE OF THE RWHF			NUMBER OF FARMERS BENEFITING FROM THE RWHF	SIZE OF FARMS CULTIVATED BY THE FARMER-COOPERATOR AND FARMER BENEFICIARIES	TYPES OF CROPS BEING CULTIVATED
		L (m)	W (m)	H (m)			

B. MGA KASUNDUAN SA PAGGAMIT/DISTRIBUSYON NG TUBIG MULA SA RWHF

Anu-ano ang mga naging kasunduan ng mga magsasaka sa mga sumusunod?	Mga Kasunduan
a) Sharing o ang paghahati-hati at distribusyon ng tubig mula sa RWHF hanggang sa mga ibang nakikinabang na magsasaka (farmer-beneficiaries)?	
b) Maintenance o ang pagpapanatili ng RWHF	
● Regular na pagche-check o pagsuri ng mga pipes o daluyan ng tubig	
● Regular na pagtatanggal ng mga damo o nga peste sa paligid ng RWHF	
● Regular na pagche-chek ng kabuuang pisikal na kondisyon ng RWHF	

C. MGA SULIRANIN/PROBLEMA/ISYU SA PAGSASAGAWA AT PAGPAPANATILI NG RWHF

Anu-ano ang mga naging suliranin, problema o isyu sa mga sumusunod	Mga Suliranin/Problema/Isyu	Mga Solusyong Isinagawa Upang Matugunan ang Suliranin
a) Pagsasagawa ng RWHF		
b) Pagpapanatili o maintenance ng RWHF		
c) Distribusyon ng tubig mula sa RWHF patungo sa mga sakahan		
d) Iba pang mga suliranin (tukuyin)		

D. EFFECTIVENESS AND EFFICIENCY OF RWHF

1) Pagkolekta at pag-imbak ng tubig (isulat sa likod kung kulang ang ispasyo)

Pangalan ng Farmer-Cooperator	Petsa ng umulan sa lugar (Month/Date)	Taas o metro ng tubig na nakolekta	Ilang araw/linggo tumagal o naimbak ang tubig pagkatapos ng ulan
1.			
2.			
3.			
4.			
5.			

2. Pakinabang sa tubig-ulan na nakolekta

Pangalan ng Farmer-Cooperator	Mga pakinabang mula sa tubig-imbakan (RWHF)	Ilang magsasaka na kalapit ang nakinabang mula sa tubig-imbakan	Mga pananim na pinaggagamitan ng tubig mula sa RWHF	May mga ibang pananim ba o isda na nailagay sa paligid o loob ng RWHF? Anu-ano ang mga ito?
1.				
2.				
3.				
4.				
5.				

3) Tibay at tatag ng mga RWHF

	Farmer Cooperator 1	Farmer Cooperator 2	Farmer Coopertor 3	Farmer Cooperator 4	Farmer Cooperator 5
Maymga naisagawa na bang repair o pagsasaayos ng mga RWHF pagkatapos itong magawa? Kung oo, anu-ano ang mga ito?					
Nakakaimbak ba ng tubig ang RWHF nang matagalan? Gaano katagal naiimbak ang tubig dito?					

4) May mga suhestiyon o rekomendasyon po ba kayo upang mas maging kapaki-pakinabang ang RWHF? Kung meron, anu-ano ang mga ito?

Pangalan ng Farmer-Cooperator	**Mga Suhestiyon/Rekomendasyon**
1.	
2.	
3.	

APPENDIX 2. LIST OF YOUNG SCIENTISTS INVOLVED IN PROJECT IMPLEMENTATION

1) **Dr. Leila D Landicho** University Researcher, Institute of Agroforestry University of the Philippines Los Banos College, Laguna Email: ldlandicho@up.edu.ph	5) **Ms. Maria Esperanza Acabado** Agricultural Technologist Office of the Municipal Agriculturist Guinobatan, Albay
2) **For. Romnick S. Baliton** Assistant Professor, Institute of Renewable Natural Resources University of the Philippines Los Banos College, Laguna Email: rsbaliton@up.edu.ph	6) **Engr. Alberto B Gonzales** Associate Professor Bicol University College of Agriculture and Forestry Guinobatan, Albay
3) **Engr. Bell Joseph Bonito** Engineer Department of Agriculture-Regional Field Unit V San Agustin, Camarines Sur Email: bhjay143@gmail.com	
4) **Mr. Alfie John Sanosa** Agricultural Technologist Office of the Municipal Agriculturist Polangui, Albay	

APPENDIX 3.

FARMER-TO-FARMER TRAINING CUM CROSS-FARM VISIT

November 23, 2019
Albay Province, Philippines

PROGRAM

SCHEDULE	ACTIVITY	PERSON/S IN-CHARGE
7:30 AM	Assembly of farmer-participants from Barangay Malama, LIgao City; Barangay Palanas, Guinobatan; and, Barangay Balinad, Polangui at Ligao City Hall	Project Collaborators and Agricultural Technologists from the three LGUs
8:00 AM	Courtesy call to the Office of the City Mayor	Project Collaborators
8:00 – 8:30 AM	Travel from Ligao City to Barangay Oma-oma	
8:30 – 8:45	Welcome Remarks	Barangay Chairman Oma-oma, Ligao City
8:30 – 8:45	Orientation about the RAINWATER Project and the Cross-Farm Visit cum Farmer-to-Farmer Training	Leila D. Landicho Project Leader
845 – 9:30	Introduction about the agroforestry practices introduced by the Conservation Farming Villages (CFV) Program in Barangay Oma-oma	Farmer-Volunteer/Farmer-Adoptor CFV Program

SCHEDULE	ACTIVITY	PERSON/S IN-CHARGE
9:30 – 9:45	Discussion	
9:45 – 10:30	Visit to the farm showcasing a Multistorey Agroforestry System /Discussion	Farmer-Adoptor Farmer-participants Project collaborators
10:30 – 11:30	Visit to the farm showcasing an Alley Cropping/Hedgerow Cropping System/Discussion	Farmer-Adoptor Farmer-participants Project collaborators
	Orientation about the use of A-frame in identifying contour lines of sloping farms	Farmer-Adoptor Farmer-participants Project collaborators
11:30 – 12:30	LUNCH	
12:30 – 2:00	Travel from Barangay Oma-Oma to Barangay La Medalla, Polangui	
2:00 – 3:30	Visit, observation and discussion with the farmer-leader in Barangay La Medalla on rainwater harvesting	Farmer-Leader
3:30 – 4:30	Travel from Barangay La Medalla to Polangui Town Proper	
4:30 – 5:00	Courtesy call to the Office of the Municipal Mayor of Polangui	Project collaborators