Republic of the Philippines
Department of Environment and Natural Resources
PROVINCIAL ENVIRONMENT AND NATURAL RESOURCES
REGION IV – MIMAROPA

October 14, 2022

DENR MIMAROPA RECORDS SECTION
RECEIVED
17 OCT 2022
☐ INCOMING
BY:
☐ OUTGOING
DATS NO.

MEMORANDUM

FOR : The Regional Executive Director
DENR IV - MIMAROPA
Roxas Blvd., Ermita, Manila

FROM : The OIC, PENR Officer

SUBJECT : **APPLICATION FOR VACANT POSITION OF CORRIDOR PROJECT MANAGER OF THE BIODIVERSITY PROJECTS**

Respectfully forwarded is the Application Letter dated October 11, 2022 of Ms. Rhodora Cherryl Montoya for Corridor Project Manager of Biodiversity Project.

For information and consideration.

ERNESTO E. TAÑADA

Brgy. Payompon, Mamburao, Occidental Mindoro
Email address: msd_occmdo@yahoo.com
Telephone number: 043-458-1103

Republic of the Philippines
Department of Environment and Natural Resources
PROVINCIAL ENVIRONMENT AND NATURAL RESOURCES
REGION IV – MIMAROPA

October 14, 2022

MEMORANDUM

FOR : The Regional Executive Director
DENR IV - MIMAROPA
Roxas Blvd., Ermita, Manila

FROM : The OIC, PENR Officer

SUBJECT : **APPLICATION FOR VACANT POSITION OF CORRIDOR PROJECT MANAGER OF THE BIODIVERSITY PROJECTS**

Respectfully forwarded is the Application Letter dated October 11, 2022 of Ms. Rhodora Cherryl Montoya for Corridor Project Manager of Biodiversity Project.

For information and consideration.

ERNESTO E. TAÑADA

Brgy. Payompon, Mamburao, Occidental Mindoro
Email address: msd_occmdo@yahoo.com
Telephone number: 043-458-1103

Blk 12, Lot 67, Neo-Calapan
Calapan City, Oriental Mindoro, Philippines

October 11, 2022

DIR. LORMELYN E. CLAUDIO, CESO IV
Regional Executive Director
Department of Environment and Natural Resources – MIMAROPA
Roxas Blvd., Metro Manila

Thru: **ERNESTO E. TAÑADA**
OIC – PENRO

Dear RED Claudio:

May I have the honor to apply for the post of ***Corridor Project Manager*** for the BD Corridor Project in Mindoro.

In my review of the Terms of Reference for this post, I believe that I have the experience, knowledge and skills required for the role and thereby successfully achieve the objectives of the said post.

In direct relation to the requirements of the job, I have more than two decades of work experience with the Philippine Government and with internationally-funded projects and programs of Local and International Organizations including the UNDP and the Food and Agriculture Organization. My assignments have revolved around project management in areas including sustainable natural resource management, biodiversity protection, livelihoods and capacity building. I have led UN and USAID funded projects and managed consultants, co-managed a local NGO (MBCFI), worked with the DA-BFAR for 17 years and with the academe as Administrative Officer V (HRMO), to name some roles I handled. As such, responsibilities in project management, planning, monitoring and evaluation, finance, budget and personnel management, coordination and networking with a range of stakeholders, whether this be at the grassroot level or at the governance and partners' level, formed part of my experiences. In addition, I have taken on various consultancies where I handled workshops facilitation and documentation, managed participatory planning processes, and developed (drafting/writing) of resource management plans, business proposals, capacity building modules and environmental safeguards studies.

For other professional requirements, I have a Master in Public Administration and a Master of Science in Aquaculture from Notre Dame University (Philippines) and Universiteit Gent (Belgium). I hold a Bachelor's Degree in Biology for my undergraduate program. I am also a resident of the island of Mindoro, have local knowledge and conditions of the area.

I believe my work experience, the skills I have and my educational background are my strongest assets which are of relevance to the post and which will contribute best to the success of this assignment. May I request your kind indulgence to peruse my Curriculum Vitae for further information. I may be reached by email at rhodoracherylmontoya@gmail.com and through my mobile number +632 9198192623.

I look forward to having an engaging talk to discuss my application and share other information you may need.

Sincerely,

Rhodora Montoya
Rhodora Cheryl Montoya

PENRO
22-4096
RECEIVED BY:
DATE: 10-11-22
TIME 10:07

RECORDS
RECEIVED BY:
DATE: 10/11 TIME:
RELEASED BY:
DATE: TIME:

MSD
RECEIVED BY:
DATE: 10/12 TIME:
RELEASED BY:
DATE: TIME:

RHODORA CHERYL A. MONTOYA
Block 12, Lot 67, Acacia, Neo-Calapan, Barangay Bulusan
Calapan City, Oriental Mindoro, Philippines
Email: rhodoracherylmontoya@gmail.com
Cell: +63 9198192623

PROFESSIONAL EMPLOYMENT HISTORY

Stakeholder Engagement Specialist (July 2022 – Present), BD Corridor Project UNDP/GEF
Department of Environment and Natural Resources – PENRO, Occidental Mindoro
Summary of Assignment: The position handles the Project's stakeholder engagement, stakeholder analysis and mapping of institutional interventions; development of stakeholder engagement strategies and facilitation of key corridor and cluster level meetings as well as orientation sessions for targeted mandated sectoral bodies that have influence in investment planning; organization of a corps of facilitators and communication planners from agencies and partners who can continue to facilitate participatory planning process in the long term; and the provision of support to the IP Network and women groups. The position also supports planning, monitoring and evaluation (PME), and knowledge management, including the implementation an IEC plan, documentation of good practices and development of appropriate knowledge products.

Deputy Executive Director (December 2021 – June 2022)
Mindoro Biodiversity Conservation Foundation Inc. (MBCFI)
Summary of Assignment: As Deputy, helps in the management and general operations of the Foundation; advocates, promotes and implements the organizational mission; ensures that goals and objectives based on strategic plans are achieved; provides recommendations on policies, plans and programs, and advices to the Board of Trustees. Supports the establishment of the Mindoro Biodiversity Conservation Center's Natural History Museum and facilities; Functions as a manager, leader, information source and decision maker in collaboration and consultation with the Executive Director for the Foundation.

Field Program Coordinator, USAID Fish Right Program **(October 2018 – February 2019)**
PATH Foundation Philippines, Inc. (PFPI)
Summary of Assignment: Over-all management of Fish Right presence in the Calamianes Islands, Palawan, Philippines and supervision of site-based activities. The assignment entails formulation of quarterly work and financial implementation plans in coordination with project specialists, partner NGOs, finance and other technical staff; preparation of quarterly field reports; Coordination and assistance to various specialists on fisheries management, marine habitat, socio-economic, monitoring, evaluation and learning, and gender and development; ensures policies and procedures of USAID and PFPI in all site activities are implemented; and establishment of cooperation, partnerships and networking agreements with fishery stakeholders, local government units, government agencies and other institutions working in the area.

Project Manager, USAID SEAnergy Project **(July 2016 – August 2018)**
PATH Foundation Philippines, Inc.
Summary of Assignment: Management, supervision and provision of over-all technical guidance and support to the implementation of activities of USAID-funded SEAnergy Project in the Verde Island Passage. The assignment entailed proper program management and coordination of activities within and with partners and donors, regular monitoring and reporting of accomplishments; alliance and partnership building with LGUs, NGO Partners, People's Organizations, coastal communities, and other public and private sector partners; developing and strengthening capacities for effective fisheries management and protection of natural and coastal resources; identification and provision of capacity building through conservation-based or natural resource-based livelihoods, training on entrepreneurship and financial management, business plan development, and promotion of behavior change towards biodiversity conservation.

Fisheries Project Manager **(April 2015 – January 2016)**
United Nations - Food and Agriculture Organization (FAO), Philippines
Summary of Assignment: Management, supervision and coordination of fisheries projects, provision of senior level technical direction, advice and support to National Consultants and Operations Support Staff in the implementation of activities for the Typhoon Haiyan Fisheries Recovery and Rehabilitation Program across Regions 8 and 4B of the Philippines.

Senior Aquaculture National Consultant **(June 2014 – March 2015) United Nations - Food and Agriculture Organization (FAO), Philippines**
Summary of Assignment: Implementation of the livelihood and training component for aquaculture for the Typhoon Haiyan Fisheries Recovery and Rehabilitation Program in Region VI, Philippines. Activities included assessment, validation, identification, and recommendation of areas, methods, beneficiaries and type of inputs and subsequent distribution, training, technical assistance, monitoring and reporting. Handled the Fisheries Technical Working Group coordination and management, regular meetings, preparation of presentations and provision of technical guidance to the Food Security and Agriculture Cluster members on fisheries and aquaculture. Supervision and guidance of other regional fisheries program personnel in consultation with the Senior Fishery Adviser and FAO Representation.

Administrative Officer V (HRMO) and College Instructor **(May 2013 - May 2014)**
Davao del Norte State College, Panabo City, Davao del Norte, Philippines
Summary of Assignment: Preparation and implementation of programs and activities for human resource development, training and capability building activities, assistance and provision of advice to the Head of the Institution in the development, formulation and execution of policies, rules and regulations in all areas of personnel management, performance management, and handled a myriad of activities relative to basic personnel matters. Worked as Part-Time Instructor handling courses in Theory and Practice in Public Administration, and Governance and Social Responsibility in the Undergraduate and Graduate School.

Fishing Regulations Officer **(August 1994 - May 2013)**
Bureau of Fisheries and Aquatic Resources - Autonomous Region in Muslim Mindanao, Cotabato City, Philippines
Designations and assignments, as follows: Section Head, Advance Aquaculture Technology Section/ Project Leader, Multi-species Marine Aquaculture Laboratory/ Liaison Officer/ Chief, Regional Fish Health Section/ Chief, Planning Section/ Fisheries Researcher, Data Processor and Assistant Project Leader of the National Stock Assessment Program/ Agriculture Researcher, Data Processor and OIC of the Soils Section
Summary of Assignments: Development of fisheries plans, programs, projects and studies relating to aquaculture. Handled the review and evaluation of submitted reports and also the preparation and submission of varied reports (annual, quarterly, progress and others) and interpretation of research data. Handled the coordination of activities and communications between the Regional Office and other partner offices. Conducted programs and activities, monitoring and surveillance of seaweeds and shrimp diseases nationwide. Provision of technical assistance, trainings and response to the needs of the fisheries and aquaculture industry. Assisted in the conduct of antibiotic residue monitoring program in compliance to EU and other exporting countries requirements. Conducted activities in fish kill and harmful algal bloom prevention, and in the monitoring and surveillance of aquatic animal disease including seaweeds. Conducted inspection and provision of advice to local industries on food safety and risk assessments. Conducted information and education campaigns and served as resource person for trainings

CONSULTANCIES/CONTRACTS

MPA MEAT and METT Consultant (August – September 2022)
Blue Alliance (Calapan, Oriental Mindoro)
Conduct of Marine Protected Areas (MPA) Management Effectiveness Assessment Tool (MEAT) and Management Effectiveness Tracking Tool (METT) for 9 Locally Managed MPAs in the Province of Oriental Mindoro to establish baseline information. A peoples' organization assessment was also conducted under this consultancy with the community organizations managing the MPAs.

Senior Biodiversity and Natural Habitat Specialist (June – December 2022)
DT Global (Spain, EU)
Member of an international team conducting an environmental and social impact assessment (ESIA) for the rehabilitation of the Agus-Pulangui Hydropower Complex Project 2 (25 days engagement).

Project Coordinator for Puerto Galera Seagrass Mapping Project (March – August 2021)
SEACOLOGY (Berkeley, California, USA)
Coordinate and handle all activities with Local Government Unit and partners regarding the seagrass mapping project, conduct information dissemination through various media channels and to different groups of stakeholders, hold interviews, promote the map app and other related activities.

Consultant for the Oriental Mindoro Aquaculture Development Plan 2021-2025
Oriental Mindoro – Provincial Agriculture Office
Handled related consultations with various stakeholders, workshops and writeshops, drafted, developed and finalized the aquaculture plan for the province of Oriental Mindoro.

Consultant for Biodiversity Friendly Enterprises (October 2020 – April 2021)
United Nations Development Program – Philippines
Assists People's Organizations managing Marine Protected Areas in the implementation of their ecotourism BDFEs.

Consultancy on Project Proposal Preparation (February 2020)
Malampaya Foundation, Inc.
Conducted training on project proposal preparation, specifically on business plan development for community enterprises in coastal communities managing marine protected areas in the Province of Oriental Mindoro. Further assisted communities in the drafting of their business plans.

Consultant for the Updating of the State of the Coasts of Oriental Mindoro (June – Sept. 2019)
Oriental Mindoro – Provincial Agriculture Office
In partnership with a team of independent consultants, collated data, handled workshops and consultation, and updated the information of Oriental Mindoro's provincial document "State of the Coasts of Oriental Mindoro".

Biodiversity Friendly Enterprise (BDFE) Consultant (May – June 2019)
UNDP – SMARTSEAS Project
Assisted in the development of Biodiversity Friendly Enterprise (BDFE) Business Plans in Eco-Tourism for two Marine Protected Areas (MPA) in the Province of Oriental Mindoro in collaboration with a group of consultants for the SMARTSEAS Project of the United Nations Development Program (UNDP). Conducted workshops, consultations, data collection and guided the drafting of the MPA Eco-Tourism Business Plans.

ICM Consultant (May – June 2019)
Oriental Mindoro – Provincial Agriculture Office
Developed the Integrated Coastal Management (ICM) Plans 2020-2026 for the Municipalities of Pola

and Pinamalayan, Oriental Mindoro. Conducted workshops, consultations, coordination and data collection for the development of the 6-year coastal management plan of the said municipalities.

ICAMP Consultant (September - October 2018)
Malampaya Foundation, Inc., Philippines
Developed the Oriental Mindoro Integrated Coastal Area Management Plan (ICAMP) 2019 – 2023. Conducted workshops, consultations, coordination and data collection for the development and updating, collated all information, handled analysis and writing to develop the 5-year coastal management plan.

Environmental Safeguards Consultant for Seaweeds (May – July 2016)
Environmental Safeguards Consultant for Abaca (February 2018)
Environmental Safeguards Consultant for Cassava (June 2018)
CARE - International NGO, Philippines
Conducted studies on environmental impact assessment of selected fisheries and agriculture value chains particularly for seaweeds, abaca and cassava. The studies included documenting current practices along the different commodities' value chain, identifying issues and concerns and proposing improved practices to upgrade the value chain; identification of disaster, climate change and environmental hazards, risks and mitigation plans; development of recommendations for addressing issues; development of community resilience and policy agenda, and identification of action plans towards upgrading the commodities' value chains.

Business Planning Consultant (May 2017)
Business Continuity Planning Consultant (October 2017)
CARE - International NGO, Philippines
Developed a Business Planning Module for Seaweeds Production and Trading and a Business Continuity Planning Module for seaweed farming associations of San Dionisio, Iloilo, Philippines. The developed modules were rolled-out for training, workshop-planning sessions, community and other stakeholders' consultations and validation workshops. Using the modules, the Business Plans of 11 fisherfolk associations were drafted, finalized and funded by CARE and their Business Continuity Plans were prepared to ensure sustainability mechanisms are in place and business continuity is assured at all times.

Process Documenter (July – December 2009)
Bagong Pag-asa Foundation, Inc., Philippines
Documentation of proceedings in the conduct of the Case Study on the Community-Based Forest Management Program of the Department of Environment and Natural Resources Region II; preparation of the minutes or proceedings of the activities, and assistance in the conduct of all other activities during focus group discussions or meetings.

SCHOLARSHIPS AND GRANTS

a. **Responsible Aquaculture Development for Food Security and Economic Progress** February27 – March 17, 2017; Granted by the Netherlands Fellowship Program (NFP)
b. **Flagship Course on Administrative Service Excellence for Middle Managers of State Universities and Colleges (Executive Development Program)**
December 2013 – March 2014; Granted by the Commission on Higher Education (CHED) through the Development Academy of the Philippines (DAP) and the Ateneo de Manila University
c. **Scholarship Grant for Masteral Studies (Aquaculture)**
September 2010 – September 2012; Granted by VLIR – UOS, Ghent University, Belgium
d. **Summer Internship Program (Sea Cucumber Aquaculture) in Homey Farms, Qingdao, China July 2011 – September 2011; Granted by VLIR –UOS, Ghent University, Belgium**
e. **Local Scholarship Program (LSP) for Masteral Studies (Public Administration)**
June 1997 – June 2000; Granted by the Civil Service Commission, Republic of the Philippines

MOST RECENT TRAININGS ATTENDED

Responsible Aquaculture Development for Food Security and Economic Progress. Provided by the Center for Development Innovation of Wageningen University. February 27 – March 17, 2017, Wageningen University, the Netherlands.
UNCC: Learn Introductory E-Course on Climate Change. Online Course provided by UNITAR and UNCC. April 2016.
French Language Level A1.1-3. Provided by Alliance Francaise de Manille, January-February 2016, Makati City, Philippines.
Basic Supervisory Development Course (BSDC). Provided by the Civil Service Commission, April 2014, Davao City, Philippines.
Seminar on Government Executive in Action for Reform (GEAR) – Human Resource Management. Provided by the Civil Service Commission, February 2014, Davao City, Philippines.
Flagship Course on Administrative Service Excellence for Middle-Level Managers (Directors of State Universities and Colleges). Provided by the Development Academy of the Philippines, December 2013 – March 2014, Pasig City, Philippines.
Training on Sustainable Fisheries Management in the Context of the Code of Conduct for Responsible Fisheries. Provided by the Philippine Council of Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD) Broad-based Coastal Management Training Program and the National Committee on Marine Sciences of UNESCO, November 2012, Los Banos, Laguna, Philippines.

EDUCATIONAL BACKGROUND

Master in Public Administration (May 2002, Meritus)
Notre Dame University, Philippines

Master of Science in Aquaculture (September 2012, with Distinction)
Universiteit Gent, Belgium

Bachelor of Science in Biology (March 1994)
Notre Dame University, Philippines

PERSONAL INFORMATION

Date of Birth	:	June 3, 1972
Place of Birth	:	Cotabato City, Philippines
Nationality	:	Filipino
Gender	:	Female
No. of Children:		Three (3)
Languages	:	Filipino (Mother Tongue) English (Professional Proficiency)
Philippine dialects understood/ spoken:		Ilokano, Chavacano, Tiruray, Visaya/Cebuano, Ilonggo, Maguindanaoan

REFERENCES

a. **Ms. Marilyn M. Alcanices**
Chief, Fisheries and Coastal Resource Management
DivisionProvincial Agriculture Office – Oriental Mindoro
Provincial Capitol, Calapan City, Oriental Mindoro
Email: ***malcanices1961@gmail.com***; Contact Number ***+63 917 8256177***

b. **Mr. Nilo S. Katada**
Regional Director
Bureau of Fisheries and Aquatic Resources - CARAGA
Email: ***nskatada@yahoo.com***; Contact Number ***+63 917 633 3498***

c. **Ms. Divina Gracia Baclig**
National DRR Specialist for Agriculture
Food and Agriculture Organization of the United Nations
Cotabato City, Philippines
Email: ***divina.baclig@fao.org***; Contact Number ***+63 997 601 1100***

SEAWEEDS COMMUNITY ENTERPRISE FACILITY BUSINESS PLANNING - FINAL CONSULTANCY REPORT

Seaweeds Business Planning Workshop
Grand Tower Suites, Iloilo City; June 9-11, 2016

Rhodora Cheryl Montoya
Community Enterprise Business Planning Consultant for Seaweeds

TABLE OF CONTENTS

I. EXECUTIVE SUMMARY

CARE Philippines, through its Emergency and Response Program in regions affected by Typhoon Haiyan in the Philippines, has rolled-out financial and capability building assistance to twelve (12) Seaweeds Community Enterprise Facilities in Region VI, Philippines, particularly in the municipalities of San Dionisio, Iloilo and Caluya, Antique. The Community Enterprise Facilities are associations of fisherfolk engaged in the culture and trading of seaweeds. The assistance provided by CARE includes the capability building of the CEFs in developing a business plan for their respective associations.

Under this consultancy, a business planning module specific for seaweeds was developed and was used as a tool in conducting a 3-day Business Planning Workshop for officers and members of the Seaweeds CEFs. Participants were assisted in writing their operational, management and financial plans, and set business strategies that would promote the marketing and trading of their dried seaweeds products. A total of 34 participants were trained and 12 business plans were prepared. The CEFs will be guided on sustaining their seaweeds production and trading businesses through these business plans.

To complement the assistance provided by CARE to these associations, continuing technical assistance and capability building, both in seaweeds production and business management, will still be essential. Teaching the associations to harness the potential of assistance from government agencies will further be a way forward. Leadership within the organizations is a big factor which the communities have a big role or obligation to choose well. The CEFs business operation's performance assessment will have to be conducted at a time after the associations have already implemented their business plans.

II. BACKGROUND

CARE Philippines has implemented an Emergency and Response Program in regions affected by Typhoon Haiyan in the Philippines. Among the areas covered by the program are the Provinces of Iloilo and Antique in Region 6. The goal of the program is to provide assistance to affected and vulnerable populations such that they are able to recover from the effects of the Typhoon, build back better and safer livelihoods, and develop resilience against future climatic risks. Among the interventions implemented by CARE Philippines are financial support and capacity development assistance through its Community Enterprise Facilities (CEFs). This assistance aimed towards optimizing the income and encouraging diversified and resilient livelihood opportunities for affected households in organizations and is expected to help more than 200 organized community enterprises dealing with different farming commodities.

In the municipalities of San Dionisio, Iloilo and Caluya, Antique, the CEFs rolled out and assisted by CARE are organizations of fisherfolks working in seaweeds production and trading. For CEFs in Iloilo, they were provided with financial capital for seaweeds farm inputs such as ropes, softies, floaters, seedlings, baskets, nets, while the CEF in Caluya, Antique was provided capital for trading needs such as weighing scales, flatboat and dryers, and rolling funds for purchase of dried seaweeds. Capacity building assistance such as trainings in seaweeds production, seaweeds value-addition, community enterprise development, financial management, and value chain analysis were provided across these CEFs.

In this particular consultancy, the Seaweeds CEFs were provided with further assistance in their seaweeds livelihoods through training in business planning and development of business strategic plans. With the aim of developing the business planning skills of the participants, a business planning module specific for seaweeds was developed and used as the learning guide for a 3-day Business Planning Workshop. Ultimately, the CEFs were able to develop their Association's business plans which reflected their business

environment, their goals and targets, and business strategies. Table 1 lists the seaweeds CEFs assisted by CARE Philippines.

Table 1. Seaweeds Community Enterprise Facilities Assisted by CARE Philippines

Name of Association	Address/Location	Number of Members			Community Enterprise
		M	F	Total	
Agdaliran Farmers and Fisherfolk Association	Barangay Agdaliran, San Dionisio, Iloilo	95	4	99	Seaweeds Production and Trading
Agdaliran Womens' Rural Improvement Association	Barangay Agdaliran, San Dionisio, Iloilo	3	65	68	Seaweeds Production and Trading
Bagacay Fisherfolk Association	Barangay Bagacay, San Dionisio, Iloilo	34	6	40	Seaweeds Production and Trading
Borongon Fisherfolk Association	Barangay Borongon, San Dionisio, Iloilo	86	7	93	Seaweeds Production and Trading
Naburot Fisherfolk Association	Barangay Naburot, San Dionisio, Iloilo	27	13	40	Seaweeds Production and Trading
Cubay Seaweeds Growers Association	Barangay Cubay, San Dionisio, Iloilo	80	10	90	Seaweeds Production and Trading
Nipa Fisherfolk Association	Barangay Nipa, San Dionisio, Iloilo	49	5	54	Seaweeds Production and Trading
Odiongan Fisherfolk Association	Barangay Odiongan, San Dionisio, Iloilo	97	92	189	Seaweeds Production and Trading
Punta Bularan Fisherfolk Association	Barangay Punta Bularan, San Dionisio, Iloilo	35	-	35	Seaweeds Production and Trading
Sua Livelihood Association	Barangay Sua, San Dionisio, Iloilo	36	29	65	Seaweeds Production and Trading
Tiabas Seaweeds Growers Association	Barangay Tiabas, San Dionisio, Iloilo	200	72	272	Seaweeds Production and Trading
Sabang Tararabid Fisherfolk Association	Barangay Sabang, Caluya, Antique	216	111	327	Seaweeds Marketing and Trading
Total Assisted Individuals in 12 CEFs		958	414	1,372	

III. OBJECTIVES OF THE CONSULTANCY

The consultancy spanned over a period of forty-four (44) days in which the Consultant was expected to deliver the outputs as reflected in Table 2. The objectives of the consultancy were as follows:

a. To design and formulate a business planning module or process specific to seaweeds production and trading;
b. To enhance the skills of the workshop participants from the 12 CEFs and capacitate the CEFs in the development of their business plans;

c. To conduct a business planning workshop with participants from the 12 CEFs and develop their respective business plans.

Based on the objectives of the consultancy, Table 2 below reflects the outputs and summarized details of the activities.

Table 2. Major Outputs of the Consultancy

Outputs	Activity Description/Remarks	Reference
Development of a Business Plan Module specific for the Seaweeds CEFs	A business plan module specific for Seaweeds Production and Trading was developed for CARE. The same was used during the conduct of the 3-day Business Planning Workshop.	Attached as Annex 3 of this Report.
Conduct of a three (3) day Business Planning Workshop	The Business Planning Workshop was conducted on June 9-11, 2016 in Iloilo City, Philippines. This was attended by 34 participants from the 12 participating CEFs. The workshop resulted in the development of a draft business plan by participants who represented their respective organizations.	Attached is the Report and Highlights of the Business Planning Workshop as Annex 2 of this Report.
Business Plans of Seaweeds CEFs	As an outcome of the 3-day Business Planning Workshop, the business plans of the 12 CEFs were finalized following the draft of the participants. The business plans reflected the short and medium term goals of the organizations, organizational management, business operations and financial forecasts. Each of the Seaweeds CEFs were provided a copy of their business plans through Biz FTC, partner NGO of CARE in Iloilo City, Philippines.	Attached is a sample of the Business Plan of Nipa Fisherfolk Association as Annex 4 of this Report.
Periodic and Final Reports	A pre-assessment report on the initial visit conducted by the Consultant at the onset of the consultancy was submitted. It presented recommendations for the conduct of the succeeding activities of the consultancy. A Report and Highlights of the Business Planning Workshop was submitted after the conduct of the 3-day Business Planning Workshop. A Final Consultancy Report (this document).	Attached as Annex 1 of this Report. Attached as Annex 2 of this Report.

IV. ISSUES AND RECOMMENDATIONS

1. **Technical assistance** – The business of seaweeds trading is a new endeavor for the Seaweeds CEFs, equally so is seaweeds production for new areas in San Dionisio, Iloilo. As such, continuing technical assistance in business management and seaweeds production would facilitate their operations and increase in income. The CEFs may be connected to government agencies able to render technical assistance such as the Department of Trade and Industry and Bureau of Fisheries and Aquatic Resources. A Memorandum of Agreement may be facilitated to forge the commitment of both parties towards providing learnings and application of the learnings.
2. **Seasonal timing for seaweeds planting** - One factor that hinders successful seaweeds production in some barangays of San Dionisio is the lack of an established knowledge of seasonal patterns that may help seaweeds farmers time their planting season. This however, takes a period of tracking the seasons (such as when strong waves are observed). This may be established with the help of the experience of community members and may be plotted on a matrix and observations made by the community over time may be noted. In seaweeds farming, this is inevitable especially for new areas and new planters.
3. **Leadership within the Associations** – A strong leadership within the organization and leaders with the interests of the organization foremost on the agenda, is important. As observed in the attendance to the planning workshop, some CEFs were not represented by relevant officers, rather by representatives. While these representatives may be able to present the business plans to the communities, yet the issue of authority over who leads the planning and who has more information regarding the Association is most crucial. It is recommended therefore to further assist the Association's towards strengthening leadership and participation of leaders to vital activities that are aimed for their development. In this case, the business plans

spell out the road towards success of the CEFs' business and a strong leader would be indispensable to help the group.

4. **Business Performance Assessment** – An assessment of the business performance of the CEFs by the end of the consultancy proved to be non-feasible due to the short period of time from the business planning to the end of the consultancy period. An appropriate assessment of the CEFs business performance will have to be over a six-month or more period, when the CEFs have already discussed their business plans in an Assembly, and the members have taken their roles in the activity. This will include the planting, harvesting and drying time of seaweeds which is more or less 50-65 days in total, by which time the Association may have done an initial trading and a first month income is realized. It is recommended therefore that the CEFs be further assisted in the implementation of their Business Plans by CARE and Biz FTC through constant monitoring, or the CEFs be further introduced with government agencies such as the Department of Trade and Industry, the Department of Agriculture (Agribusiness Section), and the Bureau of Fisheries and Aquatic Resources (Seaweeds Development Program) so that these agencies can provide technical support in seaweeds culture and business operations, strengthening cooperation within the organization and promotion of their products with seaweeds processors.

V. CONCLUSION

In the conduct of the activities under this consultancy, the facilitation provided by CARE staff and their partner NGO, Biz FTC, has been instrumental to the achievement of the expected outputs. Both has provided full assistance in being able to meet and connect with the Seaweeds CEFs leading to a better understanding of the set-up by which the activities are anchored, the preparations needed for implementation of the planned activities, the conduct of the business planning workshop, the roll-out of the business plans to the respective CEFs and finally keeping track of their business plan implementation.

Providing this capability building assistance to the fisherfolk associations, or to similar marginal communities, is a way forward for these communities as they do not commonly have the skill in business management and operations.

The Seaweeds CEFs, despite having faced the brunt of the El Niño that affected the Philippines in the early part of year 2016, are motivated to pursue their seaweeds livelihoods, knowing that they have a "plan of action" embodied in their business plans. Whilst the business plans were not specific for the individual farmer's activities on seaweeds production, the participants of the workshop were invigorated as they see the potential of organizational effort to produce dried seaweeds, making them more able to reach the markets, draw support from each others' learning and experiences, and through their association's trading business, will be able to derive additional income that can revolve around their organizations.

VI. ANNEXES

Annex 1. **Pre-Assessment Report**

Annex 2. **Report and Highlights of the Business Planning Workshop**

Annex 3. **Business Planning Module**

Annex 4. **Sample Seaweeds Production and Trading Business Plan of Nipa Fisherfolk Association**

Annex 1. Pre-Assessment Report

Report on the Pre-Assessment Visit conducted in San Dionisio, Iloilo with Seaweeds CEFs May 23-24, 2016

Background:

The visit to CARE's Community Enterprise Facility (CEF) sites in San Dionisio, Iloilo was held on May 23-24, 2016. It was purposely to gather pertinent information that will be helpful in the conduct of the Business Planning Workshop for the assisted seaweeds associations, to meet the officers or members of CARE Seaweeds Community Enterprise Facilities and share information regarding the Business Planning Workshop.

Results of the visit:

1. There are only 11 Seaweeds CEFs in the municipality of San Dionisio, Iloilo and they are all CEFs on Seaweeds Production and Trading. These are the following:

   a. Nipa Fisherfolk Association
   b. Punta Bularan Fisherfolk Association
   c. Tiabas Seaweeds Growers Association
   d. Sua Livelihood Association
   e. Naborot Fisherfolk Association
   f. Cubay Seaweeds Growers Association
   g. Bagacay Fisherfolk Association
   h. Agdaliran Women Rural Improvement Association
   i. Agdaliran Fisherfolk and Farmers Association
   j. Borongon Fisherfolk Association
   k. Odiongan Fisherfolk Association

   The President or an officer of each of these CEFs was met during the visit. A visit to the seaweeds area was targeted to be done. Except for Punta Bularan and Naburot (island barangay) which were not visited on-site, an interview with their officers (Treasurer Elmer Pascua of Punta Bularan and President Gerald Bano of Naburot) was done at the PRIA Training Center. Information about their organization and its activities, what form of assistance they have received and the challenges they are facing were gathered. They were also informed of the upcoming Business Planning Workshop and some of them have initially named the members who will be present during the workshop.

2. The Biz FTC Team headed by Ms. Mary Jane Tuares, Mr. Bargamento and Ms. Suzette of CARE Philippines based in Roxas City were also met during the visit. Additional information

were gathered from them during the visit. They provided support and assistance during the visit, in addition to staff from the San Dionisio Multi-Sectoral Integrated Association.

3. The SATAFIA Seaweeds CEF in Caluya, Antique, has focused on Seaweeds Trading and have already undergone a Business Planning Workshop in Culasi, Antique, as per information gathered from Mr. Magdaleno Bargamento, CARE Coordinator in Panay Island.

Remarks and Recommendations:

1. The venue for the workshop must preferably be held in a place that will be most helpful in achieving the results wanted which is to form the Seaweeds CEFs' Business Plans. Without prejudice to the participants and to achieve focus on the activity, this would be preferably held in Iloilo City. Accordingly, in past experience working with these communities, they prefer going home at night when the venue is accessible to their homes as they have their motorcycles, making them late or absent in the next day activities.
2. After consulting with the CEFs on the possible schedule, it appears the workshop should preferably be done before mid-June. Thus, the workshop schedule is initially set with Mr. Bargamento and Ms. Tuares on June 9-11, 2016.
3. The Seaweeds CEF in Caluya (SATAFIA) may not need to attend the Business Planning Workshop since they have undergone the training/workshop already. Thus, there will be only 11 CEFs (or 33 participants) during the workshop.
4. The Seaweeds CEFs are found to be well-trained in Seaweeds Production and Marketing and have also undergone trainings on Financial Management and Governance, Value-Chain Analysis and Seaweeds Processing. The associations are also well organized, they have complete organizational profiles and documents are in tact. These make them more ready than expected to undergo the Business Planning Workshop.
5. As for support before and during the workshop, there is a need for 2 support staff to handle the work before the activity and 3 support staff to help in encoding and doing other tasks during the workshop. Ms. Lory, the Seaweeds CEF Project Officer will be in the workshop to assist and provide necessary support. Since this support was initially in the consultancy proposal, confirmation of these need for support staff is now presented.

Next Activities:

1. Submission of the Business Planning Module will be done in the first week of June.
2. Ms. Jane Tuares will be preparing the workshop activity proposal. The list of supplies and materials have already been provided to her by the undersigned.
3. Seaweeds CEFs will be contacted in the next days, after finalizing/approval of the schedule (June 9-11, 2016).

Annex 2. Report and Highlights of the Business Planning Workshop

Report and Highlights of the Proceedings of the Seaweeds Business Planning Workshop held at the Grand Tower Suites, Iloilo City on June 9-11, 2016

The Seaweeds Business Planning Workshop was organized for CARE Philippines' eleven (11) Seaweeds Community Facility Enterprises (CEF) from San Dionisio, Iloilo and one (1) Seaweeds CEF from Caluya, Antique. The objectives were to develop the business planning skills of participants and guide/assist these CEFs in the preparation of their respective business plans. This report highlights the proceedings and salient points during the workshop.

a. ***Attendance.*** *A total of thirty-four (34) participants from the different associations were present to attend the workshop. Annex A provides the list of participating Community Enterprise Facilities and their respective representatives. Also present to provide support during the workshop were the following persons:*

1. *Suzette Gellangcanao, CARE Livelihood Specialist*
2. *Byrone Benson Barrinuevo, CARE Programme Officer*
3. *Lourie Secreto, Biz FTC Project Officer*
4. *Aljon Rey Catedrilla, Encoder/Secretariat*
5. *Lou Martin Secreto, Encoder/Secretariat*
6. *Anna Victoria Dela Vega, Encoder/Secretariat/Documenter*

b. ***Preliminaries.*** *The workshop started with a prayer and the singing of the Philippine National Anthem. Ms. Gellangcanao of CARE welcomed the participants and encouraged everyone to participate in the 3-day workshop. Ms. Secreto of Biz FTC handled the setting of expectations and provided the house rules. This was followed by an introduction of selves by the Facilitator, Secretariat, Representatives from CARE and Biz FTC, and the participants.*

Expectations of the Participants:

Area	*Expectations*
Content of the Workshop	*- learn about market opportunity; how to manage business; what is investment; how to strengthen and improve the association and how to market their product; learn about planning, calculating and recording; additional information regarding seaweeds and its importance*
Facilitator/Lecturer	*- able to clearly explain; with patience in clarifying questions; with sense of humor (not boring); always on time; preferably able to deliver in vernacular*

Setting of expectations and house rules was led by Ms. Lourie Secreto of Biz FTC (left). Mr. Gerald Bano, President of Naborot Fisherfolk Association during the introduction of participants (right).

c. ***Lecture and Workshop Proper.*** *The Consultant and Facilitator of the workshop presented an discussed the topics during the 3-day Business Planning Workshop and handled the write shop for the participants. A presentation of the Seaweeds Industry situation and outlook preceded the presentations. Annex B provides the list of the topics discussed and the learnings of the participants.*

Participants listen intently as the presentations were conducted by the Consultant.

After the presentation on the Seaweeds Industry, the succeeding topics on business planning were then presented to the participants and the workshop proceeded as follows:

1. *Introduction of the topic to explain concepts*
2. *Explanation of the objective and importance of the topic*

3. *Presentation of the workshop templates*
4. *Explanation or translation of the guide questions*
5. *Open forum for clarifications*
6. *Write shop by the participants where they fill-up the templates*
7. *Coaching by Consultant by table or by association while other groups are working*
8. *Collection of filled-up templates and encoding by the Secretariat*

Participants work in groups to discuss their business plans and answer the guide questions provided that will lead them to form their written business plans.

Coaching by Association was also done or in groups to further assist the participants during the write shops.

d. **Open Forum**. *An open forum followed each topic presentation. The participants did not have many questions regarding the business plan per se after each presentation, but questions were raised regarding specific business plan components during the coaching and these were explained there. Participants were equally interested on seaweeds production and in recognition of the difficulties faced by the San Dionisio seaweeds growers and also to take the opportunity of gaining learnings from experienced seaweeds planters, the Consultant allowed for time to discuss on the production side of the business. With the experience in seaweeds farming of SATAFIA's participants, they were asked to share some of their experiences and*

provided tips to the participants, in addition to the inputs provided by the Consultant. Below are the main points raised (question – answer/sharing format):

1. *On declining seaweeds buying price from processors – The price for seaweeds, like other commodities, are affected by the law of supply and demand. While this affects seaweeds producers, it must not be a reason for discouragement as seaweeds is still an easy commodity to produce with less inputs compared to rice and corn.*
2. *Growth competition between spinosum and cottonii varieties of seaweeds – It is an experience of SATAFIA participants that the spinosum variety is a faster growing variety than cottonii, but it commands lower buying price, so they opt for production of the cottonii variety. It is recommended therefore to plant the cottonii variety as it has a higher buying price to increase income and is also the variety with higher market demand. If they plant both varieties, ensure that these are not adjacent to each other to prevent competition. Mr. Chavez of Odiongan also shared information that spinosum grows where there is abundance of seagrasses, while cottonii is best when the area is rocky/coral.*

A participant from San Dionisio, Iloilo sharing their Association's experience and difficulties as new planters in seaweeds farming.

3. *Cycle of production – An area assessment is needed for establishing a seaweed farming area. While this may help in the plans for establishment, experience of growers will best prove the suitability. For example, an open sea area may be seasonal, therefore the seaweed growers has to keep a record of the seasons "amihan – habagat", as they will learn and adjust from their actual farming and growing experiences.*
4. *On use of nets for protection from strong waves – Neither the Consultant nor SATAFIA has heard or experienced the use of nets in seaweeds farming. Participants were warned against fouling of the nets (growth of other plants/organisms) which will impede water current which is important in*

seaweeds production. Nets have not yet been proven to be effective in controlling loss of seaweeds, much more to control strong waves which cause the loss of seaweeds. It was recommended instead to properly tie the plants, double the culture lines so they are stronger and the plants are held more tightly by the lines. But if the farmers are intent on using nets, then strategically place these to keep the fallen plants from being washed ashore, and not to "box" the plantation. A more logical move would be to choose an area with no strong waves, is protected from strong waves, or to determine the proper planting season based on actual experience over a time period.

Participants from SATAFIA in Caluya, Antique (left) share their experiences and with the Consultant demonstrate the proper tying of seaweeds seedlings to other participants (right).

5. *On seaweeds diseases – Diseased plants such as by ice-ice should be harvested and dried, and healthy plants must be transferred to a new culture area. If plants are heavily infested, such as by algae or epiphytes, and removing these already proves difficult, harvest the plants, then dry and remove the attached organisms once these are dried.*
6. *On proper tying of seaweeds plants – The SATAFIA participants together with the Consultant demonstrated the proper way of tying the seaweeds plant. First tie the straw lace (tie-tie) on the culture line (PE Rope), then manually determine the center of weight of the seedling and tie it on this part to keep the balance of the seedling, keep the knot a little loose to allow plant growth and "ribboned" for easy loosening of the tie during harvest and drying.*
7. *On distance from sand of culture lines (in shallow areas) and use of floaters – The distance of the culture line from the sand is about 4 inches as practiced in Caluya. There must also be use of floaters to keep the plants floating in the water. Used styrofoams or water bottles may be utilized as these are less expensive than HDPE (plastic) floaters and can withstand use for a longer period of time. Tying of seedlings must be done on-shore and not one by one on the sea, as this will be more difficult. The technique is to bring the whole culture line with the newly tied seaweeds seedlings on the water when done with tying and attach both ends of the culture line on opposite stakes.*

e. ***Challenges and constraints during the workshop***. *The following are observed and experienced challenges from the Consultant's point of view.*

1. *At the beginning of the workshop discussions, the participants have a seemingly low morale due to their disappointment with their experience in seaweeds farming. They question the need for a business plan against the fact that they have lost twice or are harvesting very low. They were encouraged to continue, as they still have their materials and experience will teach them a lot to succeed. They were understandably new planters and have been greatly affected by the El Nino during the summer season, they lack experience and needed further training. With the sharing of knowledge and experience by the Consultant and SATAFIA participants, this has boosted their confidence and they now look forward to making seaweeds farming a productive livelihood in their areas.*
2. *Not all participants are able to write in complete sentences, proving to be a challenge in finalizing their business plans. They were therefore encouraged to write in the vernacular to capture their plans and ideas. Writing the narrative of their business plans will be handled therefore by the Consultant.*

f. ***Presentation of the Business Plan.*** *The Naborot Fisherfolk Association was handpicked to present their business plan to the group. The Association President, Mr. Gerard Bano, using their filled templates, discussed their Association's plan. This demonstrated to the participants how filling in the forms have led to a picture of the business plan of the group. To further illustrate the outcome of the plan, a draft Business Plan of the SATAFIA was shown by the Consultant to the group. The presentation showed the business plan already written in narrative form. Though at that time was still to be completed, it showed the participants a sample of the outcome of their work during the 3-day workshop.*

g. ***Workshop closing***. *A total of 34 participants completed the training-workshop and were provided with a Certificate of Attendance. Each Association also brought back with them their filled draft business plan templates for initial discussion with their respective associations during their meetings. Two participants provided an impression of the workshop. Both have emphasized realization that with all members of the Association planting seaweeds, they can achieve their targeted volume of production per month. They also expressed gratitude for the knowledge that they have gained in business planning.*

Awarding of the Certificates of Attendance to the participants with the Consultant, Ms. Tuares and Ms. Gellangcanao.

Ms. Mary Jane Tuares of Biz FTC gave the closing remarks where she expressed hope that the participants have learned and will share their learnings with their Association. She encouraged them to continue and not be disappointed with the past experience, rather to continue with their production and use the business plans as basis for their continuing operations considering that the market for seaweeds is there.

The participants with the Consultant and staff from CARE and Biz FTC take a pose at the end of the 3-day Seaweeds Business Planning Workshop.

Annex A. List of Associations and Participants with Contact Details

Name of Association	Name of Participant	Contact Details
Agdaliran Women Rural Improvement Association	Jessica Tayo, Treasurer Chuchi Serrano, Secretary Daisay Albao, President	- - -
Agdaliran Fisherfolk and Farmers Association	Leonisa Pajonilla, Business Manager Melenia Pajonilla, Treasurer Adriano Segura, President	- - -
Bagacay Fisherfolk Association	Liberty Medel, Member	09090580571
Borongon Fisherfolk Association	Marilex Balosta, Assistant Secretary Nona Alcazaren, Member Amy Arbis, Member	 09097876379 09126642282
Cubay Seaweeds Growers Association	Rolando Camposa, Member Eva Sta. Maria, Secretary Annabelle Loredo, Assistant Secretary	09098141395 09398794921 09095533718
Naborot Fisherfolk Association	Gerald Bano, President Jerry Rodriguez, Member Delsa Buenavista, Auditor	 09499912907 09094540071
Nipa Fisherfolk Association	Artemio Rojo, President Rechiel Navarro, Secretary Hiraluna Penaflorido, Member	 09486450700
Odiongan Fisherfolk Association	Mibilin Chavez, Secretary Jerry Joy Barillos, Member Rosemarie Delfin, Auditor	09201360860 09081780420
Punta Bularan Fisherfolk Association	Rhodora Veloso, Member Marjore Alkonga, Member Maricar Arsenal, Member	09983280023 09194160068 09462849823
Sabang Tararabid Fisherfolk Association, Inc	Benjamin Manongol, Vice-President Sonny Radam, BOT Gregorio Erardo, BOT	09098435949 09100195599
Sua Livelihood Association	Gena Navarro, Member Rosanna Navarro, Member Jenelyn Navarro, Member	09126682512 09207592457 09092740935
Tiabas Seaweeds Growers Association	Gilbert Tupas, Member Mark Cloma, Member Melonie Villarias	09106162525 09091083043 09097307861

Annex B. Topics and Learnings in the Seaweeds Business Planning Workshop

Date	Topic	Participant's Learning
Day 1	The Philippine Seaweeds Industry	History of Seaweeds Culture Aquaculture production in the Philippines Global Seaweeds Production Images of Seaweeds and Production Uses of Seaweeds and Carrageenan Market for carrageenan Major producing areas Strengths and challenges of the Industry
	Business Plan and Process	What is a business plan and its use Common business mistakes Components of a business plan Process on writing
	Business Profile	Contents of a business profile Comparison to a resume and how it introduces the business to the reader What is a SWOT Analysis How does a SWOT help to critically reflect on the business' strengths, weaknesses, opportunities and threats and leads to action plans
Day 2	Market Analysis Marketing and Sales Strategies	What is a market analysis and why it should be done What is marketing and how should it be done The factors of people (customers), product, place (location), price and promotion in business How these factors are important to be described in the business plan
	Management Plan	What is a management plan Importance of a management plan How the management affects success of the business Sample organizational structure for management
	The Financial Plan	Components of a simple financial plan How the documents show the financial status of the business Form 1. Fixed asset and start-up expense list
Day 3	The Financial Plan (continuation)	Form 2. Unit cost analysis Form 3. Projected income statement Calculations for these financial documents
	The Executive Summary	What is an Executive Summary Writing the Executive Summary
	Monitoring and Assessment Strategies	What is a monitoring or assessment strategy How it helps to keep the business make an internal analysis of its plans

Annex 3. Business Planning Module (next page)

Annex 4. Sample Seaweeds Production and Trading Business Plan:

of Nipa Fisherfolk Association (next page)

ENVIRONMENTAL SAFEGUARDS STUDY of the CASSAVA VALUE CHAIN in LEYTE, PHILIPPINES

July 2018

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYMS AND ABBREVIATIONS

CBED	-	Community-based Enterprise Development
CEF	-	Community-owned/managed Enterprise Facilities
DA	-	Department of Agriculture
EMP	-	Environmental Management Plan
FAO	-	Food and Agriculture Organization
FGD	-	Focus Group Discussion
FMPC	-	Fatima Multi-Purpose Cooperative
GAC	-	Global Affairs Canada
IEC	-	Information, Education and Communication
KII	-	Key Informant Interview
MAO	-	Municipal Agriculture Office
PPE	-	Personal Protective Equipment
PRDP	-	Philippine Rural Development Program
NGO	-	Non-Government Organization
THRA	-	Typhoon Haiyan Reconstruction Assistance
UNOCHA	-	United Nations Office for the Coordination of Humanitarian Affairs
VCA	-	Value Chain Analysis

I. INTRODUCTION

A. BACKGROUND OF THE ASSESSMENT

In November 2013, Typhoon Yolanda, the strongest typhoon to hit the Philippines, affected eight (8) regions of the country. The havoc and devastation brought about by the disaster has affected more than 14.1 million people (UNOCHA, 2014), with the Eastern Visayas Region being the most badly hit. In the frontline of assistance and rehabilitation is CARE Philippines. Together with funding support from the Global Affairs Canada (GAC), CARE has been working in the Provinces of Antique and Iloilo in Region VI and Leyte in Region VIII under the Typhoon Haiyan Reconstruction Assistance (THRA) Project. The THRA addresses the issues that impede people's access to knowledge, skills, products and services and reinforce the household's livelihoods, strengthening and enhancing capacities and existing knowledge and experiences of communities and entrepreneurs affected by Typhoon Yolanda.

Cassava (*Manihot esculenta* Crantz), before known as "food of the poor" is commonly only used as a source of households for their own food and animal feed. Yet, it has evolved to becoming a 21st century crop with multipurpose uses (FAO, 2013). From the priorities of developing countries, to trends in the global economy, to the issues of climate change, cassava has shown high value potential with recognition of its varied applications. In the Province of Leyte, cassava served as an essential food source for family and livestock. With the damage wrought on staple crops including coconut, corn, rice, the effects on even the weather-resilient crop, cassava, was substantially felt by households.

In response to the typhoon devastation and towards assisting rehabilitation of affected areas, CARE together in partnership with the Fatima Multi-Purpose Cooperative (FMPC) has delivered support to cassava growers in 16 municipalities and 214 barangays in the Province of Leyte. Through the THRA Project, a focus on cassava was provided to assist farmers and other players in the cassava value chain towards rehabilitation of their farming areas and building resilience amongst individuals, families and their livelihoods.

Under the GAC, an Environmental Management Plan (EMP) has been formulated outlining the mitigation, monitoring, and institutional measures to be undertaken during the THRA programme implementation and operation to minimize projected environmental impacts. Within this framework, an assessment of the cassava value chain in the Province of Leyte was conducted with the following objectives:

1. Evaluation of the possible environmental impacts, particularly on biodiversity, of the production, processing, marketing and trading of cassava;

2. Identification of disaster, climate change and environmental hazards and risks and their potential impacts to the cassava value chain;
3. Evaluation of the technical viability of current and potential production areas for cassava;
4. Conceptualization of relevant interventions to address issues identified and arising from the assessments that are anchored on the EMP framework; and,
5. Development of workplan containing relevant interventions to address issues identified during the assessment and to upgrade the cassava value chain.

B. METHODOLOGIES

The methods to collect data and gather information used in this assessment included the following:

a. Key Informant Interview (KII) – These interviews were conducted with key persons from different stakeholders or players in cassava to include representatives of the cassava CEFs, Philippine Government agencies, researchers and other significant actors in the cassava industry and disaster risk reduction and climate change. They were chosen based on their leadership and authority within their organizations and their knowledge, expertise and experience with regards the focus commodity.

b. Desk Review - A review of related literature from various research articles, books, technical documents and from reputable websites regarding cassava production, harvesting, post-harvest and processing, and trading was conducted.

c. Site Visits - Site visits were conducted to meet CEFs officers and members and to physically observe and document production, processing and trading areas, or the processes under the value chain, which would further validate information from desk reviews and KIIs.

C. SCOPE OF THE ASSESSMENT AND LIMITATIONS

This environmental safeguard study was primarily focused for the cassava commodity in areas covered by CARE in the Leyte Province. The whole CARE-assisted cassava producing areas in Leyte comprises of 16 municipalities and 1 city (shown in Figure 1). The cassava producing areas in the Municipality of Carigara served as representative area for this study, with presumptions of homogeneity of situation across all CARE-assisted areas in the 16 municipalities of Leyte.

For this study, focus has been into Cassava Value Chain assessment. It covered practices under the different value chain nodes for cassava, particularly the processes under input,

production, harvesting, processing and trading or marketing, and the different impacts of these in the environment particularly on biodiversity, but also other impacts related to socio-economic. Likewise, hazards and risks confronting these value chains were analyzed vis-à-vis their potential impacts to these activities. Thereafter, interventions and recommendations that would respond to relevant issues were drawn for consideration.

Figure 1. Map of CARE-assisted cassava producing areas in the Province of Leyte.

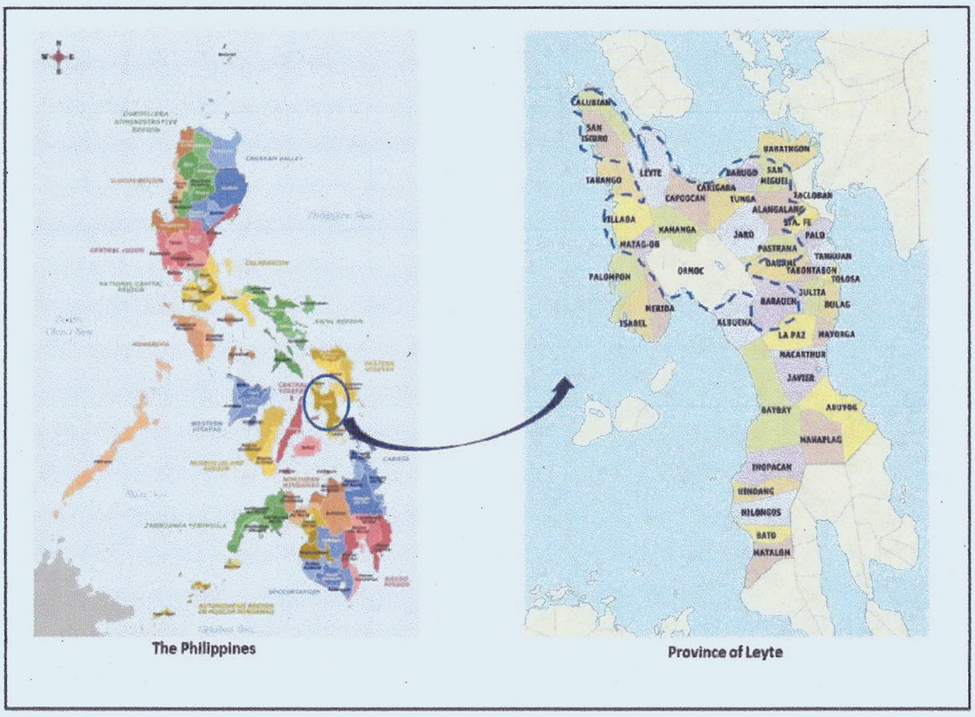


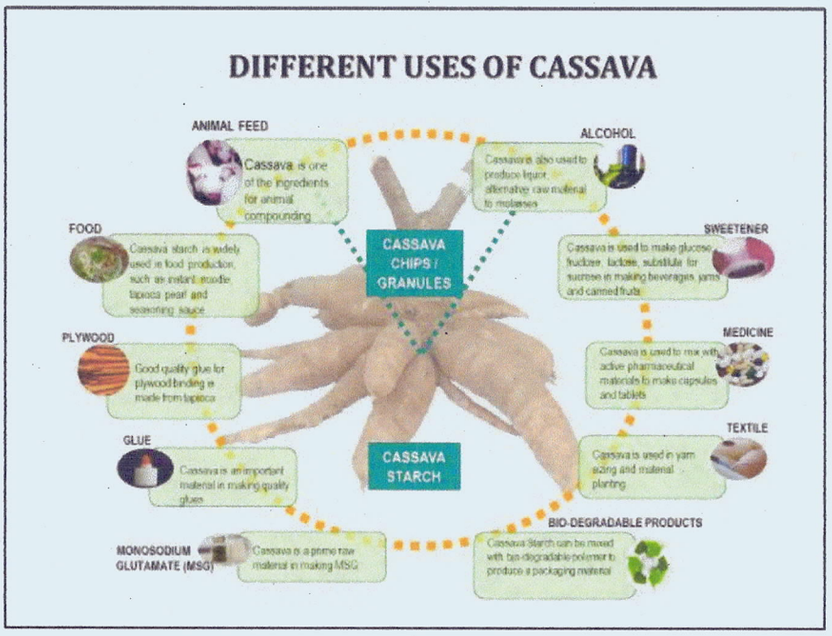
Image credit: (right) https://en.wikipedia.org/wiki/Leyte_(province) and (left) https://commons.wikimedia.org/wiki/File:Labelled_map_of_the_Philippines_-_Provinces_and_Regions.png

The Philippines faces a number of environmental hazards. In respect to this, the Department of Environment and Natural Resources' Mines and Geosciences Bureau took a major initiative to map hazards across the country. In its Project READY (Hazards Mapping and Assessment for Effective Community-based Disaster Risk Management Project), it has produced maps for 28 of the most vulnerable provinces which included Leyte. A number of risks and hazards were identified including earthquake, flood, ground rupture, ground shaking, liquefaction, rain-induced landslide, storm surge, tsunami and volcanic hazards. In this study, only earthquake, flood and rain-induced landslide were the generally relevant hazards posing risks identified to the cassava value chain, aside from hazards related to temperatures and drought. Annex 2 shows Project READY hazard maps of Leyte for earthquake-induced landslide, flood and rain-induced landslide.

II. The Cassava Industry and its Value Chain in Leyte, Philippines

From being known as a "food for the poor" and a staple food for an estimated 800 million people worldwide, cassava has evolved as a 21st century crop (FAO, 2013). The lowly cassava is now not only as a local food source for households and as a feed for livestock but is recognized for its many and diverse food and industrial applications. Currently, cassava has become a substitute for corn as an animal feed ingredient and is used in cassava meal; its starch is used in food manufacturing such as for baked goods and confectioneries, instant noodles, tapioca pearls and seasoning sauces; as an additive or base for pharmaceutical materials such as capsules and tablets; as a source of glucose, lactose, fructose and as raw materials to produce liquor and other alcoholic and non-alcoholic beverages; it is used in the textile industry for yarn sizing; as glue extenders in the plywood industry; as a source of ethanol which can be mixed with petrol as transport fuel and as industrial alcohol for the pharmaceutical and cosmetic industry. Cassava, a truly multi-purpose crop, can be used in many different forms (Figure 2). Table 1 details the varied cassava products and by-products and their applications or uses while Figure 3 presents a picture of the pathways of different cassava products.

Figure 2. Illustrative examples of the many different uses of cassava.

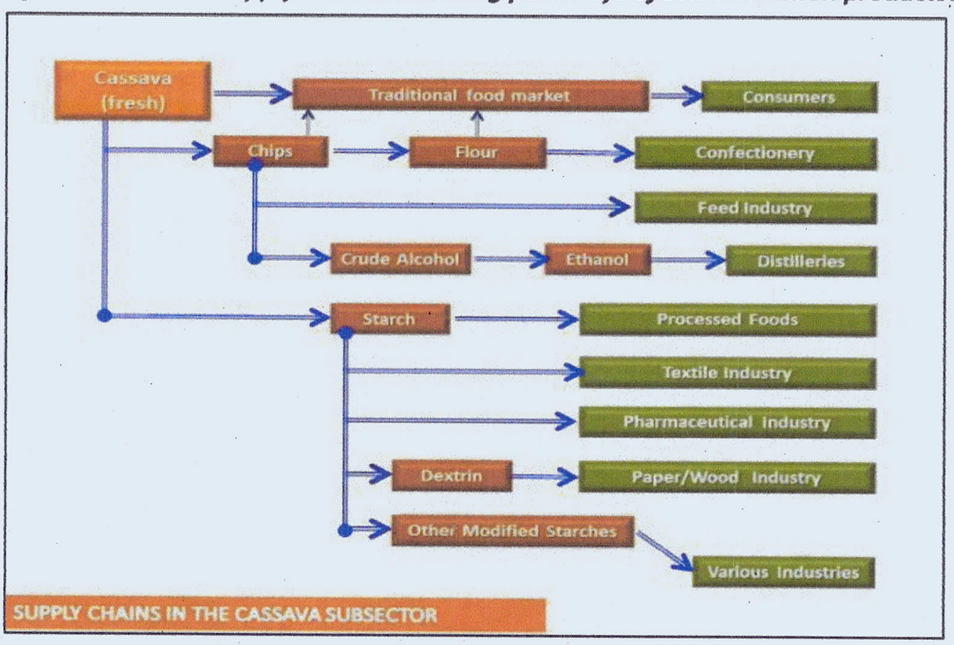


Reference and Image Credit: Cassava Project Briefer, Department of Agriculture, 2014

Currently, the Philippine Government, through the Department of Agriculture (DA), has identified cassava as a high value crop and as an alternative to rice. In the country, cassava is

the leading root crop cultivated followed by sweet potato or camote. In its Food Staple Sufficiency Plan, it promotes cassava as a staple crop for food which will also partly respond in the reduction of rice importation by the country. There is also an increasing demand from the livestock sector for feed in lieu of the costlier corn, prompting further support to cassava production. Under DA's Corn Program, cassava was therefore incorporated as a sub-sector. Within this framework, the Corn and Cassava Program's goal is to increase production of quality corn and cassava for human consumption, to achieve sustainable growth at a level where both can mutually benefit the feed milling and livestock industries, and to make farming of both crops a competitive and profitable enterprise for farmers. The DA has also crafted the Philippine Cassava Industry Development Roadmap recognizing the economic importance of cassava and aiming to develop a competitive cassava industry which can provide a reliable supply of cassava for food and industrial purposes. Along this line, DA and its attached agencies and its regional and municipal offices provides production support services, research and development, extension support, education and training services, and agricultural machinery, equipment and facilities support services.

Figure 3. Cassava supply chain illustrating pathways of some common products.



Reference: Value Chain Analysis and Competitiveness Strategy: Cassava Mindanao, PRDP, 2014

Table 1. Cassava Products and By-Products and their Uses.

Cassava Products and/or By-Products	Description of Applications and Uses
Fresh roots	Usually used at the household level as staple food for the family and as supplement for livestock feed. Grated fresh, it is used for cooking different recipes, including local delicacies in the Philippines like puto, suman, cake, jolly rolls, nilupak, candied cassava, pichi-pichi and many others. These products are not only for household consumption but are also sold commercially and provides livelihoods to many.
Leaves and young leaves	Young leaves are cooked for human consumption for their high nutritional value (25% protein on dry matter basis, valuable source of iron, calcium, vitamins A and C), are prepared by finely chopping the leaves or pounding using a pestle and mortar, and cooking with spices and other ingredients. Leaves, collected while growing or during harvest, are used as ingredient for livestock feed formulation. These are first wilted to lower cyanide level before feeding or made into silage with other forages.
Chips and granules	Cassava are made into chips by chopping the peeled or unpeeled roots (slightly cleaned) and drying, and into granules by passing through a granulator machine. The resulting product are used as feed ingredient, at times as an alternative or cheaper substitute to corn, and for other industrial purposes.
Grates	Cassava grates are produced from peeled roots, washed, grated or rasped, pressed, pulverized and dried, to produce fine or coarse grates. Dried grates have been developed considering the high perishability of fresh grated cassava. Currently well-accepted commercially for use in production of cassava delicacies as the resulting products' quality is comparable to those produced using fresh grates in taste, appearance and acceptability to consumers.
Starch	Cassava starch is extracted from fresh roots that have been peeled, washed, grated or rasped or milled, mixed with water, screened, pressed and dried. It is used in the manufacture of baked products, confectioneries and delicacies. The starch is also used as a thickening agent, bodying or dusting agent, and as a base for pharmaceuticals.
Flour	Cassava flour, high quality cassava flour (HQCF) which is unfermented flour, are derived from fresh roots, chipped and dried, or from dried chips, and milled into powder form to produce coarse or fine flour. It is used as bread flour and is cheaper compared to wheat flour, thereby increasing profitability in bakeries but producing comparable product quality.
Ethanol	Produced from fresh roots or dried chips, by mixing with liquefying enzymes to convert starch into sugars which are then fermented with yeast to produce ethanol.

A review of the cassava production trends for the Philippines reveal that there is a steady increase in production over the years 2012 – 2017 (Refer to Table 2). The area planted and consequently harvested has also grown over the same period. In order for the Department of Agriculture to achieve the goals of the Corn and Cassava Program, the government has identified the following strategies that would contribute to its success: (1) opening of new areas for cassava; (2) production and distribution of quality planting materials; (3) clustering of production areas, organization and capacity building of farmers; (4) strengthening linkages among industry stakeholders (from input to market segments of the value chain); (5) credit facilitation; and (6) geo-tagging of program areas.

Table 2. Philippine Cassava Production, Area and Value 2012-2017.

Statistic	2012	2013	2014	2015	2016	2017
Production Volume ('000 mt)	2,223.2	2,361.6	2,540.3	2,714.3	2,755.1	2,806.7
Area Planted/Harvested ('000 hectares)	217.3	217.1	216.8	223.0	229.8	234.5
Value of Production (Million pesos)	15,717.8	18,065.9	16,664.1	14,711.8	17,385.0	17,710.6

Source: Selected Statistics in Agriculture 2017, Philippine Statistics Authority

Back in the 1980's, as described by the Municipal Agriculture Office of Carigara, cassava production was part of household's backyard gardens. Cassava served the main purpose of providing for an additional household source for carbohydrates and supplemental feed for livestock, particularly for swine. At times, small volumes of cassava tubers are brought by farmers to town centers to sell during market days and proceeds are used to purchase other household needs. In these early years too, with an increase in demand for food, cassava delicacy producers from the Municipality of Palo and Tacloban City started to come to buy fresh cassava at P 60.00 per sack in Carigara.

When Typhoon Yolanda struck Region 8 or the Eastern Visayas in 2013, it destroyed the coconut industry which was the primary source of income for agricultural residents of Leyte. Coconuts take 7-9 years to bear fruits again and thus, with a gloomy outlook, residents struggled for a source of living and on regaining lost livelihood. Women planted vegetables and nuts, while men worked as farm laborers. In 2015, the THRA Project which is supported by the Canadian Government through the Global Affairs Canada was implemented by CARE Philippines. It builds on the gains of early recovery projects and helps restore livelihoods for these communities.

Interventions through cassava production in Carigara and other municipalities in Leyte started in late 2015. The assistance given under the THRA Program included (1) cash grants provided through their associations and (2) capacity building trainings. Coupled with the assurance of a big buyer through the Fatima Multi-Purpose Cooperative (FMPC), CARE's partner in the implementation of the cassava project, farmers were encouraged to increase areas and plant more cassava. The FMPC, based in the Municipality of Calubian, Leyte, served as CARE's facilitating partner on the ground. The Cooperative is also a financial services and business development provider. As CARE's ground partner, FMPC has assisted in providing additional micro-financing services for cassava farmers, trainings and coaching in various activities under the cassava value chain.

Currently, as per estimates of the Municipal Agriculture Office of Carigara, approximately 300 hectares of farmland is planted with cassava in the municipality and on average, 0.5-hectare area is cultivated by an individual farmer, though there may be individuals with larger areas. Among the provinces in the Eastern Visayas Region, Leyte has the biggest volume of production (see Table 3). Data show that while the 2017 volume has not exceeded the 2013 level, the production has picked-up from a decrease in 2014.

Comparing with other regions in the Philippines, the Eastern Visayas Region is on the top eight producing areas as of the year 2017 (see Table 4). Its overall production has dropped in 2014 compared to 2013. Typhoon Yolanda struck the area in November 2013 and the drop in performance in 2014 may be attributed to the devastation brought by the typhoon including loss of cropping materials for the succeeding planting year. Looking at the trend however, there is a slow increase towards 2017; indicative of a steady growth of the commodity in the area. The Autonomous Region in Muslim Mindanao where cassava is a staple in some provinces is the highest cassava producing region in the country, with Northern Mindanao following suit, and the Cagayan Valley Region with production that has quadrupled from 2013 to 2017.

Table 4. Cassava Volume of Production by Region/Year, Philippines 2013-2017 (mt).

Province	2013	2014	2015	2016	2017
ARMM	1,035,107.18	1,045,232.76	1,024,179.70	1,007,822.08	1,037,472.46
Northern Mindanao	601,288.53	663,579.69	728,845.14	705,334.36	736,545.61
Cagayan Valley	77,722.57	135,866.95	240,104.72	312,717.50	325,265.34
SOCCSKSARGEN	89,868.15	121,822.78	114,397.73	105,021.44	103,828.53
Central Visayas	90,697.63	90,556.48	114,035.45	96,354.61	98,653.07
Bicol Region	113,789.70	109,020.85	108,629.48	105,855.16	96,707.98
Zamboanga Pen.	52,310.18	77,185.06	81,339.42	84,013.93	90,314.55
Eastern Visayas	90,331.26	79,975.63	84,215.71	84,854.04	85,901.28
Western Visayas	62,560.37	61,237.54	59,621.63	30,496.50	56,529.27
CALABARZON	49,934.00	51,398.10	51,315.52	50,242.23	47,609.02

Source: Cassava Country Stat. countrystat.psa.gov.ph

Figure 4 illustrates the Cassava Value Chain in Leyte, Philippines. It shows the different players involved at the input chain, production, processing and marketing or trading chains and the various end users of the products derived from cassava. Annex 3 illustrates a more detailed Cassava Value Chain developed by CARE indicating further the enabling or dis-enabling factors and the different organizations working in the different value chain segments.

In total, fifty (50) Cassava CEFs in the Province of Leyte particularly in the municipalities of Barugo, Calubian, Carigara, Jaro, Tunga, San Isidro and San Miguel were provided with cash grants to purchase input materials and cover costs for land preparation for cassava production. These cash grants were released directly to the associations or through the FMPC.

Aside from cash grants to Cassava CEFs, CARE also assisted other Community-Based Organizations and individuals across the province through building capacities, particularly by providing technical assistance and trainings. Community-Based Development Facilitators (CBDF) and consultants were mobilized by the project, while trainings on Good Agriculture Practices and Processing of Cassava were partnered with the PhilRootCrops. The trainings conducted covered 10 different subject matters or topics that all built towards recovery and resilience of the affected communities and individuals. These included the following:

1. Community-Based Enterprise Development (CBED)
2. Financial Literacy
3. Cassava Value Chain Orientation and Analysis
4. Values Formation
5. Good Agriculture Practices (GAP) in Cassava Production, Chipping, Drying, Handling & Storage
6. Business Planning
7. Pre-membership Education Seminar & Philippine Crop Insurance Corporation (PCIC) Orientation
8. Gender Sensitization
9. Livelihood-Centered Community-Based Vulnerability and Capacity Assessment (CVCA) for Cassava Community Enterprises
10. Business Continuity Planning

Table 3. Cassava Production in Eastern Visayas, Region VIII, Philippines 2013-2017 (mt).

Province	2013	2014	2015	2016	2017
Leyte	43,852.99	35,563.36	38,886.29	40,254.71	40,750.33
Eastern Samar	15,898.00	15,392.24	14,485.68	14,357.83	14,188.35
Samar (Western)	10,370.00	10,171.00	11,954.75	12,236.00	12,835.00
Northern Samar	8,967.59	9,262.77	9,241.75	8,308.70	8,391.75
Southern Leyte	7,662.09	6,158.26	5,948.76	5,859.80	5,850.85
Biliran	3,580.59	3,428.00	3,698.48	3,837.00	3,885.00
Total for Region VIII (mt)	90,331.26	79,975.63	84,215.71	84,854.04	85,901.28

Source: Cassava Country Stat. countrystat.psa.gov.ph

Figure 4. Cassava Value Chain in Leyte, Philippines

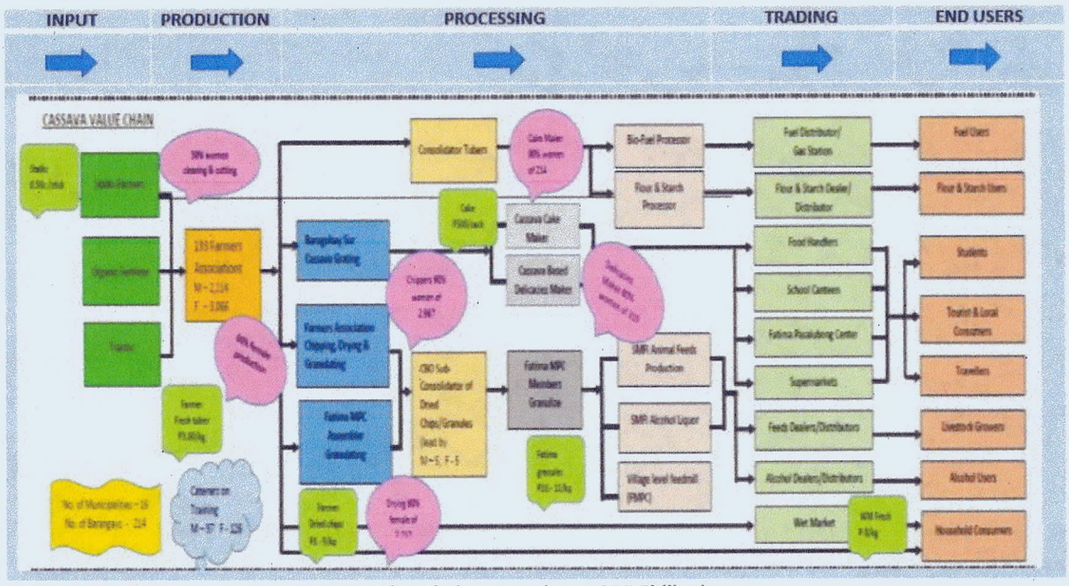


Image Credit and Data Source: Cassava Value Chain Enterprises, CARE Philippines

A. INPUT SUPPLY

In cassava production, initial farm inputs consist basically of cassava seedlings and fertilizer. In Carigara, farmers use planting materials or cassava stalks taken from their newly harvested cassava plants or from other cassava growers in the area or were "recycling" planting materials. The use of fertilizers was uncommon in early practice; understandably since cassava production was minimally done in backyard gardens.

Cultivated cassava varieties in Carigara and in other areas in Leyte include those with low cyanogen content. These include the varieties known as Golden Yellow and Lakan 1. While both varieties are planted, the Golden Yellow variety is more preferred since its tubers are reportedly heavier than that for Lakan 1. Table 5 details the different characteristics of these cassava varieties.

With the interventions (capacity building) conducted, including a Training on Good Agriculture Practice in Cassava Production provided by CARE to the cassava growers, there is increased production volume and areas and improved and better ways of farming practiced by cassava growers. Currently, farmers that have undergone the trainings follow recommendations embodied in the GAP trainings on production. For proper choice of seedling material, these include, using only physiologically mature stems of not less than 1.5 cm diameter, with a pith or cork less than half the diameter of the cortex, free from disease and fresh stems which when cut, a latex or sap comes out within 3 seconds.

Table 5. Cassava Varieties Cultivated in Carigara.

Variety	Description
UPL Cv-2 or Lakan 1	With yellow flesh and cream cortex, all-purpose variety; dry matter is 34-45% and starch is 25-33%; variety has field resistance to leaf spot and bacterial blight. Uses: food, feed, starch; high yield variety; up to 40t/ha fresh root yield
PR-C 24 or Golden Yellow	"Miracle cassava" with external root light brownish with yellow flesh and cream cortex; dry matter is 39% and starch is 21.5. Uses: food, feed; high yield variety; up to 43t/ha fresh root yield

Prior to CARE intervention, farmers in Carigara have experienced diseases of their cassava plants. With the technical services and GAP training, the Philippine Root Crops Research and Training Center (PhilRootCrops) provided disease-resistant seedling materials. Currently, PhilRootCrops uses *streptomycin* as a pre-treatment for cassava stalks; it being the only approved drug for use by the Philippine Food and Drug Administration (FDA). With the pre-treatment, mature stalks from the initial seedlings may be used for two more additional planting cycles by the farmers. To assist farmers, pre-treated planting materials from the PhilRootCrops were provided by the Department of Agriculture through the Municipal Agriculture Offices. Other than pre-treated stalks, farmers are now practicing the use of healthy seedlings sourced from other growers in the area. For plants that have disease signs, farmers have now also been taught to destroy and burn the plants thereby preventing the spread of diseases.

Fertilization was not a common practice in cassava farming before CARE intervention. Through the trainings provided, farmers now understand the importance of replenishing soil nutrients to achieve succeeding good harvests. As now known and understood by farmers, cassava plants are heavy consumers of soil nutrients. In a 60-ton harvest (including roots and stalk) per hectare, the cassava plant has removed 124 kg N, 104 kg P_2O_5, 584 kg K_2O, 217 kg CaO and 71 kg MgO, and these are sufficient amounts which if not replenished, would affect cassava growth in the next cropping season. Nitrogen, Phosphorus and Potassium are important elements for vegetative growth, early root development and translocation of carbohydrate from leaves to stalks and vice- versa. Currently, farmers follow the recommended 1 bag inorganic complete fertilizer (14-14-14) combined with 6 bags of organic fertilizer (vermicast) per hectare of cassava farm. The organic fertilizers are sourced from the CEFs who produce vermicast, such as the Camansi Farmers Association in Barangay Camansi, Carigara, Leyte.

Tables 6 and 7 highlights the impacts of the input node of the cassava value chain and the effects of hazards and risks on these.

Table 6. Environmental and other Impacts of Inputs for Cassava Production in Leyte.

Input Activity	Impact Details and Type
Treated cassava planting materials	- Availability of chemically (streptomycin)-treated cassava stalks from PhilRootCrops, which are disease-resistant seedling materials for abaca farms. This is a positive, direct impact to production of cassava with assurance of quality seedling materials and prevention of disease at the very start of the value chain. The practice supports good agriculture practice. - Other plant parts such as leaves and excess stalk are used as component of the organic fertilizer production or returns to the soil as naturally decomposed material. This is a direct, positive impact to soil quality, as these contribute to natural fertility of the soil. - The use of chemicals needs to be done in controlled manner; with antibiotics this is to manage risks of developing antibiotic-resistant organisms including pests. In this study, there is insufficient time and resources (database) to conclude any effects (impact) of this in cassava.
Production and application of organic fertilizer	- Under the GAP, utilization of organic fertilizer for cassava production is recommended. In Carigara, this is with vermicast as organic fertilizer. There is minimized or no carbon footprint as it uses base materials that come from natural sources including cassava leaves and excess stalks. This is a positive, direct impact to the environment as no fossil fuels are used compared to inorganic fertilizer. - Greenhouse gas release during production is low or none. Direct, positive impact to the environment (atmosphere) as organic fertilizer production uses low or no fossil fuels, and therefore no contribution to greenhouse gas. - With the recommended use of 6 bags organic fertilizer per hectare of cassava plantation, there is increased demand for this product. In essence, this entails a direct, positive, economic benefit to the CEFs who are producers of these fertilizers or to other stakeholders who may be engaged in its production. - The use of vermicast has generally been found to increase the number of earthworms in soil leading to other benefits such as increase in soil water and nutrient retention, and improved soil texture. Directly this is a positive environmental impact to soil improvement. Yet, cassava plants produce cyanogenic glycosides which is toxic to aerobic organisms. This however cannot be confirmed in this study specifically for cassava due to lack of time and resources (data or information).

Table 7. List of Hazards and Risks Affecting the Inputs Systems or Activities of Cassava.

Hazard or Risk	Effect or Impact on the Inputs Systems or Activities	Mitigation Measures
Typhoons and Floods	Heavy rains may cause water log in insufficiently drainable areas where the stalks are stored before they are planted	Ensure plantation areas have good drainage as water logging above 24 hours can have detrimental effect on cassava roots.
	Strong winds destroy stalks and foliage of cassava and consequently, loss of seedling materials	Employ harvest of mature plants and with available time before storm, consider preparing stalks as ready planting materials and chipping roots for drying. Pruning the mature plants may also mitigate damage from strong winds
	Heavy rains may cause landslides and strong winds may destroy organic fertilizer production areas/houses	Provide additional protective structures or strengthen structures in organic fertilizer production area
Drought	While cassava is a drought tolerant and resilient crop, significant periods of water stress (drought) will lead to a reduction in growth and yields, and prolonged drought can lessen biomass up to 70%. This loss translates to loss of input material for planting	The timing for planting plays a big factor in the growth of newly planted cassava, so ensure that sufficient water is available in the first 1-5 months of planting. This ensures that there will be no need for new input (seedling) material to replace dead tubers.

B. PRODUCTION SYSTEMS

The former method of planting cassava was commonly in the slanting or horizontal position, i.e. the cassava seedling is slightly almost lying on the soil. It is placed in the deep part in between troughs or furrows. This is how the current generation have learned from their parents and neighbors in the community.

New and updated techniques in planting cassava were taught to cassava farmers by CARE, FMPC, the Municipal Agriculture Office (MAO) of Carigara, other training partners such as the PhilRootCrops and the Community-Based Development Facilitators (CBDF) who are focals assigned in different areas. A slight resistance was sometimes met during trainings, field visits and technical assistance as participants insist the old cassava production practices worked well for them and so need not be changed. With dedication towards restoring livelihoods and building resilience in the communities and their livelihoods, persistence in sharing knowledge was done by partners. Slowly production systems have adapted to more current and

scientifically-based and proven practices and techniques. Table 8 illustrates traditional and current farming practices of cassava farmers in Carigara.

Table 8. Cassava Production (Planting) Practices in Leyte.

Method	Practices
A. Traditional	▪ Seedling materials or stalks are laid slanting on the lower troughs or lower portion of the furrows ▪ Planting density not particularly established ▪ No fertilization ▪ Seedling materials are recycled from harvested cassava
B. GAP-recommended	▪ Seedlings are planted either vertical, horizontal or slanting. 3-5 nodes of the stalk are buried in the soil and planted on the high part of the furrow. ▪ Planting density are set at 50-75 cm distance between hills and 75-100 cm between rows ▪ Pre-treated seedling materials which are disease resistant can now be sourced from the Department of Agriculture and the PhilRootCrops ▪ Farmers avoid recycling their own seedlings, and use pre-treated seedlings or source new healthy seedlings from other farms ▪ Soil analysis is recommended to be done to determine fertilization rates but this has yet to be instituted in practices of farmers ▪ Organic fertilizer (vermicast) is preferred for use over inorganic fertilizer. Fertilizers are applied in the lower portion of the furrows ▪ Intercropping is promoted for adoption by farmers and is showcased in demo farms established by CARE. Intercrops include corn, peanuts, banana, sweet potato ▪ Following parameters for site selection or suitability criteria (see Table 10)

Newly planted cassava plants in Barangay Cogon, Carigara, Leyte. Note the open field and other crop (corn) being cultivated adjacent (modular planting).

Cassava harvests can be done in 8-12 months after planting. This is a considerable amount of time before income may be derived by the farmers. Also, cassava requires little intervention upon canopy establishment and closure which is around 4-6 months post-planting. Recognizing these, intercropping as alternative way for farmers to earn from the same area of land is promoted. Aside from the economic benefit, one of the well-known ways to increase agrobiodiversity is through the practice of monocropping. CARE has therefore established demonstration farms with Cassava CEFs in October 2017 that were a showroom for farmers to see how intercropping can benefit them by planting crops that have a shorter growing period in

between cassava plants, and also to serve as a source of planting materials for its members. The demo farms also show intercropping as a support to nutrient replacement, particularly when intercrops include leguminous plants. Intercrops recommended include peanuts, corn, banana, camote or sweet potato. Aside from the use of pre-treated seedlings, crop rotation is also recommended to avoid attack of pests and diseases and in the same way as intercropping, crop rotation can provide additional source of income for cassava farmers. Farmers were also warned of the method of monocropping which is planting the same crop in the same place each year. The practice has detrimental effects to the soil by depleting nutrients, making soil unhealthy to support new plant growth. In the same way that monocropping disrupts natural soil makeup, it has the potential to spread pests and diseases. In both instances of soil nutrient depletion and pest infestation, these would require chemical use in the form of fertilizers and pesticides, leading to other environmental problems (air pollution, soil leaching).

In terms of the suitability criteria, cassava is known to be a crop which can thrive with minimum water, in slightly acidic soils and with or without fertilization particularly when planted only for household consumption (when cultivated as a monocrop in successive cropping seasons, the need for fertilization becomes very important for its capacity as a heavy soil nutrient remover). Table 9 provides a comparison between desired optimal conditions for cassava and current situation in Carigara while Table 10 details impacts of cassava production activities.

Table 9. Comparison of Recommended Parameters for Cassava Production with Current Conditions

Parameters	Recommended	Current situation in Leyte
Climate	▪ No specific climate requirement ▪ Sufficient rainfall or water to support growth of plants throughout the year	The Province of Leyte, as is most of the Philippines, has a tropical rainforest climate which is generally hot and wet year-round with rainfall heavy and frequent. With this, farmers are aware that cassava farming areas should not be located in potential flood and water-logged areas.
Soil Quality	▪ Grows in all types of soil but performs well in clay loam and sandy clay loam ▪ Loose, friable and well drained ▪ Medium soil fertility ▪ Soil pH ranging from 5.5 – 6.5	The soil is found suited for planting cassava as experienced by farmers and evidenced by production. Since cassava was not intensively cultured before CARE intervention, farmers find the soil still able to support production. As planting is being promoted and/or intensified, farmers already have learned from GAP Trainings and other capacity

		building activities that cassava is a heavy soil nutrient remover; therefore, actions are in place, such as intercropping with other plants including leguminous short-term crops to replace nitrogen and other important nutrients in the soil. Conduct of soil analysis is targeted to be done and supported by the Municipal Agriculture Office
Topography	▪ Flat or undulating slope, not more than 15% ▪ Well-drained area with no water-logging for more than 24 hours	The areas where cassava is planted are in flat or slightly sloping land. Farmers have noted on this and are well-aware of avoiding areas with potential water-logging
Shading and location	▪ No shading requirement, open field is well tolerated	Cassava production areas are in open spaces, with some areas underneath coconut trees, but these are also sparse as many trees were destroyed by Typhoon Yolanda
Accessibility	▪ Well accessible and not far from roads	Carigara has a good network of farm to market roads or barangay roads and accessibility is not a problem in the area

CARE and its partners have contributed resources to assist farmers in increasing cassava production. CARE has provided cash grants (for planting and fertilizers) and capacity building activities (trainings, technical assistance) in partnership with the FMPC. The Department of Agriculture, through the Yolanda Response and Reconstruction Project (YRRP), has provided some organizations with farm machineries such as tractors to assist in land preparation. The Department has also provided livestock – swine, goats, cattle and native chicken, while PhilRootCrops assisted in providing trainings and pre-treated cassava seedling materials and other root crops including peanuts and camote.

Table 10. Environmental and other Impacts of the Production Systems of Cassava in Leyte

Production Activity	Impact Details and Type
Establishment of cassava farms or plantations	- Cassava is a heavy consumer of soil nutrients, thus establishment of cassava plantations using GAP recommended practices is pursued. This promotes better soil nutrient and quality management. This equates to a positive, direct impact on the environment as the practices prevents soil degradation and ensures continuing harvests - Cassava production equates to additional income to farmers which is a positive and direct impact to their livelihoods
Establishment of demonstration farms for intercropping of cassava or in modular system	- The demonstration farms serve as showroom for techniques or better practices in cassava production. This has a positive and direct impact on learning for farmers as they have actual examples of the system. Involving members of the farmer

	associations in the management of demo farms also has a direct positive effect on the farmers' capacity and skills - Intercropping, and modular planting, as espoused in the GAP trainings, contributes to natural fertilization of soil particularly with leguminous crops. Positive, direct impact on soil quality as intercrops to cassava can be used as direct components to soil and naturally serves to add nutrients when left to decompose around hills - Intercropping systems have been known to have decreased pest indicators, meaning there are less pests than in monocrop systems. This may be due to a decrease in the habitat for the particular pest as other crops are grown, presence of pest predators (natural enemies) from the other farmed crops and also as different crops may have pest-repellent characteristics. This has a positive, direct impact towards increased production as cassava plants are less affected by pests - Improved conditions of biodiversity among intercrops owing to the fact that plants are themselves habitats or food for other organisms or they may have symbiotic relationships. Studies report on improved biodiversity with enhance habitat heterogeneity with intercropping. Positive, direct impact on environment and supports biodiversity protection and restoration - Intercrops provide both additional nutrition and income for farmers. Positive, direct impact to food security and to the livelihoods of farmers
Use of Organic Fertilizers	- Minimizes risk of over fertilization, toxic salt build-up and leaching. Positive, direct impact on soil quality and the environment as common adverse effects of using inorganic fertilizer is avoided - There is slow release of nutrients for plant uptake using organic fertilizers. This however is a positive, direct impact on plant nutrition as it ensures more nutrients are available for cassava plants in the long run. Yet, this can be a negative impact for plant growth when there is an immediate need for nutrients, i.e. when cassava would otherwise have benefited faster through readily available nutrients supplied by inorganic fertilizers - Minimized or no contribution to carbon footprint in fertilizer application since organic fertilizers come from natural sources. Positive, direct impact to the environment compared to application of inorganic fertilizer.
Regular farm maintenance activities such as under brushing and weeding in the first few months of planting	- Contributes to soil fertility. Positive, direct impact to environment as the practice of cutting the grasses or weeding and other organic mass will decompose and return back to the soil as natural organic matter - Natural decomposition of organic materials promotes biodiversity among organisms like earthworms which helps in the task of decomposing materials. Positive, direct impact to environment with increase in soil biodiversity.

Table 11. List of Hazards and Risks Affecting the Production Systems of Cassava in Leyte

Hazard or Risk	Effect or Impact on the Production Systems or Activities	Mitigation Measures
Typhoons and floods	- Strong winds destroy cassava foliage and stalks and subsequently lead to rotting of tubers or roots s - Accompanying heavy rains may cause water logging and landslides	- Immediate harvest of mature plants before typhoon hits to enable chipping and drying of roots and storing of stalks for seedling purposes - Pruning leaves and stems for young plants may serve as an option to keep the plants from being uprooted by strong winds - Careful selection of areas for plantation establishment to ensure these areas drain well during heavy rains. Placing intentional drainages (such as canals) may help to drain water faster during heavy rainfall
Droughts or prolonged dry season	- Cassava plants can withstand significant periods of water stress (no water) resulting however to reduction in growth and yields	- Planting of new seedlings should be timed with sufficient water availability in the first 1-5 months to ensure that plant canopy and the development of tubers roots have been initiated - Cassava plants, due to their nutrient and water use efficiency, have the ability to cope or recover if at least a wet season takes place in a year. Water stress problem can be addressed if there is an option for crop irrigation - Planting cassava in a modular system can serve as an option as the plants in the modules may be in different stages of growth. Only those modules that will be greatly affected (newly planted or growing) by drought will need to be watered making farm management easier for the cassava farmer

C. HARVESTING AND PROCESSING SYSTEMS

Cassava are harvested from the 8^{th} – 12^{th} month after planting. Presently in Carigara, cassava farmers sell their produce as fresh roots, as dried cassava chips or as cassava granules. Comparing to former practice, farmers only have the option to sell their cassava as fresh roots. In this case, cassava has a very low shelf life of 2 days after which vascular streaks appear and renders the root unfit for human consumption. The THRA program has provided farmers with more processing options and avenues for income at their hands.

Demonstration farm of Canfabi Farmers' Association in Barangay Canfabi, Carigara, Leyte, showing peanuts, corn, sweet potato intercropped with cassava or in modular planting system.

Along this line, CARE has provided Cassava CEFs support on trainings, materials and equipment. Ten CEFs were awarded with a granulator machine, a workhouse and a 5-mt capacity hermetic cocoon to protect the dried cassava chips or granules from weevil or insect infestation. On its part, the Philippine Government also provided, through the DA, chipping and grating machines to select CEFs. Previous to the provision of these, CARE has already provided "papag dryers" which are bamboo stilt dryers with ultraviolet (UV) plastic roofing as more hygienic drying platforms for cassava chips and to protect chips from rain during drying.

Cassava processing into a value-added product. Shown in the photo is a member of the BASUFA preparing grated cassava for drying. At the right is a product sample of ready-to-cook cassava chips produced by the organization.

One of the Cassava CEFs, Barugohay Sur Farmers Association (BASUFA), was provided with material and equipment support for village-level cassava processing focused on selling

cassava confectioneries. This CEF has already learned the techniques for processing fresh cassava through a skills training on cassava processing provided by CARE and handled by the PhilRootCrops. Currently, the association composed mostly of women, produces cassava chips or kropeck (with flavors of cheese, garlic, malunggay), and cooks cassava rolls, macaroons, pichi-pichi, espasol, cassava cookies, etc. Production is yet at a minimum, promoted and sold in the local market or in trade fairs, but BASUFA is planning to commercially produce these foodstuffs. In general, the fresh cassava is peeled and washed, grated and processed into any of the products that the women target to produce. The current processing activities of the BASUFA has no significant adverse environmental impact as the activities are a start-up stage. Water use for rinsing tubers is minimal and there is no significant volume of effluents coming from cassava processing. Yet, in case of commercial level processing, the volume of water use and released effluents increases, which then may require managing these for environmental protection.

Cassava chips being dried under a covered dryer. After drying, these will be "granulated" and sold to FMPC. Uses for this type of product form include animal feeds and other industrial uses.

The production of dried chips is a simple process handled by farmers with members of their household. It is considered a family-friendly enterprise as women and older children can assist in chipping and drying. Mature cassava is harvested and the tubers or roots are brought to the Association's drying area where these are cleaned of dirt or soil (but not washed) and with the skin on, are sliced or "chipped" to about 3-5mm thickness. The slicing or chipping must be done within 4 days after harvesting of the cassava. Chipped cassava is placed in the papag dryers to dry in 4 days during sunny days while it takes up to 5-6 days during days with some rain. After drying, the chips are packed in sacks and brought to FMPC to sell at P 9.00 per kilo (buying price as of July 2018). With the use of a granulator machine, the cassava chips can be further processed or ground into cassava granules which can fetch a slightly higher selling price. The resulting product are pieces of dried cassava approximately the size of corn seeds. At this form, each kilo sells at P 9.50 to FMPC. Cassava chips and granules may be stored for a month, but with the hermetic cocoon, storage can be extended up to 3 months. The hermetic cocoons are specially designed containers that will protect products from pests and insects. With its use, farmers can have the option to store their produce and with time, leverage for a higher market selling or buying price.

Table 12. Environmental and other Impacts of the Harvesting and Processing Systems of Cassava in Leyte

Harvesting or Processing Activity	Impact Details and Type
Harvesting of cassava	- Cassava are uprooted during harvesting to collect the edible roots or tubers. In the process, soil is disturbed and loosened. This is a direct, negative impact to soil stability especially in sloping areas, risk of loss of top soil and soil nutrients when harvesting is performed during a rainy day - The harvesting may also produce leaves and stalks which are generally wastes in the process. However, there are various uses of these such as for silage and compost (leaves) and as new seed materials (stalks), or they may be left on the farm to decompose naturally and return as organic matter and fertilizer to the soil. Generally, the process is a positive and has direct impact to the soil (as natural organic matter) or as new planting materials (stalks)
Production of confectioneries	- Cassava roots or tubers are processed into various forms for human consumption. The process utilizes minimal water use (for washing peeled roots and for cooking) and no significant volume of effluents are observed. The whole activity has no significant negative impact to the environment - Peels or skins of the cassava used for processing are placed by the women in a nearby garden compost. The activity has a positive, direct impact to soil fertility as naturally decomposed organic matter is returned to the soil and used to fertilize garden plants - Confectioneries or food items produced from cassava have improved nutritional value and therefore can contribute to better health and food security. Income derived from selling these contributes to the economic well-being of the cassava farmers. Positive, direct impact for the physical well-being attributed to the nutritional value provided and socio-economic life for the additional income derived from selling the products
Production of cassava chips and granules	- The production of cassava chips and granules have no adverse environmental impact on the environment. Rather, its production commands a higher market value for cassava. Thus, there is positive, direct impact on the socio-economic life of the cassava farmer with better income compared to selling fresh tubers. Additionally, there is savings with less transport costs involved since the product has been converted to a lighter, more compact, but higher value product - The process of granulating cassava produces fine particles (dusts) from the cassava chips. The process has a negative, direct impact on the health of the cassava farmers from inhalation of cassava dust particles

In the cassava value chain, wastes from cassava is unheard of since all parts of the plants are utilized. The leaves can be used for compost, as an ingredient in producing animal feeds (silage), while the stalks may be used as new planting materials or form part of a compost, and the tubers are processed into food or into chips and granules. In washing fresh cassava for confectioneries, the use of water is minimal, there are no effluents of significant volume from their kitchen and the peels (skins) of the cassava are used by the women as part of their

garden compost. In essence, the processes involved are not in any way detrimental to the environment.

The harvesting of cassava undoubtedly produces a volume of leaves and stalks (just as with maize and other crops). In the study sites, there are left on the field to naturally decompose or are plowed-in in the next land preparation activities to combine and return nutrients with the soil. In the GAP trainings conducted, use of leaves as feed silage was part of the modules received by the cassava farmers. While there is no significant report of it being practiced in Carigara as of the time of study, this was provided as an option for farmers as to the use of leaves and as a source (ingredient) of livestock feed.

A newly installed cassava granulating machine (left) and a Papag Dryer for cassava chips (right).

Table 13. List of Hazards and Risks Affecting the Harvesting and Processing Systems of Cassava in Leyte

Type of Hazard or Risk	Effect or Impact on the Harvesting and Processing Systems	Mitigation Measures
Typhoons	- Strong winds may destroy cassava plants and therefore loss of material for use in processing activities - Destroy processing structures (workhouses) and loss of equipment	- Mature cassava ready for processing may be harvested and processed into chips while there is sunlight and dried, before any typhoon and its rains come - Secure workhouse and equipment or materials before any typhoon to prevent their being blown away or destroyed - Consider personal safety as a priority at all times
Droughts or prolonged dry season	- Loss of materials (roots, tubers) for use in processing. While cassava plants can withstand significant periods	- Assurance of a continuous supply of cassava for processing depends on availability of harvests. Therefore guarantee of

	of water stress (no water), prolonged periods can result to reduction in growth and yields of tubers and subsequently to loss of processing materials	continuous supply of cassava tubers for processing depends on the production stage.
Flood and prolonged rain	- Floods, particularly when it occurs for more than 24 hours, can cause loss of processing materials (roots, tubers) as these easily rot when exposed (submerged) in water - Destroy structures (workhouse) and loss of equipment and materials - Prolonged rain lowers atmospheric temperatures and lengthen drying times for processed cassava. Rain and moisture can lead to growth of molds, cause rotting and lower quality of processed cassava	- Situate cassava processing areas and facilities in flood-free areas or areas with good drainage and where flood waters do not have potential for flowing through and destroy structures, equipment and materials - Ensure protection of cassava undergoing processing (i.e. drying) from rain and moist by having covered drying areas or direct covers on the drying products
Rain-induced landslides	- Landslides may destroy structures (workhouse) and loss of equipment and materials for processing	- Situate processing areas where risk of landslides is low to protect assets (workhouses, materials, equipment, etc)
Earthquake, ground shaking and ground rupture	- May lead to landslides or destruction of cassava workhouses and equipment	- In setting up processing areas, avoid steep inclinations and known fault lines

E. MARKETING AND TRADING SYSTEMS

Previous to Typhoon Yolanda, marketing of cassava roots has been done by individual farmers within their municipality by selling a few sacks of fresh roots in the local market. Additionally, confectionery producers from the nearby municipality of Palo and from Tacloban City come to purchase from the farmers. As narrated by FGD participants, the market segment was the main bottleneck for the growth of the cassava industry in their area as there was no big buyer for the farmers' cassava production.

As CARE aided these farmers, it also partnered up with FMPC who served as the main big buyer of cassava from the farmers. While the FMPC was CARE's facilitating partner on the ground, it also was the accredited assembler or consolidator recognized by the San Miguel Corporation (SMC). FMPC and SMC signed a Farm and Consolidation Agreement together

whereby FMPC is able to directly deliver cassava products to SMC's B-MEG Feed Plant in Macabog, Ormoc, Leyte.

At the farm level, individual farmers by themselves benefit by having formed themselves into associations. Having done so, their organizations become their own farm-level consolidator such that they have no need to deliver their products in town to a bigger buyer as their organization can buy from them. This saves the farmer the cost of transporting their own produce. Any profit margin made by their organization returns back to the organization itself and its members.

Currently, the buying price for fresh cassava depend on its intended use. For processing into confectioneries, a sack fresh cassava of good quality and approximately 100 kilos costs P 450.00 – P 550.00. On the other hand, fresh cassava for other uses (industrial) is bought by FMPC at P 3.00 per kilo or P 300.00 per 100 kilos. At a recovery rate of 42% from fresh to dried, the CEFs sells to FMPC at P 9.00 per kilo dried chips or P 378.00 for the recovered 42 kilos dried (100 kilos fresh: 42 kilos dried chips). The price translates to an increase in income by at least 26%. Additionally, dried chips are easier to transport thus further savings are realized by the cassava farmers from transportation expenses to the buying center. Further on the trading chain, the San Miguel Corporation purchases these chips at P 11.00 per kilo. With the presence of FMPC as a consolidator, the farmers are able to have a sure buyer of their produce. This in effect responds to the need for a big buyer of cassava by the farmers in their locality.

Table 14. Environmental and other Impacts of the Marketing and Trading Systems of Cassava in Carigara, Leyte.

Marketing and Trading Activity	Impact Details and Type
Farm level consolidation by CEFs	CEFs themselves consolidate their members' harvests. This leads to easier access of farmers to buyer or market and removes transport costs to main buyers. Positive, direct socio-economic impact as the individual cassava farmers have no need to go to town centers to sell their produce. In a way, this can be said as empowering communities since once they are formed into organizations, they have an even easier access to different forms of support that goes back to benefit the individual members.
Municipal level consolidation by FMPC	Farmers are assured of a big buyer for their cassava produce. This is a positive, direct impact to the livelihoods of the cassava farmer. The absence of a buyer in the market was a bottleneck before CARE assistance which now has been responded to with the FMPC partnership.
Cassava can be bought or sold as fresh roots, in dried chips, granules, grates, starch or flour	Cassava is a versatile crop that may be sold or bought in various forms. This is a positive attribute of the crop, as depending on the availability of processing equipment, a farmer has options to different markets. Positive, direct impact on the livelihoods of farmers as each product form have different selling/buying price, thus farmers can secure best prices and consequently earn better income from their crops.

Table 15. List of Hazards and Risks Affecting the Marketing and Trading Systems of Cassava in Leyte.

Type of Hazard or Risk	Effect or Impact on the Marketing and Trading Systems	Mitigation Measures
Typhoons	- Strong winds destroy warehouses or stockrooms and equipment or tools (weighing scale, rope, cargo truck, others)	- Provide additional support or strengthen structures of warehouses or stockrooms and safekeep equipment or tools when there is threat of a typhoon
Flood or rains	- Floods may cause destruction of structures and equipment by sheer force of water flowing through it or by being immersed in water - Rains and floods can cause delay in transportation by destruction of roadways or and by the mere fact of unfavorable weather	- Situate locations where flood waters do not have potential for flowing through and on higher ground to avoid getting flooded - Products ready for transport need to be well-secured from moisture until favorable weather conditions allow for safe transport
Rain-induced landslides	- Leads to landslides that may destroy structures, equipment and roads	- Situate locations for marketing structures where risk of landslides is low and where product removal is easier with safe transportation access
Ground shaking and ground rupture	- May lead to landslides and destruction of structure and tools	- Avoid areas with steep inclinations and known fault lines

III. Impact Chain Analysis for the Cassava Industry of Leyte

As gathered from the different information sources, based on observations in the field visits, and as espoused in the GAP for cassava, the following climate stimuli chart for cassava was drafted (Figure 5). It shows which climatic conditions have the most significant impact on the production and harvesting/processing phases of cassava. The matrix shows that different climatic stimuli have different effect on the different phases involved in cassava production, such as high temperatures which may have low or no negative impact during the growing stage and also will have a positive impact on the harvesting and drying stages. The destructive effects of typhoons have the highest negative impact on both the production and processing phases for cassava not only to the plants per se but to associated structures, facilities or

equipment used. Measures to address the effects or impacts have been elaborated in the preceding tables detailing hazards and risks along the cassava value chain, their impacts and mitigation measures.

Figure 5. Climate Stimuli Chart for Cassava.

Climate Stimuli Chart for Cassava		
	Production Phase	**Processing Phase**
Climatic Stimuli	**Planting/ Growth Maturity**	**Harvesting and Drying**
Rainfall and flooding	Heavy rainfall and flooding may damage roots if waterlogged beyond 24 hours	Moisture prolongs drying period which may lower quality of chips and granules
High temperature	Low impact as cassava is resilient to high temperature. Leaves have adaptation by folding and drooping when temperature is warm thereby lessening water evaporation	Positive impact as it promotes faster drying time for cassava chips and granules
Typhoons	Damage to cassava plants, potential loss of materials, equipment and structures due to strong winds and heavy rains	
Prolonged dry season and drought	Negatively affects growth (decrease in tuber or root development)	May lead to decrease in harvests volume which will affect the processing phase (absence of materials for processing)

Legends:
Red – high negative impact; Yellow – medium negative impact; Green – low or no negative impact; Blue – positive impact; Gray – seems not to be very relevant.

IV. Issues, Recommendations and Action Plans

In view of the findings of the study, a list of issues and concerns covering different functions of the cassava value chain in the study areas of Leyte is elaborated in Table 16. Suggested action points and recommendations are also provided that may serve as a guide to address the issues and concerns, hoping thereby to improve the cassava value chain and further assist cassava farmers. The recommendations include suggestions provided by KII participants which both public and private sectors can handle to promote the cassava industry.

Table 16. List of Issues, Recommendations and Action Plans

Issues or Concerns	Action Points	Recommendations on possible projects and advocacy agenda	Focal and Potential Partners
INPUT, PRODUCTION and PROCESSING CONCERNS			
Limited supply of quality (pre-treated) planting materials	▪ Increase areas of CEFs demonstration farms to build more capacity to organizations as source of planting material needs of farmers at the local level and teach them pre-treatment procedures. This also empowers communities and make them more active partners in the cassava industry ▪ Pre-treatment of cassava stalks to render these more disease-resistant may be taught at the DA municipal level for easier access of cassava farmers to this technique. Pre-treated planting materials have better quality in terms of disease-resistance	▪ If possible, provide additional funding to cassava CEFs to be able to increase areas of demo farms that can be the source of quality (pre-treated) planting materials ▪ Include this agenda in sustainability planning for adoption of other organizations helping cassava farmers ▪ Request PhilRootCrops to teach DA Agriculture Technicians the methods or systems in pre-treatment of cassava seedling materials	▪ CARE for additional funding ▪ FMPC for micro-financing schemes ▪ DA Regional and Municipal Agriculture Offices for technical assistance ▪ PhilRootCrops for the pre-treatment training ▪ FMPC and San Miguel Corporation for possible contract growing scheme for cassava farmers
Local level cassava starch and flour production	▪ Determine feasibility of village-level cassava and flour production ▪ Assist cassava CEFs in building capacity to produce starch and flour at the local level (if feasible) to further diversify their product options and increase potential income	▪ Conduct of a rapid assessment for feasibility of cassava starch and flour production ▪ Training on starch and flour making for potential CEFs ▪ Enhance marketing skills of CEFs by linking them with the DA Agribusiness and Marketing Assistance Service (AMAS) and facilitate partnering with end-market users ▪ Assist CEFs of individual farmer access to credit facilities offered by DA through the Agricultural	▪ CARE for the assessment ▪ DA Regional or Municipal Office for training needs ▪ DOST for technology and potential equipment start-up support ▪ DA and Land Bank of the Philippines for financing of ACEF and ACPC

		Competitiveness Enhancement Fund (ACEF) and the Agricultural Credit and Policy Council (ACPC) which could be used to start-up village level processing ▪ Business Plan Development for to guide project and support access to credit	
Health-related concerns from cassava (dust) particles) during granulation of cassava chips	▪ Ensure farmers are well-informed on dust-particles emanating from cassava granulation process which may be inhaled or may sting eyes during the process	▪ Provide cassava farmers or workers with Personal Protective Equipment (PPE), particularly masks and protective eyewear for safety during processing activities	▪ CARE ▪ Municipal Health Office
ENVIRONMENTAL AND SOCIAL IMPACT CONCERNS			
Risks of cassava monocropping	▪ Emphasize risks of monocropping in soil quality, its effects in soil nutrient removal and decreased biodiversity to cassava farmers through continuing technical assistance and by ensuring farmers follow intercropping, integrated farming systems and modular farming schemes recommended to them ▪ Emphasize use of organic fertilizer to replenish soil nutrients and protect soil quality	▪ Collaboration of all partners in the area in promotion of intercropping, integrated farming systems and following the GAP for cassava ▪ Ensure adoption of intercropping, integrated farming systems and GAP for cassava by other organizations for sustainability post-CARE interventions	▪ CARE ▪ FMPC ▪ PhilRootCrops ▪ DA Regional Office VIII and Municipal Agriculture Office for technical assistance
Cassava's long growing period before harvest	▪ Emphasize intercropping schemes as a solution that maximizes land areas, promotes better soil nutrient conservation and contribution, increases income potential to complement cassava income	▪ Increase intensity of technical assistance provided by CARE and FMPC's CBDFs and provide support to DA's Agriculture Technicians on the ground for their mobility	▪ CARE ▪ FMPC ▪ Municipal Agriculture Office ▪ DA Regional Office

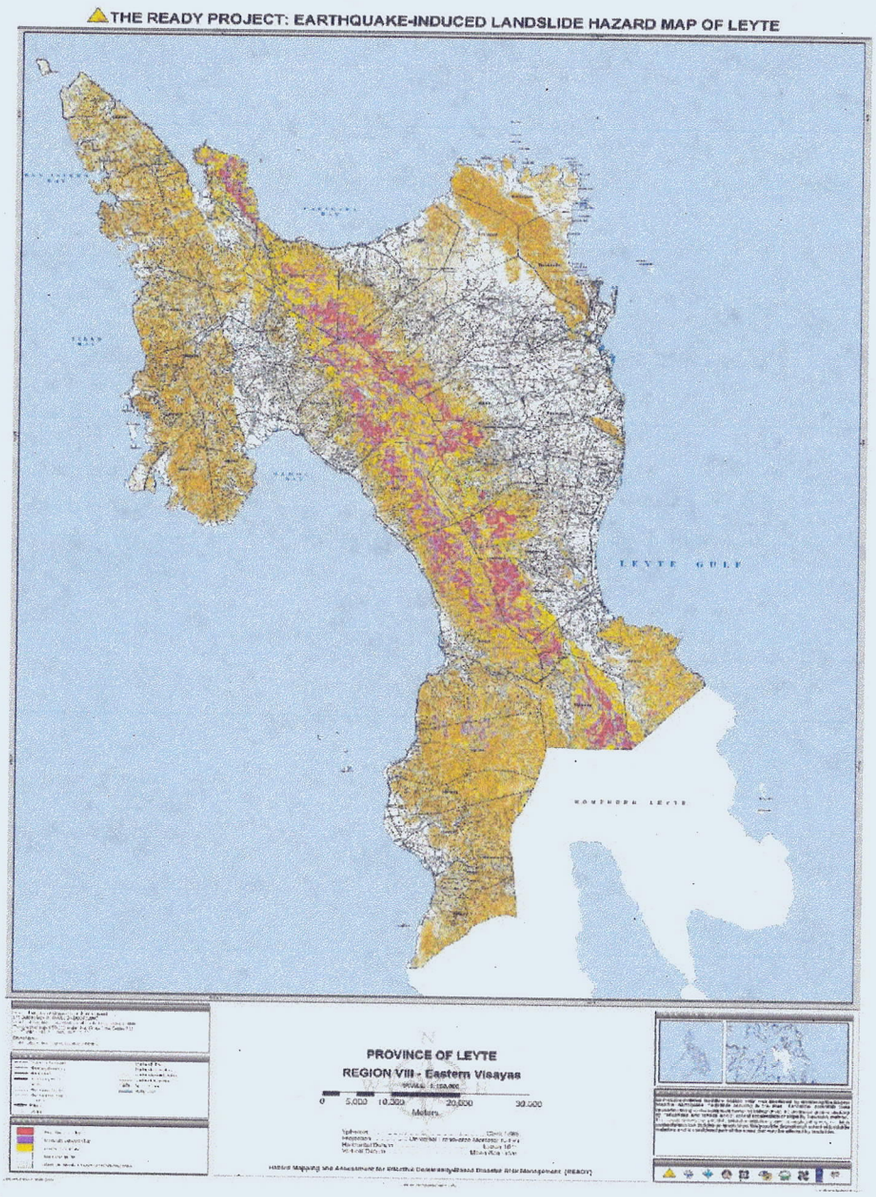
Low buying price of cassava chips and granules	▪ Consider other processed products including starch and flour and other value-added products that would diversify and increase potential income for farmers	▪ Collaboration with other government and private partners that may be able to help sustain the cassava industry and encourage farmers in Leyte	▪ CARE ▪ FMPC ▪ Municipal Agriculture Offices ▪ DA Regional Office VI for provision of livelihood projects and technical assistance in ACEF and ACPC ▪

ANNEXES

Annex 1. Key Informants and Primary Data Sources

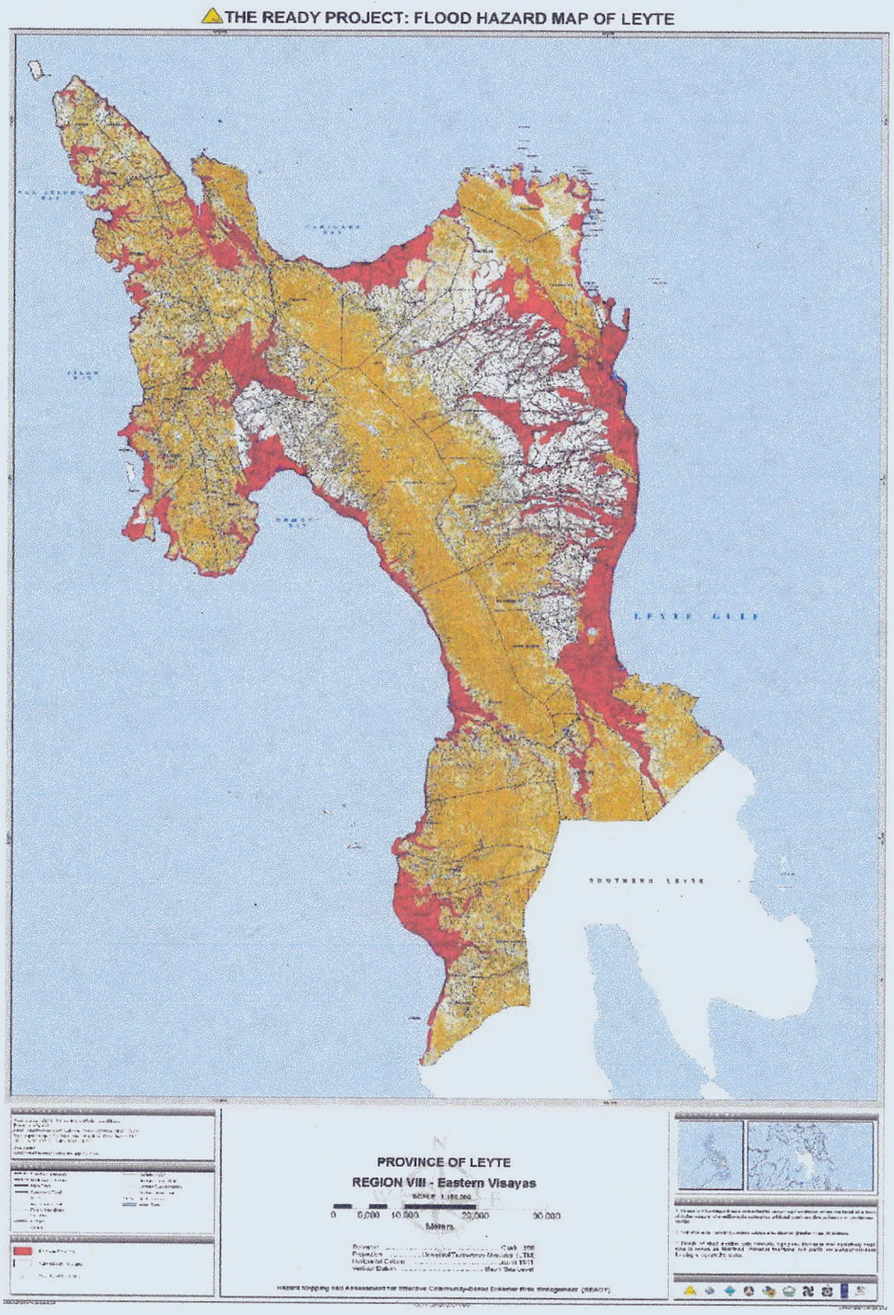
Key Informants	Florencio O. Darriguez, Jr. President and Community-Based Development Facilitator Canfabi Integrated Farmers' Association Barangay Canfabi, Carigara, Leyte
	Maria Nida Lauron - President Gloria Penaflor – Secretary Imelda Dimaselan – Member Barugohay Sur Farmers' Association Barangay Barugohay, Carigara. Leyte
	Joel Pacala Cherly Jay Pacala Piloro Farmers' Association Barangay Piloro, Carigara, Leyte
	Sandra Garrido Camansi Integrated Farmers' Association Barangay Camansi, Carigara, Leyte
	Luzviminda Castelo Secretary and Community-Based Development Facilitator Cogon Farmers' Association Barangay Cogon, Carigara, Leyte
	Bella M. Rivera Agricultural Technologist Focal Person for Corn and Cassava Municipal Agriculturist Office Carigara, Leyte
	Mary Tiezel Rufin Capacity Building Officer CARE Philippines, Carigara, Leyte
	Roger Buscay Project Manager Fatima Multi-Purpose Cooperative Carigara, Leyte
	Earl Vincent Vegas Development Management Officer II Field Programs Operational Planning Division Department of Agriculture Diliman, Quezon City
	Reina Lapid Program Assistant Field Programs Operational Planning Division Department of Agriculture Diliman, Quezon City

Annex 2. Project READY Hazard Maps for Leyte



CARE-covered LGUs with areas that have high-low susceptibility to earthquake-induced landslide:

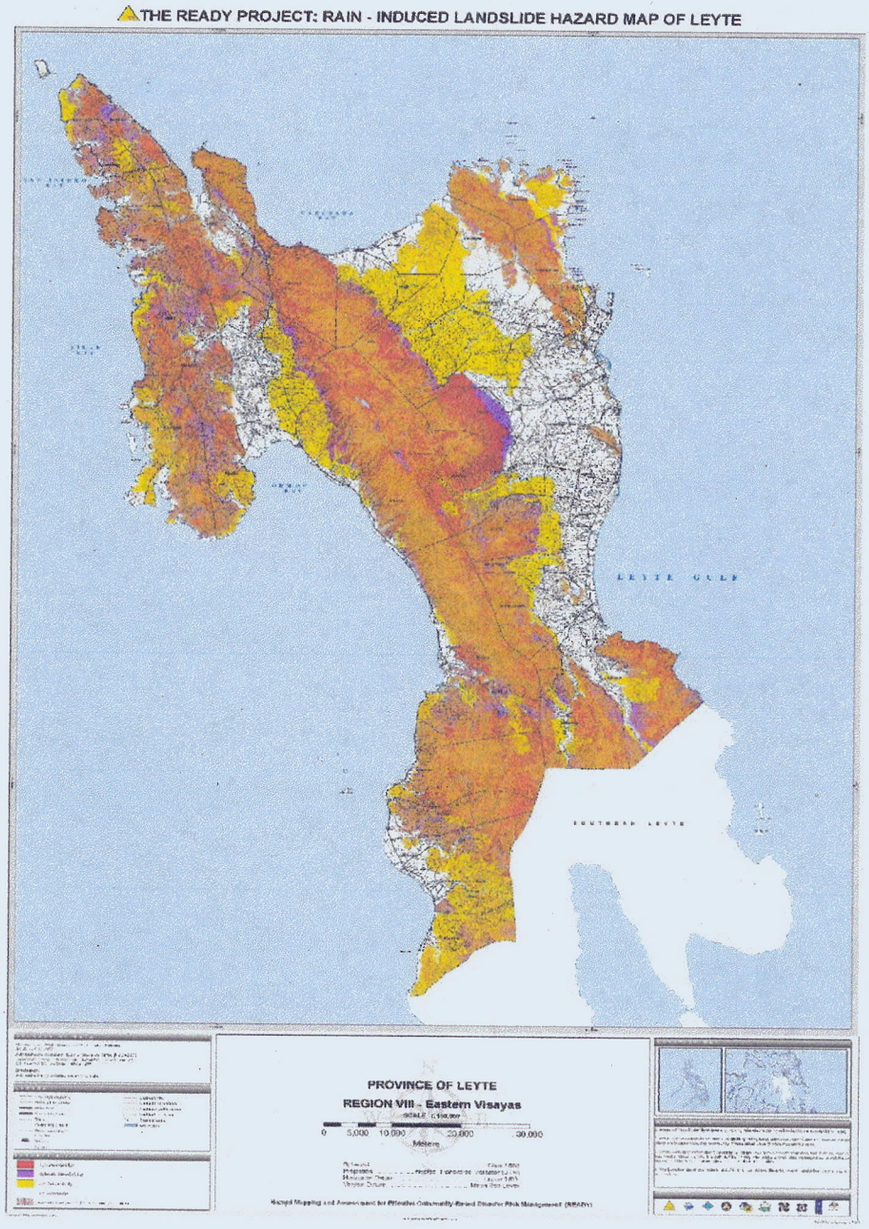
1. Leyte-Leyte
2. Capoocan
3. Carigara
4. Jaro
5. Kananga
6. Ormoc City
7. Burauen



CARE-covered LGUs with areas that have high susceptibility to flood hazard:

1. Barugo	6. San Isidro	11. Ormoc
2. Capoocan	7. San Miguel	12. Burauen
3. Carigara	8. Tunga	13. Kananga
4. Calubian	9. Villaba	14. La Paz
5. Jaro	10. Matag-ob	15. Leyte-Leyte

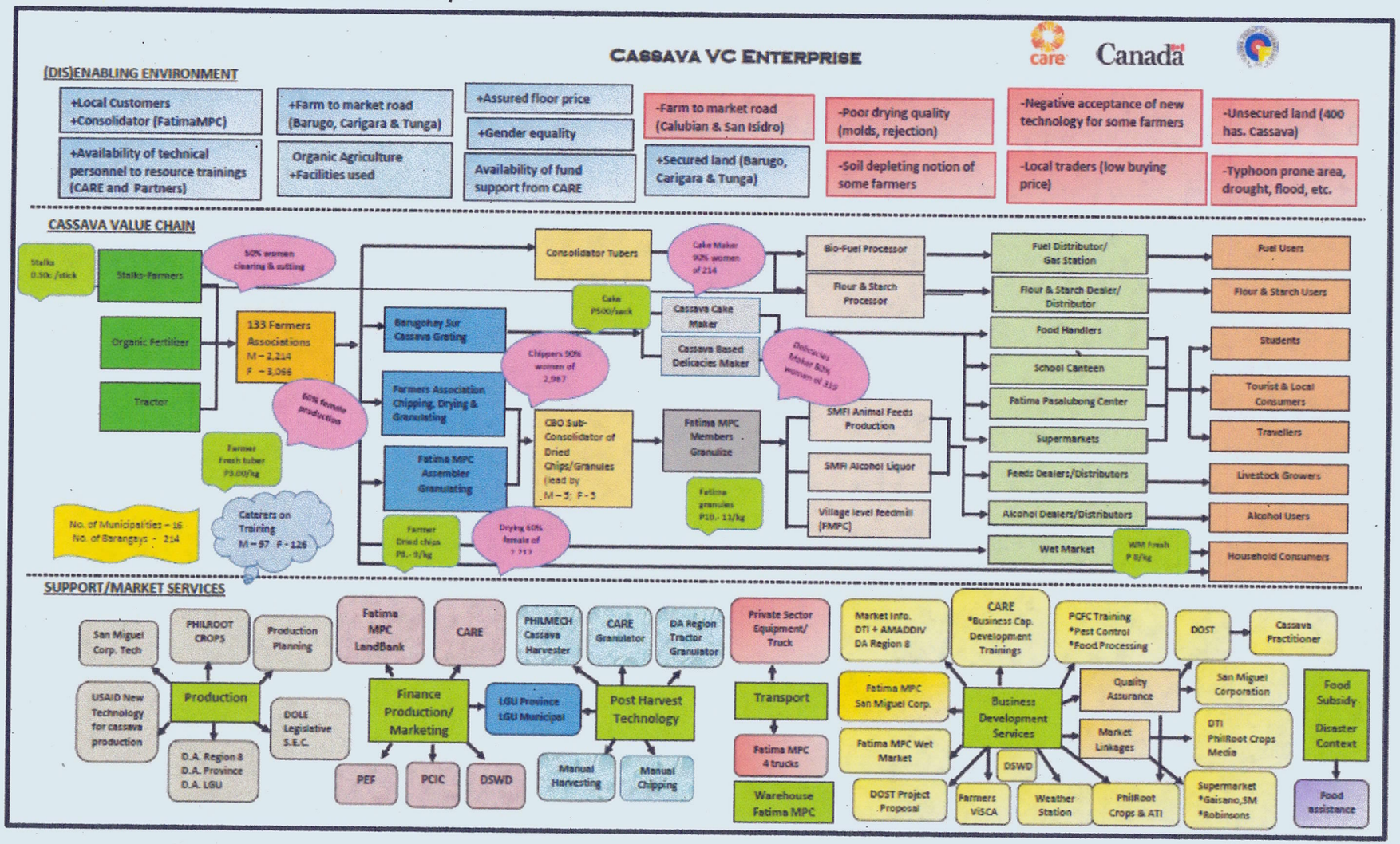
THE READY PROJECT: RAIN - INDUCED LANDSLIDE HAZARD MAP OF LEYTE



CARE-covered LGUs with areas that have high-low susceptibility to rain-induced landslide hazard:

1. Barugo
2. Capoocan
3. Carigara
4. Calubian
5. Jaro
6. San Isidro
7. San Miguel
8. Tunga
9. Villaba
10. Matag-ob
11. Ormoc
12. Burauen
13. Kananga
14. La Paz
15. Leyte-Leyte
16. Pastrana

Annex 3. Cassava Gendered Value Chain of Leyte



REFERENCES

Abass, A.B., Towo, E., Mukuka, I., Okechukwu, R., Ranaivoson, R., Tarawali, G. & Kanju, E. (2014). *Growing cassava: a training manual from production to postharvest*. Ibadan: IITA.

Bellotti, A., Herrera Campo, B.V. & Hyman, G. (2012). *Cassava Production and Pest Management: Present and Potential Threats in a Changing Environment*. Tropical Plant Biol. 5: 39.

Benton, T. G., Vickery, J. A. Wilson, J. D. (2003). *Farmland biodiversity: is habitat heterogeneity the key*. Trends Ecol. Evol. 18, 182-188.

Burns, A., et. al. (2010). *Cassava: The Drought, War and Famine Crop in a Changing World*. Sustainability 2: 3572-3607.

Cerilles A.W.E. (2015). *Gahung-Gahung Organic Cassava Farming System: A Climate Change Adaptive and Poverty-Alleviating Farming Strategy*. Journal of Agricultural Technology. 11(8): 1669-1675.

Delaquis, E., de Haan, S., and Wyckhuys, K.A.G. (2018). *On-farm diversity offsets environmental pressures in tropical agro-ecosystems: A synthetic review for cassava-based systems*. Agriculture Systems and Environment 251: 226-235.

Duong Van Son, et. al. (2016). *Study on Improvement of Cassava Value Chain in Quang Binh Province, Vietnam*. International Journal of Political Science (IJPS) Volume 2, Issue 1 PP 25-34.

Gold, C.S., Altieri, M.A., Bellotti, A.C. (1990). *Effects of intercropping and varietal mixtures on cassava hornworm, Erinnyis ello L (Lepidoptera: sphingidae), and the stemborer, Chilomima clarkei (Amsel) (Lepidoptera: pyralidae), in Colombia*. Trop. Pest Manage. 34 (4), 362–367.

Kouakou, J., et. al. (2016). *Cassava Production and Processing.* Collection Pro-Agro, Engineers Without Borders and the Technical Centre for Agricultural and Rural Cooperation (CTA).

Philippine Cassava Industry Development Roadmap CY 2015-2022. De Luna, Edilberto M. Assistant Secretary for Field Operations and National Rice Program and Corn Program Coordinator (2014), Department of Agriculture, Diliman, Quezon City, Philippines.

Save and Grow: Cassava. A guide to sustainable production intensification (2013). Food and Agriculture Organization of the United Nations, Rome, Italy.

Selected Statistics on Agriculture 2017. Philippine Statistics Authority, Philippines.

Technoguide on Cassava Production (2011). Agriculture and Fisheries Information Service, Department of Agriculture, Philippines.

Philippine National Standard for Dried Cassava Chips and Granules (PNS/BAFPS 29:2010 ICS 67.080). Bureau of Product Standards, Department of Trade and Industry, Philippines.

Typhoon Haiyan (Yolanda) Philippines, *Environmental Situational Review*. Joint UNEP/OCHA Environment Unit, 14 January 2014. *https://reliefweb.int/sites/reliefweb.int/files/resources/Philippines%20Haiyan%20Environmental%20Situational%20Overview%2014-1-14.pdf-*

Value Chain Analysis and Competitiveness Strategy: Cassava Mindanao (2014). I-PLAN Component Mindanao Cluster. Philippine Rural Development Project, Department of Agriculture.

Value Chain Analysis for Cassava Fresh Tubers and Dried Granules (2014). Provincial Project Management and Implementing Unit, Provincial Government of Occidental Mindoro through the Philippine Rural Development Project, Department of Agriculture.

This Environmental Safeguards Study for Cassava is prepared for CARE – Philippines by:

RHODORA CHERYL MONTOYA, Lead Consultant
VENER L. DILIG, Co-Consultant
AquaVerde Development and Consultancy, Calapan City, Oriental Mindoro

Canada

ENVIRONMENTAL SAFEGUARDS STUDY of the ABACA INDUSTRY in Selected Municipalities of Antique

April 2018

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYMS AND ABBREVIATIONS

ADF	-	Antique Development Foundation
AIP	-	Annual Investment Plan
ALFA	-	Alojipan Farmers' Association
BASFICIA	-	Bandoja, San Francisco Sur, San Francisco Norte, San Isidro Irrigators' Association
BCFA	-	Barbaza Corn Farmers' Association
BJUFA	-	Barangay Jaguicquican Upland Farmers Association
CBED	-	Community-based Enterprise Development
DA	-	Department of Agriculture
DOST	-	Department of Science and Technology
EMP	-	Environmental Management Plan
FGD	-	Focus Group Discussion
FISFA	-	Flores Integrated Social Forestry Farmers' Association
GAC	-	Global Affairs Canada
IEC	-	Information, Education and Communication
IISFA	-	Idao Integrated Social Forestry Association
KII	-	Key Informant Interview
MALALUBI	-	Mablad, Langkaon, Lumboyan and Bigaa Farmers' Association
MAO	-	Municipal Agriculture Office
MDRRMO	-	Municipal Disaster Risk Reduction and Management Office
MENRO	-	Municipal Environment and Resource Office
MISFA	-	Magsaysay Integrated Social Forestry Farmers' Association
MPDO	-	Municipal Planning and Development Office
NPK	-	Nitrogen, Phosphorus and Potassium
OSOFA	-	Osorio Farmers' Association
PAGASA	-	Philippine Atmospheric, Geophysical and Astronomical Services Administration
PRDP	-	Philippine Rural Development Program
NGO	-	Non-Government Organization
SABAFA	-	Salazar Banana Farmers' Association
SANPAFA	-	San Pascual Farmers' Association
SARCFA	-	Special Agrarian Reform Community Farmers' Association
SARUFA	-	San Ramon Upland Farmers' Association
THRA	-	Typhoon Haiyan Reconstruction Assistance
VCA	-	Value Chain Analysis

I. INTRODUCTION

A. BACKGROUND OF THE ASSESSMENT

CARE Philippines has been in the frontline of assistance and rehabilitation activities in Typhoon Yolanda affected regions in the Philippines after it hit the country in November 2013. Under the Typhoon Haiyan Reconstruction Assistance (THRA) Project which is funded by the Global Affairs Canada (GAC), CARE has been working in the Provinces of Antique and Iloilo in Region VI and Leyte in Region VIII. The Project seeks to address the issues that impede people's access to knowledge, skills, products and services and reinforce the household's livelihoods, strengthening and enhancing capacities and existing knowledge and experiences of communities and entrepreneurs.

In the Province of Antique, among the most badly hit high-value agricultural crop is abaca, *Musa textilis*, prompting a focus towards assisting farmers in the rehabilitation of their farming areas while building their resilience and that of their livelihoods. The THRA Project worked in four (4) municipalities – Culasi, Tibiao, Barbaza and Laua-an, in a partnership between CARE, an international non-government organization and the Antique Development Foundation (ADF), a local non-government organization based in San Jose, Antique.

In these municipalities, barangays affected by Typhoon Haiyan were among the focus of rehabilitation assistance for abaca production, processing, marketing and trading. Under the GAC, an Environmental Management Plan (EMP) has been formulated outlining the mitigation, monitoring, and institutional measures to be undertaken during the THRA programme implementation and operation to minimize projected environmental impacts. Within this framework, an assessment of the abaca value chain of the selected municipalities of Antique was conducted with the following objectives:

1. Evaluation of the possible environmental impacts, particularly on biodiversity, of the production, processing, marketing and trading of abaca;
2. Identification of disaster, climate change and environmental hazards and risks and their potential impacts to the abaca value chain;
3. Evaluation of the technical viability of current and potential production areas for abaca;
4. Conceptualization of relevant interventions to address issues identified and arising from the assessments that are anchored on the EMP framework; and,
5. Development of workplan containing relevant interventions to address issues identified during the assessment and to upgrade the abaca value chain.

B. METHODOLOGIES

The methods to collect data and gather information used in this assessment included the following:

a. Focus Group Discussion (FGD) - A group of 3-5 persons, who are officers or members of the Abaca Community Enterprise Facilities (CEFs) assisted by CARE, were interviewed. For a complete list of persons who participated in the FGD, refer to Annex 1.

b. Key Informant Interview (KII) - The Key Informant Interviews was conducted with persons from the Philippine Government agencies, academe, researchers and other key actors in the abaca industry and disaster risk reduction and climate change. They were chosen based on their leadership and authority within their organizations and their expertise with regards the focus commodity.

c. Review of Related Literature - A review of related literature of various research articles, books, technical documents and from reputable websites regarding abaca production, harvesting, post-harvest and processing, and trading was conducted.

d. Site Visits - The site visits were done to further verify information given by interviewees in FGDs and KIIs.

C. SCOPE OF THE ASSESSMENT and LIMITATIONS

This environmental safeguard study is primarily focused in abaca producing areas in four local government units of the Province of Antique, namely the municipalities of Barbaza, Culasi, Laua-an and Tibiao (refer to Figure 1). A total of twenty-eight barangays from the four municipalities that are engaged in various activities under the abaca value chain were covered by the study. For the site visits and focus group discussions, only selected areas or barangays were visited. The areas visited were pre-selected on the basis of homogeneity or basic similarities in terms of topography and climate, which more or less would be representative of the whole project area covered by the assistance provided by CARE.

In effect, two municipalities - Culasi and Laua-an - were selected. From hence, site visits and FGDs were conducted in selected barangays of these two municipalities. Verification as to similarities in geography, climate and experiences of farmers in neighboring barangays and municipalities of Barbaza and Tibiao were verified with respondents of FGDs and KIIs to validate assumed homogeneity.

Figure 1. Geographical Scope of the Study.

Photo credit: Abaca Value Chain Analysis (VCA) of Region VI, Department of Agriculture (DA) – Philippine Rural Development Program (PRDP)

Table 1. Municipalities and Barangays in Antique Province covered by the Study

Municipalities	Barangays	
Barbaza	▪ Bigaa ▪ Cadiao ▪ Cubay ▪ Embranggaan ▪ Idao ▪ Langkaon	▪ Lumboyan ▪ Marigne ▪ Mablad ▪ Mayabay ▪ San Ramon
Culasi	▪ Alojipan ▪ Flores ▪ Magsaysay	▪ Osorio ▪ Salde ▪ San Pascual
Laua-an	▪ Guiamon ▪ Jaguicquican ▪ Latazon ▪ Lindero	▪ Maybunga ▪ San Ramon ▪ Tigunhao
Tibiao	▪ Pitac ▪ Salazar	▪ San Francisco Sur ▪ Tuno

For the study, focus has been into the Abaca Value Chain, particularly in the input supply production, processing, marketing and trading. A gendered value chain for abaca that indicates how tasks are shared among gender is shown in Annex 2 of this document.

II. The Abaca Industry and Value Chain in Antique and in CARE-assisted Municipalities of Barbaza, Culasi, Laua-an and Tibiao

It is a known fact that abaca production in the world market is dominated by the Philippines. As of 2015 data from the Philippine Fiber Industry Development Authority (PhilFIDA), the country produces approximately 87.17% of the world's abaca fiber, while 12.77% and 0.06% comes from South American Countries Ecuador and Costa Rica, respectively. Yet despite the volume of production, the Glatfelter Company – New Tech Pulp Inc. (NTPI), based in Lanao del Norte, had to import a portion of its requirement for abaca fiber from Ecuador, as documented from 2006 – 2014 (4,747.8 MT Abaca Fiber) by PhilFIDA (Abaca Value Chain Analysis of Region VI, DA-PRDP). A continuing trend is expected since fiber requirements are high and the production from the Philippines could not meet the demand and requirements. In addition, the demand for abaca fiber has grown with a number of opportunities arising in the market, including an expanding and growing market for specialty papers, handmade paper, natural fibers and chlorine-free materials, development of new uses for textile materials or as blending materials, and a growing demand for conservation of forest resources and reversion to the use of biodegradable materials. All these show that abaca has a potential of a growing and expanding market for its products.

In terms of domestic production, the Western Visayas Region has consistently maintained seventh place among other regions in the country while the Bicol Region leads the volume of production (Refer to Table 2 for the abaca domestic production volume).

Table 2. Philippine Abaca Fiber Production from 2011-2015 (in MT)

Rank	Top Producing Regions	2011	2012	2013	2014	2015
1	Bicol Region	27,109.1	22,246.0	23,352.1	27,885.6	25,133.7
2	Davao Region	7,765.0	8,614.3	5,408.1	8,417.1	11,255.0
3	Eastern Visayas	18,718.1	15,472.3	11,093.0	10,379.6	8,418.1
4	CARAGA	6,586.5	4,523.8	4,175.4	5,945.4	6,785.3
5	ARMM	5,554.0	5,489.4	5,799.1	5,620.5	6,779.3
6	Northern Mindanao	2,283.9	3,180.0	2,112.9	3,205.4	4,170.8
7	Western Visayas	2,459.2	2,355.3	1,930.3	1,636.3	1,933.4
8	SOCCSKSARGEN	1,420.9	1,380.1	889.8	1,609.7	1,422.9
9	Zamboanga Peninsula	647.3	656.3	529.7	642.4	636.2
10	Central Visayas	529.4	700.2	494.9	462.0	592.4
11	Southern Tagalog	104.8	133.4	126.4	138.2	146.7
12	Central Luzon	80.5	53.0	46.3	62.0	55.2
13	CAR	15.6	2.1	-	-	-
Total Country Production		**73,274.2**	**64,806.1**	**55,958.0**	**66,004.2**	**67,328.8**

Source: Abaca Value Chain Analysis of Region VI, DA-PRDP and PhilFIDA

From Table 2 above, abaca production for Western Visayas (and also for Eastern Visayas) has dipped from 2013 which accordingly may be partly attributed to the onslaught of Typhoon Yolanda and the lack of incentives to farmers leading to their lack of motivation to tend their farms and harvest abaca fibers (Abaca VCA of Region VI, DA-PRDP). By the year 2015, production has started to pick up again.

Table 3. Abaca Production in Region VI, 2011-2015 (in kgs)

Rank	Province	2011	2012	2013	2014	2015
1	Aklan	1,874,691	1,643,100	1,357,177	1,191,174	1,450,202
2	Iloilo	275,622	362,305	321,242	208,288	247,257
3	Capiz	193,264	167,191	53,200	149,010	164,962
4	Antique	89,723	142,563	113,257	38,101	54,744
5	Negros Occidental	27,123	93,066	85,319	54,264	34,210
Total for Region VI		**2,460,423**	**2,408,825**	**1,930,195**	**1,640,837**	**1,951,375**

Source: Abaca Value Chain Analysis of Region VI, DA-PRDP and PhilFIDA, 2018

In terms of provincial abaca production in Region VI, Antique has consistently remained as the 4th largest producer with the highest production in the province of Aklan from among five provinces. Yet, production in Antique Province in 2013-2014 experienced a steep decline from 113,257 in 2013 to 38,101 kgs in 2014, as an effect of the devastation of farms by Typhoon Yolanda (Table 3).

As of the year 2015, statistics collected by PhilFIDA showed that the municipalities of Culasi, Barbaza and Hamtic in Antique Province have the most number of farmers and largest abaca farming areas.

Table 4. Top ten abaca producing municipalities of Antique as of Year 2015

Rank	Municipality	Hectarage of Abaca Areas	Number of Farmers	Potential Expansion (hectares)
1	**Barbaza**	**309.52**	**336**	**500**
2	Hamtic	164.92	301	
3	**Culasi**	**153.98**	**400**	
4	**Laua-an**	**110.87**	**160**	**500**
5	Patnongon	75.90	66	
6	Pandan	55.08	78	
7	Bugasong	40.15	22	
8	**Tibiao**	**32.00**	**65**	
9	San Jose	15.06	76	
TOTAL		**957.48**	**1,504**	**1,000**

Source: PhilFIDA, 2015 (Note: Highlighted in pink are CARE CEF areas)

As of March 2018, the assistance from CARE through the Antique Development Foundation (ADF) showed a larger number of farmers and hectarage of farm in the municipalities of Barbaza, Culasi, Laua-an and Tibiao. Information from CARE – ADF of CEFs engaged in abaca production, processing and trading are presented in Table 5. In addition to the existing hectarage of abaca production areas, CARE – ADF has also initiated a Household Level Abaca Plantation program, through which a total of 97.85 hectares have been planted as of March 2018. Through this program, interested farmers who are members of the CEFs are provided with planting materials and other inputs to plant abaca within near distances from their residences (further discussed in production systems).

Table 5. Number of Abaca Farmers and Hectarage under CARE – ADF assistance in Antique, 2018

Municipality	Number of Farmers	Area in Hectares
Barbaza	389	421.5
Culasi	503	323.5
Laua-an	182	196.0
Tibiao	122	8.5
Total	**1,196**	**949.5**
Area planted through the Household Level Abaca Plantation Program		**97.85**
Total		**1,047**

Source: March 2018 CEFs data, CARE

Under the Typhoon Haiyan Rehabilitation Assistance, CARE has provided support to a total of 27 Community Enterprise Facilities, which are farmers' associations, engaged in activities under the different functions of the abaca value chain. These are segregated according to focus activities: 4 in abaca production solely; 9 in abaca processing and marketing; 4 have mixed focus in production, processing and marketing; 3 in nursery management; 4 in organic fertilizer production (vermicast); 2 in handicrafts and 1 in twining. Information regarding these CEFs are elaborated in Table 6.

Table 6. Profile of CARE's Abaca Community Enterprise Facilities

Municipality	Name of Barangay	Name of CEF	Focus Project or Activity/ies	Number of Members			Area (has)
				M	F	T	
Barbaza	Embranggaan	Dumangsal Farmers' Association	Production	43	22	65	8.3
	San Ramon	San Ramon Upland Farmers' Association (SARUFA)	Production, Processing and Marketing	35	7	42	185.0

	Cadiao	Camp Eufre Farmers' Association	Processing and Marketing	45	5	50	50.0
	Idao	Idao Integrated Social Forestry Association (IISFA)	Processing and Marketing	52	13	65	20.0
	Mablad, Langkaon, Lumboyan and Bigaa	Mablad, Langkaon, Lumboyan and Bigaa Farmers' Association (MALALUBI)	Processing and Marketing	38	10	48	114.0
	Marigne	Marigne Farmers' Association (MARIGNE)	Processing and Marketing	-	-	32	25.0
	Mayabay	Mayabay Integrated Social Forestry Farmers' Association (MISFA)	Processing and Marketing	-	-	85	19.2
	Mablad	Mablad Farmers' Association (MABLAD)	Organic Fertilizer	29	95	124	-
	Cubay	Barbaza Corn Farmers' Association (BCFA)	Organic Fertilizer	30	32	62	-
	Lumboyan		Abaca Twinning	3	24	27	-
Culasi	Salde	Salde Farmers' Association	Production, Processing and Marketing	27	10	37	117.5
	Alojipan	Alojipan Farmers' Association (ALFA)	Processing and Marketing	-	-	105	11.0
	Flores	Flores Integrated Social Forestry Farmers' Association (FISFA)	Processing and Marketing	81	36	117	20.0
	Magsaysay	Magsaysay Integrated Social Forestry Farmers' Association (MISFA)	Processing and Marketing	-	-	130	112.0
	Osorio	Osorio Farmers' Association (OSOFA)	Processing and Marketing	56	58	114	63.0
	San Pascual	San Pascual Farmers' Association (SANPAFA)	Nursery	28	29	57	0.5
Laua-an	Tigunhao	Ratanila Cluster Level Association	Handicraft/ Weaving	42	8	50	188.0
	Guiamon	Kalabasa Cluster Level Association	Handicraft/ Weaving	6	44	50	-
	San Ramon	Baylan Cluster Level Association	Production	-	42	42	8.0
	Maybunga	Masadya Cluster Level Association	Production	-	40	40	-
	Jaguicquican	Barangay Jaguicquican Upland Farmers Association (BJUFA)	Production, Processing and Marketing	30	22	52	-
	Latazon	Triple L Cluster Level Association	Abaca Production, Processing and Marketing	-	48	48	-
	Lindero	Sitio Labanagan, Lindero, Laua-an Farmers' Association	Organic Fertilizer Production	36	16	52	-
Tibiao	Pitac	Pitac Upland Farmers' Association	Production	5	64	69	8.0
	Salazar	Salazar Banana Farmers' Association (SABAFA)	Nursery	3	50	53	0.5
	Tuno	Special Agrarian Reform	Nursery	-	-	-	0.5

		Community Farmers' Association (SARCFA)					
	San Francisco Sur	Bandoja, San Francisco Sur, San Francisco Norte, San Isidro Irrigators' Association (BASFICIA)	Organic Fertilizer (Vermi)	74	27	101	-
	Total						**950.5**

Source: March 2018 CEFs data, CARE

Under the THRA Program, interventions to rehabilitate or restore assets and build resilience both to people and their livelihoods have been implemented across the abaca value chain in Antique from input services or supplies, production, processing and onwards to marketing and trading. A package of capacity building activities was conducted which included Trainings on Financial Literacy, Community-based Enterprise Development (CBED), Abaca Value Chain Analysis, Abaca Good Agriculture Practices, Values Formation and in some communities, trainings in abaca twinning, knotting and handicrafts. Aside from these, financial and material support were also provided to the CEFs. The financial support has enabled abaca farmers and the organizations to purchase inputs and cover other costs related to abaca production. Other CEFs in trading and marketing utilize the funds as rolling capital to buy and sell abaca fiber.

Figure 3 provides a quick overview of the Abaca Value Chain as it is generally in the country. In Antique, under CARE's auspices, several CEFs are focused in the various value chain nodes. Under production, there are 4 CEFs focused on fiber production; processing (twining, knotting, handicrafts), 3 CEFs; mixed production, processing and marketing, 4 CEFs and combined processing and marketing, 9 CEFs. In addition, under input provision, 3 CEFs are focused on abaca nurseries while 4 CEFs are in the production of organic fertilizer (vermicast). Figure 4 provides a detailed view of the abaca value chain in Antique with gender disaggregation.

Figure 2. Overview of Abaca Value Chain

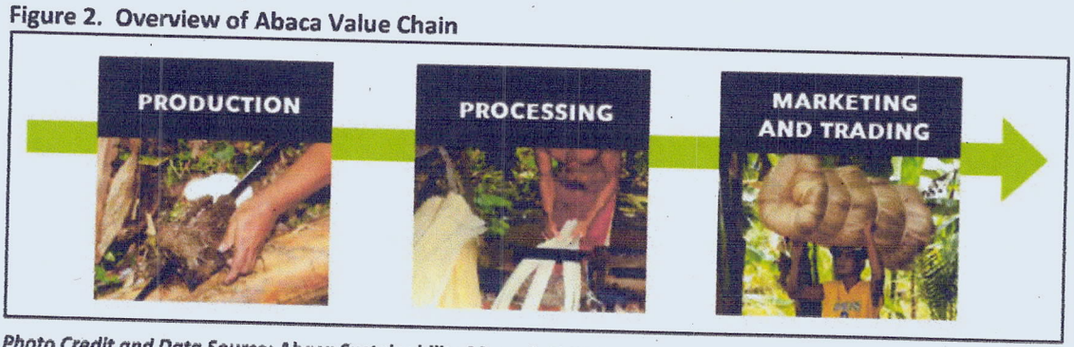


Photo Credit and Data Source: Abaca Sustainability Manual, PhilFIDA and GTZ

Figure 3. Gendered Abaca Value Chain in Antique

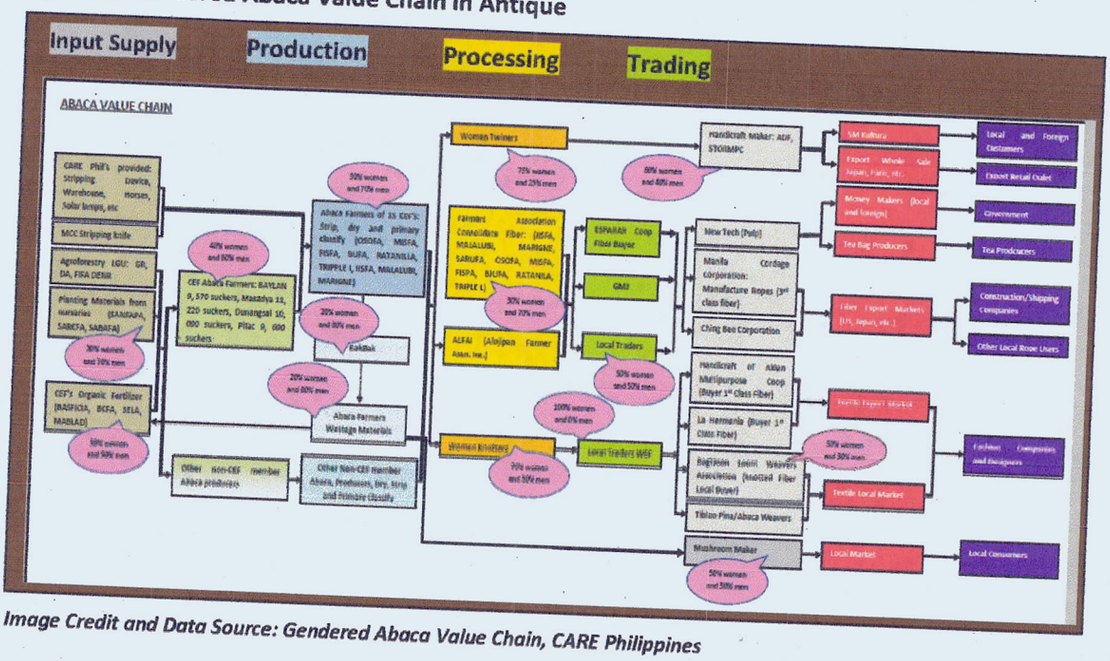


Image Credit and Data Source: Gendered Abaca Value Chain, CARE Philippines

A. INPUT SUPPLY

In the municipalities assisted by CARE in Antique, farm inputs were provided by the organization to support abaca production. These include materials commonly programmed (by government too) for abaca farmers such as planting materials, i.e. corms and suckers. Yet, a more comprehensive approach was provided by CARE to respond to the current needs of the farmers. CARE provided solar lamps and tents for use by farmers to protect dried fibers and themselves as they commonly have to stay for days in abaca farm areas. To ensure that nutrients for newly planted abaca are sufficient, organic fertilizers were also distributed particularly for recipients of the Household Level Abaca Plantation. These fertilizers come from CEFs focused on organic fertilizer production (Table 6). In addition, horses to carry harvests from far-flung abaca farms where there are no farm-to-market roads were also provided. Routes to these areas can be very steep and thereby, use of horses as carrying animals was found helpful.

As a response to the shortage of planting materials for the whole province, CARE has established three half-hectare abaca nurseries in the municipalities of Tibiao (2 nurseries) and Culasi (1 nursery) which target to produce corms and suckers to abaca planters. Refer to Table 6 for the list and basic information of the abaca nursery CEFs. At the time of the conduct of the study, the nurseries have not yet begun to provide or sell corms and suckers as the plants are on the growing stage yet.

Figure 4. Abaca Nursery (in background) managed by the San Pascual Farmers' Association in Culasi, Antique.

CARE has also established CEFs focused on organic fertilizer production which produces vermicast from animal manure and rice husks in culture with the African nightcrawler. These become the source of organic fertilizer inputs used for newly planted abaca seedlings particularly for the Household Level Abaca Plantation being implemented by individual members of the various CEFs. Aside from CARE, the PhilFIDA and the municipal Local Government Units also have regular programs under the Municipal Agriculture Offices to assist farmers in abaca production and processing. These include provision of stripping knives and seedlings. In the 2018 Annual Investment Program of the Municipal Government of Culasi, Antique, three abaca nurseries are targeted to be established in Barangays Salde, Osorio and Alojipan. PhilFIDA also have recently provided stripping knives to abaca farmer associations.

Table 7 lists the activities falling under the input of the abaca value chain in Antique that have relevant impacts to the environment, to the abaca production itself and the stakeholders particularly the abaca farmers. These are the establishment of nurseries and the provision of organic fertilizers. The impacts of an abaca nursery at this value chain node relates more to its function as being a source of good quality, disease-free seedlings; the importance of which is very essential. When fully grown, abaca in nurseries have the same impacts on soils (preventing erosion, etc.) as they would whether they are a source of seedlings and when they are planted to be harvested as source of fiber. In this latter aspect, the impacts are discussed under the production systems.

Table 7. Environmental and other Impacts of Inputs for Abaca Production in Antique

Input Activity	Impact Details and Type
Nursery establishment	- Availability of disease-free seedling materials for abaca farms. This is a positive, direct impact to abaca production as there is assurance of quality seed materials and prevention of disease is at the very start of the value chain.
Organic fertilizer production	- Minimized or no carbon footprint as it uses organic materials that come from natural sources. Positive, direct impact to the environment compared to use of inorganic fertilizer where production uses fossil fuels that are generally non-renewable. - Greenhouse gas release during production is low or none. Direct, positive impact to the environment (atmosphere) as organic fertilizer production uses low or no fossil fuels.

The Office of Civil Defense (OCD) - National Disaster Risk Reduction Management Council (NDRRMC) is equipped with Hazard Maps for provinces and municipalities in the country. For the province of Antique, hazards maps were prepared that identified areas affected by flood, rain-induced landslide, ground shaking, ground rupture, storm surge, liquefaction and tsunami. Upon review of these, generally abaca farming areas in the four municipalities covered by the study have low or non-susceptibility to storm surge, liquefaction and tsunami as the abaca areas are in higher grounds and far from shorelines. Hazards that may have impact on abaca livelihood and farming communities include floods, rain-induced landslides, ground shaking and ground rupture. These are in addition to other climate hazards including typhoons, heavy rain, high temperature and drought. Table 8 identifies the hazards or risks affecting the input node of the abaca value chain and Annex 3 shows the Rain-Induced Hazard Maps of the Municipalities of Barbaza, Culasi, Laua-an, Tibiao and the Province of Antique. These maps provide an overview of the landslide prone areas and may be downloadable at *ndrrmc.gov.ph/gmma-ready-project* including the maps for other hazards (flood, ground rupture, ground shaking, storm surge, etc).

Table 8. List of Hazards and Risks Affecting the Inputs Systems or Activities of Abaca in Antique

Hazard or Risk	Effect or Impact on the Inputs Systems or Activities	Mitigation Measures
Typhoons	Strong winds destroy abaca nurseries and structures in organic fertilizer production areas Heavy rains may cause water logging and landslides	Situate under trees that provide shading and protection from winds and strong rains Immediate harvest of mature stalks which may be used for abaca fiber extraction Provide additional protective structures or strengthen structures in organic fertilizer production area
Droughts or prolonged dry season	Abaca do not tolerate dry periods	Situate abaca nurseries in areas where water can be accessible when

		needed Follow shading requirements for abaca production areas to diffuse sunlight and conserve moisture
Flood	Floods may cause destruction of nurseries and other structures by sheer force of water flowing through these	Situate nurseries and fertilizer production areas in areas where flood waters do not have potential for flowing through
Rain-induced landslides	Leads to landslides which may destroy plants and structures	Situate nurseries and fertilizer production areas where risk of landslides is low
Ground shaking and ground rupture	Destroys structures	Consider using lighter, renewable building materials
High temperatures	Abaca plants do tolerate heat from high temperatures	Situate nurseries in shaded areas and following shading requirements for abaca

B. PRODUCTION SYSTEMS

1. Production Methods

Abaca farming, as narrated by FGD participants, was done in Antique even by older generations including their parents and grandparents. Commonly, the abaca fibers extracted was made into ropes for tying animals and structures, wrapping carrying containers or weaved into clothing. The production systems (planting and growing) in the past followed no particular method as abaca plants were found growing naturally and abundantly in their areas. With the advent of other types of materials that may be used such as polyethylene ropes, building materials and clothes made from other fibers or sources, people gave less attention into producing abaca fiber as there were other easy options available for them. Another factor for this was the tediousness or difficulty of the process in extracting fibers and marketing, which was compounded by low buying price.

As new uses and products are discovered for abaca coupled with the call for use of organic, biodegradable and renewable materials, attention was reverted to abaca for the fact that its farming supports the environment and for its many superior physical properties compared to other natural fibers. These characteristics include a high fiber density at 1.5 g/cm, fiber length ranging at 2-4 meters, strongest tensile strength of 980 N/m, and lowest elongation percentage of only 1.1%. Currently, the PhilFIDA which is the country's focal agency for fiber development leads the implementation of the projects and programs aimed to further develop the abaca sector nationwide.

In Antique, CARE in partnership with the Antique Development Foundation and in coordination with PhilFIDA has been in the forefront in working to restore abaca farmers' lost livelihoods due to Typhoon Yolanda. In hand with the restoration is the building of resiliency through capacity building. These has comprised of financial support and trainings on Good Agriculture Practices (GAP) for abaca farming that teaches methods to improve abaca production which the farmers have already currently adapted. The GAP module guides farmers on recommended planting densities (hills per hectare), plant propagation practice using corms and suckers, application of fertilizers, shading requirements and compatible plants and intercrops, proper locations and doing regular maintenance activities such as underbrushing of weeds, and most other aspects involved in abaca production.

As of the time of study, farmers use corms and suckers locally sourced from barangays with existing abaca farms. For example, in the Municipality of Culasi, these are from Barangays Magsaysay, Osorio, Alojipan and Flores. PhilFIDA also recommends use of tissue-cultured plantlets and seeds, however there are no agency-run laboratories, gene banks and accredited nurseries in Antique as source for quality, disease-free planting materials. Obtaining seedling materials from nearby barangays or adjacent areas is considered a good practice as it also provides a safeguard against disease, as locally sourced seedlings which are considered "native" to the area has no history of disease outbreaks. There were no experience of any major abaca diseases such as the abaca mosaic, abaca bunchy top, abaca bract mosaic nor any pests such as the brown aphids, root or corm weevil and slug caterpillars in the province. The exact variety

Figure 5. Newly grown abaca seedlings under the Household Level Abaca Plantation Program in Culasi, Antique.

Figure 6. Samples of a corm and sucker from Barangay Magsaysay, Culasi, Antique.

of abaca planted in the study areas is not known, but it is generally considered the native variety in these locations.

Yet, the practice of using corms and suckers in abaca farming is still found to be challenging by most abaca farmers in Antique. They have mentioned that mortality is high among suckers, thus they prefer corms as seedling material. However, even the corms are also not all viable, but they suspect that this was because the corms are not well cut or sliced or are not uniformly sized or have not followed recommended size measurement. Smaller ones have higher mortalities than bigger sized corms. In addition, some seedlings provided are not abaca, but are rather "pakel", a variety of banana found in their localities. A case at hand was Mr. Lomugdang's (featured in Figure 7) experience where 26 out of the 50 pieces of corms provided to him under the Household Abaca Plantation Program have died. While the mortalities may be attributable to other factors which may affect such as soil quality, rain, temperature, shading and others, the irregularity of the corms was considered as the biggest factor.

As mentioned, abaca farms that have existed before CARE interventions had no particular farming method and were considered natural growth in forest areas. Their locations were also far, such that farmers take a half-day or more climbing steep mountains to get to the farms. Thus, in practice, farmers visit at most twice a year and stay for a number of days harvesting fiber before returning home. The trek up was difficult and bringing down harvested fibers was equally hard. This scenario adds to the difficulty of farming abaca. In response to this, CARE has provided horses (as stated in the inputs section) to support the need for some form of transport system for the farmers and their harvests. In this situation, the Household Abaca Plantation Program was introduced to establish abaca farms that are nearer and easier managed by farmers. Table 9 illustrates farming practices for abaca in the study areas while Figure 5 shows images

Figure 7. Mr. Nelson Lomugdang, Abaca Demo Farm Technician, showing good growth of abaca seedlings at the Demo Farm in Barangay Salde, Culasi, Antique

of growing abaca seedlings in some sites in the study areas. From the photo, it can be seen that farmers follow practices taught under the GAP Training such as minimal underbrushing, staking and shading.

Abaca demonstration farms were also established by CARE. One is situated in Barangay Salde, Culasi, Antique, where 5,000 pieces of abaca corms were planted by members of the Salde Farmers' Association. The demo farm served to showcase best practices in abaca production while members learn by doing as they themselves undertake the maintenance of the demo farm.

Table 9. Current Abaca Planting Practices in Study Areas of Antique

Method	Practices
A. Traditional	▪ Located in mountainous areas and hardly reachable by abaca technicians ▪ Planting density not particularly established ▪ No fertilization ▪ Underbrushing of weeds only during harvest periods
B. GAP-recommended	▪ Planting density of 2000 hills per hectare at 2m x 2m square distance between seedlings ▪ Use of locally-sourced corms or suckers as seedlings ▪ Use of stakes to mark hills and when it grows, provide additional shade to seedlings ▪ Fertilization during planting (using organic fertilizer - vermicast) ▪ Initial clearing of weeds during planting followed by regular underbrushing ▪ Situated in areas 20 – 30 minutes away from farmer's house or village ▪ Strict selection of areas with 40-50% shading provided by recommended shade trees (katuray, anii, dapdap, fruit trees, coconut) and away from trees that have high moisture consumption rate or with bitter saps (gmelina, mahogany and eucalyptus trees) ▪ Following parameters for site selection (see Table 10)

2. Suitability Criteria

The abaca, as with other trees or plants, have its own set of requirements for optimum growth and to maximize production. These include soil quality, climatic conditions, topography, shading and location (in relation to other existing plants).

Climate is a very important environmental factor affecting plant growth and development. The Philippines' climate is tropical and maritime and has the characteristics of having a relatively high temperature, high humidity and abundant rainfall. The Province of Antique falls in two climate categories. These are Type I and Type III as identified by the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) based on the

Modified Corona Classification of Climate. Type 1 climate occurs in the southern parts of Antique and is characteristic of having two pronounced seasons, dry from November to April and wet during the rest of the year with maximum rain period from June to September. The northern parts of Antique, on the other hand, falls in Type III climate with no pronounced maximum rain period with a short dry season lasting only three months which may either be from December to February or from March to May. Type III resembles Type I in that it has a short dry season.

While abaca grows on all types of soil, it performs well with well-drained clay loam type. It is recommended to apply organic and liquid fertilizers to improve the soil fertility and increase yield. It is best that the soil is analyzed by the Bureau of Soil and Water Management (BSWM) to ascertain fertilizer requirements before planting. Having the soil analyzed provides a better understanding of the quality and nutrient composition of the soil and adjust rates of fertilization. This way, application of fertilizer when it is in fact unnecessary, would equate to lesser financial costs during establishment and in the maintenance of the abaca farm.

In the visits conducted in the study sites, no soil analysis was conducted in abaca farms. While this is recommended, it is not necessarily a pre-requisite; also, it is a fact that sampling results may take a while to be released and the abaca farms are in large areas of land from where samples will be taken, thus a hefty volume of soil material for analysis is expected. The BSWM has conducted soil nutrient analysis in the country but only for rice farming areas, thus results were not necessarily applicable for abaca. On another note, the Philippine Rice Research Institute (PhilRICE) has also made a guidebook on "Simplified Keys to Soil Series – Antique". The guidebook was created under a program on mapping of rice areas in the Philippines but is a good and quick guide to identify soil types and have a base information on inherent fertility of the soil (Guidebook downloadable in the link provided in the References Section of this report). Other considerations on site selection and crop suitability concerns including topography, shading and accessibility of areas are explained in Table 10.

Table 10. Comparison of Recommended Parameters for Abaca Farming and Production and Conditions in Antique

Parameters	Recommended	Current situation in Antique
Climate	▪ Temperature range between 20-27^{0}C ▪ Rainfall distribution all throughout the year ▪ Preferably Type 4 Climate	Based on PAGASA identified climate types for Antique, Type I applies for the southern parts and Type III for northern parts of the province. Whilst Type 4 climate is preferred, Type I and III both have short dry seasons; therefore, the areas are still suitable for abaca farming. Further, based on the information derived from the site visits, abaca farms in the province have

		thrived from the time of the parents and grandparents of the current generation, thus verifying climate suitability of farming areas
Soil Quality	▪ Grows in all types of soil but performs well in clay loam and sandy clay loam ▪ Loose, friable and well drained	CARE-ADF's Abaca Local Farmer Technicians (ALFT) conduct initial screening of locations for site suitability and checks soil type. Based on observation of existing farms and growth conditions of newly planted abaca in the nurseries, demo farm and HH Level Abaca Plantations, newly planted seedlings have grown. Mortalities are most probably attributable to quality of seedling rather than the soil type but this has to be verified. In terms of nutrient composition, a soil analysis was not conducted for fertilization and application of nutrients that may be found in deficit.
Topography	▪ High terraces and flat plains which have good drainage conditions ▪ Plain to slightly rolling hilly or mountainous areas ▪ Areas of no more than 500 meters above sea level	Old existing farms are located in mountainous areas far from farmer villages, while newly established plantations (HH Level Abaca Plantations) are situated in rolling hills or mountain sides nearer their houses. Farmers also ensured avoiding steep inclinations along mountain sides, and stayed within the recommended 40^0 inclination.
Shading and location (relative proximity to other plants)	▪ 40-50% shade ▪ Choose shaded areas amongst recommended trees and plants ▪ No less than 1.0 km away from corn and legume farming areas as these harbor pests affecting abaca	As observed in farms visited, abaca farmers have taken into consideration shading requirements for abaca. In field visits, it was clear that the farmers have situated their newly established farms in areas where there are no Gmelina, Mahogany or Eucalyptus trees, bamboos and 1 km away from their corn fields.
Accessibility	▪ Well accessible and not far from roads	Old abaca farms are situated in high mountainous areas. Newly established plantations followed recommendation of 20-30 minutes' walk from farmer villages for easier access.

Table 11. Environmental and other Impacts of the Production Systems of Abaca in Antique

Production Activity	Impact Details and Type
Establishment (planting, growing) of abaca demo farms and plantations	- Prevents soil erosion and landslides. Positive, direct impact on environment due to improved water and soil holding capacity as provided by the root system of abaca plants - Contributes to natural fertilization of soil. Positive, direct impact on soil quality as the plant (stalks, leaves) can be used as components of a compost and naturally serves to add nutrients when left to decompose around hills - Improved conditions of biodiversity. Positive, direct impact on protection of forest/rainforest ecosystem and supports biodiversity restoration - May help prevent forest fires. Positive, direct impact as protection from forest fires due to its high moisture content. But prolonged dry seasons or droughts may hinder this form of protection offered by abaca as it is not drought-tolerant. - Additional income to farmers. Positive, direct impact to the livelihoods of farmers
Use of Organic Fertilizers	- Minimizes risk of over fertilization, toxic salt build-up and leaching. Positive, direct impact on soil quality and the environment as common adverse effects of using inorganic fertilizer is avoided. - Slow release of nutrients for plant uptake. Positive, direct impact on plant nutrition as it ensures more nutrients are available for plants in the long run. Yet, this can be a negative impact for plant growth when there is an immediate need for nutrients, i.e. when abaca plants would otherwise have benefited faster through readily available nutrients supplied by inorganic fertilizers. - Minimized or no contribution to carbon footprint in fertilizer production since organic fertilizers come from natural sources. Positive, direct impact to the environment compared to use of inorganic fertilizer where production uses fossil fuels that are generally non-renewable. - Possible build-up of nutrient concentrations in soil when improperly used. Direct, negative impact on soil quality and in abaca plants when organic materials have not fully decomposed before application
Regular farm maintenance activities such as underbrushing and weeding	- Contributes to soil fertility. Positive, direct impact to environment as the practice of keeping the grasses and other organic mass will decompose and return back to the soil as fertilizer

Table 12. List of Hazards and Risks Affecting the Production Systems of Abaca in Antique

Hazard or Risk	Effect or Impact on the Inputs Systems or Activities	Mitigation Measures
Typhoons	- Strong winds destroy abaca plants - Accompanying heavy rains may cause water logging and landslides	- Situate under trees that provide shading and protection from winds and strong rains - Immediate harvest of mature stalks before typhoon hits for abaca fiber

		extraction - Careful selection of areas for plantation establishment to ensure these are well-drained areas
Droughts or prolonged dry season	- Abaca do not tolerate dry periods	- Situate abaca plantations in areas where water can be accessible when needed - Follow shading requirements for abaca production areas to diffuse sunlight and conserve moisture
Flood	- Floods may cause destruction of plantation by sheer force of water flowing through it	- Situate plantation areas in locations where flood waters do not have potential for flowing through
Rain-induced landslides	- Leads to landslides that may destroy abaca plantations	- Situate plantation areas where risk of landslides is low
Ground shaking and ground rupture	- May lead to landslides and destruction of abaca plantations	- Avoid areas with steep inclinations and known fault lines

C. PROCESSING SYSTEMS

Harvesting of mature abaca happens 18 to 24 months after planting or as soon as the flagleaf appears. The flagleaf signals that all leaves have reached full maturity and the stalk possesses ideal properties for fiber extraction. Harvesting as soon as this appears has several benefits: (1) the stalk is in its optimum condition for stripping, (2) its removal will promote the growth of the follower stalk and (3) there is lessened competition for nutrients, water and sunlight. Once harvested, succeeding harvests are conducted ideally in the next 3-4 months. However, in the case of old existing farms in the study sites where location is difficult, this is done in another 6 months or only twice a year.

Figure 8. Images of the process of tuxying and stripping done by an abaca farmer in Barangay Magsaysay, Culasi. (Photo credit: G. Estolloso, MISFA President)

The processes involved in extracting abaca fiber involves the removal of leaves (topping) of the mature stalk, cutting of the topped stalk (tumbling), separation of the leafsheath outer

layers containing the fiber (tuxying), fiber extraction from the tuxies (stripping), and finally, drying of the abaca fiber. These processes are practiced in Antique as it is also in other abaca farming areas.

However, there are differences in the use of a tool or equipment, particularly in the processes involved in tuxying and stripping. In the study areas, the traditional methods are in place, i.e. tuxying is done manually with the use of a tuxying knife, while stripping is done by hand stripping using a serrated knife set up in a so-called stripping assembly. Currently, there are no mechanical equipment in the study areas (tuxying machine, spindle stripping machine and decorticating machine) that are now available or used in other abaca farming areas in the country. These machines require a substantial financial investment for or from the users which is a drawback, but will be of benefit if abaca production is already big.

In manual stripping, a serrated knife is set up on a piece of wood sturdy enough to be its base (as shown in Figure 9), while other wood (or branches) are used as support. The assembly has no specific setting-up requirements, meaning the size of wood as base can be of any size as long as it is sturdy thus, commonly used are just branches sufficiently strong as determined by the farmer-stripper. The stripping assembly set-up can be inside makeshift house with thatched roofing (leaves, palm fronds, etc.) or tents, or be attached between tree trunks in a shaded location. The set-ups can be used for a year or more, especially when it is shaded and protected from rain. The farmers simply remove the serrated knife at the end of a stripping period and re-attach it to the same assembly when fiber stripping again begins.

Figure 9. Hand stripping of abaca tuxy (left; photo credit: DENR-FASPS at www.denr.gov.ph) and air-dried abaca fiber (right).

The usual way of drying abaca is by air-drying. The stripped fibers are hung in a bamboo rack and allowed to dry under the sun for a day, or inside the makeshift house to be air-dried for 2-3 days. Currently, CARE-ADF is planning to provide abaca farmers with a mechanical dryer to further assist this activity and shorten the drying time.

Using the traditional methods, the processing of abaca into fiber may be described as the hardest, most labor-intensive, among the different activities in the value chain. The methods require the expertise of so-called "tuxeros", skilled workers in handling tuxying and stripping work. During the field visits, it showed that there is a lack of skilled workers to handle the activities such that in some areas, ready to harvest abaca stalks were over-maturing. This situation is compounded by a labor practice in the province known as "Sacada". Yearly, able-bodied men from various barangays in Antique are brought to the Negros Islands as sugarcane plantation workers. This creates a gap for workers to handle abaca fiber processing. An example is in Barangay Salde, Culasi where during the time of field visit (February 2018), nine abaca farmers who were the barangay's tuxeros have abaca stalks ready for harvest but these men were in the Sacada thus, abaca plants were left to over-mature. The Sacada however is a practice that appears to keep or trap the workers in the system due to the cash or "entresipo" they have taken in advance from the employers. Sadly, this cash advance cannot be paid in equivalent cash or money in case a Sacada worker decides not to go but can only be paid by sending a replacement laborer. Accordingly, the province of Antique is the largest supplier of Sacada workers.

While the lack of skill in abaca processing is already responded to in the GAP and stripping trainings provided by CARE-ADF, the issues in mechanization and Sacada are still in want for action. Both may require more than just a financial solution but also a political will on the part of the local governments to assist farmers increase their abaca fiber output and provide a better livelihood through abaca farming.

Under the processing function of the abaca value chain, CARE-ADF has assisted other communities in stripping, knotting, twining, handicraft and weaving. Skills trainings were provided for community members of various barangays, teaching them skills on handling these activities with the purpose of providing them additional income sources. These communities are non-CEF groups, but rather are individuals assisted by CARE-ADF. In summary, 30 barangays with 920 participants were trained in knotting abaca fiber; 18 barangays with 449 participants in twining; 10 barangays with 323 participants in handicraft/weaving and 16 barangays with 223 participants trained as abaca strippers. Refer to Annex 3 for a complete list of the barangays and sex disaggregated number of trainees.

Knotting abaca fiber uses only the best quality, or S2 grade of fiber. The knotted abaca are bought from the knotters at P 350.00 per kilo, but it takes them quite a time (a month at least) to produce a kilo. The men in the family usually helps to pound the fiber to make these softer while the women do the knotting as a "pastime" activity which for them is a form of relaxation from common daily stresses and it their income.

Twined abaca is made into ropes of 30-meter length and are sold at P 25.00 each. The activity is equally time-consuming as it takes about 2 days to produce a 30m rope. Yet, the

twiners see this as an additional income, however meager, which they use to supplement kids' allowances for school.

Figure 10. Clockwise, from leftmost: Knotting abaca fiber; knotted abaca ready for pick up; abaca twining; a 30-meter twined abaca; combined abaca-bariw placemat and placemat made of twined abaca and scrunch.

On handicraft making, the CEFs of RATANILA CLA and KALABASA CLA, had minimal production of the abaca-bariw placemats and scrunch, respectively. These groups have faced several issues including disinterest of members to produce twined abaca due to low buying price, behavioral issues particularly laziness of members, lack of time due to numerous work or concerns, lack of handicraft-making areas (workhouse) and low supply availability of fiber.

Table 13. Environmental and other Impacts of the Processing Systems of Abaca in Antique

Processing Activity	Impact Details and Type
Topping, Tumbling, Tuxying and Stripping	Provides back fertilizer to the soil from organic mass. Positive, direct impact to the environment as the organic mass consisting of leaves and remnants of stripped tuxies returns back to the soil as organic fertilizer once these has decomposed. Offers another form of livelihood for farmers. Positive, direct socio-economic impact for farmers, as these activities can be a source of additional income.

Drying	Proposed use of mechanical dryers powered by petroleum products. Negative, indirect impact to the environment through emission of greenhouse gases.
Knotting and Twining	Offers an extra source of income. Positive, direct socio-economic impact for farmers and most women, as these can bring extra income that may be earned particularly during idle or leisure times (watching tv, relaxing).
Handicraft/Weaving	Offers another form of livelihood for abaca communities. Positive, direct socio-economic impact to communities as these activities can be a source of additional income.

Table 14. List of Hazards and Risks Affecting the Processing Systems of Abaca in Antique

Type of Hazard or Risk	Effect or Impact on the Processing Systems	Mitigation Measures
Typhoons	- Strong winds destroy abaca plants and therefore loss of material for use in processing activities - Destroy processing structures (workhouse) and loss of equipment - Transportation of processed fiber from current abaca areas is risky for farmers	- Immediate harvest of mature stalks for abaca fiber extraction - Secure workhouse and equipment or materials before any typhoon - Consider personal safety as a priority at all times
Droughts or prolonged dry season	- Abaca do not tolerate dry periods therefore loss of material for processing	- Follow measures recommended for production systems, such as: Situating abaca plantations in areas where water can be accessible when needed and following shading requirements for abaca production areas to diffuse sunlight and conserve moisture, thereby ensuring steady supply of materials for processing activities
Flood	- Floods may cause destruction of abaca plantations causing loss of processing materials - Destroy structures (workhouse) and loss of equipment and materials	- Follow measures recommended for production systems, such as: Situating plantations in areas where flood waters do not have potential for flowing through thereby ensuring steady supply of fiber

Rain-induced landslides	- Leads to landslides that may destroy abaca plantations and loss of materials for processing - Destroy structures (workhouse) and loss of equipment and materials	- Situate plantations and workhouse areas where risk of landslides is low
Ground shaking and ground rupture	- May lead to landslides and destruction of abaca plantations, workhouses and loss of equipment and materials	- Avoid areas with steep inclinations and known fault lines

E. MARKETING AND TRADING SYSTEMS

The marketing aspect was among the issues identified in the FGDs as a contributory factor on the disinterest of farmers in abaca farming. They also felt there was insufficient support around this, such that the buying price was low and there was difficulty in finding a market or a buyer. Under the THRA Program, the assistance provided by CARE-ADF includes a financial support to the CEFs to serve as rolling capital in purchasing abaca fiber from their members and selling these. The CEFs deliver their associations' fiber produce to Business Development Unit (BDU) set up by CARE-ADF as buying centers for abaca fiber in each municipality. From these BDUs, the stocks are brought to the Laua-an BDU which is the main consolidating center, and then transported for delivery to NewTech Pulp Inc. an abaca fiber buyer in Iloilo City. The CEFs earns a small margin of profit (P 5.00 per kilo as of February); a portion of which is used as incentives or allowances for CEF officials or members involved in the marketing and a portion goes to the savings of the association.

In the implementation of the THRA program for the development of the abaca value chain in Antique, ADF through its Business Resource Center and the individual beneficiaries have signed an agreement for mutual cooperation and support and to ensure sustainability of the program and the gains it has achieved. ADF, with the funding received from the GAC through CARE, commits to pursue the trainings for GAP, provide planting materials and fertilizers, continuously provide technical assistance, monitor plantations and production activities and assures to purchase abaca fiber at current market price to ensure fair trade is given to abaca farmers. The farmers on their part commits to continually strive to improve by attending trainings, meetings and other activities aimed to advance the abaca value chain, maintain their abaca farms and harvest as soon as abaca are mature, report to ADF any untoward occurrence particularly signs of abaca disease, inform ADF when abaca fiber is ready for sale, and sell their produce only to ADF. The agreement is binding for a period of six years. This ensures that farmers not only get a fair current market price for their abaca

fiber, eliminating the issue of no access to markets and low buying rates, but continuous support for improvement of their abaca livelihoods.

Table 15. Environmental and other Impacts of the Marketing and Trading Systems of Abaca in Antique

Marketing and Trading Activity	Impact Details and Type
Purchase at farm level of abaca fiber by CEFs	Easy access of farmers to buyer or market. Positive, direct socio-economic impact as the individual abaca farmers have no need to go to town centers to sell their produce. In a way, this can be said as a way of empowering communities since once they are formed into organizations, they had easier access to different forms of support that goes back to benefit the individual members.

Table 16. List of Hazards and Risks Affecting the Marketing and Trading Systems of Abaca in Antique

Type of Hazard or Risk	Effect or Impact on the Marketing and Trading Systems	Mitigation Measures
Typhoons	- Strong winds destroy warehouses or stockrooms and equipment or tools (weighing scale, rope, cargo truck, others)	- Provide additional support or strengthen structures of warehouses or stockrooms and safekeep equipment or tools when there is threat of a typhoon
Flood	- Floods may cause destruction of structures and equipment by sheer force of water flowing through it or by being immersed in water	- Situate locations where flood waters do not have potential for flowing through and on higher ground to avoid getting flooded
Rain-induced landslides	- Leads to landslides that may destroy structures and equipment	- Situate locations where risk of landslides is low
Ground shaking and ground rupture	- May lead to landslides and destruction of structure and tools	- Avoid areas with steep inclinations and known fault lines

III. Impact Chain Analysis for the Abaca Industry of Antique

As gathered from the different information sources, FGDs and KIIs, and based on observations in the field visits, the following climate stimuli chart for abaca was drafted. It shows which climatic conditions have the most significant impact on the production and harvesting phases of abaca. Measures to address the effects or impacts have been elaborated in the preceding tables detailing hazards and risks along the abaca value chain, their impacts and mitigation measures.

Figure 11. Climate Stimuli Chart for Abaca

Climate Stimuli Chart for Abaca

Climatic Stimuli	Production Phase		Harvesting Phase	
	Planting/ Growth	Maturity	Tuxy/ Fiber Extraction	Fiber Drying
Rainfall	Heavy rainfall damage young plants due to waterlogging		Moisture decreases quality of fiber	
Temperature	Low tolerance to high temperature			Faster drying time
Typhoons	Damage to plants and structures due to strong winds and heavy rains			
Prolonged dry season	Negatively affects growth (decrease growth)		Decreased volume of material for processing	
Drought	Damage to plants due to lack of water leading to lack of material for processing			
Flooding	Damage to plants and structures due to strong force of flood waters			

Legends:
Red – high negative impact; Yellow – medium negative impact; Green – low or no negative impact; Blue – positive impact; Gray – seems not to be very relevant.

IV. Issues, Recommendations and Action Plans

In view of the findings of the study, a list of issues and concerns covering different functions of the abaca value chain in study areas of Antique is elaborated in Table 14. Suggested action points and recommendations are also provided that may serve as a guide to address the issues and concerns, hoping thereby to improve the abaca value chain and further assist abaca farmers.

Table 17. List of Issues, Recommendations and Action Plans

Issues or Concerns	Action Points	Recommendations on possible projects, advocacy agenda or policy proposals	Focal and Potential Partners
ENVIRONMENTAL AND SOCIAL IMPACT CONCERNS			
Use of vermicast for organic fertilization	▪ Undergo nutrient analysis of organic fertilizer to determine specific % compositions of NPK and other nutrients and after soil analysis, a more accurate application of amount of fertilizer can be done	▪ Collaborate with DA – BSWM for nutrient analysis of organic fertilizer samples ▪ Propose to government, in particular DA and BSWM, to include abaca production areas in a nutrient mapping program similar to rice areas, given the high potential as export earner, multiple uses and positive environmental contribution of abaca	▪ CARE – ADF ▪ PhilFIDA for technical assistance ▪ DA Regional Office VI and Municipal Agriculture Office for technical assistance ▪ BSWM Central Office Manila for collection method and analysis
Abaca's long maturation period of 18-24 months before initial fiber extraction	▪ Consider a livelihood with faster income potential to complement abaca production and which will maintain growing plants while tending other crops or plants. The Guidebook on Abaca and Reforestation Farming mentions mushroom production, orchid and anthurium culture as possibilities.	▪ Conduct a quick livelihood assessment survey or review information to identify resources in the areas and capabilities of the communities followed by quick market assessment for feasibility. ▪ Provision of alternative livelihood with faster income potential	▪ CARE – ADF ▪ Municipal Agriculture Offices for alternative livelihood options ▪ DA Regional Office VI for provision of livelihood projects and technical assistance in ACEF and ACPC ▪ AFLTs for conduct of assessment surveys

	Guidebook downloadable at: http://www.rainforestation.ph/resources/pdf/howto/Milan_and_Goltenboth_2005_Abaca_and_Rainforestation_Farming.pdf	▪ Assist CEFs of individual farmer access to credit facilities offered by DA through the Agricultural Competitiveness Enhancement Fund (ACEF) and the Agricultural Credit and Policy Council (ACPC) ▪ Business Plan Development for identified livelihoods to guide project and support access to credit	
Abaca farmers leaving their farms to be employed as sacada workers	▪ Provide alternative livelihoods for sacada workers so that they do not need to secure cash advances from employers which binds them to the system ▪ Provide alternative loaning mechanisms through CEFs that may be paid with produce from abaca farms	▪ Identification and implementation of alternative livelihoods in consultation with the sacada workers ▪ LGUs to support sacada workers by passage of local labor ordinances that curbs the malpractice, or cause to use cash-for-work programs to provide additional income for these workers	▪ CARE – ADF ▪ LGUs' Sangguniang Bayan for local ordinances ▪ Municipal Social Work and Development Office for Cash-for-Work Program ▪ Municipal Agriculturists' Office for alternative livelihoods
CROP SUITABILITY CONCERNS			
Distance and steep inclinations of abaca farming areas leading to difficulty in transporting produce	▪ Potential usefulness of agricultural tramline systems designed by DA - Philippine Center for Postharvest Development and Mechanization (PhilMech) – see link for overview of tramline: http://www.philmech.gov.ph/PhTechnology/pdf/16.pdf ▪ Access to farms through Farm-to-Market Roads (FMR)	▪ Coordinate with PhilMech regarding potential support to the abaca farmers in hauling and transporting produce from farms and to transport portable stripping machines to isolated farms ▪ The tramlines are much cheaper by 11 times than constructing roads. With lowered costs, this may possibly be funded by other organizations or donors, rather than just the government ▪ Coordinate with the DA to look into FMRs to access farm areas where	▪ CARE – ADF ▪ PhilFIDA for possible funding support of tramlines or FMRs ▪ DA – PhilMech for technology information and support ▪ DA Central Office and Region VI for a scoping of the areas and access to FMR funding support

		FMR is possible other than the tramline	
Determination of Soil suitability and quality	▪ Perform soil type or soil series identification for rapid assessment. Download guidebook at: *http://www.philrice.gov.ph/wp-content/uploads/2015/08/Simplified-Keys-to-Soil-Series-Antique.pdf* ▪ Conduct soil sampling for a more thorough determination of type and nutrient composition	▪ Conduct trainers' training on soil type identification and soil sample collection for AFLT for re-echo ▪ Collaborate with DA – BSWM for analysis of soil samples collected and if possible, nutrient mapping of abaca plantation areas	▪ CARE – ADF ▪ PhilFIDA for technical assistance ▪ DA Regional Office VI and Municipal Agriculture Office for technical assistance and training ▪ BSWM Central Office Manila for soil analysis and training ▪ Individual abaca farmers and CEFs

ANNEXES

Annex 1. Key Informant Interview and Focus Group Discussion Participants

Key Informants	***Josephine Rapo*** Abaca Focal Person – Antique Philippine Fiber Development Authority
	Amancio F. Estolloso Municipal Agriculturist Municipality of Culasi, Antique
	Alfonsito B. Sorilla Municipal Agriculturist Municipality of Laua-an, Antique
	Arjun A. Garcinela Agricultural Technologist for Rice and Corn and Designate-Municipal Disaster Risk Reduction and Management Officer Municipality of Laua-an, Antique
	John John U. Sumanting Municipal Information and Tourism Officer and Designate-Municipal Disaster Risk Reduction Management Officer Municipality of Culasi, Antique
	Rufelyn Roto Abaca Local Farmer Technicial Municipality of Culasi, Antique Email: dannydelros@yahoo.com
	Sherabel Pelaez Community-Based Development Facilitator CARE – ADF Municipality of Culasi, Antique
	Marissa Fermin President, KALABASA CLA Laua-an, Antique
	Marsalina Labanon President, RATANILA CLA Laua-an, Antique
	Elmer Robreza In-Charge, Business Development Unit Laua-an, Antique
Focus Group Discussions	Magsaysay Integrated Social Forestry Association (4 participants) Magsaysay, Culasi, Antique
	Salde Farmers Association (5 participants) Salde, Culasi, Antique
	Barangay Condes Rural Improvement Club (3 participants) Condes, Culasi, Antique
	Barangay San Luis – Twining Trainees (5 participants) San Luis, Culasi, Antique
	San Pascual Farmers' Association (4 participants) San Pascual, Culasi, Antique

Annex 2. Non-CEFs Barangays and Communities assisted under THRA Program

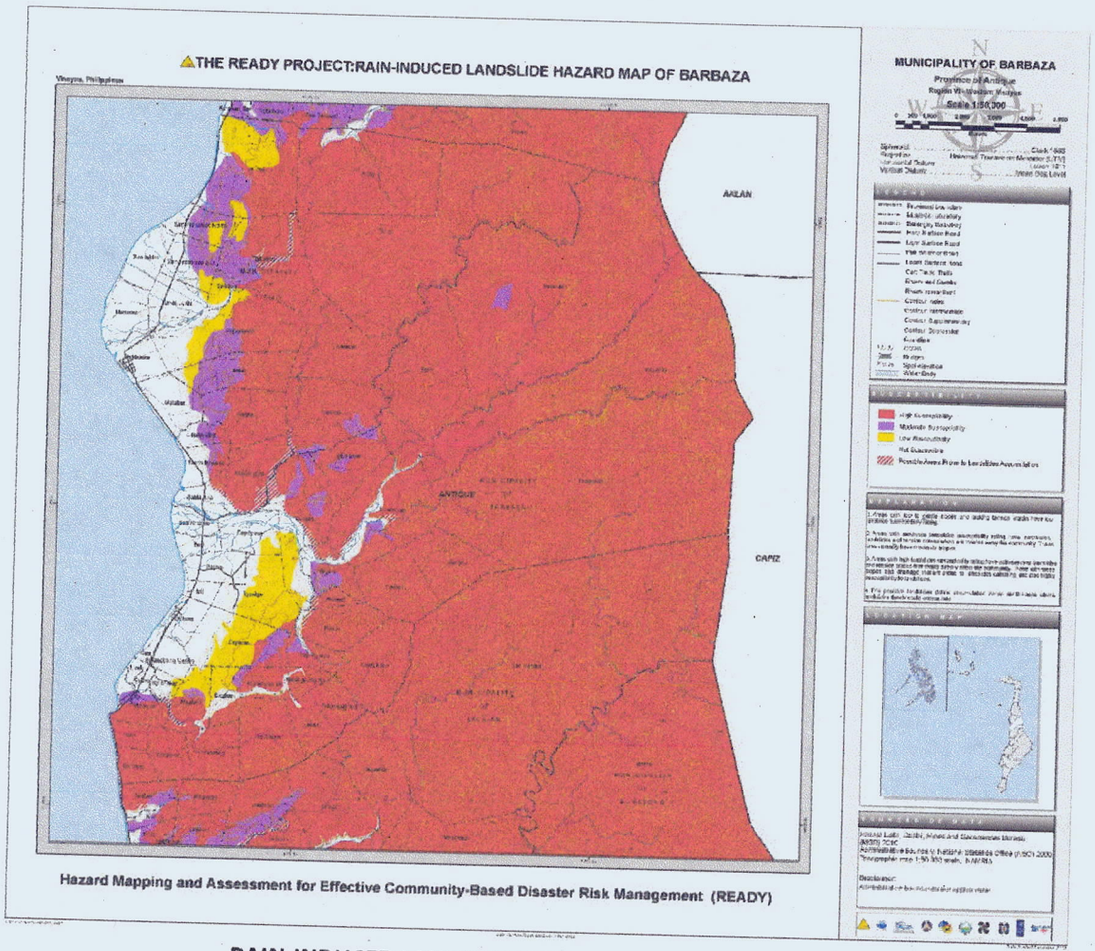
CLUSTERS		NAME (Association or Barangay)	COMMODITIES	SEX			VALUE CHAIN FUNCTION	CEFs and NON-CEFs	AREA PLANTED (in hectares)
				Male	Female	Total			
1	KNOTTERS								
	Abaca Knotting	Liya-Liya, Laua-an	Abaca	3	23	26	Knotters	Non-CEF	
	Abaca Knotting	Mauno, Laua-an	Abaca	-	30	30	Knotters	Non-CEF	
	Abaca Knotting	Naba, Culasi	Abaca	22	3	25	Knotters	Non-CEF	
	Abaca Knotting	Condes, Culasi	Abaca	9	19	28	Knotters	Non-CEF	
	Abaca Knotting	Janlagasi, Culasi	Abaca	-	25	25	Knotters	Non-CEF	
	Abaca Knotting	Batunan sur, Culasi	Abaca	-	25	25	Knotters	Non-CEF	
	Abaca Knotting	Centro Norte, Culasi	Abaca	-	28	28	Knotters	Non-CEF	
	Abaca Knotting	Lamputong, Culasi	Abaca	-	28	28	Knotters	Non-CEF	
	Abaca Knotting	Bita, Culasi	Abaca	2	23	25	Knotters	Non-CEF	
	Abaca Knotting	Tomao, Culasi	Abaca	27	5	32	Knotters	Non-CEF	
	Abaca Knotting	Buhi, Culasi	Abaca	6	20	26	Knotters	Non-CEF	
	Abaca Knotting	Osorio 1, Culasi	Abaca	0	25	25	Knotters	Non-CEF	
	Abaca Knotting	San Juan, Culasi	Abaca	3	24	27	Knotters	Non-CEF	
	Abaca Knotting	Poblacion, Barbaza	Abaca	-	-	-	Knotters	Non-CEF	
	Abaca Knotting	Jinalinan, Barbaza	Abaca	-	61	61	Knotters	Non-CEF	
	Abaca Knotting	Ipil, Barbaza	Abaca	-	66	66	Knotters	Non-CEF	
	Abaca Knotting	Soligao, Barbaza	Abaca	7	33	40	Knotters	Non-CEF	
	Abaca Knotting	Salazar, Tibiao	Abaca	2	30	32	Knotters	Non-CEF	
	Abaca Knotting	Esparagoza, Tibiao	Abaca	3	25	28	Knotters	Non-CEF	
	Abaca Knotting	Osorio 1, San Remegio	Abaca	10	20	30	Knotters	Non-CEF	
	Abaca Knotting	Biga-a, Barbaza	Abaca	7	24	31	Knotters	Non-CEF	

	Abaca Knotting	Idao, Barbaza	Abaca	10	23	33	Knotters	Non-CEF	
	Abaca Knotting	San Antonio, Barbaza	Abaca	15	19	34	Knotters	Non-CEF	
	Abaca Knotting	Langkaon, Barbaza	Abaca	13	17	30	Knotters	Non-CEF	
	Abaca Knotting	Biri, Barbaza	Abaca	15	17	32	Knotters	Non-CEF	
	Abaca Knotting	Sta. Ana, Tibiao	Abaca	6	20	26	Knotters	Non-CEF	
	Abaca Knotting	Magtulis, Barbaza	Abaca	14	23	37	Knotters	Non-CEF	
	Abaca Knotting	Binangbang Centro	Abaca	5	26	31	Knotters	Non-CEF	
	Abaca Knotting	Embranggaan, Barbaza	Abaca	7	24	31	Knotters	Non-CEF	
	Abaca Knotting	Lanas, Barbaza	Abaca	15	13	28	Knotters	Non-CEF	
	TOTAL			**201**	**719**	**920**			
	TWINNERS								
2	Bariw/Abaca Twinning	Valderrama, Culasi	Abaca	6	22	28	Twiners	Non-CEF	
	Abaca Twinning	Nauhon, Sebaste	Abaca	-	15	15	Twiners	Non-CEF	
	Abaca Twinning	Sta. Cruz, Pandan	Abaca	-	6	6	Twiners	Non-CEF	
	Abaca Twinning	Sto. Rosario, Pandan	Abaca	-	6	6	Twiners	Non-CEF	
	Abaca Twinning	Guia, Pandan	Abaca	-	6	6	Twiners	Non-CEF	
	Abaca Twinning	San Vicente, Culasi	Abaca	11	18	29	Twiners	Non-CEF	
2	Abaca Twinning	San Luis, Culasi	Abaca	7	25	32	Twiners	Non-CEF	
	Abaca Twinning	Caridad, Culasi	Abaca	3	25	28	Twiners	Non-CEF	
	Abaca Twinning	Fe, Culasi	Abaca	6	20	26	Twiners	Non-CEF	
	Abaca Twinning	Buenavista, Culasi	Abaca	3	26	29	Twiners	Non-CEF	
	Abaca Twinning	Balac-balac	Abaca	2	33	35	Twiners	Non-CEF	
	Abaca Twinning	Bagacay, Culasi	Abaca	3	25	28	Twiners	Non-CEF	
	Abaca Twinning	Alegre, Culasi	Abaca	4	24	28	Twiners	Non-CEF	
	Abaca Twinning	Camancijan, Culasi	Abaca	8	24	32	Twiners	Non-CEF	
	Abaca Twinning	Carit-an, Culasi	Abaca	5	22	27	Twiners	Non-CEF	
	Abaca Twinning	Batonan Norte, Culasi	Abaca	5	20	25	Twiners	Non-CEF	
	Abaca Twinning	Crossing Aligtus, Barbaza	Abaca	5	32	37	Twiners	Non-CEF	

	Abaca Twinning	Lumbuyan, Barbaza	Abaca	3	24	27	Twiners	CEF	
	Abaca Twinning	Leon, Laua-an	Abaca	8	24	32	Twiners	Non-CEF	
	TOTAL			**79**	**397**	**476**			
3	**HANDICRAFT/WEAVING**								
	Bariw/Buri/Abaca Handicraft	RATANILA Cluster Level Ass'n. Brgy. Tigunhao, Laua-an	Abaca/Buri/ Bariw	42	8	50	Weavers	CEF	188.0
	Bariw/Buri/Abaca Handicraft	KALABASA Cluster Level Ass'n. Brgy. Guiamon, Laua-an	Abaca	6	44	50	Weavers	CEF	
	Bariw/Buri/Abaca Handicraft	Sitio Durog, Brgy. Iguirindon San Remegio	Abaca/Buri/ Bariw	-	20	20	Weavers	Non-CEF	
	Bariw/Buri/Abaca Handicraft	(ESBAR) Centor Easte, Libertad	Abaca/Buri/ Bariw	-	20	20	Weavers	Non-CEF	
	Bariw/Buri/Abaca Handicraft	Brgy. Panangkilon, Libertad	Abaca/Buri/ Bariw	-	10	10	Weavers	Non-CEF	
	Bariw/Buri/Abaca Handicraft	Brgy. Sto. Rosario, Pandan	Abaca/Buri/ Bariw	30	30	60	Weavers	Non-CEF	
	Bariw/Buri/Abaca Handicraft	Kapabag, Pandan	Abaca/Buri/ Bariw	2	28	30	Weavers	Non-CEF	
	Bariw/Buri/Abaca Handicraft	Brgy. Alegre, Sebaste	Abaca/Buri/ Bariw	-	25	25	Weavers	Non-CEF	
	Bariw/Buri/Abaca Handicraft	Brgy. Diclum, Tobias Fornier	Abaca/Buri/ Bariw	30	30	60	Weavers	Non-CEF	
	Bariw/Buri/Abaca Handicraft	(UGWAD) Anini-y	Abaca/Buri/ Bariw	10	10	20	Weavers	Non-CEF	
	Nito/Abaca/Handicraft	Brgy. Mablad, Barbaza	Nito Abaca	12	21	33	Weavers	Non-CEF	
	Loam Weaving Patadyong	Brgy. Bagtason, Bugasong	Abaca	20	25	45	Weavers	Non-CEF	
	TOTAL			**152**	**271**	**423**			**188.0**
4	**STRIPPERS**								
	Abaca Strippers	Brgy. Santiago, Laua-an	Abaca	7	4	11	Strippers	Non-CEF	

	Abaca Strippers	Brgy. Leon, Laua-an	Abaca	10	2	12	Strippers	Non-CEF	
	Abaca Strippers	Brgy. Capnayan, Laua-an	Abaca	7	-	7	Strippers	Non-CEF	
	Abaca Strippers	Brgy. Maria, Laua-an	Abaca	8	4	12	Strippers	Non-CEF	
	Abaca Strippers	Brgy. Pangalcagan, Bugasong	Abaca	15	4	19	Strippers	Non-CEF	
	Abaca Strippers	Brgy. Bugnay, Valderrama	Abaca	6	13	19	Strippers	Non-CEF	
	Abaca Strippers	Brgy. Pamandayan, Hamtic	Abaca	11	3	14	Strippers	Non-CEF	
	Abaca Strippers	Brgy. Pili 2, Hamtic	Abaca	17	2	19	Strippers	Non-CEF	
	Abaca Strippers	Brgy. Pasu/Jungao, Hamtic	Abaca	15	5	20	Strippers	Non-CEF	
	Abaca Strippers	Brgy. Botbot, Hamtic	Abaca	15	2	17	Strippers	Non-CEF	
	Abaca Strippers	Brgy. Yapu, Bugasong	Abaca	6	-	6	Strippers	Non-CEF	
	Abaca Strippers	Brgy. Masanag, Hamtic	Abaca	14	3	17	Strippers	Non-CEF	
	Abaca Strippers	Brgy. Pulutchina, Hamtic	Abaca	10	6	16	Strippers	Non-CEF	
	Abaca Strippers	Brgy. Del Pilar, Hamtic	Abaca	13	4	17	Strippers	Non-CEF	
	Abaca Strippers	Brgy. Cantulan, hamtic	Abaca	17	-	17	Strippers	Non-CEF	
	Abaca Strippers	Brgy. Panoon/Ayutay, Hamtic	Abaca	-	-	-			
	Abaca Strippers	Brgy. Paningayan Culasi	Abaca	25	-	25	Strippers	Non-CEF	
	TOTAL			**171**	**52**	**223**			

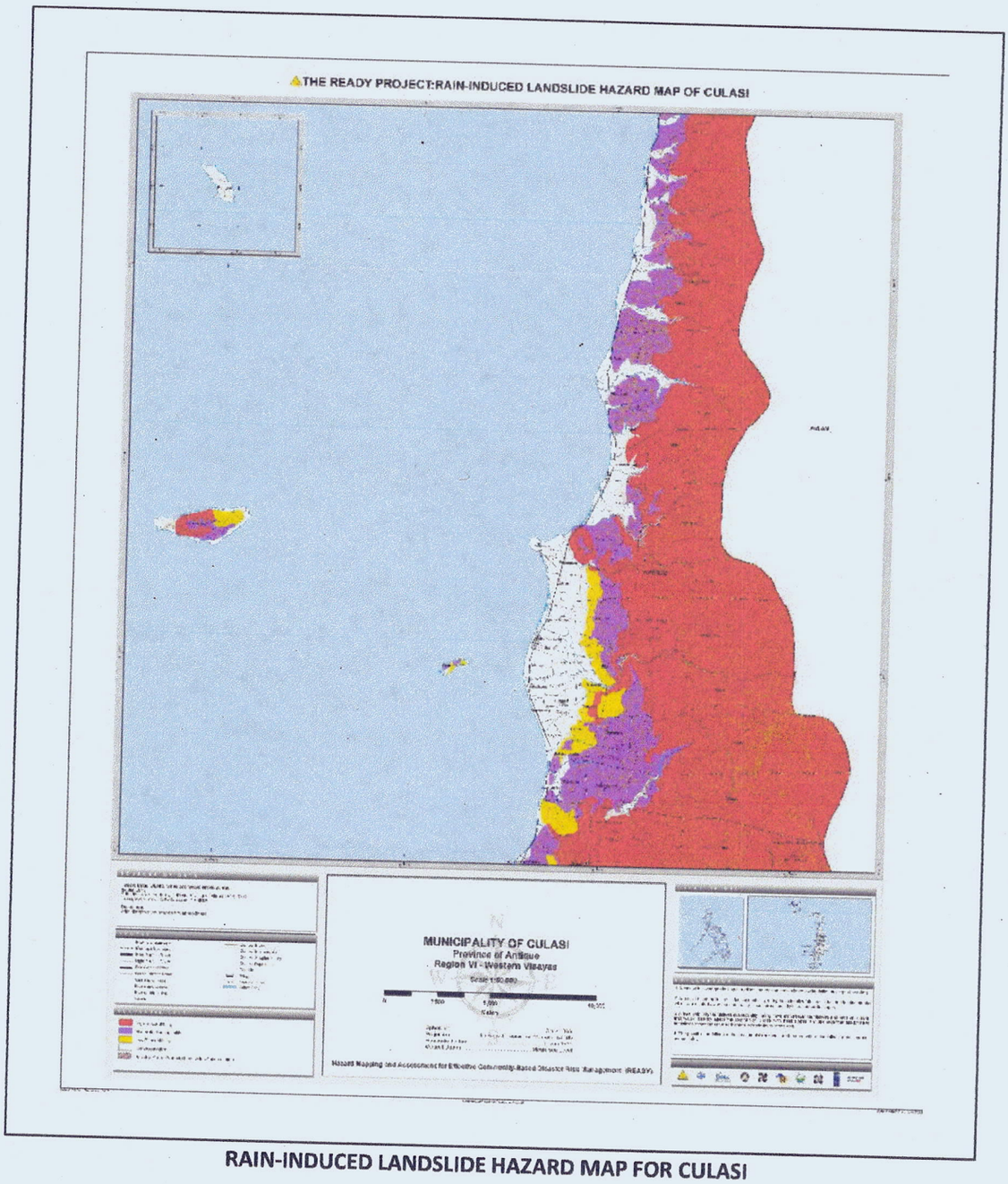
Annex 3. RAIN-INDUCED LANDSLIDES HAZARD MAPS FOR THE PROVINCE OF ANTIQUE AND THE MUNICIPALITIES OF CULASI, BARBAZA, LAUA-AN AND TIBIAO



RAIN-INDUCED LANDSLIDE HAZARD MAP FOR BARBAZA

List of Barangays in Barbaza with High Vulnerability to Rain-Induced Landslide:

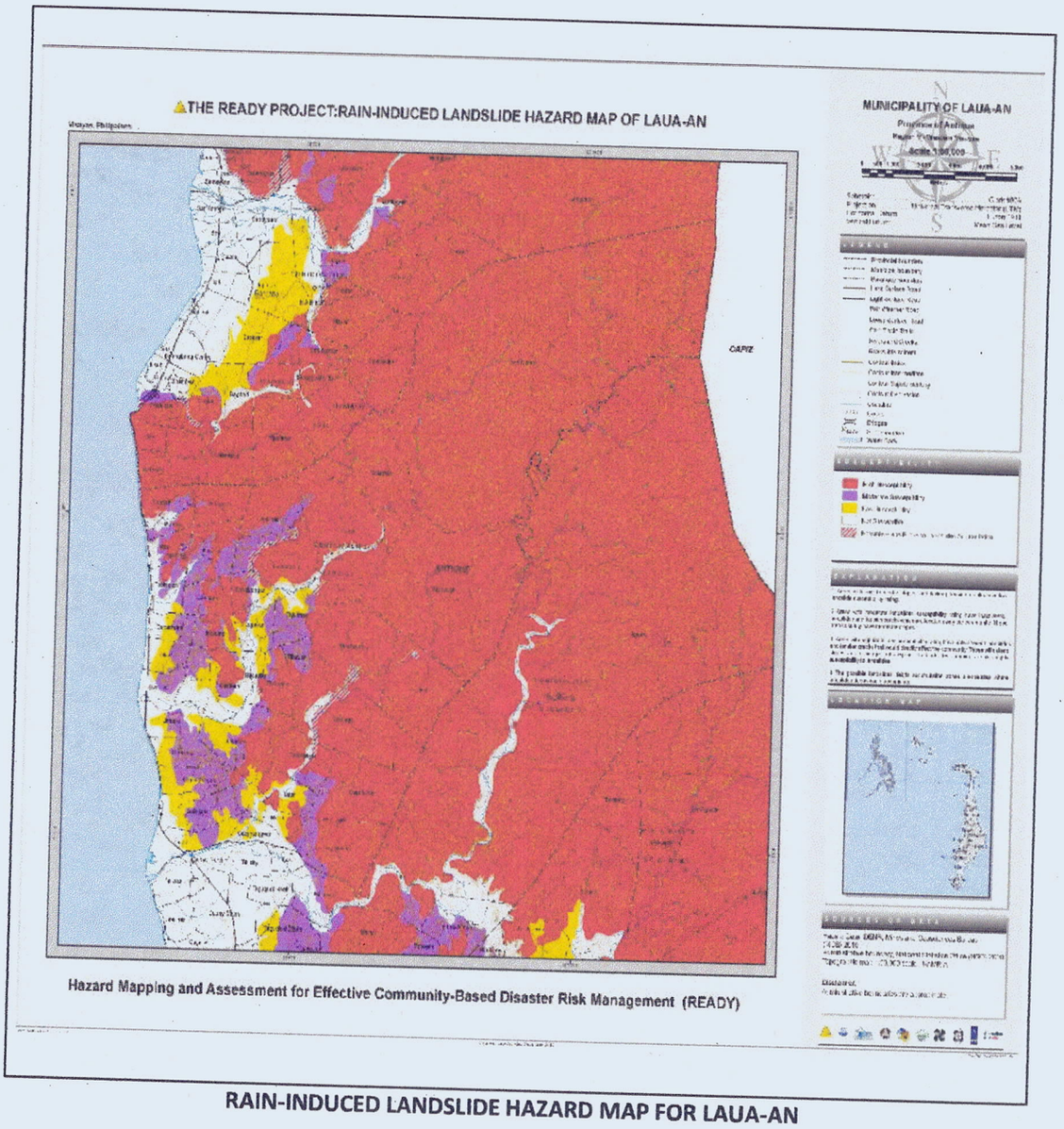
- Bahuyan
- Biga-a
- Binangbang
- Cadiao
- Calapadan
- Embraggaan
- Idao
- Ignaturum
- Integasan
- Lanas
- Langcaon
- Lumboyan
- Mablad
- Marigne
- Magtulis
- Mayos
- Mayabay
- Nalusdan
- Narirong
- Poblacion
- San Ramon
- Soligao
- Tabong-Tabong
- Tig-Alaran
- Yapo



RAIN-INDUCED LANDSLIDE HAZARD MAP FOR CULASI

List of Barangays in Culasi with High Vulnerability to Rain-Induced Landslide:

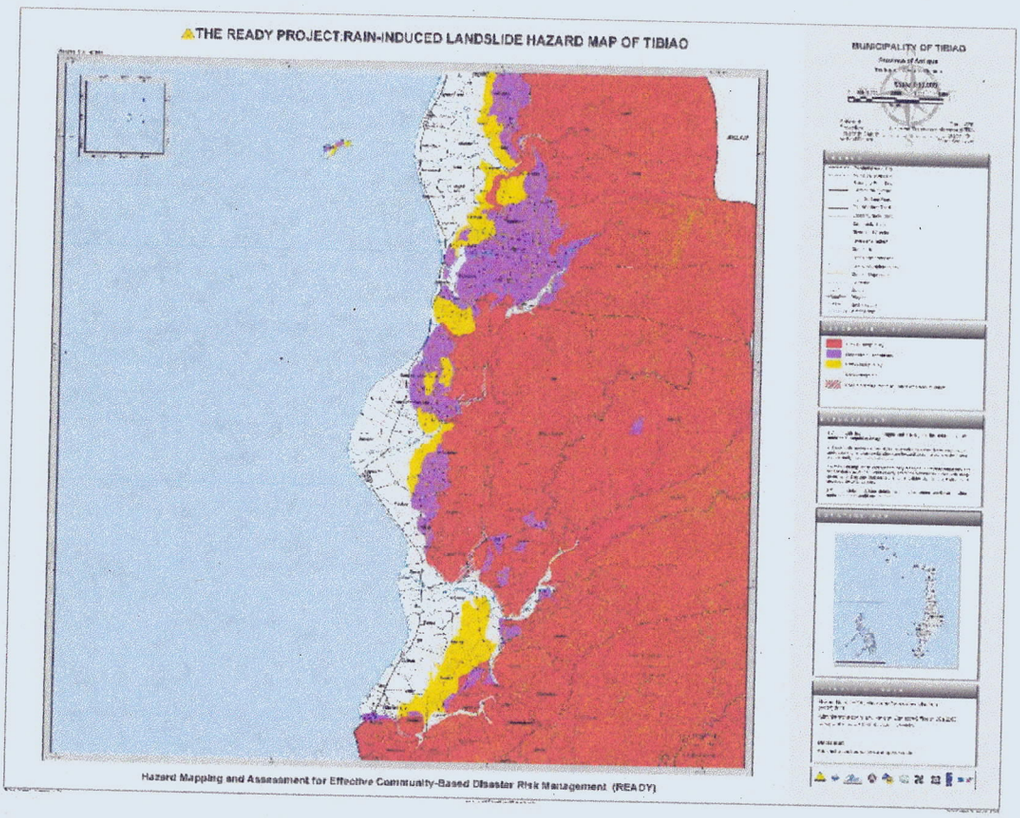
Alojipan
Buenavista
Flores
Magsaysay
Naba
Osorio
Paningayan
Salde
San Luis
Simbola
Valderama



RAIN-INDUCED LANDSLIDE HAZARD MAP FOR LAUA-AN

List of Barangays in Laua-an with High Vulnerability to Rain-Induced Landslide:

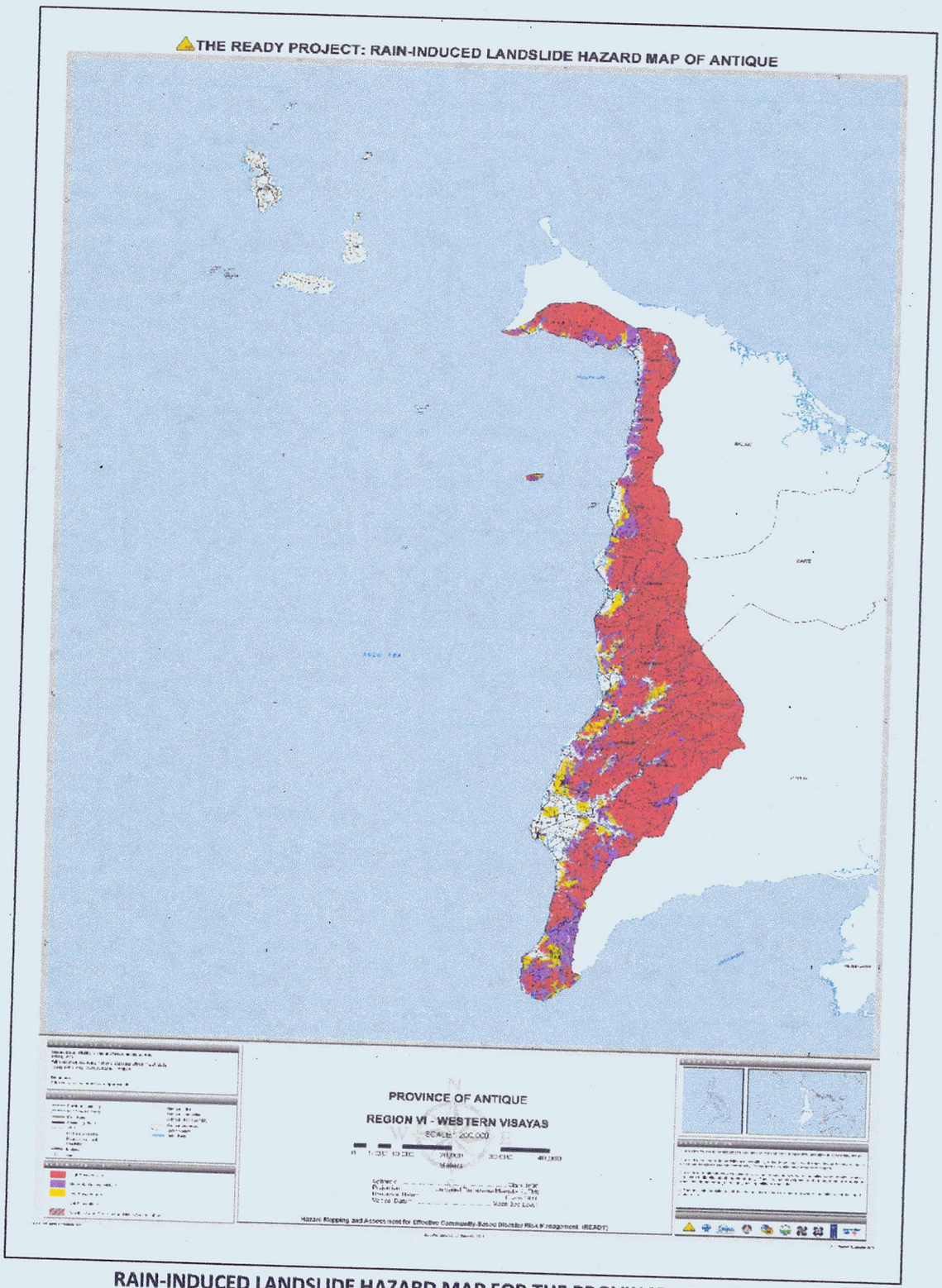
Banban
Capnayan
Guiamon
Intao
Jaguikican
Jinalinan
Lactudan
Latazon
Loon
Liberato
Magyapo
Maria
Maybunga
Pandanan
Paningayan
San Ramon
Santiago
Virginia



RAIN-INDUCED LANDSLIDE HAZARD MAP FOR TIBIAO

List of Barangays in Tibiao with High Vulnerability to Rain-Induced Landslide:

Alegre
Amar
Castillo
Esparagoza
Importante
La Paz
Natividad
Pitac
Salazar
Sta. Ana
Sto. Rosario
Tigbaboy
Tuno



RAIN-INDUCED LANDSLIDE HAZARD MAP FOR THE PROVINCE OF ANTIQUE

REFERENCES

Abaca Technoguide. Philippine Fiber Industry Development Authority.

Abaca and Rainforestation Farming: A Guide to Sustainable Farm Management. Paciencia Po Milan and Friedhelm Goltenboth, 2005. *(http://www.rainforestation.ph/resources/pdf/howto/Milan_and_Goltenboth_2005_Abaca_and_Rainforestation_Farming.pdf)*

Abaca Sustainability Manual. Philippine Fiber Industry Development Authority and Deutsche Gesellschaft für International Zusammenarbeit (GIZ) GmbH and Glatfelter GmbH. *(http://www.philfida.da.gov.ph/index.php/2017-09-22-05-23-59)*

Analysis of Key Drivers of Deforestation and Forest Degradation in the Philippines. Deutsche Gesellschaft für International Zusammenarbeit (GIZ) GmbH, 2012. *(https://www.giz.de/en/downloads/giz2013-en-key-drivers-deforestation-forest-degradation-philippines.pdf)*

Hazard Maps of Antique. National Disaster Risk Reduction Management Council, Philippines. *(http://ndrrmc.gov.ph/gmma-ready-project)*

Philippine Natural Fibers. Department of Agriculture - Fiber Industry Development Authority.

Simplified Keys to Soil Series - Antique. Philippine Rice Research Institute, Maligaya, Science City of Muñoz, Nueva Ecija, 2013. *(http://www.philrice.gov.ph/wp-content/uploads/2015/08/Simplified-Keys-to-Soil-Series-Antique.pdf)*

Supply chain improvement for the abaca industry in the Bicol region [Philippines]. Mascariñas, A.M.Amano, V.L.Mascariñas, J.B.Cortez, C.V. Jr.et al., 2009.

Supply/Value Chain Analysis of Four (4) Commodities (Abaca, Coco-Coir, Cassava and Queen Pineapple). Department of Agriculture and RP-Spain, SAIS-BC Project.

The Abaca Plant and Its Fiber, Manila Hemp. J.E. Spencer, n.d.

Value Chain Analysis: Abaca Fiber Region VI. Philippine Rural Development Project, Department of Agriculture, Philippines.

This Environmental Safeguards Study is prepared for CARE – Philippines by:

RHODORA CHERYL MONTOYA, Lead Consultant
VENER L. DILIG, Co-Consultant
AquaVerde Development and Consultancy, Calapan City, Oriental Mindoro