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USAID PACIFIC AMERICAN CLIMATE FUND (PACAM) CLIMATE ADAPTIVE AGRICULTURE AND RESILIENCE (CAAR) PROJECT FINAL REPORT



Cover photo: Field established sweet potato bed. Inset: Chief Raymond Igechep, one of the project participants from Makiy displaying his harvest.

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LIST OF ACRONYMS AND ABBREVIATIONS

CCA	Climate Change Adaptation
GCI	Grantee Custom Indicator
M&E	Monitoring and Evaluation
PACAM	Pacific-American Climate Fund
USAID	United States Agency for International Development
CAAR	Climate Adaptive Agriculture and Resilience Project
COM-FSM	College of Micronesia – Federated States and Micronesia
CRE	Cooperative Research and Extension Service (at COM-FSM)
COP	PACAM Chief of Party
EPA	Yap Environmental Protection Agency
PC	Project Coordinator
PD	Project Director
RFM	Regional Finance Manager
EPA	Environment Protection Agency
YDN	Yap Development Network
CSA	Climate Smart Agriculture
SLM	Sustainable Land Management
CRS	Catholic Relief Services
TWA	Tamil Women's Association
GWG	Gagil Women's Group
YSBDC	Yap Small Business Development Center

I. ACTIVITIES AND MILESTONES

Completed Activities

There were 15 milestones/targets set for CAAR project to be accomplished over a three-year timeframe. All project activities were tied to one or more milestone activities. Each of those milestones, in turn, represented an activity or activities to achieve the objectives of the project. A set of indicators used to measure the outcomes of milestones within a stipulated timeframe. The CAAR project accomplished all milestones before the project's end date of March 31, 2018. Summary of those activities are given below.

Milestone No.	Milestone description	Milestone verification indicators	Status
1	Drafting and submission of project workplan	Workplan completed in a format provided by PACAM	Completed
2	Drafting and submission of a Communications and Outreach Plan for the project	Communications and Outreach Plan that addresses capture and dissemination of best practices; communications and outreach for events such as formal trainings, activity launches, and community meetings; provision of success stories to PGRD; media engagement. This should be submitted in a format provided by PACAM	Completed
3	Drafting and submission of project monitoring and evaluation plan (M&E Plan)	Monitoring and evaluation plan (including Environmental Mitigation and Monitoring Plan - EMMP) completed in a format provided by PACAM	Completed
4	Drafting and submission of a Gender Analysis and Action Plan	Gender Analysis and Action Plan in a format provided by PACAM and certificate of completion of the USAID 101 Gender Training Course	Completed
5	At least 4 education materials on climate smart agricultural practices and awareness materials on water conservation developed	Draft education materials including brochure materials	Completed
6	At least 2 trainings provided to selected communities (women and men) on sustainable climate-smart agriculture practices for food and nutrition security	Participant attendance lists for all trainings; training materials; and training evaluations	Completed

7	At least 10 water tanks installed, and appropriate education materials provided	Receiving reports from beneficiaries and photos	Completed
8	At least 1 training on value addition and marketing to women entrepreneurs provided	Participant attendance lists for all trainings; training materials; and training evaluations	Completed
9	At least 2 trainings provided to selected communities (women and men) on sustainable CSA agriculture practices for food and nutrition security	Participant attendance lists for all trainings; training materials; and training evaluations	Completed
10	At least 2 trainings on value addition and marketing to women entrepreneurs provided	Participant attendance lists for all trainings; training materials; and training evaluations	Completed
11	All planned water tank installations completed, and appropriate education materials provided	Project Data and Source Documentation verifying distribution and installation such as beneficiary receiving reports and photos	Completed
12	Scale up sustainable land management practices in all selected pilot sites have been completed to increase agricultural production and livelihood opportunities	Field activities data, Periodical reports Newsletters, Site activity photographs	Completed
13	At least 10 community gardens have been established and have been planted with seeds and crops and all education materials have been distributed to stakeholders	Field activities report, Newsletters Reports from beneficiaries, Photographs, Success stories	Completed
14	Project Best Practices have been fully captured and disseminated to relevant stakeholders	Copy of finalized best practices; stakeholder distribution list and report	Completed
15	Drafting and submission of project final report	Final Report	Completed

Milestone 1: The workplan was completed early before the start of the project as per the format suggested by PACAM. Throughout the project, this workplan served as a guideline and a tool to carry out the activities. The workplan detailed specific activities, expected results, a timeframe for completion and its relationship to a specific milestone (workplan is attached).

Milestone 2: Communications and outreach plan was completed during the early stages of project implementation. Outcome level objective of this plan was to “to increase knowledge among stakeholders about USAID funding to Yap, FSM to support climate smart adaptation measures and related co-benefits.” Its output level objectives were i) to raise awareness in climate-smart agriculture practices, and ii) to document and share best climate-smart agriculture practices including sustainable soil management, gender-focused outreach and training on water conservation measures. Details of publications and outreach activities are described in the ‘communications’ section.

Milestone 3: Monitoring and Evaluation (M&E) was developed to track the progress and various activities and results were structured to contribute directly towards project’s goal and objectives. The M&E plan provided background information of the project, presented its Results Framework, summarized project indicators, reviewed procedures for data quality assessment and evaluation, summarized project indicators, reviewed procedures for data quality assessment and evaluations, outlined roles and responsibilities and provided Performance Indicator Reference Sheets and Indicator Tracking information. CAAR Project had six overall project indicators, two of which were PACAM indicators selected from the list provided by PACAM. The remaining four indicators were custom indicators developed to address project’s expected results. These indicators were developed to provide significant data that were easy to collect, measure and validate. Project’s data is described in detail in the M&E Section.

Milestone 4: A Gender Analysis and Action Plan was prepared based on the responses collected from project participants and stakeholders in response to a set of questions provided by PACAM. The purpose of this plan was to promote equal participation of and benefit from project stakeholders in the project areas. This plan essentially referred to a set of methods used to understand relationships between men and women, their access to resources, their activities, and the constraints they face relative to each other. All project staff undergone Gender 101: Gender Equality at USAID, an online course as stipulated by PACAM. After completion of this course, the project staff acquired a holistic view of gender equality, understood why it is important and the roles and responsibilities of every USAID employee to implement and promote it.

Milestone 5: The concept of CSA was the focus area of CAAR project activities. This concept integrated the three dimensions of sustainable development by jointly addressing the food security and climate challenges of displaced atoll communities. It aimed to strengthen livelihoods and food security of displaced atoll communities, by improving the management of natural resources and adopting appropriate methods and techniques for the production of nutritious vegetables and processing of farm produce. A key component was the integrated approach that followed principles of sustainable land management practices including water conservation and use.

Under this milestone activity, project participants received training on sustainable (volcanic) soil management and water conservation practices. Each training session comprised of a PowerPoint presentation of a specially prepared module, followed by question-answer sessions. Hands-on training and demonstrations of pertinent activities followed to introduce and engage communities with appropriate methods. Four modules were covered under this activity: i) Know Your Soil, ii) Soil Profile, iii) Soil Nutrients, iv) Soil Organic Matter. In addition, a module on Introduction to Water Conservation was also presented. All participants received printed copies of these training modules.

“Soil management is sustainable if the supporting, provisioning, regulating, and cultural services provided by soil are maintained or enhanced without significantly impairing either the soil functions that enable those services or biodiversity. The balance between the supporting and provisioning services for plant production and the regulating services the soil provides for water quality and availability and for atmospheric greenhouse gas composition is a particular concern” (Principle 3, World Soil Charter).

Milestone 6: Project participants received extensive hands-on training in various CSA methods. The topics covered under this milestone activity includes study of soil profile and importance of different soil horizons, properties, behavior and management of two major types of soil found on Yap Proper namely, schist derived clay soils and volcanic red soils. Participants were also introduced to hot composting method called Green & Brown Alternative,' for converting organic wastes to compost to enhance soil quality and improve crop production.

Milestone 7 and 11: Water is the prime channel through which the impacts of climate change are felt by the atoll communities in Yap. Most of these impacts are from changes in the water cycle - through increased variability of rainfall, higher temperatures, and extreme weather events linked to ENSO phenomena. These climate events affect atoll communities' water supplies with little warning. Although water management as an adaptation strategy generally involves a range of options related to policies, investments, resource management, and institutional and technical factors, in smallholder systems, primary options demand implementation locally on fields and farms. Actions that increase the capacity to store and access water when needed increase the communities' resilience to climate variability. Therefore, CAAR Project primarily focused on domestic rainwater harvesting and storage.

Water-management strategy that CAAR Project adopted involved a simple yet innovative rainwater-collection system for every household using a Bob Rainwater Bag. It is a trademark product developed by Relief International. Bob offers 350 gallons of water storage and provides water right at the doorstep of every household. In terms of impact, this method proved to be simple, viable, replicable, and capable of bringing clean water to every household of the atoll communities. It contributed to the growing body of knowledge about domestic rainwater harvesting, and it directly contributed to poverty reduction by improving access to safe water in every household and relieving women and children from the drudgery of fetching water while improving health and quality of life of household members. Altogether 71 Bob bags were installed across 4 community settlements and other locations.

Water conservation and awareness trainings were conducted across all settlements and community locations to impart the knowledge on the source of water, amount of available and water cycle. In addition to rainwater using Bob bags, the training activities helped communities to implement on-field water conservation methods to enhance crop growth using traditional practices (mulching using organic refuses such coconut leaves, banana trunk etc.). Water use efficiency on the field is enhanced by minimizing losses of water from evaporation, runoff or drainage and increasing water infiltration with methods such as maintaining a protective cover of mulch or the use of ridges and furrows (in taro and sweet potato cultivation) residue management, and promotion of agroforestry practices. Water conservation in raised-bed gardening and container gardening was achieved through plant choice, selection of an appropriate organic growth medium such as compost or coco pith, and efficient watering methods.

Milestone 8 and 10: Given the reliance of vulnerable atoll communities on environmental services for their livelihoods, another element of the adaptation approach implemented through the CAAR Project was i) nutrition education, and ii) value-addition of farm produce through *capturing* value and *creating* value. While local food production helps protect the environment through the reduction of waste, climate change

mitigation, reducing “food miles,” soil benefits and biodiversity, educating the communities the nutritional aspects of vegetables augments consumption pattern thus reducing nutritionally-related disorders. Most of the recipes/methods CAAR project used for nutrition education were adopted from Expanded Food and Nutrition Education Program (EFNEP) and adapted to suit local situations. Capturing value relates to capturing some of the value added to a product by processing or marketing. Whereas creating value focused on developing products that are differentiated in some way.

Based on PowerPoint presentations, handouts and hands-on demonstrations, communities were introduced to nutrition education and value-addition methods over several cycles. The main objectives of this activity were to provide communities with information on i) how to identify different types of vegetables, ii) significance of color and nutritional value of different vegetables, iii) to identify the recommended daily intake of vegetables, and iv) to provide tips to consume vegetables daily (in the form of snacks, soup, smoothie, stir fry, juice, salad etc.). Cooking demonstrations helped participants to engage in cooking activities while trying new recipes using locally produced vegetables along with other ingredients. A range of new recipes from EFNEP activities were shared with communities. Value-addition component of this activity focused on creating value to increase the shelf life (for e.g. breadfruit flour) or add value (pumpkin jam, papaya ice cream). Making flour from breadfruit was an innovative method introduced to all participants. As part of World Food Day outreach event, a variety of snacks, pastries and bread loaf made using breadfruit flour alone or in combination with white flour were exhibited.

The training on marketing farm produce was carried out in partnership with Yap Small Business Development Center (YSBDC). The learning objectives of this training were to provide information on i) knowing the cost of items and time spent on garden, ii) how to analyze the cost spent on tools and supplies needed, iii) what benefits would the garden provide for each household, and iv) how much profit would the participants gain. Evaluation showed that participants gained a basic understanding on small scale business concepts and its significance.

Milestone 9: This activity was continuation of CSA activities carried out under milestone 5, with focus on soil water and soil water management. Soil water management involves improving water use efficiency and minimizing losses of water from evaporation, runoff or drainage. This includes various methods, such as storing water in reservoirs, to allow it to sink into the soil and increase soil moisture levels. It also includes using a protective cover of vegetation on the soil surface to slow down the flow of running water and spread the water over a large area. In addition to many agronomic practices such as agroforestry, organic residue management (mulching, compost application), structural measures are also important to conserve soil and water. Through workshops and hand-on training activities communities were introduced to soil water management concepts for climate change adaptation and to enhance livelihood options. Training activities encouraged communities to prepare compost on a regular basis to use in raised beds (for e.g. growing leafy vegetables such as Chinese cabbage), to improve soil fertility (taro and sweet potato cultivation), to control soil erosion and increase soil fertility.

Milestone 12: Sustainable Agriculture Land Management (SLM) practices are those agricultural practices that preserve and enhance productive capacities of land; actions to stop or reverse land degradation; actions necessary to meet the food needs of the population, rehabilitate degraded lands, adapt to changing climate and mitigate climate change. While the core concept of CSA and SLM methods are similar, prime focus of CSA is improving food security whereas SLM practices enhance the productivity of land while helping to adapt to climate change. The SLM practices are beneficial because they can stop land degradation process, increase crop diversity, promote higher yields, improve micro-climate for plants, and preserve organic carbon in the soil, among other co-benefits. Training activities conducted on SLM practices include soil nutrient management (organic and inorganic fertilizer application), residue management (mulching, composting), agroforestry methods, soil and water conservation methods and integrated pest management.

In addition to container gardening methods to grow vegetables, training on SLM practices helped communities to scale up activities and establish and maintain home vegetable gardens to enhance food and nutrition security. The SLM methods also helped communities to grow starchy staples (taro and sweet potato), thus increasing crop diversity and preserve soil organic carbon.

Milestone 13: This milestone activity captured the evidence of gardening activities communities were engaged in across all settlements and locations, by means of photographs, field reports, activity data along with respective client details. The knowledge gained through hands-on training activities and technical assistance enabled the communities to establish household vegetable gardens incorporating a variety of crops including starchy staple crops.

Milestone 14: During the course of the project, best practices of effective climate change adaptation strategies have been captured and disseminated to the public and other stakeholders. A best practice is a method or technique that through research and experience has shown reliably lead to a desired result. Altogether, 6 best practices have been captured and documented in relation to one of the PACAM indicators selected for CAAR project.

Additional details of completed activities and sub-activities are given below:

Output 1: Improved soil management for climate smart agriculture

- **Activity 1.1 - Submission of project workplan (completed)** - The workplan was completed early before the start of the project as per the format suggested by PACAM. Throughout the project, this workplan served as a guideline and a tool to carry out the activities. The workplan detailed specific activities, expected results, a timeframe for completion and its relationship to a specific milestone (milestone 1 - workplan is attached).
- **Activity 1.2 – Recruitment of project staff and training (completed)** – By January 2016, all full-time staff are hired and received training on extension techniques and approaches.
- **Activity 1.3 - Submission of communications and outreach plan (completed)** - Communications and outreach plan was completed during the early stages of project implementation. Outcome level objective of this plan was to “to increase knowledge among stakeholders about USAID funding to Yap, FSM to support climate smart adaptation measures and related co-benefits.” Its output level objectives were i) to raise awareness in climate-smart agriculture practices, and ii) to document and share best climate-smart agriculture practices including sustainable soil management, gender-focused outreach and training on water conservation measures. Details of publications and outreach activities are described in the ‘communications’ section (milestone 2).
- **Activity 1.4 Submission of M&E and EMMP (completed)** – Project’s EMMP Plan was completed and submitted in July 2015. M&E plan was developed to track the progress and various activities and results were structured to contribute directly towards project’s goal and objectives. The M&E plan provided background information of the project and presented its Results Framework, summarized project indicators, reviewed procedures for data quality assessment and evaluation, outlined roles and responsibilities and provided Performance Indicator Reference Sheets and Indicator Tracking information. CAAR Project had six overall project indicators, two of which were PACAM indicators selected from the list provided by PACAM. The remaining four indicators were custom indicators developed to address project’s expected results. These indicators were developed to provide significant data that were easy to collect, measure and validate. Project’s data is described in detail in the M&E Section (milestone 3).

- Activity 1.5 Project sensitization workshops (completed) – Stakeholder introductory workshops were held among communities to present project’s overall goal, objectives and methodologies, and expected outcomes.
- Activity 1.6 Recruitment of project participants (completed) – During the first two years, 136 participants were recruited in three batches. During the last phase an additional 74 participants were recruited bringing the total number of enrolled participants to 210. Out of this, 166 participants attended and received training.
- Activity 1.7 Publish education materials on CSA and water conservation (completed) – Under this specific activity, project participants received training on sustainable (volcanic) soil management and water conservation practices. Each training session comprised of a PowerPoint presentation of a specially prepared module, followed by question-answer sessions. Hands-on training and demonstrations of pertinent activities followed to introduce and engage communities with appropriate methods. Four modules were covered under this activity: i) Know Your Soil, ii) Soil Profile, iii) Soil Nutrients, iv) Soil Organic Matter. In addition, a module on Introduction to Water Conservation was also presented. All participants received printed copies of these training modules (milestone 5).
- Activity 1.8 Conduct trainings on CSA (completed) - Project participants received extensive hands-on training in various CSA methods. The topics covered under this milestone activity includes study of soil profile and importance of different soil horizons, properties, behavior and management of two major types of soil found on Yap Proper namely, schist derived clay soils and volcanic red soils. Participants were also introduced to hot composting method called ‘Green & Brown Alternative,’ for converting organic wastes to compost to enhance soil quality and improve crop production (milestone 6).
- Activity 1.9 Conduct soil management trainings (completed) – All project participants received training on volcanic soil management, soil organic matter, soil nutrients, soil water, soil nutrient management and composting under this specific activity session.
- Activity 1.10 Disseminate knowledge on climate-smart agricultural practices to targeted communities (completed) – All training workshops under CAAR project were focusing on the core concept of CSA practices.

Output 2: Improved livelihood opportunities and gender-focused climate-smart agriculture practices

- Activity2.1 Submission of Gender Analysis and Action Plan (completed) - The Gender Analysis and Action Plan was completed and submitted by February 2016 (milestone 4).
- Activity 2.2 Provide trainings on sustainable CSA methods (completed – This was a specific milestone activity and all participants received training and adopted CSA practices while establishing household gardens (milestone 9).
- Activity 2.3 Scale up sustainable land management practices on selected pilot sites (completed) – Participants adopted SLM practices while establishing household gardens.
- Activity 2.4 At least 10 community home gardens have been established and appropriate educational materials distributed (completed) – Based on the various training focusing CSA methods, communities established household vegetables gardens for food and nutrition security (milestone 13).
- Activity 2.5 Provide training on value addition and marketing to women entrepreneurs (completed) – All participants received training on value addition, nutrition education, and marketing under this activity (milestone 8 & 10).

Output 3: Reduced risks from climate variability and change

- Activity 3.1 Conduct trainings on sustainable CSA (completed) – All participants completed training CSA practices in addition to those completed under milestone 5 (milestone 9).
- Activity 3.2 Local capacity building (agroforestry training) and promotion of appropriate diverse crop production practices (completed) – In addition to the CSA methods, all participants undergone training on agroforestry practices. Training sessions helped the communities to expand the crop portfolio at household and community level.
- Activity 3.3 Sustainable land management practices scaled up in all pilot sites (completed) – All participants adopted one or more SLM practices to enhance crop production. The SLM methods also helped communities to grow starchy staples (taro and sweet potato), thus increasing crop diversity and preserve soil organic carbon (milestone 12).
- Activity 3.4 Provide communities with access to climate change information and trends (completed) – Appropriate climate related information disseminated to communities on an ongoing basis during the project period.

Output 4: Increased awareness on sustainable water use and conservation

- Activity 4.1 Promote a range of rainwater harvesting techniques (completed) – Rainwater harvesting as a viable option to meet water demand especially during the periods drought was presented to the participants through water conservation training. All participants received this training while some of them received Bob bags for rainwater harvesting.
- Activity 4.2 Install at least 10 rainwater tanks with appropriate instructional materials (completed) – Water management strategy CAAR Project adopted involved a simple yet innovative rainwater-collection system for every household using a Bob Rainwater Bag. It is a trademark product developed by Relief International. Altogether 71 Bob bags were installed across 4 community settlements and other locations (milestone 7).
- Activity 4.3 Training on water conservation and management (completed) – All receiving participants received training to effectively adopt water conservation measures at household level (milestone 7).
- Activity 4.4 Develop and disseminate education and awareness materials on water conservation (completed) – Brochures and handouts on water basics and water conservation were produced and distributed among the communities. These educational materials were discussed in detail during the training sessions.
- Activity 4.5 All rainwater collection tanks installed, and appropriate instructional materials provided (completed) – Altogether 71 rainwater collection Bob bags were installed during the project period across the project locations. Participants also received training on proper maintenance of Bob bags (milestone 11).
- Activity 4.6 Project's best practices have been fully captured and disseminated to relevant stakeholders (completed) – Best practices of effective climate change adaptation strategies have been captured and disseminated to the public and other stakeholders through various outreach activities (milestone 14).
- Activity 4.7 Quarterly reports were submitted at the end of every quarter during the project period.

Initially, the project recruited 136 participants from 4 neighboring island community settlements of Ruu, Makiy, Daboch and Gargey and trained them in various climate-smart agriculture practices including water conservation methods and training on nutrition and value addition. Based on a request from two community groups and after reviewing the progress of work with the initial project participants, an additional 74 participants (members of two women groups from Gagil and Tomil municipalities) were recruited during the last year of the project. These additional participants also undergone same set of trainings in soil management, water conservation and livelihood opportunities. An informal closeout survey revealed that 97 participants actively continued with their kitchen garden activities across all project locations.

I. COMMUNICATIONS, GENDER AND ORGANIZATIONAL CAPACITY

2.1 Communication and Outreach

In addition to the workshops and trainings conducted for the participants across all project locations, project activities were promoted in various fora in the state, in the region and other parts of the world through community outreach activities, or attendance in symposium or conference. Training manuals specifically prepared under this project helped the communities to follow through various activities after respective training workshops. PACAM's Communications Officer frequently disseminated project activities and progress through social media and electronic means. All these activities helped to popularize our work and PACAM's support across various regions around the globe.

The following are some of the activities carried out to reach out to the public:

1. Regular attendance in Yap Development Network's meeting to exchange information about USAID Project activities to enhance climate resilience.
2. Attended and presented a paper on 'Climate-friendly adaptation strategies for the displaced atoll population in Yap' during the World Symposium on Climate Change Adaptation in the Pacific Region, in Fiji. This paper won the second prize in the Best Papers Award category.
3. Attended and presented a paper on 'Climate change impacts and food security' during the 4th FSM National Women's Conference in Yap.
4. Participated in World Food Day activities in Yap. Participants from Ruu, Daboch and Gargey displayed and sold various farm produce grown in their home gardens as part of this project.
5. Two special workshops conducted as part of World Soil Day 2016 (December 5). Over 50 community members including project participants from Ruu and Makiy attended this event. As part of this celebration, community members from all age groups participated in a tree planting drive across Makiy settlement. Subsequently, similar workshops and tree planting activities were held in Ruu, Daboch and Gargey settlements.
6. Participated in Yap State Agriculture Fair organized at the Yap State Division of Agriculture and Forestry in December 2016 wherein participants exhibited and sold their farm produce.
7. Attended 'Climate Displacement, Migration and Relocation Symposium' in Honolulu in December 2016. This symposium was organized by White House Council on Environmental Quality in collaboration with University of Hawaii, the US Department of the Interior, Pacific Islands Climate Science Center, NOAA Office of Coastal Management, Hawaii Sea Grant College Program and Alaska Sea Grant

College Program where discussed CAAR project and other ongoing Yap CRE programs on climate change during panel discussions.

8. In February 2017, Project Director made a presentation on CAAR Project activities and climate change adaptation activities during the YDN partners' meeting.
9. The project team along with Yap CRE staff attended and showcased various climate smart food production systems and low-cost urban garden models during the 2017 Yap Day festivities in March. A variety of nutritious fruit and leafy vegetables from CRE demonstration gardens and USAID's Pacific-American Climate Fund Climate Adaptive Agriculture and Resilience Project beneficiaries were on display and sale.
10. Attended and presented a paper on 'Climate Adaptive Agriculture and Resilience – Sustainable Adaptation Strategies for Island Communities in Yap,' during the 8th Island Sustainability Conference at University of Guam in April 2017.
11. Participated in annual Homecoming festival in Colonia in June 2017 in which CAAR Project participants exhibited and sold their farm produce.
12. On June 5, 2017, CAAR Project staff and participants and beneficiaries joined the State in observing World Environment Day. During this event, project staff conducted agroforestry workshop, followed by tree planting activities across Gargey, Ruu, Daboch and Colonia.
13. Attended and presented a paper on 'Climate-smart urban vegetable gardening for displaced urban populations in the small islands of Micronesia,' during the 15th Islands of the World Conference in Kangaroo Island.
14. Attended the World Symposium on Climate Change Impacts and Adaptation Strategies in Coastal Communities in Samoa and presented a paper on 'Enhancing adaptive capacity and climate change resiliency of coastal communities in Yap.'
15. Attended Extension Climate Forum at University of Guam and gave two lectures: i) Vulnerability and resilience on Pacific Islands – Understanding Climate Variability and Resilience in Yap; ii) Extension and Outreach Responses to Climate Change.
16. Attended 2018 Southern Sustainable Agriculture Working Group Family Farms Conference and presented a poster on 'Enhancing adaptive capacity of displaced atoll communities through climate-smart agriculture interventions.'

Publications

1. Krishnapillai, Murukesan (2018). Enhancing adaptive capacity and climate change resilience of coastal communities in Yap. In Leal Filho, W. (Ed). *Climate Change Impacts and Adaptation Strategies in Coastal Communities*. Springer, Berlin. Pp. 87-118.
2. Krishnapillai, Murukesan (2017). Climate-friendly Adaptation Strategies for the Displaced Atoll Population in Yap. In: Leal Filho, W. (Ed) *Climate Adaptation in Pacific Countries: Fostering Resilience and Improving the Quality of Life*. Springer, Berlin; Pp. 101-117.

2.2 Gender Action Plan

CAAR Project's Gender Action Plan focused on addressing the roles of men and women and their power norms within traditional island communities' context. It initially identified the constraints and gaps along with inequalities that could be addressed. About 68 percent of project participants were women. All project staff completed Gender Analysis 101 online course in the beginning. Preliminary survey conducted across the 4 community settlements identified the following two issues, which were further addressed in the gender action plan.

1. Inability of some participants to attend the training workshops regularly. During weekdays, some men and women participants had to work away from their settlement in Colonia to earn a living. Also, some youth participants had to attend the college or school. To address this concern, training activities were conducted during weekends, holidays and after hours that enabled maximum participation of working men and women.
2. While women are traditionally the farmers and responsible for the family's food security, men are the traditional decision-makers. To avoid any conflict of decisions, the project recruited both men and women and incorporated their inputs into the project activities. The project team ensured that women had needed technical skills while hearing men's voices on farming matters.

There are no cultural beliefs in Yap that a certain gender can do better than the other relative to gardening, water conservation, food provision, etc. However, women are generally less vocal and initially inclined to be shy in workshops and training events while men are inclined to be more vocal. To address this, female Project Coordinator worked with field assistants to engage women clients more directly in an appropriate manner in workshops, training sessions and informally to facilitate their participation. Also, in line with the gender analysis and action plan, having both men and women involved on the project team helped to ensure the priorities for men and women are considered throughout the project. Project outreach activities prompted two women groups – Tomil Women's Association and Gagil Women's group – to join the project during the last year.

1.3. Organizational Capacity Building

Project staff received orientation training in the beginning and introduced to the concepts and procedures of the project, understanding beneficiaries' priorities and identifying performance and project needs. Importance of documentation, supervision, duties and responsibilities were the core contents of the training. Knowledge of USAID rules and regulations, financial and administrative responsibilities, procurement procedures, communications, branding and marking strategies, monitoring and evaluation were also included in the discussion. Also, during the early phase of project implementation, PACAM fielded a senior advisor to train, coach and work with the USAID/COM-FSM project team to build organization and individual staff capacity. The senior advisor worked closely with Project Coordinator to develop and start implementation on an accelerated work plan, strengthen relationships among the project team and with government and other entities, establish daily operating procedures and planning multiple work streams to achieve project goals. The accelerated work plan helped COM-FSM team to move forward aggressively in newly strengthened relationships between the project team and government and other entities working in Yap. Catalyzed by CAAR, a new permanent Yap Development Network was established to increase coordination and improve exchanges of ideas and information on climate change activities among other issues. Also, based on the accelerated work plan, new daily operating procedures were established including daily coordination meetings for project management and weekly planning meeting for the entire project staff. These meetings enabled planning and execution of multiple work streams that have directly accelerated project activities and progress toward overall project goals. Communication among COM-FSM/CAAR project team members has improved, enabling a faster and more coordinated pace in field activities. The Senior Advisor worked directly with the project coordinator and field assistants on orientation and introduction to the concepts and procedures of the project, approaches to understanding, adaptation to beneficiaries' priorities and understanding evaluation of overall project goals and performance needs. Additional training clarified expectations for staff work documentation, supervisory relationships, and duties and responsibilities under a USAID-PACAM project vis-à-vis related COM-FSM practices and policies. With the project coordinator, particular emphasis was given to USAID rules and regulations governing project implementation, financial and administrative responsibilities, procurement procedures, communication, branding and marking strategies, leveraging resources and monitoring and evaluation. Based on the experience gained during the period the senior advisor was with

the CAAR team, project coordinator continued to work with all other staff to increase productivity and performance throughout the project period. The training enabled the staff to carry out their activities effectively and achieve project milestones and goals on time.

2. KEY ACHIEVEMENTS AND SUCCESSES

Project's adaptation strategies were designed to ensure short and long-term benefits, even under harsh conditions on a degraded landscape. However, these methods are equally applicable in other vulnerable coastal settings since they are pragmatic and designed to protect both natural and human communities from impacts of climate change. These strategies were both effective (appropriate to the environment where it was applied) and sustainable (atoll communities were involved in the activities, supported them, and they are committed to sustaining them into the future). These strategies combine various activities that offer climate-resilient development benefits. For example, the mosaic restoration approach has the advantage of meeting immediate development needs while contributing to longer-term capacity development that creates a foundation for reducing future vulnerabilities. Agroforestry is “nature's green infrastructure” that provides many ecosystem services including shoreline protection, sustaining livelihoods besides sequestering carbon. To maintain their effectiveness over time, atoll communities were involved in all activities, support services, and information sharing. It is highly likely that atoll communities will face many intense climate-impacted issues and challenges in the future. Therefore, these adaption strategies are not a one-time event but an ongoing and iterative process that will be subjected to periodic evaluation of performance and fine tuning.

Key achievements are summarized below:

Focused adaptation strategies—Integrated climate-smart adaptation strategies used in the CAAR Project have offered some broader insights and lessons to atoll communities for enhancing adaptive capacity and resilience on a degraded landscape. The coherent extension approach involved outreach, technical assistance, and education opportunities that were explicitly designed and involved all stakeholders. The activities were focused on strengthening the livelihoods of atoll communities by improving access to services, knowledge, and resources.

Soil management—Volcanic soil health management through composting, mulching, and incorporation of traditional crops and agroforestry systems gradually improves soil properties, making conditions more favorable for crop growth. Mulching protects soils from excessive heat, exposure to wind, and moisture loss. Potential rates of carbon sequestration in response to improved soil management vary widely as a function of land use, climate, soil, and many other factors. With land (where displaced atoll community settlements are situated) being severely degraded, it is perhaps unreasonable to expect a higher rate in the beginning. The very low carbon levels in the Gagil and Yap Series of soils (1–2% of organic matter) mean that a 1% increase in carbon content of soil mass is feasible. Maintaining an appropriate level of soil organic matter and biological cycling of nutrients is challenging in humid tropical conditions. In practice, however, the land is expected to be used for agriculture before that rate of C sequestration would apply.

Vegetable gardening—Incorporation of an alternative mode of crop production in conjunction with mosaic restoration activities increased production of nutritious vegetables for home consumption and provided an alternate source of income. Restoration agroforestry has great potential for re-greening degraded lands in a less expensive and participatory way, creating a basis for improved livelihoods, water provision, and sustainable food production.

Climate-smart agriculture—Integration of traditional and modern climate-smart agriculture practices maximizes the use of natural processes, enhances the diversity of production, and tailors production intensity to the capacity of the degraded landscape. Improving soil health and crop diversity and the important components of traditional farming systems can make a significant contribution to resilience and, at the same time, enhance adaptive capacity to better manage future challenges.

Rainwater harvesting—Installation of efficient rainwater harvesting Bob bags across the households reduced communities' burden to fetch water from distant sources while improving their health and quality of life. Rainwater harvesting coupled with water conservation measures and soil water management strategies augments vegetable gardening and rehabilitating degraded land.

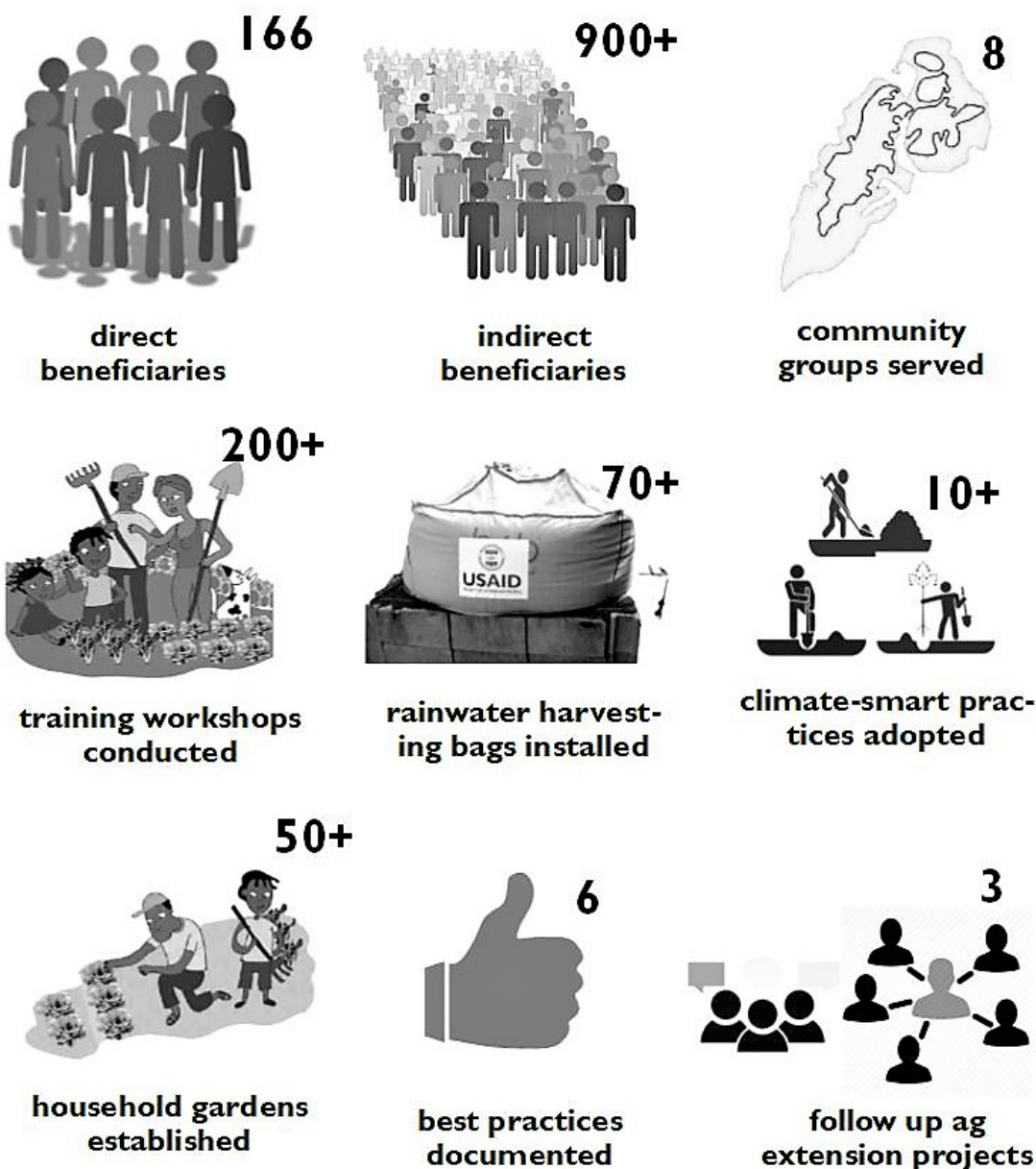
Agroforestry—Introduction of agroforestry systems and sustainable land management practices enhances crop diversity in the long run, and it increases food security and livelihood benefits. Agroforestry systems are locally based and incorporate indigenous species and techniques that have been used traditionally in the Pacific Islands for many generations. Fully established agroforestry systems will eventually reduce communities' dependence on purchased products and resources, as well as reducing vulnerability to changing market conditions. Exploring market opportunities for multipurpose tree products will have significant economic, social, and environmental benefits in the future.

Food availability—Communities gained knowledge on food preservation and value addition to meet food security challenges during off seasons or at times of adversity.

Continuous learning process—Bringing in new information to the atoll communities was indeed a challenge and a key barrier to adaptive capacity. However, local field staff served as conduits for information and support to the dissemination of information in the local vernacular to non-literate members of the community. They ensured that outreach services strengthened community needs. The Project's gender plan provided focused formal and informal trainings to female members of the household and enhanced their participation. Women's participation in adaptation strategies contributed to their empowerment as they earn their own income.

Multiple benefits—Climate-smart adaptation strategy is a “multiple benefit” approach as it typically builds climate resilience alongside other benefits. The instituted methods are fully scalable. However, context-specific priorities need to be determined. By promoting strategies, revitalizing degraded lands, and scaling up innovative adaptation methods, crop production could be enhanced to support the food security requirements of atoll communities living on marginal lands.

Replicable—The fact that these adaptation methods can be easily replicated in other geographic locations increases the importance of the present work. Furthermore, the activity and its results were measurable (effectiveness), it produced results with a reasonable level of resources and time (efficiency), the activity addressed priority climate risks (relevance), and it could be carried forward over a long period of time (sustainable).



3.SUSTAINABILITY

Adaptation is a vital part of the climate-change framework. Actions to enable adaptation to climate change present opportunities to promote sustainable development. Since CAAR Project's adaptation interventions encompass the local customs and traditions of atoll communities, it is likely that these approaches will be successful in the long run. By providing innovative adaptation options such as climate-smart, alternative crop-production methods, communities are empowered to increase and sustain crop productivity that is affordable and low-risk. When empowered, atoll communities are better positioned to adapt. This project has created a secure environment for atoll communities to learn and apply methods and share results with those who are still enduring risk in atoll settings.

This program's outcome and impacts boost incentives to scale up climate resilience activities into wider vulnerable communities' development programs and policies of our partners including dialogue between various Government agencies and departments. When recognition is growing at local and national levels, program activities will influence policy making at all levels. Program activities and outcomes are documented to explain its mission and successes to next generation of community practitioners, government planners and policy makers and to serve as outreach tools to garner further support.

A fundamental insight emerging from the climate change adaptation work in Yap is that of the multiplying effect of the program's strategies and the communities' acceptance and strengthening adaptive capacity. Communities see connections and value of the program's impacts to be more forward looking after initial success with the Gargey Project. This has paved the way to expand the current program (CAAR Project) to eight communities including four displaced atoll community settlements on Yap Proper. The project has taken another big leap and expanded the adaptation work to five municipalities covering over 300 households under the umbrella of the Adaptive Community Transformation (ACT) on Yap project funded by USAID—Office of U.S. Foreign Disaster Assistance—Catholic Relief Services. These projects represent an ongoing learning process on climate change adaptation, and the knowledge will contribute to the growing number of successful adaptation programs in the Pacific and beyond.

Climate change is one of the approved program areas that COM-FSM engaged in as part of the extension Plan of Work under USDA-NIFA. We will continue to provide extension support (outreach, extension education, technical assistance) to all communities (including atoll communities) as part of extension mandate. Recently, Yap CRE secured a funding worth \$948,750 from Italian Ministry for Environment, Land and Sea under Italy-PSIDS Climate Cooperation Program to enhance water security (water infrastructure) and climate resilient food systems for the displaced atoll population in Yap.

4. LESSONS LEARNED

The Project addressed vulnerability issues of displaced coastal communities in Yap and the adaptation framework aimed to strengthen their adaptive capacity and enhance resilience to future threats. The project demonstrated three focused climate-smart adaptation methods and practices targeting the displaced atoll communities residing primarily at four settlements on Yap Proper. The strategies were based on the traditional knowledge and practices of the atoll communities coupled with climate-smart agriculture and built upon three vulnerable sectors—traditional agriculture, water, and community development. The approach ensured economic viability, improved biodiversity, and ecosystem services benefiting all island communities. The motivation for this project supported displaced atoll communities to better manage and adapt to extreme climate pressures in the context of food security through community-based climate smart adaptation. Food is not only a basic need for these climate migrants, it is the single (and often fragile) support they have for maintaining their livelihood. This project, therefore, promoted the production of household-level food production systems utilizing traditional and climate-smart methods.

Adaptation benefits resulted from the catalytic and innovative nature of a previous successful attempt with a group of displaced atoll communities and the valuable lessons learned and information generated. By its concurrent focus on enhancing food security through traditional crops coupled with nutrient-rich vegetables, promotion of rainwater-harvesting systems and water conservation, and promoting resilient household livelihood opportunities, the program brought together crucial elements needed to reduce vulnerabilities and cope with disasters and climate extremes while embracing the traditional culture. Community resilience is a pre-condition for achieving Sustainable Development Goals.

Empowering atoll communities by providing appropriate outreach assistance and extension services allowed them to improve their livelihoods by harnessing new methods and knowledge. The project's climate-smart interventions are highly location-specific and knowledge-intensive. The approach offers an opportunity for atoll communities to revitalize and overcome barriers while also adjusting to the new realities of climate extremes. Nevertheless, it applies to similar situations in small islands where displaced population are found in marginal areas. This significantly add to the world knowledge of how we approach the climate change-induced and climate change-forced migrants in different locations. Restoration agroforestry has great potential for regreening degraded lands in a less expensive and participatory way, creating basis for improved livelihoods, water provision and sustainable food production. This project's climate-smart adaptation strategy was a "multiple benefit" approach as it typically builds climate resilience alongside other benefits.

6. MONITORING AND EVALUATION

6.1 M&E Indicator Target Tracking Table

	Indicator	Base line	Y1 Total Targ ets Plan ned	Y2 Total Targ ets Plan ned	Y3 Total Target s Planne d	Tot al Y1- Y3 Targ ets Plan ned	Project Period of Performance: Actuals Achieved												Tot al Act ual
							Q 1	Q 2	Q 3	Q 4	Q 5	Q 6	Q 7	Q 8	Q 9	Q 10	Q 11	Q 12	
PACAM Indicators																			
1	PACAM Indicator 1																		
	Number of stakeholders (individuals) with increased capacity to adapt to impacts of climate variability and change as a result of USG assistance	0	40	40	40	120	0	0	0	40	0	46	0	0	50	74	0	0	210
	Micronesia/Yap	Yap	Yap	Yap	Yap	Yap	Yap	Yap	Yap	Yap	Yap		Yap			Yap	Yap		
	Gender (Male/Female)	0	40	40	40	120	0	0	0	M10 F30	-	M19 F27	-		M14 F36	M8 F66	0	0	
2	PACAM Indicator 5																		
	Number of best practices for effective climate change adaptation developed, applied or disseminated	0	2	2	2	6	0	0	0	0	1	1	2	1	1	0	0	0	6
	Micronesia/Yap	Yap	Yap	Yap	Yap	Yap	Yap	Yap	Yap	Yap	Yap	Yap	Yap	Yap	Yap	Yap	Yap		
	Practices developed										1	1	2	1	1	0	0	0	6
Project Custom Indicators																			
3	1. Number of individuals trained in sustainable-climate smart agriculture practices for nutrition and food security	0	40	40	40	120	0	0	0	0	27	0	42	0	0	26	35	36	166
4	2. Number of climate smart livelihood opportunities developed and	0	4	4	2	10	0	0	0	0	0	4	0	1	0	3	2	0	10

	implemented in communities																		
5	3. Number of individuals adopting crop diversification techniques/practices	0	10	10	10	30	0	0	0	0	40	0	46	0	0	46	0	34	166
6	4. Number of water conservation practices adopted by project beneficiaries	0	2	2	2	6	0	0	0	0	2	0	2	1	1	0	0	0	6

PACAM Indicator 1

Number of stakeholders (individuals) with increased capacity to adapt to impacts of climate variability and change as a result of USG assistance:

CAAR Project's initial target number of beneficiaries was 120. During the first two years, 136 participants were recruited in three batches and providing training. However, in 2017 (final year of the project) after seeing the success of the program through various outreach activities conducted on Yap (participation in World Food Day, Yap Day festival and Yap Home Coming Festival) two women groups - Gagil Women's Group and Tomil Women's Association - approached the management. Since we have completed most of the training for the first 3 groups of participants (a total of 136) as per the original workplan and had unspent funds, we recruited additional 74 participants from two women's groups. These participants from Gagil and Tomil municipalities also face similar challenges owing to poor soil conditions (volcanic red soil) and climate change related challenges. PACAM's notification regarding fund reduction came thereafter, so we modified the workplan for these additional project participants. They have been given extension training for all three areas (soil management, water conservation, livelihood enhancement), however, provided technical assistance in improved taro and sweet potato cultivation and Bob bags for few participants. So, altogether, a total of 210 participants (166 women and 44 men) enrolled in the program. Out of this, 166 participants attended and received training.

PACAM Indicator 5

Number of best practices for effective climate change adaptation developed, applied or disseminated:

Six best practices have been documented under this project and submitted as part of milestone 14 activity. They are: i) raised bed gardening, ii) container gardening, iii) agroforestry practices, iv) compost making using 'brown-green' alternative, v) improved method for taro and sweet potato cultivation and vi) rainwater harvesting using Bob bags.

CUSTOM Indicator 1

Number of individuals trained in sustainable-climate smart agriculture practices for nutrition and food security

A total of 166 participants were trained in sustainable climate-smart agriculture practices over a three-year period. The methods include sustainable soil management, soil nutrient management, soil organic matter, alternative vegetable growing techniques, water conservation practices and improved taro and sweet potato cultivation practices. Final survey (informal survey) indicated 97 participants were actively engaged in one or more vegetables and/or tuber crops cultivation (In addition to the original 136 participants, an additional 30 participants from the last group (Gagil Women's Group and Tomil Women's Association) received training in sustainable climate smart agriculture practices. The project did not exclude any members, rather provided training for all who attended the workshop sessions).

CUSTOM Indicator 2

Number of climate smart livelihood opportunities developed and implemented in communities

This indicator captured the techniques and methods adopted by the project participants in enhancing the livelihood opportunities. Final survey (informal survey) revealed that, among all the targeted communities, over 50 kitchen gardens were in good composition growing a variety of vegetables such as Chinese cabbage, spring onions, sweet pepper, cucumber, eggplant, string

beans, and tuber crops such as taro and sweet potato. About 11 participants were regularly selling vegetables to restaurants and shops in Colonia. For growing Chinese cabbage, participants mostly used container gardening using polybags. Nursery growbags are used for sweet pepper whereas eggplants are mostly grown in the ground. Taro and sweet potato are grown in mounds elevated from ground. The techniques and methods adopted by the project participants include i) composting, ii) mulching, iii) container gardening, iv) raised bed gardening, v) improved taro and sweet potato cultivation, vi) volcanic soil management, vii) agroforestry practices, viii) water conservation practices, ix) pest management practices, and x) vertical pallet gardening.

CUSTOM Indicator 3

Number of individuals adopting crop diversification techniques/practices

Crop diversification is one of the strategies in reducing vulnerability in the event of climate-related shocks. Diversified cropping has the innate ability to absorb shocks and perform well than many monocropping systems. CAAR Project encouraged participants to diversify the gardening operations and include a variety of crop portfolio. This indicator captured the extent of activities that communities involved in. Final survey revealed that out of those 166 participants received training, 97 were active in adopting all the best practices for growing vegetables and tuber crops (The actual number mentioned is the number participants who have attended all training sessions and established gardens and/or adopted crop diversification practices. Those who have established two crops or more are included in the count).

CUSTOM Indicator 4

Number of water conservation practices adopted by project beneficiaries

Options for climate change adaptation in water includes investment options such as on-field water storage and rainwater harvesting, land management options such as enhancing soil moisture retention capacity, and capacity building options including training in water conservation and management. This indicator measured water conservation practices adopted by project beneficiaries. Rainwater harvesting is one of the methods adopted, for which the project installed 71 Bob bags among beneficiaries' households.

The other water conservation methods adopted include various soil water conservation methods such as minimum tillage, alternative crop production methods (container gardening, raised bed gardening, vertical pallet planters, nursery pots), mulching, use of organic refuse (compost), border planting, planting in ridges and surface water runoff control using vegetation. Participants who have adopted one or more of these methods are included in the count.

6.2. Environmental Monitoring

Environmental monitoring report was submitted biannually. Based on the questionnaire PACAM provided, all proactive measures were taken to counteract any harm to the environment resulting from project activities. Responses of each of the questions are given in the table below.

EMMP Implementation Questions

Organization: COM-FSM

Reporting Period (Circle One): Biannual Final Other

Questions	Location	Frequency	Responses
Have training materials been reviewed to ensure erosion prevention measures are included?	Office	Biannual	Yes Appropriate instructions were given to the participants during each workshop and training about soil conservation measures to be undertaken. This was further emphasized in the hands-on training.
Have training materials been reviewed to ensure contamination prevention and waste management measures are included?	Office	Biannual	Yes Soil protection messages were included in the handouts provided. As part of activity on soil conservation measures using agroforestry practices, this was emphasized.
Have training materials been reviewed to ensure soil fertility measures are included?	Office	Biannual	Yes Importance of protecting topsoil and soil organic matter has been extensively discussed in all soil management workshops.
Are fuel and oil associated with shredders and field tillers being stored and disposed of properly?	COM-FSM	Biannual	Yes Gasoline for use in shredders is stored in proper container at the CRE premises. No disposal was necessary.
Have vegetative erosion control measures been implemented?	Member communities	Biannual	Yes This was emphasized when soil water and soil water management workshops were conducted. The concrete block in the raised beds and used tires hold compost material in place without being eroded during heavy rains. Specific guidelines were also given during tree planting demonstration activities.
Are proper practices being used for the disposal of organic and inorganic wastes to avoid environmental contamination?	Member communities	Biannual	Yes Not much organic wastes generated from gardening activities. Mostly they were converted to compost.

Are appropriate fertilizer practices, such as the use of organic or green manure, in place?	Member communities	Biannual	Yes Communities have been informed about the advantages and disadvantages of organic and inorganic nutrients during the training activities. Crops growing in polybags used very minimum amount of nutrient (one teaspoon).
Are appropriate soil practices, such as agroforestry, in place?	Member communities	Biannual	Yes. Workshops on soil conservation measure using agroforestry practices were carried out by communities. Hundreds of saplings were planted among these communities.
Have seed selections been confirmed during environmental reviews to ensure species used are non-invasive?	Member communities	Biannual	Yes Only certified seeds were distributed. Seeds were imported after procuring import permit from National Government. Seeds accompanied with a phytosanitary certificate from the country of origin.
Has it been confirmed that all seeds used have gone through the national plant quarantine process?	Member communities	Biannual	Yes All seeds imported were subjected to import permit issued by the national government.
Has stakeholder-led land use planning been encouraged in communities?	Member communities	Biannual	No Raised beds and container gardening methods were used for vegetable gardening. Appropriate instructions were given to participants who were growing traditional crops on the ground.
Were buffer strips along wetlands or water bodies observed during environmental review?	Member communities	Biannual	No Not applicable
Have any degraded or marginal areas been revegetated to reduce runoff, as needed?	Member communities	Biannual	Yes Gardens are established on degraded lands. The vegetation cover prevents further erosion of soil.
During environmental reviews, was adequate on-site drainage in place to avoid stagnant water?	Member communities	Biannual	Yes Settlements are on a rolling terrain and presently drainage is not an issue. However, communities were trained to avoid any water

			stagnation that comes out of field activities.
Are water storage areas placed in safe locations away from potential sources of contamination such as pig waste?	Member communities	Biannual	Yes Bob bags were placed on a platform elevated from the ground and it is safe.
Are records of periodic water quality tests maintained, and have the results confirmed the water is safe to use on crops?	Member communities	Biannual	Yes Water quality tests were performed every six months in partnerships with Yap EPA.
Have any new environmental concerns arisen?	All	All	No
If new environmental concerns have arisen, has COM-FSM discussed this with PACAM as required by the grant agreement?	All	All	No Not applicable

ANNEXES

Annex 1. Work Plan Table

Attached

Annex 2: Communication Products

Copies of published articles attached.

Annex 3: Documentation of Best Practices

This has been submitted as evidence for milestone 14 and not included here.

Annex 4. Other project outputs that were not captured in milestone verification or M&E source documentation

Not applicable