

# 2014 College of Micronesia Combined Research and Extension Annual Report of Accomplishments and Results

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## I. Report Overview

### 1. Executive Summary

The effects of climate change have been devastating. Programs on mitigation and adaptation continued as well as programs on food security, food safety and childhood obesity that were supplemented by programs on proper hygiene and healthy lifestyle that are critically important in safeguarding the well-being of citizens. The increasing cost of food and fuel has forced people to make the adjustments necessary for the new economic, social and environmental conditions and find innovative methods of farming of crops, livestock, and aquaculture species. Salt tolerant species of staple crops and climate smart production practices are being researched. Efforts towards improving the present monoculture planting of cassava through intercropping with nutritious and saleable vegetables like okra and long beans were carried out. Sweet potato varieties were evaluated for yields and palatability offered another opportunity for food security and improved nutrition. Research and extension activities promoted agricultural productivity and food security, self-sufficiency, and enhancing quality of life. The utilization, processing and development of new products from staple food crops that are acceptable to the native population and in local markets continued. Trials on taro and tapioca varieties for their suitability to grow under atoll conditions continued. The micro propagation of elite (disease-free and high yielding) varieties that will improve the quality and quantity of certain crop varieties for food security were ongoing. Continued germplasm maintenance of staple root crops has insured genetic conservation of these valuable resources for future generations. This has facilitated the continued supply of planting materials to growers and for in-vitro multiplication of other food crops.

Aquaculture demonstration projects continued to transfer the technical know-how to Micronesians for alternative source of income towards socio-economic improvement. Efforts were made to initiate and improve site-specific multi-species aquaculture and transfer simple and appropriate feeding technology for targeted aquaculture species to farmers to formulate and prepare their own feeds. Other projects provided stock enhancement to replenish depleted stocks and continuation of a project to develop the technology for the farming of sea cucumbers in the FSM to enable the replenishment of lagoons and reefs depleted as a result of over harvesting.

Outreach programs continued on issues ranging from food safety and quality, food security, families, youths and communities, water quality, and managing limited natural resources and the environment. Most adult residents were overweight or obese and many of them had suffered from NCD complications leading to heavy burdens to families and the state governments, due to high cost of medications and referrals abroad for treatments. The youth development programs provided information to increase knowledge and appreciation of marine and terrestrial flora and fauna. More students are exposed to computers, which provided the opportunity to use the Internet as an introduction and information gathering. Water quality education programs continued as collaborative efforts with international and regional organizations, government agencies, and community groups. Sustainable agriculture and IPM programs provided farmers information on agricultural production practices that protect the fragile island ecosystem integrity and biodiversity. Programs continued on resistant crop varieties and practical biological pest control measures to provide useful tools for stakeholders to combat crop pests and diseases and increase productivity. The use of beneficial organisms was emphasized to reduce pest threats on crops.

Multi-state and multi-institutional efforts continued through the Center for Tropical and Subtropical

Aquaculture (CTSA) on aquaculture projects with the University of Hawaii. A cost-sharing agreement with Pohnpei State Government continued, whereby extension agents from the Agriculture Station have been collaborating with Pohnpei CES staffs. Continuing shortage of necessary human resources and professional staff remained a top priority and several programs and activities toward developing this area were implemented. Research and extension staff were encouraged to continue their education with one staff member completing an AS degree. Vacant positions have been filled with graduates of 2-year Agriculture and Natural Resources program. Student interns funded under the Resident Instruction in the Insular Areas grants have gained experience working with CRE services. Other capacity building activities included sustainable agriculture workshops, tissue culture and nursery practice, IPM, health and nutrition, and basic sewing attended by farmers, homemakers, the youth and adult sectors of the society and the underprivileged.

**Total Actual Amount of professional FTEs/SYs for this State**

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	40.0	0.0	14.0	0.0
Actual	36.7	0.0	21.3	0.0

**II. Merit Review Process**

**1. The Merit Review Process that was Employed for this year**

- Internal University Panel
- External University Panel
- External Non-University Panel
- Expert Peer Review

**2. Brief Explanation**

Project proposals were developed as a result of meetings and consultation with stakeholders and also based on existing plans of work for research and extension. The proposals were submitted to a publication, merit or scientifically acceptable peer review committees for comments and suggestions. Other special project proposals were subject to peer review within and outside of the colleges by other stakeholders and also subjected to review by advisory committees. Proposals were also posted on websites. Once comments were incorporated into the proposals, the Vice-President of Cooperative Research and Extension then submitted them for review and approval at each college. Final proposals were submitted to the AES/CES Interim Director through the college Presidents for approval.

**III. Stakeholder Input**

**1. Actions taken to seek stakeholder input that encouraged their participation**

- Use of media to announce public meetings and listening sessions
- Targeted invitation to traditional stakeholder groups
- Targeted invitation to non-traditional stakeholder groups

- Targeted invitation to traditional stakeholder individuals
- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals
- Survey of selected individuals from the general public

**Brief explanation.**

When meetings were called to discuss research and extension planned activities, stakeholders such as community leaders, farmers, homemakers, traditional leaders and political leaders, were directly involved in the discussions. Many of their suggestions and comments were included in the planned research and extension activities. In some cases, research activities were done in farmers' fields and in so doing farmers participated directly in the implementation of projects. Scheduled meetings were also held in the communities to inform community leaders, farmers, and homemakers, political and traditional leaders about progress being made with research and extension activities. During these meetings, stakeholders were given the opportunity to ask questions, make comments, and share traditional knowledge and even suggested changes or other activities that are more important and relevant to the needs of their communities. Other methods of encouraging stakeholder participation were done through direct meetings and workshops with different sectors of the population to solicit their inputs in identifying priority issues.

**2(A). A brief statement of the process that was used by the recipient institution to identify individuals and groups stakeholders and to collect input from them**

**1. Method to identify individuals and groups**

- Use Advisory Committees
- Use Internal Focus Groups
- Use External Focus Groups
- Open Listening Sessions
- Needs Assessments
- Use Surveys

**Brief explanation.**

Farmers, homemakers, political, traditional and community leaders were requested to identify names of individuals or groups in their respective communities who should be attending meetings and workshops. Other individuals were those working on similar programs with other agencies and those recommended by peers. Those identified were informed via letter, radio or through personal visits when meetings or trainings were held. Other methods were through strategic planning meetings, interagency collaboration, community associations and direct client contact and needs assessment surveys directly in the field. Meetings/discussions were also held with school authorities, church leaders, parents and the general public on the implementation of community projects.

**2(B). A brief statement of the process that was used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them**

**1. Methods for collecting Stakeholder Input**

- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals

- Survey of traditional Stakeholder individuals
- Meeting with invited selected individuals from the general public
- Survey of selected individuals from the general public

**Brief explanation.**

Some of the methods used for collecting stakeholder input were one-on-one visits conducted in the communities and through discussions and interviews with community leaders. Surveys and field observations in addition to farmers association and other community meetings were also used. Youth programs were developed through discussions with schools, church and community groups and through direct assistance to government agencies such as the Early Childhood Education (ECE) recruitment programs. Stakeholders were directly involved in identifying positions and hiring of new upper level staff. Other methods used were questionnaires, need assessments, Board of Regents reviews, annual retreat, cabinet level meetings and student recruitment campaigns.

**3. A statement of how the input will be considered**

- In the Budget Process
- To Identify Emerging Issues
- Redirect Extension Programs
- Redirect Research Programs
- In the Staff Hiring Process
- In the Action Plans
- To Set Priorities

**Brief explanation.**

During meetings with stakeholders, suggestions, comments and modifications from them were sorted out and those with positive impacts to research and extension project proposals were incorporated. It also helped with planning and prioritization of the next year's planned program activities. The review of strategic action plans, hiring of senior research and administrative positions, and focusing on special projects were also used to collect stakeholder inputs. State agencies assisted in developing programs and focus budgets for activities supported by matching funds through MOAs.

**Brief Explanation of what you learned from your Stakeholders**

We learned that farmers, homemakers, fishermen, community groups and others are good sources of traditional knowledge which can be considered and used to improve social, agricultural and environmental issues. Entrepreneurs interested in business development lack marketing strategies and training is necessary for them to be successful.

**IV. Expenditure Summary**

<b>1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)</b>			
<b>Extension</b>		<b>Research</b>	
<b>Smith-Lever 3b &amp; 3c</b>	<b>1890 Extension</b>	<b>Hatch</b>	<b>Evans-Allen</b>
1184193	0	1067137	0

<b>2. Totaled Actual dollars from Planned Programs Inputs</b>				
	<b>Extension</b>		<b>Research</b>	
	<b>Smith-Lever 3b &amp; 3c</b>	<b>1890 Extension</b>	<b>Hatch</b>	<b>Evans-Allen</b>
<b>Actual Formula</b>	1055648	0	988964	0
<b>Actual Matching</b>	91724	0	26484	0
<b>Actual All Other</b>	0	0	0	0
<b>Total Actual Expended</b>	1147372	0	1015448	0

<b>3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous</b>				
<b>Carryover</b>	1033984	0	847355	0

## V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Aquaculture
2	Families, Youths & Communities
3	Childhood Obesity
4	Climate Change
5	Food Safety
6	Global Food Security and Hunger
7	Sustainable Energy

**V(A). Planned Program (Summary)**

**Program # 1**

**1. Name of the Planned Program**

Aquaculture

Reporting on this Program

**V(B). Program Knowledge Area(s)**

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
135	Aquatic and Terrestrial Wildlife	10%		10%	
136	Conservation of Biological Diversity	10%		10%	
301	Reproductive Performance of Animals	10%		10%	
302	Nutrient Utilization in Animals	15%		15%	
307	Animal Management Systems	15%		15%	
308	Improved Animal Products (Before Harvest)	10%		10%	
315	Animal Welfare/Well-Being and Protection	10%		10%	
511	New and Improved Non-Food Products and Processes	10%		10%	
608	Community Resource Planning and Development	10%		10%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	4.0	0.0	3.0	0.0
<b>Actual Paid</b>	7.8	0.0	7.9	0.0
<b>Actual Volunteer</b>	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
195120	0	390641	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
16954	0	14000	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

PCC: Series of larval rearing trials were conducted to produce crablets of mangrove crabs and rabbit fish fingerlings. These crablets were given to local farmers for grow-out trials in ponds and cages. Some of the rabbit fish fingerlings produced were given to local farmers for grow-out and the rest were kept in the hatchery for nursery and grow-out studies and for display to visitors. Meetings with fish farmers were held and recommendations were given on how to grow crabs, rabbit fish, and milkfish. A partnership between PCC and a local aquaculture company was established for implementation of the newly approved project on milkfish fry production funded by the Center for Tropical and Sub-tropical Aquaculture. College and high school students were accommodated for internship, hands-on training and summer work program.

CMI: Three runs for the production of pearl oyster spats were conducted; spats were continued to deliver to the three sites, two that are now established in the main island. Like in previous years some were kept at the college's farm waiting for shipment to other potential farmers. Continued maintenance of marine species is ongoing, when reaching their mature stage they are then release either in the lagoon or the ocean.

COM-FSM: Discussions were held on the need for an aquaculture hatchery facility to serve as a resource for research and extension. A MOU identifying facilities, objectives and roles was developed and signed to institute this collaborative effort. Several workshops/trainings on sandfish sea-cucumber, half-pearl seeding, and micro-algae culture were carried out at the Marine Laboratory and other demonstration sites. Training included: hatchery work protocol; spawning induction and spawning procedure for sandfish; handling of larval and grow-out juveniles; feeding of larvae, and monitoring of their development; and half-pearl seeding.

Two marine science students trained on general hatchery operation, spawning induction, ocean-grow out, and micro-algae culture. Six brood stock searches and surveys were conducted for sea-cucumber on coastal reefs where population has been decreasing.

Spawning trials on sandfish sea-cucumber were carried out yielding 15,000 juveniles. Eight framed cage units, ready for occupancy, were placed in three areas. One hundred ten brochures on pearl farming and sea-cucumber farming were distributed to walk-in clients and workshop/training participants.

**2. Brief description of the target audience**

PCC: The target audience includes the existing hatchery operators, mangrove crab and fish farmers, people who are interested in fish farming, students, traditional leaders, government officials and policy makers.

CMI: Program continued to work with children, students, youths, adults, local governments, national government, community members and traditional leaders.

COM-FSM: Target audiences include school groups, individuals, fishermen, farmers, and resource owners, private entrepreneurs, businesses, government agencies, and non-government organizations. Traditional leaders and organized community groups were given special focus.

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	7310	9356	1032	3094

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2014

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2014	Extension	Research	Total
<b>Actual</b>	0	1	1

**V(F). State Defined Outputs**

## Output Target

### Output #1

#### Output Measure

- Number of demonstration farms established.

Year	Actual
2014	23

### Output #2

#### Output Measure

- Number of publications for lay use.

Year	Actual
2014	3

### Output #3

#### Output Measure

- Number of conference paper and publication/presentation.

Year	Actual
2014	2

### Output #4

#### Output Measure

- Expected Professional Journal publications.

Year	Actual
2014	1

### Output #5

#### Output Measure

- Expected Gray Literatures.

Year	Actual
2014	2

### Output #6

#### Output Measure

- Expected publications for lay use.

<b>Year</b>	<b>Actual</b>
2014	4

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Increase awareness in the communities and prospective and existing industry about sustainable, site-specific, and low energy aquaculture technologies.
2	Adoption of sustainable aquaculture technologies by commercial and community groups.
3	Number of established aquaculture operations.

**Outcome #1**

**1. Outcome Measures**

Increase awareness in the communities and prospective and existing industry about sustainable, site-specific, and low energy aquaculture technologies.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2014	523

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

PCC: Crablets and rabbit fish fingerlings were successfully produced but farmers lack proper knowledge on growing them. There is no reliable supply of imported milkfish fry according to milkfish farmers.

CMI: Clients lack the knowledge and understanding to do the work affectively and sustainably.

COM-FSM: Community members are not aware of the effects of invasive species, loss of bio-diversity and the impending economic effect of the loss of compact funding.

**What has been done**

PCC: Farmers were given hatchery-produced crablets and rabbit fish fingerlings and grow-out techniques were demonstrated. Farmers were informed about the new milkfish fry production project.

CMI: Presentations were conducted in communities and in schools.

COM-FSM: Trainings on hatchery techniques and ocean grow-out for sand fish sea cucumber, half-pearl and micro-algae culture, for skills improvement and invasive species control.

**Results**

PCC: Farmers realized that mangrove crab and rabbit fish could be raised to marketable size using the proper grow-out methods. Milkfish farmers have supported the idea of establishing local fry production.

CMI: The basic knowledge and understanding shared to the people, provided them with information and better prepared them in safeguarding the environment and the ecosystem.

COM-FSM: Two student-interns improved skills of aquaculture technologies. More than 30 trainees learned the basic skills for pearl farming. Eight trainees learned pearl seeding techniques. Two pearl farmers sold half-pearl products. The half-pearl seeding technology was extended to the Marshall Island extension. A private hatchery currently produces giant clam juveniles for restocking the reefs. Several communities have become aware of the tilapia problem and are seeking ways to address it or have taken effort to control by capture and removal.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
315	Animal Welfare/Well-Being and Protection
511	New and Improved Non-Food Products and Processes
608	Community Resource Planning and Development

#### Outcome #2

##### 1. Outcome Measures

Adoption of sustainable aquaculture technologies by commercial and community groups.

##### 2. Associated Institution Types

- 1862 Extension
- 1862 Research

##### 3a. Outcome Type:

Change in Action Outcome Measure

##### 3b. Quantitative Outcome

Year	Actual
2014	296

##### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**

PCC: Farmers lack ideas on how to produce and grow crablets and rabbit fish fingerlings. Production of milkfish relies on imported fry.

CMI: Many people do not have the motivation to start a fish farm, pearl or other potential aquaculture project. Scarcity of marine food is because of overharvesting.

COM-FSM: Community members are not aware of the effects of invasive species, loss of biodiversity and the impending economic effect of the loss of compact funding.

**What has been done**

PCC: Improved seed production and grow-out techniques were demonstrated to crab and rabbit fish farmers. A milkfish broodstock facility was established and spawning was monitored.

CMI: With follow-up presentations and face to face sessions, more clients adopted the system of preserving and conserving of depleted marine species.

COM-FSM: Internship training attracted interested students and community members. An agreement was signed to provide a research and demonstration facility to support entrepreneurs and guide control of invasive species.

**Results**

PCC: Farmers became interested to grow mangrove crabs and more requests for crablets were received. Existing hatchery operators showed interest to adopt the hatchery techniques for mangrove crabs and rabbit fish. Milkfish farmers participated in the establishment and monitoring of milkfish broodstock.

CMI: Clients sent representatives for the trainings in order to have the necessary skills to establish and manage their farms. These same clients have requested materials and supplies for the establishment of aquaculture farms.

COM-FSM: Thirty-six individuals participated in the internship program to improve skills and adopt new aquaculture technologies.

A site was selected and a MOU has been signed with a State Government for a period of ten years for a hatchery facility. A community fishpond was reconditioned and stocked with wild-caught rabbit fish juveniles. A simple survey of tilapia population in a community indicated that the capture and removal efforts were successful. Tilapia infestations were not found in the mangroves.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals

307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
315	Animal Welfare/Well-Being and Protection
511	New and Improved Non-Food Products and Processes
608	Community Resource Planning and Development

### **Outcome #3**

#### **1. Outcome Measures**

Number of established aquaculture operations.

#### **2. Associated Institution Types**

- 1862 Extension
- 1862 Research

#### **3a. Outcome Type:**

Change in Condition Outcome Measure

#### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2014	29

#### **3c. Qualitative Outcome or Impact Statement**

##### **Issue (Who cares and Why)**

PCC: There is a limited supply of mangrove crab and rabbit fish in the local market. There is no reliable source of fry for milkfish farmers.

CMI: It is a challenge to do and sustain an aquaculture farm because of money, commitment and the motivation.

COM-FSM: Economic security for Micronesia is critical.

##### **What has been done**

PCC: Crablets and rabbit fish fingerling production was continued and grow out techniques were disseminated to farmers. Milkfish broodstock was established and proper management was implemented.

CMI: Continued outreach education and extension to clients is seen to be effective in winning their interests to look into starting a farm of their own.

COM-FSM: Proper maintenance of pearl farms led to sales of half pearl products and the

provision of pearl seeding training in the Marshall Islands.

### Results

PCC: Seventeen farmers have established their crab farms and were able to monitor the growth of crabs. Five more farmers were interested to start crab farming and rabbit fish. A hatchery operator was also interested to start crab, rabbit fish and milkfish seed production in their facility. Four high school and college students became interested in fish farming.

CMI: One traditional leader has established land owners club for the development of aquaculture projects in their respective communities.

COM-FSM: Two families earned wages from this and it's an alternative source of income in two communities.

## 4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
307	Animal Management Systems
308	Improved Animal Products (Before Harvest)
315	Animal Welfare/Well-Being and Protection
511	New and Improved Non-Food Products and Processes
608	Community Resource Planning and Development

### V(H). Planned Program (External Factors)

#### External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Populations changes (immigration, new cultural groupings, etc.)

#### Brief Explanation

PCC: Unpredictable weather condition and extreme storms in Palau have adversely affected the seed production activities of mangrove crabs and rabbit fish fingerlings. Some of the milkfish and rabbit fish broodstock held in tanks died due to high turbidity of seawater source. Collection of good quality spawners became very scarce. Some facilities at the hatchery are already old and need to be replaced. Unstable electrical supply resulted to breakdown of water and air pumps that resulted in fish mortalities.

CMI: Transportation to reach the people in the outer islands is a major setback. A good and well equip lab will make it possible to complete research projects. Property is on a lease land and therefore might be an issue at the end of the contract expiration.

COM-FSM: Sites visits and monitoring have been carried out, though disrupted due to bad weather and transportation limitation, especially to the other outer islands. It took time to approve a MOU between all parties for the establishment of a research and demonstration facility in a new state location.

## **V(I). Planned Program (Evaluation Studies)**

### **Evaluation Results**

PCC: The success in producing rabbit fish fingerlings and crablets has promoted the development of the aquaculture industry in Palau. Existing farmers were able to stock their farms and were assured of the source of crablets and fingerlings for future expansion. They learned proper methods in growing crabs and rabbit fish in ponds and cages. Milkfish farmers are hopeful that very soon their production will no longer be dependent on imported fry.

CMI: Two pearl grafting training had taken placed; spawning of pearl oysters is ongoing at Arrak hatchery. Trainees have gained the necessary experience in hatchery management and half pearl grafting.

COM-FSM: Feedback from the communities has been positive and encouraging. Numbers of trainees and inhabitants have been encouraged. They have acquired skills and knowledge that would foster confidence and assurance to going into pearl and sea cucumber activities.

### **Key Items of Evaluation**

PCC: There is a need to continue the crablet and rabbit fish fingerling production to support the growing interest of existing and prospective farmers. Transfer of technology to local hatchery operators needs to be continued so that the industry will be sustained. Further demonstration of grow-out methods to fish farmers need to be continued. To reduce the dependence on imported milkfish fry the establishment of milkfish broodstock facility in Palau is important.

CMI: College needs a good system of supporting the implementation of activities on the ground. A good lab and working environment must be upgraded. It needs to be cleared that challenges are very unique in an island setting as it is in a volcanic island setting. Missed out opportunities for people in the outer islands must be look at carefully and constructively.

COM-FSM: The half-pearl seeding technology and shell carving were extended as there is high local and international demand for the finished product and communities benefited from the value addition. The half-pearl seeding technology was recently extended to the Marshall Island. The sand fish hatchery technology was refined and improved by experience from the previous years. The hatchery had produced 15,000 juveniles from two

spawning this year. Several cages of sea cucumber have been established in the communities to release sea cucumber for growth development and measurement.

**V(A). Planned Program (Summary)**

**Program # 2**

**1. Name of the Planned Program**

Families, Youths & Communities

Reporting on this Program

**V(B). Program Knowledge Area(s)**

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
608	Community Resource Planning and Development	25%		25%	
801	Individual and Family Resource Management	20%		20%	
802	Human Development and Family Well-Being	20%		20%	
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	10%		10%	
806	Youth Development	25%		25%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	9.0	0.0	1.0	0.0
<b>Actual Paid</b>	6.6	0.0	0.0	0.0
<b>Actual Volunteer</b>	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
165101	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
14345	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

**(PCC is not implementing this planned program this year.)**

CMI: Outreach as well as demonstrations took place at the community and in schools. Re-enforcement issues of interest for the discussions were on family unit, teen pregnancy, drug abuse, school drop outs, healthy living, education and physical exercises.

COM-FSM: Training is provided to participants in income-generating opportunities including sewing, cooking and handicrafts, computer and basic business to individuals aspiring to be entrepreneurs to help them qualify for microcredit from lending institutions. Youths were taught entrepreneurship including the writing of basic business plans, skills in wood and ornamental carving, sewing, gardening, food processing, and low-cost nutritious recipes. Counseling and guidance was given to high school students.

**2. Brief description of the target audience**

CMI: Outreach activities targeted youth groups, middle school students as well as parents, faculty and school administrators.

COM-FSM: Target audience is youths, students and their families, schools, government agencies, sport agencies and clubs, college students, 6-8 graders, young mothers, homemakers, out-of- school youths and interested community groups and individuals.

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1249	3747	869	1970

**2. Number of Patent Applications Submitted (Standard Research Output)**  
**Patent Applications Submitted**

Year: 2014  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2014	Extension	Research	Total
Actual	0	0	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of training conducted targeting youths.

Year	Actual
2014	47

**Output #2**

**Output Measure**

- Number of training conducted targeting families and youths in the communities.

Year	Actual
2014	67

**Output #3**

**Output Measure**

- Total number of youth clubs organized.

Year	Actual
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2014

4

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Number of youths with increased awareness and understanding of roles and relationship with parents.
2	Number of families adopting interpersonal skills to improve quality of life and harmony in the family.
3	Total number of families and youths benefiting from the use of learned skills.

**Outcome #1**

**1. Outcome Measures**

Number of youths with increased awareness and understanding of roles and relationship with parents.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2014	904

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

CMI: Youths and young age students require significant knowledge of family unit.

COM-FSM: Families with limited income, communities, government, and schools consequently social issues are rising because youths are not using their time in a productive and constructive manner.

**What has been done**

CMI: Trainings and outreach activities carried out to middle school students and youths in the communities. Family institutional trainings are ongoing.

COM-FSM: Technical assistance was provided in formation and operation of youth clubs. Entrepreneurship trainings on basic business plan for local needs including counseling to high school students.

**Results**

CMI: Youths targeted have increased their knowledge.

COM-FSM: Students learned basic information on food nutrition, skills in growing and marketing vegetables and personal hygiene. Youths were making use of their time by gaining skills and participating in sport events. Skills learned included sewing, handicraft making, cooking and even computer and basic business strategies for their home-based enterprises. A total of 42 families including 5 young adults and 14 youths, 131 students increased their knowledge and skills in entrepreneurship, carving, gardening, sewing, food processing, health & nutrition setting goals.

#### 4. Associated Knowledge Areas

<b>KA Code</b>	<b>Knowledge Area</b>
608	Community Resource Planning and Development
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures
806	Youth Development

#### Outcome #2

##### 1. Outcome Measures

Number of families adopting interpersonal skills to improve quality of life and harmony in the family.

##### 2. Associated Institution Types

- 1862 Extension
- 1862 Research

##### 3a. Outcome Type:

Change in Action Outcome Measure

##### 3b. Quantitative Outcome

<b>Year</b>	<b>Actual</b>
2014	677

##### 3c. Qualitative Outcome or Impact Statement

###### **Issue (Who cares and Why)**

CMI: Parents and their children are lacking the knowledge and responsibilities necessary in their communities.

COM-FSM: Majority of youths and families are not adopting interpersonal/entrepreneurial skills to improve quality of life and harmony in the families.

###### **What has been done**

CMI: Outreach and training programs were provided to schools and communities.

COM-FSM: Hands-on trainings in vegetable gardening were conducted. Training was given in home-based enterprises with follow up visits made to monitor progress on individual participants.

**Results**

CMI: Increased knowledge for both parents and children showed good results.

COM-FSM: Four youth clubs were established and supported by youth program and actively participating in community development, including community clean up and beautification. A youth club and church youth group are growing vegetables for sale. In one state, four participants utilized skills learned to make handicraft products for their families. One was utilizing carving skills and producing other handicraft products. Eight have established home gardens based on skills learned. In another state, groups are producing handicrafts from recycled materials.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
608	Community Resource Planning and Development
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures
806	Youth Development

**Outcome #3**

**1. Outcome Measures**

Total number of families and youths benefiting from the use of learned skills.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2014	170

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

CMI: Necessary skills and know-how was missing with many children and parents.

COM-FSM: Many families have limited income and are experiencing difficulties as cost of living

has been escalating.

**What has been done**

CMI: Continued training and outreach programs and activities are taken places at schools and in some part of the communities.

COM-FSM: Encouragement through follow-up visits to program participants and one-on-one interventions, recommendations and guidance in sport clinics.

**Results**

CMI: All family members and participants who went through the training had improved their knowledge and are proud of their achievement.

COM-FSM: One youth group is earning income from selling vegetables from their gardens. Other youths participated in sport training and activities for sport tournaments and Micronesian Olympic Games. One of five who were provided sewing machines continued to make and sell products. Participants provided with seedlings were able to utilize fresh produce thus reducing cost on foods and few earn income by selling to roadside markets. One with carving tools is making more carvings than was taught.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
608	Community Resource Planning and Development
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures
806	Youth Development

**V(H). Planned Program (External Factors)**

**External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

**Brief Explanation**

CMI: Good and reliable transportation to conduct activities with outer islands' clients.

COM-FSM: Inclement weather, conflicts in community events and high costs of fuels to visit outer islands limited the outreach activities. The public schools curriculum does not orient the students on entrepreneurship and priorities are set on other areas, forcing youths to voluntarily engage with limited choices for them rather than what they are interested in.

### **V(I). Planned Program (Evaluation Studies)**

#### **Evaluation Results**

CMI: Increased in knowledge capacity that continues to bring prosperity and healthy relationship amount to tight nit families.

COM-FSM: As result of interviews and observations, youth programs have improved behavior and condition of participants. Youths and young parents are sewing good products, practicing carving techniques and generating income for their families. Parents and youths are working together gearing toward a positive living condition. Some participants reported that they sold their products through their families living outside FSM.

#### **Key Items of Evaluation**

CMI: It is highly recommended that more available resources be in place. All side of the family unit is being compromised due to kids watching too much violent movies and other bad influence the have greatly impacted their lives. It is highly recommended that more available resources be in place. All side of the family unit is being compromised due to kids watching too much violent movies and other bad influence the have greatly impacted their lives.

COM-FSM: Families were burdened with domestic problems associated with poverty such as teen delinquencies, substance abuse, and violence. Provision of home-based employment skills would probably improve a sense of security among these families. Good working relationship between parents and youths; generating extra family income; increased number of young parents engaged in the program could increase the number of students involved.

**V(A). Planned Program (Summary)**

**Program # 3**

**1. Name of the Planned Program**

Childhood Obesity

Reporting on this Program

**V(B). Program Knowledge Area(s)**

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
703	Nutrition Education and Behavior	25%		25%	
704	Nutrition and Hunger in the Population	25%		25%	
724	Healthy Lifestyle	25%		25%	
802	Human Development and Family Well-Being	25%		25%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	4.0	0.0	1.5	0.0
<b>Actual Paid</b>	4.1	0.0	0.6	0.0
<b>Actual Volunteer</b>	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
102563	0	29669	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
8912	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

PCC: There was a 10% decrease in obese/overweight children in Palau due to practicing healthy eating, engaging in healthy levels of physical activity, and having access to healthy foods. The college contributed to this decrease by conducting four Food Technology and Nutrition Education classes among school children and youths, benefiting 200 participants. Six books on local food processing were submitted for printing.

CMI: Surveys were conducted in ECE centers on four islands. It is now clear that many of the young students showing conditions when the body does not get the right amount of the vitamins, minerals, and other necessary nutrients.

COM-FSM: The program is all about healthy lifestyle, what you eat, and physical activities. It deals with prevention and reduction of NCD incidences. Workshops/trainings conducted in communities and schools increased knowledge and skills in the areas of nutrition and health.

Awareness programs for adults in the communities and schools included parents with children in the ECE program, youth and young adults. Topics included health benefits of eating fruits and vegetables, importance of local foods, sources of calories and requirements, and foods with less salt, fats and sugar. And intervention home visits of referrals from Public Health was conducted .

**2. Brief description of the target audience**

PCC: The targeted audiences include 2 to 8 year-old children and their teachers, parents, school administrators and policy makers. This is a coordinated effort among agencies such as Ministry Of Education, Ministry Of Health, Palau Community College, Bureau of Agriculture, Head Start, Council of Chiefs, and Association of School Principals.

CMI: Target audience includes parents, kinder, young mothers, and other school aged children.

COM-FSM: The general public is targeted, however, this year more focus was given to school children and referrals from the health services.

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	2000	3657	1442	1473

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2014  
 Actual: 1

**Patents listed**

USP Library Cataloguing-in-Publication Data

Marero, Lydia.  
 Manual on food processing for Pacific: adaptation to climate change /  
 Lydia Marero. -- Koror, Palau : Palau Community College, 2014.  
 338 p. ; 15 x 18 cm.  
 ISBN 978-982-9801-98-2  
 1. Food industry and trade--Oceania. 2. Food security--Oceania. I. Title.  
 TP369.O3M37 2014  
 664.00995--dc23

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2014	Extension	Research	Total
Actual	2	7	9

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of conference papers and publications on childhood obesity.

Year	Actual
2014	7

**Output #2**

**Output Measure**

- Number of trainings conducted on childhood obesity and physical activity.

Year	Actual
2014	4

**Output #3**

**Output Measure**

- Number of extension publications on childhood obesity and physical activity.

<b>Year</b>	<b>Actual</b>
2014	4

**Output #4**

**Output Measure**

- Number of training conducted on proper diet and physical activity.

<b>Year</b>	<b>Actual</b>
2014	4

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Number of persons with increased knowledge in healthy food choices and physical activity.
2	Number of program participants adopting recommended practices on healthy food choices and physical activity.
3	Reduction in the number of obese children.

**Outcome #1**

**1. Outcome Measures**

Number of persons with increased knowledge in healthy food choices and physical activity.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2014	1331

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

PCC: Most Palauan children are not knowledgeable about eating more healthy foods and eating less salty, sweet and fatty foods, and not following healthy eating patterns.

CMI: Parents, young mothers and other family members does not understand the cause of childhood obesity and other related sicknesses that influence the human growth and development of a child.

COM-FSM: Limited knowledge about consequences and negative implications of unhealthy diet and lack of physical activity. There is an increasing awareness that NCDs are food-related nor an understanding of childhood obesity as it is often associated with enough food to eat.

**What has been done**

PCC: Multi-agency collaboration promoted eating healthy local foods and eating less salty, sweet, and fatty foods. Children were encouraged to eat breakfast and make healthy food choices.

CMI: Education and outreach activities carried out targeting families, communities and schools, especially the young and students? from kindergarten schools.

COM-FSM: Training, education, community events, one-to-one intervention, Body Mass Index (BMI), cooking demonstrations and recall for diets and physical activities were conducted. Food preparation using less salt, fats and sugar and more local food, fruits and vegetables, and yellow food varieties was taught.

**Results**

PCC: Of the 750 number of children informed, 179 of them gained knowledge about eating healthy foods, eating less salty/sweet/fatty foods and healthy eating patterns, while 571 children reported an intention to do the same.

CMI: Survey was conducted to identify information on children's diet, activities, height, weight and health. It was conducted on three island communities including the district center.

COM-FSM: Participants increased awareness about the health complications of childhood obesity and knowledge about balanced diet and healthy physical fitness for childhood obesity prevention. They learned how to prepare, eat healthy food and the value of physical activities. More than 867 participants learned the nutritive value and importance of yellow varieties of fruits and vegetables; proper food preparation using less salt, fats and sugar.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle
802	Human Development and Family Well-Being

**Outcome #2**

**1. Outcome Measures**

Number of program participants adopting recommended practices on healthy food choices and physical activity.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2014	949

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

PCC: Obese/overweight children do not prepare nutritious local foods and make no effort to balance food intake and physical activity.

CMI: Parents of the young children has no clue as to what influenced their children's physical condition.

COM-FSM: Limited number of persons adopting what they learned about healthy food and physical activity and relying on imported foods such as rice, ramen or canned meat because of convenience, low costs and storage.

#### **What has been done**

PCC: Trainings on the preparation of nutritious local foods were conducted among 200 participants and physical activities were encouraged among the participants.

CMI: Presentations and outreach activities carried out to parents, teachers and schools executives of what are the best educational and parenting approaches.

COM-FSM: Follow-up visits, monitoring and evaluation, intervention and encouragement, partnering with clients, continuing collaboration, and distribution of information materials on healthy meals and physical activities were conducted.

#### **Results**

PCC: Two hundred children and youths who were trained to produce and preserve healthy local foods were able to learn nutritious one-dish meals and 30 food products from local food sources. They were also encouraged to increase physical activity.

CMI: Parents of these young children institute corrective measures by following the advice and guidance of experts, with the right preventive measures.

COM-FSM: Increased number of individuals and families prepared healthy and balanced meals, started small family and school garden plots or walked around in their neighborhoods. More local food is now served at home, in public markets and in school cafeterias. More home gardens are in place and many families are eating fresh vegetables and less salt, fats and sugar used in cooking.

#### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle
802	Human Development and Family Well-Being

**Outcome #3**

**1. Outcome Measures**

Reduction in the number of obese children.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2014	648

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

PCC: Obese/overweight Palauan children and youths do not supplement their diets with healthy foods and do not engage in daily 60-minute or more of physical activity.

CMI: Lack of educational materials and trainings for all is a key issue for our children unhealthy diet.

COM-FSM: Childhood obesity may lead to more complications like diabetes, heart and chronic respiratory problems.

**What has been done**

PCC: Youth clients were taught to prepare healthy local foods and other stakeholders were served prepared food products and they were encouraged to practice increased physical activity.

CMI: Planned programs and trainings were done, targeting parents, young mothers and especially family members on healthy living and healthy lifestyles.

COM-FSM: In collaboration with Public Health conducted monitoring, evaluation, and referrals for specific intervention measures in communities, schools, and public areas reduce health problems such as obesity, hypertension, diabetes and other health issues.

**Results**

PCC: Of the 856 clients served, 200 children have practiced healthy eating and engaged in healthy levels of physical activity, while 656 have reported an intention to eat fruits, vegetables,

fish, milk and local foods they have tasted from prepared foods that were served. This activity contributed to the overall decrease in childhood obesity in Palau.

CMI: Presentations in schools as well as trainings for staff have taken, targeting young children, parents and families. Preschool physical activities were scheduled and carried out.

COM-FSM: Reduction in obese children is evidence by feedback from families and through observations during follow-up visits. Parents and children supported each other by providing healthy food and snacks to eat, and doing physical activities, while education department banned the selling of junk food and snacks on school premises.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle
802	Human Development and Family Well-Being

#### V(H). Planned Program (External Factors)

##### External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

##### Brief Explanation

PCC: The increasing number of obese children in Palau may be caused by developments in technology like too much television viewing and playing games in the computers. Sedentary lifestyles like access to cars instead of walking, and convenience of eating imported foods which are oftentimes fattening and not eating healthy local foods also lead to obesity.

CMI: Experts to properly advice on good and better way forward as well as developing good curriculum on food and nutrition. Families continued acquiring unhealthy food and less on the healthy food. Bad influences of different lifestyles challenged the basic foundation of bringing good and well informed families on best diet for their children.

COM-FSM: Lack of public water transportation limits access to the program by numerous scattered islands in the lagoon and outer islands. Generally, consumers' preference of imported canned and processed foods versus local healthy foods hinders in promoting eating healthy, balanced diets. Lack of healthy and cheap local produce also limits intake of nutritious and balanced diets. There were few things which affected the delivery of the

program include weather, funerals in the communities, and transportation.

## **V(I). Planned Program (Evaluation Studies)**

### **Evaluation Results**

PCC: Nutrition education programs are evaluated by the participants before and after the program through tests. Participants in the trainings were able to prepare diets from local foods resources. Reduction in childhood obesity is monitored by MOH. There was a decrease in childhood obesity by 10% in 2014.

CMI: The knowledge that was absent has gained tremendously. The survey gathered during the schools visitations show the needs to improve children health through proper diet and physical exercises. Teachers' trainings will continue increasing the physical activity programs in schools. Lessons shared with children have showed good progress.

COM-FSM: Childhood obesity could be prevented with consistent public awareness campaigns through training, education, demonstrations, dissemination of information materials, feedbacks from surveys and collaborative efforts of communities, especially the concerned families. As a result of interventions and follow up visits, more gardens are in place and new recipes are practiced using less salt, sugar and fats in cooking. The results showed that parents and children increased eating healthy food and doing physical activities.

### **Key Items of Evaluation**

PCC: Palauan children have practiced consuming more healthy foods from local sources, have consumed less salty/sweet/fatty foods, have engaged in healthy levels of physical activity, and they belong to families who have access to more healthy foods.

CMI: Childhood obesity and malnutrition programs should continue, it gives the knowledge and understanding to all interested parties. It gives all the level of confident that the children and parents have that was not very well taken in the beginning. With proper knowledge acquired everyone will realize that behaviors will need to be changed for better, especially for the health and wellbeing of the children.

COM-FSM: To sustain community interests and participation, stronger collaboration among programs with related concerns in preventing and/or reducing childhood obesity and developing volunteerism among trained participants are essential.

Focus on the role and responsibilities of families, communities, and schools to ensure continuing public awareness and adoption of recommended balanced diets and activities. Questions on the adult survey based on 24-hour food recall and behavior checklists needed to be prepared carefully. Students' survey based on the behavior, food recall, intake of fruits and vegetables and sugar drinks are needed.

**V(A). Planned Program (Summary)**

**Program # 4**

**1. Name of the Planned Program**

Climate Change

Reporting on this Program

**V(B). Program Knowledge Area(s)**

**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
111	Conservation and Efficient Use of Water	10%		10%	
112	Watershed Protection and Management	15%		15%	
125	Agroforestry	10%		10%	
131	Alternative Uses of Land	5%		5%	
132	Weather and Climate	10%		10%	
133	Pollution Prevention and Mitigation	10%		10%	
134	Outdoor Recreation	5%		5%	
135	Aquatic and Terrestrial Wildlife	5%		5%	
136	Conservation of Biological Diversity	5%		5%	
141	Air Resource Protection and Management	5%		5%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	5%		5%	
315	Animal Welfare/Well-Being and Protection	10%		10%	
605	Natural Resource and Environmental Economics	5%		5%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

**1. Actual amount of FTE/SYs expended this Program**

Year: 2014	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	2.0	0.0	3.0	0.0
<b>Actual Paid</b>	3.8	0.0	3.4	0.0
<b>Actual Volunteer</b>	0.0	0.0	0.0	0.0

**2. Actual dollars expended in this Program (includes Carryover Funds from previous years)**

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
85052	0	168282	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
7390	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

### V(D). Planned Program (Activity)

#### 1. Brief description of the Activity

**PCC:** Salt water intrusion into taro patches have been unfavorable for taro cultivation. Salt water intrusion was prevented by raising levels of the dike and construction of secondary dike inside the taro patches to hold and contain fresh water. Several taro varieties were evaluated for tolerance / susceptibility to saline soil conditions. Farmers and communities affected by Typhoon Bopha were also assisted in land preparation and planting root and vegetable crops to ensure food security.

**CMI:** Extension education and activities carried out to communities in the islands that were affected by drought and inundation of sea water into the land. Presentations on climate change were carried out in schools to students, faculty, staff and administration.

**COM-FSM:** Conducted community visits on awareness for climate change adaptation and mitigation with farmers and other clients. Salt tolerant crops were introduced to the farmers during community visits. Information about salt tolerant giant swamp taro varieties adaptable to coral atolls and other low-lying islands were provided.

#### 2. Brief description of the target audience

**PCC:** Research activities on climate change in Palau is geared to farmers, state and government officials, scientists, extension agents, agriculture students, and professionals. Results are published in conference publications and scientific journals.

**CMI:** Targeted audiences are students, parents, school administrators, teachers, staff, land owners and families.

**COM-FSM:** Farmers, students within the island proper and the outer island community residences, gardeners, homemakers, students and teachers, community leaders, policy makers, state and local governments were targeted.

#### 3. How was eXtension used?

eXtension was not used in this program

### V(E). Planned Program (Outputs)

**1. Standard output measures**

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	911	2131	310	580

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2014

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2014	Extension	Research	Total
<b>Actual</b>	0	4	4

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of awareness training conducted.

Year	Actual
2014	7

**Output #2**

**Output Measure**

- Number of salt-tolerant crops/plants developed and distributed.

Year	Actual
2014	15

**Output #3**

**Output Measure**

- Number of people who adopted sustainable food production technologies.

<b>Year</b>	<b>Actual</b>
2014	1461

**Output #4**

**Output Measure**

- Increased staple food crop production.

<b>Year</b>	<b>Actual</b>
2014	150

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Number of persons with increased awareness on impact and how to mitigate climate change in Micronesian life.
2	Number of program participants adopting sustainable food production technologies.
3	Number of persons who increased staple food crop production.

**Outcome #1**

**1. Outcome Measures**

Number of persons with increased awareness on impact and how to mitigate climate change in Micronesian life.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2014	1461

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

PCC: Climate change impacts as frequent as typhoons, excessive rainfall, increased flooding and soil erosion, sea level rise, salt water intrusion, and soil salinity has been adversely affecting the farming communities.

CMI: Island communities continued to be victimized by the natural phenomenon.

COM-FSM: Communities located in low-lying areas and atolls were concerned with rising sea level and intrusion of salt water into the taro patches.

**What has been done**

PCC: Root crops and vegetable planting materials were given to communities affected by Typhoon Haiyan. Continued evaluation of taro varieties for tolerance/susceptibility to salt water intrusion into taro patches were done.

CMI: Combine teams? efforts visited the affected islands and surveyed the communities? vegetation, water catchments, and ground wells after the drought in the affected islands.

COM-FSM: Selection of salt tolerant staple crops was distributed as well as distribution of vegetable and root crop planting materials. The establishments of demonstration plots of promising cultivars resilient to climate change were also done.

**Results**

PCC: The reality of climate change impacts was once again experienced and felt by communities affected by Typhoon Haiyan. The farmers were able to grow vegetables and root crops to ensure their resilience to climate change. Salt tolerant taro varieties were identified. Results of these research was presented in the International Horticultural Congress in Brisbane, Australia in August, 2014

CMI: Mobilization of organizations such as RMI Chief Secretary's office, Resources and Development (R&D), International Office of Migration (IOM), USAID, Environmental Protection Agency (EPA) and many NGOs delivered the necessary relieve efforts to the islands affected. People understood the impact, but cannot stop the inundations of sea water into their land.

COM-FSM: Strategic development plan on recovering the taro patches on the outer islands was developed but pending to implement due to lack of transportation. Program participants, families, and communities increased knowledge on securing food sources using adaptable varieties of root crops.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
125	Agroforestry
131	Alternative Uses of Land
132	Weather and Climate
133	Pollution Prevention and Mitigation
134	Outdoor Recreation
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity
141	Air Resource Protection and Management
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
315	Animal Welfare/Well-Being and Protection
605	Natural Resource and Environmental Economics

#### Outcome #2

##### 1. Outcome Measures

Number of program participants adopting sustainable food production technologies.

##### 2. Associated Institution Types

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2014	682

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

PCC: Frequent typhoons, storm surges, sea level rise and salt water intrusion into taro patches are some of the climate change impacts in Palau that have adversely affected the communities.

CMI: People in the outer islands continued to be affected by inundation of salt water into many of their food crops.

COM-FSM: Communities resorted to abandoning taro patches and food gardens close to the seashore due to salt water intrusion and sea surges.

**What has been done**

PCC: Communities affected by Typhoon Haiyan were assisted in land preparation and given planting materials of root and vegetable crops. Several taro varieties were evaluated for tolerance to saline soil conditions.

CMI: Ongoing trainings and workshops to students, traditional leaders and people in the communities on climate change especially the issues affecting the people (Sea Level Rise and Droughts) were held. There were activities also involving students to plant local plants along the shorelines, including food trees that are salt resistance.

COM-FSM: Affected communities were provided with salt tolerant varieties of sweet potato and information about salt tolerant giant swamp taro local cultivars and guided to develop a strategic development plan for climate change.

**Results**

PCC: Seventy two families who have experienced the severe impacts of climate change were assisted in planting root and vegetable crops to enhance food production and food security of the communities.

CMI: The agriculture demonstration site has produced enough local plants and food trees to be distributed to the affected areas to minimize erosions. Others will be given to a re-plantation project at the airport.

COM-FSM: Strategic development plan on recovering the taro patches on the outer islands has been developed awaiting implementation. Interested individuals secured their planting materials of root crops from the propagation sites established last year. Regular clean up and dumping in waste bins was observed.

#### 4. Associated Knowledge Areas

<b>KA Code</b>	<b>Knowledge Area</b>
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
125	Agroforestry
131	Alternative Uses of Land
132	Weather and Climate
133	Pollution Prevention and Mitigation
134	Outdoor Recreation
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity
141	Air Resource Protection and Management
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
315	Animal Welfare/Well-Being and Protection
605	Natural Resource and Environmental Economics

#### **Outcome #3**

##### **1. Outcome Measures**

Number of persons who increased staple food crop production.

##### **2. Associated Institution Types**

- 1862 Extension
- 1862 Research

##### **3a. Outcome Type:**

Change in Condition Outcome Measure

##### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2014	250

##### **3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

PCC: When frequent high intensity typhoons occur, sea level rise and salt water come into taro patches, there is the big problem of food security for the communities.

CMI: The inundation of sea water and droughts had affected food crops in many of the atolls. Sea level rise affected the runway and houses especially in the capital.

COM-FSM: Affected communities lost either portion or entire farms and taro patches along seashores.

**What has been done**

PCC: Communities affected by severe impacts of climate change after strong typhoons were immediately assisted with replanting of sweet potato, cassava and vegetable crops as well as salt tolerant taro varieties.

CMI: Awareness and informational sharing to the people were scheduled accordingly; food and waters were distributed to the people that were affected. Re-plantations of local food trees were carried out in villages.

COM-FSM: Planting materials from established propagation plots were distributed to affected communities.

**Results**

PCC: There was an increase in food supply of sweet potato, cassava, taro and vegetable crops as a result of immediate replanting of these crops in areas affected by the strong typhoon. High yield and productivity of these root crops and vegetable was ensured when the farmers practiced the recommended fertilization regime for the crops.

CMI: With the assistance from outside donors, reverse osmoses equipment were set up in communities that were affected by the drought. Food donations were given to the affected communities to supplement the local foods that were not available as a result of the droughts.

COM-FSM: Limited feed-back and observation indicated some program families have established farms.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
125	Agroforestry
131	Alternative Uses of Land
132	Weather and Climate
133	Pollution Prevention and Mitigation
134	Outdoor Recreation
135	Aquatic and Terrestrial Wildlife

136	Conservation of Biological Diversity
141	Air Resource Protection and Management
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
315	Animal Welfare/Well-Being and Protection
605	Natural Resource and Environmental Economics

#### **V(H). Planned Program (External Factors)**

##### **External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

##### **Brief Explanation**

**PCC:** Extreme weather conditions, sea level rise and salt water intrusion sometimes destroy the replanted crops used for rehabilitation of climate change affected areas in Palau.

**CMI:** The college is still without researchers which, limited the impacts of programs.

**COM-FSM:** Limited and irregulars scheduled trips to the outer islands, high costs of fuels for motor boats and inclement weather affected visits to island communities.

#### **V(I). Planned Program (Evaluation Studies)**

##### **Evaluation Results**

**PCC:** Food supply in communities who have experienced strong typhoons, coastal erosion, sea level rise, and salt water intrusion have been severely affected. An essential measure to ensure resilience to impacts of climate change is the immediate replanting of root and vegetable crops in the affected communities.

**CMI:** As the percent of rain falls went up, a survey immediately got under way and it concluded that there will be more time for the vegetation to be restored and food crops to normally generate fruits again. Plans are now established to look into the dry and salt resistance crops.

**COM-FSM:** Time and effort to fully carry out program was limited due to remoteness and limited/scheduled trips to the outer islands that were most vulnerable to climate change.

Producers though residing in challenging environments affected by climate change can still improve their livelihood by equipping them with knowledge, skills and access to appropriate technologies including new adaptive varieties of root crops

**and conserving environments by proper solid waste management.**

### **Key Items of Evaluation**

**PCC:** The most severe impact of climate change affecting food production is strong typhoons and salt water intrusion into taro patches. Identification and distribution of salt tolerant taro varieties is an essential remedial measure to ensure food production in the affected areas.

**CMI:** Vulnerability of the islands should be considered with urgency as these low-lying islands and atolls cannot survive along to live through climate change impacts. As these islands are known to only have 1-3 meter above sea level, it will be impossible for the people to continue to survive. All food crops on land will no longer be accessible and the end result will be obvious.

**COM-FSM:** Communities with awareness and access to technologies like new promising varieties of root crops can secure their food sources and even generate extra income from selling the produce. They had clean surroundings free from pest problems like mosquitoes and with safe produce from their gardens.

**V(A). Planned Program (Summary)**

**Program # 5**

**1. Name of the Planned Program**

Food Safety

Reporting on this Program

**V(B). Program Knowledge Area(s)**

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
703	Nutrition Education and Behavior	25%		25%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	25%		25%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	25%		25%	
724	Healthy Lifestyle	25%		25%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	3.0	0.0	1.0	0.0
<b>Actual Paid</b>	2.9	0.0	0.5	0.0
<b>Actual Volunteer</b>	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
72545	0	24724	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
6303	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

PCC: Four food safety trainings were conducted by food handlers.

CMI: Food safety training and presentations continued to take place during community visitations and outreaches.

COM-FSM: Education and training about proper food preparation, hygienic food handling, causes and prevention of food- and water-borne illnesses were conducted to communities, schools and food establishments. Clients were identified based on interest and by referrals from Health Services and Special Education. Workshops/trainings conducted for the communities included outer islands and elementary schools to increase knowledge and skills in Food Safety and an awareness of the consequences of unsanitary practices. Information provided included recipes and other printed information materials. Follow-up visits to observe and ask questions to determine impact of program were conducted. Cross training of agents was carried out in every state of the FSM during the year.

**2. Brief description of the target audience**

PCC: Target audience include food handlers, food entrepreneurs, school cooks, teachers, students, and parents .

CMI: Continued targeting students, parents, chefs and churches.

COM-FSM: Target audience included homemakers, cooks of food establishments, school teachers and students, government and non-government groups and other individuals. Also included were mothers with young children, families with special need children, senior citizens, and special interest group such as "Women-in-Farming", and the outer Island peoples.

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	2245	4791	1331	2360

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2014

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2014	Extension	Research	Total
Actual	0	0	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of community workshops on food safety conducted.

Year	Actual
2014	64

**Output #2**

**Output Measure**

- Number of program participants with increased knowledge and practices after completing educational programs.

Year	Actual
2014	2434

**Output #3**

**Output Measure**

- Number of extension publications on food safety.

Year	Actual
2014	4

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Number of program participants who increase awareness of food safety issues.
2	Number of program participants adopting recommended practices after completing educational programs.
3	Reduced incidences of food-borne and water-borne illnesses.

**Outcome #1**

**1. Outcome Measures**

Number of program participants who increase awareness of food safety issues.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2014	2719

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

PCC: Food handlers are not well informed on proper food handling behaviors to prevent food borne illnesses.

CMI: People are not fully aware of the consequences as a result of handling the food unsafely.

COM-FSM: There is limited awareness by homemakers and food handlers on food safety, proper food handling, storage, and food selection including damaged cans and packaged imported food items, and understanding of food labels.

**What has been done**

PCC: Four food safety trainings were conducted to 200 participants and 656 clients were taught to wash their hands or apply sanitizers before eating.

CMI: Instructions and trainings offered to students, communities and food handlers on proper food safety measures.

COM-FSM: Community workshops, individual visits to referred families, school enrichment programs, presentations and demonstrations of food sanitation and safe handling in respond to request from families, communities, and schools.

**Results**

PCC: Key food handling behaviors such as practicing personal hygiene, cooking foods adequately, avoiding cross-contamination, keeping food at safe temperature, and avoiding food

from unsafe source were adequately understood by 200 participants of Food Safety Classes and another 656 clients learned proper hand-washing.

CMI: Participants gained the necessary knowledge. Students received high marks and are one step ahead of passing the experience to family and friends.

COM-FSM: Participants increased their knowledge on non-patronizing of expired goods, maintaining hygiene in their kitchen and sanitary handling during meal preparations. More than 867 individuals increased awareness on food safety issues. Elementary students learned the proper ways if washing hands and food handling while adults learned and practiced food safety at homes.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
703	Nutrition Education and Behavior
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
724	Healthy Lifestyle

**Outcome #2**

**1. Outcome Measures**

Number of program participants adopting recommended practices after completing educational programs.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2014	817

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

PCC: Food handlers are not practicing proper food handling techniques to prevent food borne illnesses.

CMI: Food poisoning had occurred often with deadly consequences.

COM-FSM: Safe food handling is a community concern to avoid water- and food-borne illnesses and a high incidence of non-communicable diseases, partly the results of unsafe, unsanitary, inappropriate methodology in food preparation.

#### **What has been done**

PCC: Food handlers were taught proper food handling techniques in Food Safety Classes as well as to clients served with food products during tours to college research station and other civic events.

CMI: Government has warned side-road food handlers to get food safety certificates before selling food to the public. EPA agents conducted routine check around the capital city making sure food handlers are certified in selling food to the public.

COM-FSM: Follow-up visits to observe and encourage positive changes to improve food safety issues in households and schools. Home gardens demonstration plots were established at some households and schools.

#### **Results**

PCC: 200 participants of Food Safety Classes have adopted behaviors in proper food handling such as practicing good personal hygiene, cooking foods adequately, avoiding cross contamination, keeping food at safe temperature, and avoiding food from unsafe source.

CMI: There are now no known cases of food poisoning reported by the health officials to date. Even with that, outreach and awareness continued to carry out in different communities.

COM-FSM: Participants adopted food safety practices, including selection and purchase of foods, of personal hygiene, cleanliness of kitchens and utensils, sanitary meal preparation, and proper food storage. Surveys indicated 80% of program families have cleaner kitchen facilities. Home gardens were established at 34 households and at 2 schools. Local food vendors applied food safety guidelines. Observations conducted at the schools and communities showed that families and students increasingly applied food safety lessons.

#### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
703	Nutrition Education and Behavior
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
724	Healthy Lifestyle

**Outcome #3**

**1. Outcome Measures**

Reduced incidences of food-borne and water-borne illnesses.

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2014	257

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

PCC: Food handlers and consumers do not practice proper food handling procedures resulting in outbreaks in food borne illnesses due to warm temperature and humidity.

CMI: Food handlers and water sources in people's residences should be at all times be evaluated to avoid contaminations.

COM-FSM: People do not always know or associate their activities such as food production, marketing and preparation with food safety and related issues such as high incidences of non-communicable diseases.

**What has been done**

PCC: 200 food handlers were taught how to avoid food borne illnesses through proper food safety practices and 656 clients were taught proper hand-washing techniques before eating.

CMI: Training and other activities on proper food safety and water sanitation were conducted.

COM-FSM: Awareness and adoption of safe handling and storage were promoted through training, education, meetings, one-to-one contacts and partnerships. School children learned to properly wash hands with soap and water.

**Results**

PCC: There was no incidence of food borne illnesses due to the conduct of food safety classes and practicing food safety techniques among food handlers in Palau.

CMI: The number of food borne illnesses and water contaminants were remedies and participants gained the basic knowledge of the safety measures.

COM-FSM: There appears to be reduced incidence of water- and food-borne diseases among communities which lessened public burden of medical treatment to affected individuals. One household made an extension for a kitchen that uses only gravity to run water into sink and for drainage. Another acquired a refrigerator to improve food storage. First and second graders sing songs while washing hands.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
724	Healthy Lifestyle

#### V(H). Planned Program (External Factors)

##### External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

##### Brief Explanation

PCC: Facilities for proper food storage and cleaning are not always available in many homes resulting in unsafe food handling environment.

CMI: Most people lack a decent and clean surrounding to prepare food as well as clean cooking supplies and materials. Ground water is contaminated as a result of unfriendly disposable methods of all kinds of wastes. Droughts and other weather conditions including animals waste greatly have negative impacts on the water catchments.

COM-FSM: There is low motivation, limited resources and lack of clear vision on the importance of food safety. Delayed road improvement affected safe supply of drinking water and clean supplies of local produce due to mud and dust. Heavy rains and floods and high fuel costs restricted visits to island communities. Lack of refrigerators in majority of homes shortened storage and safety of foods. Imported foods are cheaper and more convenient than the local produces in markets. Non-Communicable Diseases are recognized as a greater health threat but are not associated with Food Safety and are

considered a nutrition problem.

## **V(I). Planned Program (Evaluation Studies)**

### **Evaluation Results**

PCC: Participants have understood and practiced proper food safety techniques as shown in their pre and post-tests.

CMI: Food handlers now have the opportunity to be checked and evaluated by health professionals before handling and preparing food for the public. In terms of water monitoring of water catchments, it is found to be contaminated..

COM-FSM: Participants are using new recipes, application on food safety practices. Local stores had separated displays of expired foods. Food handlers practiced sanitary habits of preparing and storing cooked food with cover. The post survey showed that adults and students were slowly adopting food safety in their lives.

### **Key Items of Evaluation**

PCC: Food safety training materials such as DVDs on proper food handling need to be shown to participants.

CMI: Continued partnership of all stakeholders is highly recommended for the continued safety and well-being of people's life and health.

COM-FSM: Sanitation and cleanliness in the kitchen and the observing of hygienic practices by food handlers in food preparation and storage reduced incidence of water-borne and food-borne illnesses. Keeping storage quality of food under room temperature is a challenge in islands with no electricity, ice plant and refrigeration. The questionnaires on food safety guidelines in the survey determined when and how people applied food safety after training.

**V(A). Planned Program (Summary)**

**Program # 6**

**1. Name of the Planned Program**

Global Food Security and Hunger

Reporting on this Program

**V(B). Program Knowledge Area(s)**

**1. Program Knowledge Areas and Percentage**

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	10%		10%	
112	Watershed Protection and Management	10%		10%	
136	Conservation of Biological Diversity	10%		10%	
202	Plant Genetic Resources	10%		10%	
204	Plant Product Quality and Utility (Preharvest)	10%		10%	
205	Plant Management Systems	10%		10%	
212	Diseases and Nematodes Affecting Plants	5%		5%	
216	Integrated Pest Management Systems	20%		20%	
315	Animal Welfare/Well-Being and Protection	10%		10%	
601	Economics of Agricultural Production and Farm Management	5%		5%	
	<b>Total</b>	100%		100%	

**V(C). Planned Program (Inputs)**

**1. Actual amount of FTE/SYs expended this Program**

Year: 2014	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	16.0	0.0	6.0	0.0
<b>Actual Paid</b>	11.5	0.0	8.9	0.0
<b>Actual Volunteer</b>	0.0	0.0	0.0	0.0

**2. Actual dollars expended in this Program (includes Carryover Funds from previous years)**

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
435267	0	375648	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
37820	0	12484	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

## V(D). Planned Program (Activity)

### 1. Brief description of the Activity

PCC: The root crops germplasm collection being maintained at the research station continued to be a reliable source of planting materials for the food security of the Palauan people. Mass propagation and conservation of the taro, cassava and sweet potato germplasm has been a major activity. A total of 7,621 planting materials of sweet potato, cassava, taro and fruit trees were distributed to 212 farmers. In addition, 72 farmers affected by Typhoon Haiyan were assisted in establishing vegetable gardens to ensure food security. Mass propagation and conservation of the taro, cassava and sweet potato germplasm has been a major activity.

CMI: Small scale and urban gardening methods were presented to students at the post-secondary level. Presentations were at hand during World Food Day activities sponsored by the government, college and NGOs. Different demonstrations showcasing simple methods of farming where harvesting of fruits and vegetables decrease greatly, within four to six month periods. Replanting was done right after harvest and therefore food was available sustainably.

COM-FSM: Traditional 'nature and culture integrated' farming systems has sustained Islanders including remote atoll dwelling populations since earliest times. These smallholder systems have profound influence on the landscape ecology, capacity of supporting soil fertility, crop protection, high cultivar diversity, and provided the island communities with food resources that made them among the most self-sufficient and well-nourished peoples in the region. However, things have changed. Appropriate research and extension intervention in innovative climate-smart agriculture strategies will help island communities adapt to the new situations to develop and sustain small farm enterprises for food security and income. School-base programs, training on food production and processing techniques for food security and value adding and translated educational materials were provided during the year. Collaboration with other agencies, stakeholders, community groups, and individuals ensured support for workshops, farm visits, and demonstrations.

In vitro and in vivo screenings are continued to study salt tolerance level in collected and tissue culture maintained germplasm. In vitro conservation of selected salt tolerant germplasm for mass multiplication in future has been initiated. Two books (sweet potato cultivation guide and soft taro cultivation guide) have been published. High yielding sweet potato varieties based on field performance evaluations were propagated and demonstrated. Intercropping cassava with okra and long beans was promoted as a means for food security and additional income.

### 2. Brief description of the target audience

PCC: Our target audiences are scientists, extension agents, agriculture students and professionals, federal, state and national agencies, conference publications, and scientific journals. Farmers, students, parents, state and federal government officials and private individuals are also beneficiaries of our extension programs.

CMI: Implementation efforts reached schools government offices as well as the general public.

COM-FSM: Scientists, extension staff, agricultural professionals, agriculture students, federal, state and national agencies, conference publications, and scientific journals are target audiences for research activities. Farmers, community leaders, producers and exporters, homemakers, teachers and students, policy makers, extension colleagues, NGOs and other members of the community who are involved in the agriculture sector are target audiences for extension activities. Internships are being provided to college agriculture students at Agricultural Experiment Stations and Cooperative Extension Services.

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	2355	6084	919	1783

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2014

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2014	Extension	Research	Total
<b>Actual</b>	1	1	2

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of demonstration farms established.

<b>Year</b>	<b>Actual</b>
2014	20

**Output #2**

**Output Measure**

- Number of publications for lay use.

<b>Year</b>	<b>Actual</b>
2014	15

**Output #3**

**Output Measure**

- Number of conference papers and publications/presentations.

<b>Year</b>	<b>Actual</b>
2014	6

**Output #4**

**Output Measure**

- Expected professional journal publications

<b>Year</b>	<b>Actual</b>
2014	2

**Output #5**

**Output Measure**

- Expected gray literature.

<b>Year</b>	<b>Actual</b>
2014	8

**Output #6**

**Output Measure**

- Expected publications for lay use

<b>Year</b>	<b>Actual</b>
2014	5



**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Number of persons with increased knowledge on appropriate production and processing technologies.
2	Number of program participants adopting recommended practices.
3	Number of established farms producing, utilizing, and/or selling produce and products.

## **Outcome #1**

### **1. Outcome Measures**

Number of persons with increased knowledge on appropriate production and processing technologies.

### **2. Associated Institution Types**

- 1862 Extension
- 1862 Research

### **3a. Outcome Type:**

Change in Knowledge Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2014	3155

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

PCC: Knowledge of best management practices, high yielding planting materials and techniques to prepare new food products and prolong shelf life is essential to increase productivity and food security.

CMI: Clients were not aware of the issues concerning storage of food and its implications.

COM-FSM: There is a lack of knowledge among youths and adults about farming, food processing and security, and management practices to adapt to new realities of climate and cultural changes and economic pressures.

#### **What has been done**

PCC: Workshops were conducted and information on new varieties of crops, best management practices, biocontrol agents and publications were disseminated. Four food technology trainings were conducted as a measure on food security.

CMI: Small and urban gardening were conducted in schools and in the communities.

COM-FSM: Hands-on demonstrations, one-on-one sessions, workshops and educational sessions were conducted to increase the participant's knowledge of integrated small farm activities.

## **Results**

PCC: Techniques to improve crop productivity and the environment such as best management practices and use of biocontrol agents have been disseminated during workshops conducted and also to visitors to the Research and Development Station. Participants in food technology trainings can prolong the shelf life of food products thus enhancing food security in the community.

CMI: Trained participants have increased their knowledge and have strongly recommended the program to others.

COM-FSM: Program participants are more knowledgeable about the methods involved in home gardening activities using improved soil management practices, vegetable production methods and livestock production and management. In one state, 144 participants improved knowledge on food production and processing methods as indicated by follow-up interviews. Another 46 farmers developed awareness of improved practices due to extension activities. In another state, participants across six municipalities including the outer islands, gained knowledge from 32 trainings/workshops provided.

#### 4. Associated Knowledge Areas

<b>KA Code</b>	<b>Knowledge Area</b>
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
136	Conservation of Biological Diversity
202	Plant Genetic Resources
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
212	Diseases and Nematodes Affecting Plants
216	Integrated Pest Management Systems
315	Animal Welfare/Well-Being and Protection
601	Economics of Agricultural Production and Farm Management

#### Outcome #2

##### 1. Outcome Measures

Number of program participants adopting recommended practices.

##### 2. Associated Institution Types

- 1862 Extension
- 1862 Research

##### 3a. Outcome Type:

Change in Action Outcome Measure

### 3b. Quantitative Outcome

Year	Actual
2014	471

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

PCC: Limited planting materials and control of pests and diseases greatly affect farm productivity. Farm produce can be prepared in many ways to enhance food security for the family.

CMI: Clients were not cognizant of the small and urban gardening methods.

COM-FSM: Despite outreach efforts that was made with youths and adults, there is still limited adoption of sustainable farming practices due to lack of motivation, poor soil and unavailable garden space or lack of resources to address this socioeconomic situation.

#### What has been done

PCC: Disease-free, high yielding planting materials were distributed to farmers to increase productivity. Food technology trainings were conducted to preserve foods.

CMI: Trainings and demonstrations were carried out to new farmers and families with little space around homes. Training on composting methods also was initiated for continued sustainability of the food crops.

COM-FSM: Technical assistance and hands-on trainings organized for youths and adults in soil management, nursery production and animal husbandry were provided, including follow-up visits to encourage participants.

#### Results

PCC: Participants of food technology trainings were able to prepare new food products and preserve foods. Food supply and production in Palau has been enhanced by improved yield of farmers who are growing disease-free and high-yielding planting materials of root crops and using biocontrol agents to control pests of crops.

CMI: There is an increased number of families? established urban gardening methods in the urban areas. Students who took part in the training are now completing their last course requirements and will be joining others in pursuing their four year degree program.

COM-FSM: Sixty seven clients in one state have successfully adopted one or more integrated small farm practices involving vegetables, poultry or pigs. Feedbacks indicated participants adopted recommended production and food processing practices. In another state, 34 gardens were established. Twenty youths and adults established farms and are cultivating different crops. Twenty-eight pepper growers continued to receive technical assistance; Early Childhood Education (ECE) centers, community groups and families have established small garden plots. Ultimately extension activities changed the behavior of the participants.

#### 4. Associated Knowledge Areas

<b>KA Code</b>	<b>Knowledge Area</b>
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
136	Conservation of Biological Diversity
202	Plant Genetic Resources
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
212	Diseases and Nematodes Affecting Plants
216	Integrated Pest Management Systems
315	Animal Welfare/Well-Being and Protection
601	Economics of Agricultural Production and Farm Management

#### Outcome #3

##### 1. Outcome Measures

Number of established farms producing, utilizing, and/or selling produce and products.

##### 2. Associated Institution Types

- 1862 Extension
- 1862 Research

##### 3a. Outcome Type:

Change in Condition Outcome Measure

##### 3b. Quantitative Outcome

<b>Year</b>	<b>Actual</b>
2014	399

##### 3c. Qualitative Outcome or Impact Statement

###### **Issue (Who cares and Why)**

PCC: Best management practices should be adopted by farmers to improve productivity. Families should be capable of preparing new food products from their produce for food security.

CMI: Availability of dietary food was not realized and taken into account by many of the clients.

COM-FSM: Vegetable and livestock production is limited owing to resources availability or government support to farmers and pest problems. High living cost and limited income with lack of opportunities are major issues.

### What has been done

PCC: Proper cultural management and quality planting materials were adopted by farmers. Participants acquired new skills and prepared new products learned from the food technology classes.

CMI: Continued trainings and knowledge sharing to unaware students and families were done affectively during scheduled times. Monitoring and evaluating of the mentioned gardening methods were done throughout the process, information sharing of each plant development was crucial in identifying successes and failures.

COM-FSM: Technical assistance has been given to farmers in establishing and expanding integrated farming activities combining vegetable and livestock production.

### Results

PCC: Demonstration farms showcasing best management practices such as use of disease-free and high yielding planting materials and adequate fertilization led to high productivity of root crops. Families prepared and have new food products from their produce for food security.

CMI: With successful partnerships and trainings there were increased number of urban gardening sites in school campuses and in three condense urban communities.

COM-FSM: Four commercial growers in one state provided a variety of vegetables for gross sales of about \$26,000 in the market. Seven families engaged in egg production meet about 30 percent of daily demand in one state. Marketing of processed food by two program participants earned \$3,500.00 in another state and 20 farmers are producing, selling and exporting their farm produce. ECE centers are harvesting and incorporating garden vegetables in school meals; livestock farmers have more egg production and increased litter sizes for sale. Ultimately extension activities have changed economic condition of the participants.

## 4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
136	Conservation of Biological Diversity
202	Plant Genetic Resources
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
212	Diseases and Nematodes Affecting Plants
216	Integrated Pest Management Systems
315	Animal Welfare/Well-Being and Protection
601	Economics of Agricultural Production and Farm Management

## **V(H). Planned Program (External Factors)**

### **External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

### **Brief Explanation**

PCC: Crops are destroyed during typhoons, heavy rains and salt water intrusion and inundation so raw materials for food processing is inadequate.

CMI: Climate change will be a continued challenging factor as water sources are limited. Population density will still be a major issue with a small island setting. High humidity and salt spray in the air continued impacting the performance of the food crops.

COM-FSM: Establishments of plot demos in atolls and distant islands were affected by inclement weather, irregular availability of water transportation and high fuel costs. Sometimes transportation, fuel, extreme bad weather, and conflict of activities within the communities and funerals are constraints at all sites of the country.

## **V(I). Planned Program (Evaluation Studies)**

### **Evaluation Results**

PCC: The root crops germplasm collection at the research station has been a reliable source of high yielding varieties of taro, sweet potato and cassava which are essential components to increase productivity. Biocontrol agents have effectively controlled pests of taro and cassava. Participants in the food technology trainings were very eager to prepare new food products they have learned.

CMI: There is an increased number of clients interested in pursuing the gardening methods as a supplement for their food supply. Availability of nutritious diet will greatly impacted people's health, with less reliability on unhealthy diet.

COM-FSM: Integrating nutrition information about crops to be introduced and their recommended practices is effective in convincing communities to establish their own gardens, consume and preserve them for their families. Family and school practiced container garden, using local basket and banana stem techniques. Compost and home-made pesticides are also practiced. Two program participants are generating family income by selling value-added products. Experiments are showing positive results and audiences are showing increased interest in developing farms. The extension activities have improved knowledge, created awareness and developed skills of participants in sustainable agriculture systems.

Farmers, community leaders, teachers, and parents are willing to test new innovative technologies in order to improve on current practices and management styles. There are more collaboration between the Farmers/Schools and free sharing of traditional knowledge and skills to complement new technologies and practices. Ultimately extension activities have developed positive attitudes, zeal for learning techniques and farming aspects, and have changed the behavior and economic condition of the participants.

### **Key Items of Evaluation**

PCC: The tissue culture technique has been successful in providing a continuous supply of taro and banana planting materials to farmer clients. Biocontrol agents have been successful in controlling pests of root crops and invasive weeds in Palau. Families are now able to prepare new food products from their produce for food security.

CMI: With the knowledge acquired through these methods of small scale and urban gardening, it will be an excellent and impending rigorous effort. Food will be better presented if programs of cooking also included and established in order to have different cooking methods also be shared.

COM-FSM: Increasing number of communities appreciated the importance of maintaining their own gardens for availability of healthy and fresh produce and for healthy physical fitness. " Eating the Rainbow" slogan seemed easy to remember by people in growing and producing healthy local produce.

There are increased numbers of container gardens and increased number of people involved in the program. Participants produce and sell value-added products and generate family income. Research now provides increased germplasm types and increased seedling production, to increased number of farmers. Those farmers work an increased number of farms, adopted best practices and technologies resulting in increased yields, reduced inputs, increased efficiency, increased economic return, and conservation of resources as a result of extension activities. Extension activities resulted in improved knowledge, created awareness and developed skills of the participants in sustainable agriculture systems and provided fresh produce to be donated to vulnerable populations for consumption. Researchers presented results of research and extension projects during scientific conferences and meetings, and developed publications related with the projects.

**V(A). Planned Program (Summary)**

**Program # 7**

**1. Name of the Planned Program**

Sustainable Energy

- Reporting on this Program
  - Reason for not reporting
  - Not enough human resources to implement the program.

**V(B). Program Knowledge Area(s)**

1. Program Knowledge Areas and Percentage

**V(C). Planned Program (Inputs)**

**1. Actual amount of FTE/SYs expended this Program**

Year: 2014	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	0.0	0.0	0.0
<b>Actual Paid</b>	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
<b>Actual Volunteer</b>	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

**2. Actual dollars expended in this Program (includes Carryover Funds from previous years)**

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
<b>1862 Matching</b>	<b>1890 Matching</b>	<b>1862 Matching</b>	<b>1890 Matching</b>
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
<b>1862 All Other</b>	<b>1890 All Other</b>	<b>1862 All Other</b>	<b>1890 All Other</b>
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

No planned activity.

**2. Brief description of the target audience**

No planned activity so no target audience.

**3. How was eXtension used?**

{No Data Entered}

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2014

Actual: {No Data Entered}

**Patents listed**

{No Data Entered}

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2014	Extension	Research	Total
Actual	0	0	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- {No Data Entered}

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

**Outcome #1**

**1. Outcome Measures**

{No Data Entered}

**V(H). Planned Program (External Factors)**

**External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

**Brief Explanation**

{No Data Entered}

**V(I). Planned Program (Evaluation Studies)**

**Evaluation Results**

{No Data Entered}

**Key Items of Evaluation**

{No Data Entered}

## VI. National Outcomes and Indicators

### 1. NIFA Selected Outcomes and Indicators

<b>Childhood Obesity (Outcome 1, Indicator 1.c)</b>	
0	Number of children and youth who reported eating more of healthy foods.
<b>Climate Change (Outcome 1, Indicator 4)</b>	
0	Number of new crop varieties, animal breeds, and genotypes with climate adaptive traits.
<b>Global Food Security and Hunger (Outcome 1, Indicator 4.a)</b>	
0	Number of participants adopting best practices and technologies resulting in increased yield, reduced inputs, increased efficiency, increased economic return, and/or conservation of resources.
<b>Global Food Security and Hunger (Outcome 2, Indicator 1)</b>	
0	Number of new or improved innovations developed for food enterprises.
<b>Food Safety (Outcome 1, Indicator 1)</b>	
0	Number of viable technologies developed or modified for the detection and
<b>Sustainable Energy (Outcome 3, Indicator 2)</b>	
0	Number of farmers who adopted a dedicated bioenergy crop
<b>Sustainable Energy (Outcome 3, Indicator 4)</b>	
0	Tons of feedstocks delivered.