

2010 College of Micronesia Combined Research and Extension Annual Report of Accomplishments and Results

Status: Accepted

Date Accepted: 07/25/2011

I. Report Overview

1. Executive Summary

Integrated research and extension programs to address economic, social, and ecological issues on small islands continued through the cooperative research and extension offices at the three partner colleges: College of the Marshall Islands (CMI), College of Micronesia - FSM (COM-FSM), and Palau Community College (PCC). Dissemination of new knowledge and technologies to sustain and improve the quality of life of all Micronesian citizens in the Republic of the Marshall Islands (RMI), Federated States of Micronesia (FSM), and Republic of Palau (ROP) has been the thrust of programs in all six counties.

The swine flu and the seasonal flu are still of major concerns, so awareness programs on proper hygiene and healthy lifestyle were important to safeguard the well-being of citizens. The rising sea level due to climate change is becoming a serious concern as we witnessed catastrophic effects of this phenomenon. The increasing cost of food and fuel has forced people to make adjustments necessary for the new economic, social and environmental conditions and find innovative methods of farming of crops, livestock, and aquaculture species. 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 varieties (*Cyrtosperma* spp. & *Colocasia* spp.) for their suitability to grow under atoll conditions continued and the micro propagation of elite (disease-free and high yielding) varieties that will improve the quality and quantity of certain crop varieties for the export market were ongoing. Continued germplasm maintenance of staple root crops has insured the genetic conservation of these valuable resources for future generations. This has also facilitated the continue supply of planting materials to growers and allow in-vitro multiplication of other food crops.

Aquaculture demonstration projects continued to transfer the technical know-how to Micronesians to enable them to actively engage in projects that could provide alternate income generation with the overall aim of improving the socio-economic conditions of islanders. 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. A project got underway 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 and youths, water quality, and managing limited natural resources and the environment. Health and nutrition programs continued on the importance of healthy lifestyles, which included physical activity and consumption of safe and nutritious local food to combat obesity, diabetes, heart diseases and other NCDs. The outbreak of melamine infected food from China alerted us on how vulnerable we are to food borne diseases. A project on endangered species of banana produced rare banana varieties to support nutritional needs for Vitamin A among children and adult. 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 to electronic connectivity 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. Biological control agents, such as mirid bugs (*Cyrtorhinus fulvus*) to control taro leafhopper, *Aphidius colemani* on melon aphid, and predatory mites (*Neoseiulus longispinosus*) on cassava spider mites. Biological control of the *Mimosa diplotricha* continued with psyllid insects.

Multi-state and multi-institutional efforts continued through the alliance of the American-Pacific land-grant universities and colleges through the Agricultural Development in the American Pacific (ADAP) project and with the Center for Tropical and Subtropical Aquaculture (CTSA) on aquaculture projects. 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, including a Financial Assistance & Scholarship Program for program staff and financial assistance for college students enrolled in agriculture and home economic. 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: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	53.0	0.0	14.0	0.0
Actual	40.0	0.0	12.0	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
- Targeted invitation to selected individuals from general public
- 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, 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, 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

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, community groups and others are good sources of traditional knowledge which can be applied and used to improve social, agricultural and environmental issues. Entrepreneurs interested in business development lack marketing strategies and training necessary for them to be successful.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1038571	0	857852	0

2. Totaled Actual dollars from Planned Programs Inputs				
Extension			Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	968712	0	557419	0
Actual Matching	143732	0	104079	0
Actual All Other	0	0	0	0
Total Actual Expended	1112444	0	661498	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	940256	0	338529	0

V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Aquaculture
2	Small Island Agricultural Systems
3	Families, Youths & Communities
4	Food, Nutrition & Health

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Aquaculture

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
133	Pollution Prevention and Mitigation	5%		5%	
135	Aquatic and Terrestrial Wildlife	5%		5%	
136	Conservation of Biological Diversity	20%		20%	
301	Reproductive Performance of Animals	10%		10%	
302	Nutrient Utilization in Animals	10%		10%	
307	Animal Management Systems	20%		20%	
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	5%		5%	
608	Community Resource Planning and Development	5%		5%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	9.0	0.0	5.0	0.0
Actual	4.0	0.0	2.0	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
96871	0	92903	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
14373	0	34000	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: Larval rearing trials on rabbit fish and mangrove crabs were conducted at the newly opened multi-species hatchery and thousands of fingerlings of these species were produced. Some fingerlings were given to local fish farmers for grow-out in cages while thousands more were released into the wild. Preliminary trial runs on the seed production of mangrove crabs yielded some crablets. A total of 30 milkfish (*Chanos chanos*) broodstock with body weight ranging between 3 to 4 kilos were collected from local milkfish farms and were stocked in 80-ton capacity tank for gonad maturation and spawning. Lectures on fish biology and aquaculture were provided to students in schools and during field trips to visit and observe actual hatchery operations. Local clients were assisted in their plan to put up hatchery for rabbit fish operations. Posters and aquarium exhibits were presented in various local and national events.

CMI: Several spawning runs took place which produced millions of oyster spats, which were distributed. The ROC-Taiwan government handed over its fish hatchery facility after they trained local staffs. There is a growing interest in the sea cucumber industry, but now there are no standard procedures for harvesting and there is a strong possibility that this resource might be depleted soon.

COM-FSM: Black pearl extension work continued on training of local farmhands to maintain the farms and the pearl hatchery. The sea cucumber project continued on the hatchery technology transfer and on developing restocking methods. Two restocking sites were designated on a high-value commercial species, the sandfish (*Holothuria scabra*). A long-term high-density holding tank system was developed for both broodstock and juveniles.

2. Brief description of the target audience

PCC: People in the community, government officials, local and foreign tourists, students and individuals who are interested and engaged in aquaculture activities are considered the target audience.

COM-FSM: In Pohnpei, the pearl project targeted three atoll communities including one NGO, one local government and several private land owners for implementing commercial farming. The sea cucumber project targeted local and state governments to develop collaborations in wild stock surveys and

restocking programs.

CMI: Two local governments that have existing pearl oyster farms and invitations have been sent out to potential local farmers.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	479	10000	1695	10000

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

Patent Applications Submitted

Year: 2010

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of demonstration farms established.

Year	Actual
2010	13

Output #2

Output Measure

- Number of publications for lay use.

Year	Actual
------	--------

2010 1

Output #3

Output Measure

- Number of conference paper and publication/presentation.

Year	Actual
2010	2

Output #4

Output Measure

- Expected Professional Journal publications.

Year	Actual
2010	1

Output #5

Output Measure

- Expected Gray Literatures.

Year	Actual
2010	3

Output #6

Output Measure

- Expected publications for lay use.

Year	Actual
2010	1

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	Quantitative Target	Actual
2010	250	2174

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

PCC: Some people are not aware of recent aquaculture development in the country. Individuals with limited know how are interested to start an aquaculture project.

CMI: The status of the hatchery is the critical component for the pearl farming industry. The people should look at this as something that will be greatly beneficial.

COM-FSM: Some people are unaware that aquaculture will provide sources of income from new productions and add values to existing commodities.

What has been done

PCC: Facilitated posters and aquarium displays, walk-in and pre-arranged visits, technical assistance about aquaculture. Presented lectures about biology of fishes and aquaculture in schools.

CMI: Several spawns were conducted to determine the status and also to revive the pearl project that is aiming to obtain more reliable farm communities.

COM-FSM: Facilitated public displays of products from the projects, hands-on training, on-site visits and broadcasted information via local radio stations.

Results

PCC: People have realized the importance and contribution of aquaculture for the country's food security and economic development. The Multi-species Hatchery is essential in making

aquaculture sustainable. Fish farmers gained knowledge and availed of technical assistance on operation of aquaculture projects. Students learned the basic concepts of aquaculture.

CMI: The hatchery program was able to raise 14,000 spats for future distribution to community farms and increased participants? knowledge.

COM-FSM: The pearl and sea cucumber projects received immediate attentions from domestic and overseas stakeholders and international journals on high quality products and skill training methodologies.

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
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	Quantitative Target	Actual
2010	50	47

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

PCC: Survival of rabbit fish and natural spawning of mangrove crab at Bureau of Marine Resources Hatchery was unsuccessful. Mangrove crab farmers depend on wild caught crabs for seed stock.

CMI: The government-operated pearl hatchery was unable to provide spats and the industry has been on hold for several years with an undetermined future.

COM-FSM: People need to adopt techniques to add value to existing products and materials to generate and increase income.

What has been done

PCC: Larval rearing and grow-out trials of rabbit fish using broodstock feeds in the hatchery, ponds and cages were done. Seed production of mangrove crabs was conducted.

CMI: Plans have been developed and other agencies involved in pearl industry have shown great interest in its revival and the hatchery was able to produce spawn.

COM-FSM: The project provided pearl farm training and monitoring activities for pilot farms and demonstrated value-added products, sea cucumber spawning and grow-out methods.

Results

PCC: Natural spawning, high survival rate and production of natural food for two species of rabbit fish at the hatchery were improved. Seed production of mangrove crabs was successful. Farmers obtained improved growth performance of rabbit fish in ponds and cages using the developed feeds.

CMI: Now the hatchery is fully equipped and can handle large numbers of runs to produce spats efficiently on mass scale through joint efforts with local agencies.

COM-FSM: Pearl project staff continued hatchery productions of pearls and sea cucumbers, pilot farm maintenance and made sample value-added products. This enhanced local awareness in pearl farming business investment and conservation. Long-term high density sea cucumber holding system was developed for high-valued sandfish (*H. scabra*).

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
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

Year	Quantitative Target	Actual
2010	8	44

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

PCC: Inconsistent supply of hatchery produced rabbitfish fingerlings and mangrove crabs discourages farmers to grow them in ponds and cages.

CMI: Limitation in supply of oyster spats is the major bottleneck in commercial production.

COM-FSM: State governments and communities lack fisheries management plans and capacity building.

What has been done

PCC: Larval rearing of two species of rabbit fish produced fingerlings stocked in two fish farms using suitable feeds. Seed production of mangrove crabs was done .

CMI: Oyster spats were produced on mass scale and distributed.

COM-FSM: Youths in three communities were trained in nucleus implantation. Tagging trials of sea cucumber (*Holothuria scabra*) were conducted for restocking purposes.

Results

PCC: Growing rabbit fish with high protein feed in ponds and fish cages is feasible and encourages more farmers to go into aquaculture activities. Two aquaculture operations regularly harvested and market cage-grown fish.

CMI: More than 500,000 oyster spats were cultured and distributed to two farms.

COM-FSM: Training of half-pearl nucleus implantation and line culture skills were conducted at three outer island communities using 10,000 hatchery-produced pearl oysters. A quarter of million spat were produced from the hatchery selective breeding program for pearl farm commercialization process. A long term tank culture system was for broodstock and juveniles of the sandfish (*H. scabra*) and several thousand juveniles were produced from the hatchery.

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
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

Frequent occurrence of natural disasters such as typhoons, rapid increase in the population and unexpected change in government policies will greatly influence the outcome of programs.

V(I). Planned Program (Evaluation Studies and Data Collection)

Evaluation Results

PCC: In the past people have been dependent on fish caught from the wild. With the success in producing fingerlings of rabbit fish in hatchery, people become aware of the potentials in growing these important fish species in ponds and cages. Establishment of the multi-species hatchery promoted development of aquaculture by providing consistent supply of rabbit fish fingerlings. There was an increase in number of fish and mangrove crabs in ponds and cages. More people are becoming interested in growing fish for commercial purpose.

CMI: Two atolls have been dedicated in maintaining the pearl industry by expanding their farm operations and looking at creating more jobs for the atoll communities.

COM-FSM: Nine youths from three local communities learned half-pearl nucleus implantation and pearl-shell accessory making as well as farm maintenance work by technicians of the pearl project. The sea cucumber hatchery technology was transferred and improved to the Micronesian technicians for the high valued species such as the sandfish which has been over fished to a level of near extinction in Pohnpei. The hatchery technology and a long term land-based holding system developed have potential to contribute to the enhancement of resources and provide additional source income.

Key Items of Evaluation

PCC: A practical method in larval rearing of two rabbit fish species has been documented with success in natural spawning of captive breeders. A nursery and grow-out of rabbit fish in cages has been verified and better feeding protocol was developed. Success of producing high valued aquaculture species such as grouper, which gave an opportunity to fish farmers to experience growing them in ponds or cages. Through series of lectures in schools and poster and aquarium displays in national events, students became more interested in learning fish biology and aquaculture. The development of techniques in seed production of mangrove crabs also encouraged more farmers to grow this high valued aquaculture species in ponds and cages.

CMI: The two existing pearl companies are preparing for their upcoming harvest and sell in December 2010. The hatchery staff is working closely with these companies' personnel to schedule a date to visit the two farms and distribute 150,000 oyster spats each. The two hatcheries at the college are for fish and oyster productions. The family of a deceased farmer who had an existing oyster farm, expressed interest in starting up the family business.

COM-FSM: Half-pearls and pearl shell accessories by adding value to pearl shells are getting more attention among local and international stakeholders in Japan and USA. A display and sale of sample products from COM's pearl project was conducted in Pohnpei, resulting in positive responses from domestic and overseas stakeholders. Cross-breeding work produced a high rate of unique blue colored pearls and other rare colors such as light-green peacock and enquiries have been received from overseas for using these pearls for joint sales promotions of the Micronesian brand pearls. The sea cucumber (*H. scabra*) species has been consumed as a favorite seafood unlike other places in the world where people catch and process for export. Although the COM project revealed that this species was not near extinction in Pohnpei lagoon, it could be depleted rapidly in spite of the

Pohnpei State government's export ban if restocking program is not implemented. The COM's hatchery-based aquaculture project shows a feasible tool to enhance resources and to re-vitalize local economy in Pohnpei.

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Small Island Agricultural Systems

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	15%		15%	
112	Watershed Protection and Management	10%		10%	
136	Conservation of Biological Diversity	15%		15%	
202	Plant Genetic Resources	10%		10%	
204	Plant Product Quality and Utility (Preharvest)	5%		5%	
205	Plant Management Systems	10%		10%	
212	Pathogens and Nematodes Affecting Plants	5%		5%	
216	Integrated Pest Management Systems	15%		15%	
315	Animal Welfare/Well-Being and Protection	5%		5%	
601	Economics of Agricultural Production and Farm Management	10%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	19.0	0.0	7.0	0.0
Actual	18.0	0.0	8.0	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
435920	0	371613	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
64679	0	70079	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: Conservation and maintenance of the taro, cassava and sweet potato germplasm at the research station continued to be a major activity as a repository of root crops germplasm collection in Palau. Field and sensory evaluation of taro hybrids obtained from the SPC revealed that they were well adapted to the environment and were very acceptable to Palauan taste. Planting materials of these new taro hybrids were distributed to farmers. Biocontrol agents for control of cassava spider mite and taro leafhopper were released on cassava and taro plantings to assist farmers in controlling these pests. Training on maintenance of rainwater catchments were conducted to students and teachers. Community groups and students visited the Dry Litter waste demonstration. Assessment of and workshop on piggery waste management was conducted. Revised dry litter design was distributed to five farmers. A televised infomercial was shown in a local television program to increase awareness on alternative ways of operating a piggery without harming the environment.

Biocontrol agents for predatory mite for cassava spider mite and mirid bug for taro leafhopper were released on cassava and taro plantings to assist farmers in controlling these pests. Also, Entomologists from Northern Marianas College came to Palau to collect psyllid insects to control Mimosa in the Saipan, Rota and Tinian.

Water outreach presentations were conducted to high school students and teachers on how to maintain their rainwater catchments. Different community groups and schools visited the animal waste dry litter system and a piggery waste management assessment was conducted to piggery farmers. An animal waste management workshop was conducted in collaboration with University of Hawaii. Revised dry litter design was distributed to five farmers and a televised infomercial was shown in a local television program as awareness on alternative ways of operating a piggery without harming the environment.

CMI: Lime trees and mountain apples were propagated thru air layering and distributed and demonstrations on growing sweet potato using used tires were conducted. In collaboration with the government and NGOs and in celebration of World Water Day, a video entitled "The Challenges of Water in the Republic of the Marshall Islands" was produced.

COM-FSM: Activities vary between home and school gardening. Small scale commercialization has emerged with new farms in all islands. A research project on salt tolerant root crops started in response to climate change and agroforestry programs continued to promote biodiversity and food security. Livestock farmers benefited from local feed and medicinal plants as pharmaceuticals. A public demonstration on

water catchment's first-flush divergent to remove contaminants from catchment collecting rain water was conducted. The concept behind the first -flush is to divert the first downpour, in effect removing contaminants including bird droppings, dust, or foreign particles before the storage tank. The divergent mechanism is by gravity with the use of "V trap" to prevent overflow of contaminated water into the catchments. Kosrae continued seedling distribution and farm visits for on-site recommendations. During visits, technical assistance and support were provided to farmers on appropriate farming techniques and practices. Transfer of tissue-cultured plantlets from growth room to greenhouse for acclimatization, from greenhouse to nursery for maintenance and distribution continued. More than 7,000 taro and 6,500 sweet potato seedlings were produced, and total 10 banana, 4,600 taro and 1,472 sweet potato plants were distributed and more than 8,701 eggplant, green onion, Chinese cabbage, cucumber and tomato seedlings were produced, and 6,050 seedlings were distributed.

2. Brief description of the target audience

PCC: The agriculture program caters to several groups including the farmers, students from the kindergarten, elementary, high schools to college level, parents, teachers, government officials and the private individuals.

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, producers and exporters of the state, extension colleagues, and other members of the community who are involved in the agriculture sector are target audiences for extension activities.

CMI: Audience include community members such as, leaders, farmers, men, women, youth, school principals and teachers, elementary, high school and college aged students.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	5600	9200	3664	7700

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

Patent Applications Submitted

Year: 2010

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Expected Professional Journal Publications.

Year	Actual
2010	1

Output #2

Output Measure

- Expected Gray Literatures

Year	Actual
2010	7

Output #3

Output Measure

- Expected publications for lay use.

Year	Actual
2010	18

Output #4

Output Measure

- Conference presentations

Year	Actual
2010	15

Output #5

Output Measure

- Conference publications

Year	Actual
2010	4

Output #6

Output Measure

- Number of publications for lay use.

Year	Actual
2010	6

Output #7

Output Measure

- Number of conference paper publication/presentations.

Year	Actual
2010	3

Output #8

Output Measure

- Number of demonstration farms established.

Year	Actual
2010	79

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 technologies.
2	Number of program participants adopting recommended practices.
3	Number of established farms and farm related businesses by individuals and cooperatives.

Outcome #1

1. Outcome Measures

Number of persons with increased knowledge on appropriate production technologies.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	2400	5000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

PCC: People are unaware of pollution caused by piggeries to water resources. Best management practices and IPM techniques are essential to increase productivity.

CMI: Most farmers using commercial fertilizers are unaware of the detrimental impacts on the environment. Due to lack of knowledge and information on proper water treatment, people are bound to experience health issues.

COM-FSM: Many farmers have limited technical knowledge and skills about appropriate agricultural practices, animal waste management, and composting.

What has been done

PCC: Demonstrations on rainwater catchment and dry litter system were conducted in schools and communities. Planting materials, publications and biocontrol agents were distributed to farmers.

CMI: Demonstrations on making compost were conducted in schools and communities. Water quality awareness activities were also performed.

COM-FSM: Pilot projects on appropriate animal management were implemented. Training and demonstration Research and Extension have organized hands-on trainings to increase the participants' knowledge and farm visits for on-site recommendations on composting and appropriate farming techniques were conducted.

Results

PCC: Students, teachers, farmers and the community gained knowledge and awareness on maintenance of rainwater catchments and animal waste management. Farmers now understand the importance of germplasm conservation, use of biocontrol agents, and best management practices to ensure successful crop production and improve productivity.

CMI: Farmers gained knowledge in making their own compost using copra cakes. Participants are aware of the first-flush diversion catchment system.

COM-FSM: Participants gained knowledge about animal waste management, composting and appropriate farming techniques. Participants are aware of the first-flush diversion catchment system. The extension activities have improved knowledge, created awareness and developed skills of 143 participants in sustainable agriculture systems and innovative farming techniques and practices.

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	Pathogens 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	Quantitative Target	Actual
------	---------------------	--------

2010

1200

250

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

PCC: Water contaminants and improper animal waste disposal are harmful to health and the environment. Planting materials and pests and diseases greatly affect farm productivity.

CMI: Seventy-five percent of household water catchments are contaminated by pathogens and E. coli. Saline groundwater on farms affects plant growth.

COM-FSM: Inappropriate livestock management practices and limited knowledge in manure utilization contribute to pollution of the environment. Targeted number of farmers and home-gardener communities will adopt appropriate farming techniques and practices.

What has been done

PCC: Workshops and demonstrations on cleaning of water catchment and proper animal waste disposal were conducted. Farmers were provided with planting materials and biocontrol agents.

CMI: Demonstration on the first-flush and presentation of dry litter waste management were conducted. Brochures were developed, translated, and distributed. Proposed sites for groundwater wells were tested.

COM-FSM: Interagency-conducted training and workshops. Pilot demonstration projects sites were identified. Ten banana, 4,600 taro, 1,472 sweet potato plants and 6,050 seedlings of eggplant, green onion, Chinese cabbage, cucumber and tomato were distributed to interested farmers.

Results

PCC: People are now cleaning water tanks or boiling drinking water. Regulating agencies are promoting the use of dry litter waste management which is now adopted by three piggeries. Food production has been enhanced by the improved yield of farmers using disease-free and high-yielding planting materials and use of biocontrol agents to control pests.

CMI: Four farmers have installed first-flush divergent systems. Ten farmers have volunteered their piggeries for demonstration of the dry-litter system.

COM-FSM: Ten livestock waste management projects have been established and animal manure has been utilized to improve crop production and the environment. Eighty-four youths and adults have started establishing their farms. Ultimately the projects have developed positive attitudes, zeal for learning techniques and farming aspects, and have changed the behavior 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	Pathogens 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 and farm related businesses by individuals and cooperatives.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	18	75

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

PCC: Clean drinking water and proper animal waste disposal are essential for health and environment. Quality planting materials, and IPM techniques should be adopted to improve productivity.

CMI: Outbreak of waterborne illnesses continues to be a problem. Through collaborative efforts, effective programs will be organized to address the health issues.

COM-FSM: Clean drinking water and proper animal waste disposal are essential for health and environment. Quality planting materials, and IPM techniques should be adopted to improve productivity.

What has been done

PCC: Education programs to clean water tanks and demonstration on dry litter waste management were conducted. Crops were produced using quality planting materials and

biocontrol agents.

CMI: Water Quality awareness trainings were conducted with schools and communities. The water quality staff collaborated with partner agencies in addressing these issues by offering awareness programs, testing water sources for bacterial contaminants, and demonstrating the First Flush Device concept in schools and communities.

COM-FSM: Extension staff had established gardens in the communities and schools and provided training on maintaining them. Students have been recruited into the college programs in agriculture. Agro-forestry and sustainable agriculture programs have been promoted in all communities and basic skills and knowledge on agriculture were provided as well as seedlings and planting materials in order for adults and students to start their own gardens.

Results

PCC: Collaborative efforts on conservation and protection of natural resources have improved water quality and the environment. Quality planting materials, biocontrol agents and fertilization resulted in high productivity of root crops. Visitors are interested to adopt the practices showcased at the research station.

CMI: The use of hand sanitizers is used by young kids and adults in all events. Individuals are conscientiously aware that they need to use hand sanitizers at all times. Local businesses have indicated that it is one of the first items that was sold out, especially during the outbreaks of waterborne and other health illnesses. Individuals and schools administrators have install the First Flush Device.

COM-FSM: Demonstrations on home gardening were provided at ECE schools for both children and staffs as a way of supplementing the school menu. Total of fifty-seven gardens were established in Kosrae and 39 in Pohnpei. On farmer in Yap reached sales of \$2000 per month by the end of the year. Farmers in Chuuk planted leguminous trees as hedgerows to provide mulch and compost materials to improve soils. The President of the FSM included the statement of "Go Local" in his State of the Nation address. Vegetable products were used in the kitchen to improve family meals.

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	Pathogens 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: Financial constraint would affect the outcome for farmers who can not afford the dry litter system and the supplies to operate it as well as rainwater catchments and their maintenance. There is a need to hire a crop protection specialist to assess and develop effective techniques to control new pests that may seriously affect crop production.

CMI: The arrival of the chemical reagents to test for bacteria took over 6 months, which hindered the testing component of the awareness activities. The Regional water quality project fund was reduced which made it difficult to do all proposed activities.

COM-FSM: Limited supplies and funding to carry on planned activities was one of the major constraints. Additionally, transportation, extreme bad weather, scheduling of field trip boats to the outer islands with no advance notice of ship scheduling. Drought, heavy rains and low government budget for agriculture hampered the delivery of efficient services especially to far-flung villages outside the lagoons due to unavailability/lack of travel money. Likewise, local populace looked down in farming as a dirty and low-paying job. Wildfire during hot days caused crop losses in affected areas. The weather has contributed to the effect of the outcome, especially with cucurbits and is a strong limiting factor in the production of tomatoes. Duplication of efforts through the Department of Resources and Economic Affairs and local and international NGOs in programs which are similar to the backyard garden program create misunderstandings with farmers. The tidal surges of December emphasize the need for Food Security initiatives, management for atoll food systems as sea levels rise and salt tolerant crops and/or rapid generating crops for post-disaster relief. Other factors affecting production are the number of working age Micronesians who are emigrating each year. Local statistics indicate close to 2800 emigrants per year.

V(I). Planned Program (Evaluation Studies and Data Collection)

Evaluation Results

PCC: Participants gained knowledge and valued their health, water resources and environment . The root crops germplasm collection has been a reliable source of planting

materials of high yielding varieties of root crops, which are essential to increased productivity. Biocontrol agents have effectively controlled pests of taro and cassava.

CMI: Addressing water quality issues was challenging, so more funding for water quality programs will allow the Extension Agent to target the populated islands and atolls. It will also allow follow up visits to monitor program impact. The agriculture staff learned the significance of agriculture and especially on the practical skills that farmers must possess.

COM-FSM: Experiments are showing positive results and farmers increased interest in developing agricultural farms. The extension activities have increased knowledge on sustainable agriculture systems. Ultimately the projects have developed positive attitudes, zeal for learning techniques and farming aspects, and have changed behavior of participants. More than 19,500 elite seedlings of different varieties of staple food crops were produced through micropropagation and nursery management. Total 10,031 seedlings of different varieties of banana, taro, sweet potato and vegetables were distributed to 213 interested farmers. New varieties of banana are bearing fruits and farmers are very happy to harvest excellent bunches of banana.

Families that participated in the program produced their own vegetables and continue to maintain their gardens. And municipalities that participated in the program displayed more vegetables during their perspective agriculture fairs this year. Farmers in Yap are producing enough noni to require external markets. More yellow varieties of bananas and other crops are available in markets. More farmers are treating animal diseases using local medicines and are requesting less service from Extension staff. Farmers are accepting agro-forestry techniques for soil improvement.

High efficiency protocols and nursery techniques have been developed for mass-multiplication of different varieties of banana, taro and sweet potato. Initial grafting experiments on citrus are showing positive results. Ultimately the projects have developed positive attitudes, zeal for learning techniques and farming aspects, and have changed the behavior of the participants.

Key Items of Evaluation

PCC: Water education campaign and dry litter waste management workshops and demonstrations have been successful in providing continuous education and awareness to farmers, youths, community groups, government and private organizations. 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.

CMI: One hundred eighty farmers have acquired the basic skills in farming. The agriculture staff plans on working with farmers from other populated atolls, but in order to do so, funding should be increased. Additional funding to cover all thirty islands is necessary for more programs in schools and in the communities.

COM-FSM: Increased germplasm types, increased seedling production, increased number of farmers, increased number of agricultural farms, presented results of research and extension project during scientific conferences and meetings, published publications related with the projects, developed high efficiency protocols for rapid multiplication of banana, sweet potato and taro; extension activities resulted in improved knowledge, created awareness and developed skills of the participants in sustainable agriculture

systems; positive results of the evaluation: Use of local plants and farm residues as fertilizers and pesticides; conserving local plants for food, medicinal and other uses; revival of traditional farming through Agroforestry approach

There is an increase in the number of students with interest in farming for profit and increase number of commercial farms, research is effective in small programs if targeted efficiently such as developing high efficiency protocols for rapid multiplication of different varieties of banana, sweet potato and taro, and in vivo and in vitro grafting experiments in lime showed positive results and sour orange rootstock accepted Mexican lime and Mexican lime thorn-less budwood. There is a definite need to develop strategic plans in food security and in responses to climatic change including identifying or developing salt tolerant root crops and skills in sustainable agriculture systems. Stakeholders are in need of marketing guidance and processing techniques to add value and lengthen shelf-life of local foods.

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Families, Youths & Communities

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	20%		0%	
801	Individual and Family Resource Management	15%		0%	
802	Human Development and Family Well-Being	14%		0%	
804	Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures	6%		0%	
806	Youth Development	45%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	12.4	0.0	1.0	0.0
Actual	9.0	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
237201	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
35000	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: Continuous promotion of science in after-school science program, summer program for Upward Bound, school outreach presentation, Earth Day mini fairs, STEM fair were conducted in the schools and community to promote and provide awareness on major environmental conditions, agriculture and water issues in the island. . Students were involved in classroom lectures, hands on activities, science projects contests, mini fairs, field trips and summer programs.

CMI: The youth program staff conducted life skills activities targeting students and school dropouts. Other activities were on traditional weaving and basic knitting workshops for female participants, a human resource development training for out of school youths, and an after school tutoring session in math with high school and elementary students. The Extension Agent also conducted basic computer trainings for 8th graders and awareness programs in other schools.

COM-FSM: Programs in culinary arts, sewing, wood carving, and handicraft were provided to both adults, youths, and out of school children in the communities. Other youth programs included substance abuse, beautification, cultural preservation and sports.

2. Brief description of the target audience

The youth development program caters to students in elementary, high school, college, teachers, school administrators, school cooks, parents, youths, homemakers, students, employees, unemployed, church groups and other interested individuals.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	781	1870	7616	2800

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

Patent Applications Submitted

Year: 2010

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	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
2010	17

Output #2

Output Measure

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

Year	Actual
2010	20

Output #3

Output Measure

- Total number of youth clubs organized.

Year	Actual
2010	1

Output #4

Output Measure

- Number of students recruited for AS Degree Program as a result of their contact with research and extension.

Year	Actual
2010	17

Output #5

Output Measure

- Number of students recruited for Agriculture Certificate Program as a result of their contact with Research and Extension

Year	Actual
2010	13

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.
4	Number of youth who increase knowledge in agriculture and science.

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

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	900	3500

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

PCC: Youths, teachers and their families are not aware of issues that impact the environment and marine resources on the island. The youth should be encouraged to enroll in science in college.

COM-FSM: Youths are disenfranchised and at risk due to family and cultural breakdown. Offering opportunities to re-introduce youths to the future saves them, their family and community much distress.

CMI: According to a recent study, the top three issues affecting youths are teen pregnancy, suicide, and unemployment due to lack of educational qualification.

What has been done

PCC: After-school programs, science fairs, summer programs, fieldtrips were conducted to educate youths, teachers and parents on the environmental resources protection and conservation.

COM-FSM: Entrepreneurship training is provided to youths through handicraft and other craft development training in collaboration with Development Bank personnel. Kids received carving, weaving, food processing, sewing training and entrepreneurial counseling.

CMI: A monthly newsletter was developed and circulated to all the youths and students in the country. Trainings on income generating activities, human resource development, social and life skills were conducted for youths. Math and science tutoring sessions were conducted in several schools.

Results

PCC: Students, teachers, parents, school cooks and school administrators, government and non-government agencies who have participated in the program have greater awareness of environment and marine resources issues.

COM-FSM: Some youths sought business development, participated in village fairs selling products learned from the program, 1 continues to carve food pounder and 20 women continue to make jam at home. A total of 111 women attended and completed sewing projects. Most of the participants can sew their own dresses that they don't have to spend money on. Participants learned and applied the skills they learned from culinary, handicraft and sewing to augment family incomes.

CMI: The 44 females who completed the handicraft training all now put into practice the knowledge they had gained by making and selling products. The participants in the human resources development training are now employed and can help with family needs. The students who attended the after school tutoring session in math have all enrolled at the College of the Marshall Islands as full time students.

4. Associated Knowledge Areas

KA Code	Knowledge Area
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

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	300	150

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

PCC : There is a need to change attitudes of youth and the community toward science and environmental protection/conservation of the natural resources.

COM-FSM: Positive youth development in terms of knowledge, behavior, and health is a major issue with families with children and adolescent. Every parent is concern with safety of the children and wants them to grow up with positive behavior and contributing to the society.

CMI: Statistics showed that a large percentage of unemployment target the youth. One major factor is that these youths do not possess the educational qualification and are lacking the necessary skills.

What has been done

PCC: After-school programs, Earth Day clean up, mini fairs and field trips have been conducted in schools and community with youth involvement.

COM-FSM: Programs in culinary arts, handicrafts, wood carving and sewing were provided to youths.

CMI: Twenty- seven females attended an income-generating project. A human resource development workshop was conducted. A newsletter addressing youth related issues was developed and got circulated on a monthly basis.

Results

PCC: There is an increase in students involved in community clean up, recycling, science clubs and fairs. Schools are now doing their own after school science program. More students are pursuing their college education in agriculture and environmental and marine science in the local college and abroad.

COM-FSM: Participants in culinary arts helped their families, friends and relatives by sharing learned skills in cooking nutritious local foods for healthy diets, participants in handicraft utilized their skills in making handicrafts to be sold for additional money and participants in sewing programs saved money from buying clothes.

CMI: The participants of the 4-H activities and trainings have improved self-esteems to enable them to find jobs and be able to continue making handicrafts to sell.

4. Associated Knowledge Areas

KA Code	Knowledge Area
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

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	300	302

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

PCC: There is a need to increase students' enrollment in agriculture and environment and other science based programs.

COM-FSM: Living condition is not suitable and inflation makes purchasing difficult. Families prefer to preserve and market their produce rather than buy their needs. All clients experienced the same issue that they all need to learn to preserve or sew in order to generate income as well as for themselves and for their kids.

CMI: Statistics showed that most of the unemployment burden falls on the youth. Inadequate parental support and supervision is having a profound negative impact on young people.

What has been done

PCC: Summer science classes, presentations, and environmental events were conducted in schools to encourage more enrollment.

COM-FSM: Staff collaborated with the private sector grants under the local government and other government and non-governmental agencies, responded to the needy and disadvantaged families by offering training skills in handicrafts, culinary arts, sewing and wood carving. Tutoring lessons in math, English and science were also offered to interested students with limited skills.

CMI: Trainings on basic life skills were conducted in the communities, elementary and high schools to teach participants on how to strengthen their relationships with parents and families and ways to improve their livelihoods. Programs were conducted to prepare the participants for job interviews to seek employment and/or to be self-employed.

Results

PCC: There is now a significant increase of 300% in students' enrollment in agriculture, environmental science, and involvement in the science clubs and projects .

COM-FSM: The participants transferred their learned skills in culinary arts, handicrafts, and sewing and positive attitudes to earn a living for themselves, their families, relatives and communities.

CMI: More than two hundred youths and students were taught basic life skills. The twenty-seven students who completed the handicraft training displayed their products to the public and having presenting few as donations to CMI, Land Grant, and MIEPI. People and agencies have made positive comments on the CRE newsletters have requested to be including in the mailing list.

4. Associated Knowledge Areas

KA Code	Knowledge Area
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 #4

1. Outcome Measures

Number of youth who increase knowledge in agriculture and science.

Not Reporting on this Outcome Measure

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: None

COM-FSM: Outcomes are affected by natural disasters like heavy rains when participants failed to show up for training. Priorities on projects are focusing on larger scale and not directed on youths only. Unexpected impact from weather contributed to success of project. Poor economy of the state caused lesser attention on youth programs that can develop youth entrepreneurship and contribution to the society's economic development.

CMI: Due to limited funds, not all proposed activities were implemented.

V(I). Planned Program (Evaluation Studies and Data Collection)

Evaluation Results

PCC: Evaluation results illustrate that although there are lots of programs on science, youths, school administrators and teachers are not aware of them. Local environmental issues are often overlooked because they just concentrate on the text books that are applicable on foreign context. The evaluation show that the students have limited knowledge on the local issues discussed.

COM-FSM: In some cases evaluation is done before and after activities where participants would complete a pre and post tests to see level of awareness. In all cases Evaluation is done by observation and discussions during program. Participants learned and shared expected skills at culinary, handicrafts, wood carving and sewing to their families, friends and communities. They earned for themselves, their families and friends to buy what they need for food, clothing, medication or social activities and provided assistance to others whom they deemed they had to assist financially. The concerned students learned adaptive skills in taking exams and further developed confidence in learning.

CMI: Results indicate that the participants had expanded their knowledge and livelihood opportunities after completing the trainings provided by CRE. There is a need to expand the program to other participants both in the capital city and in the outer islands.

Key Items of Evaluation

PCC : Programs must help address the low level of awareness that school administrators, teachers and students have in regards to environment and marine science issues. The program must help the schools change the mentality of students toward science by providing activities that will motivate the students and help them understand difficult concepts in science.

COM-FSM: Micronesians are enthused by programs which offer the chance to be more self-sufficient. There is a robust entrepreneurial spirit here that needs to be cultivated and stimulated with available support. Youth are not bad, they are disillusioned by what they see as their future. Emigration is appealing for many youths therefore programs should be developed to prepare them for that future.

CMI: The population of RMI is very young with an increase over 73% under the age of 25. The youth unemployment rate is estimated at 80%. There is a need to expand livelihood opportunities through targeted program and life-skills trainings.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Food, Nutrition & Health

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
701	Nutrient Composition of Food	10%		10%	
702	Requirements and Function of Nutrients and Other Food Components	10%		10%	
703	Nutrition Education and Behavior	15%		10%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	20%		20%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	20%		20%	
724	Healthy Lifestyle	25%		30%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

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

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	12.4	0.0	1.0	0.0
Actual	9.0	0.0	2.0	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
198720	0	92903	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
29680	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: Six nutrition and food safety programs were conducted to increase knowledge and impart skills in nutrition and health related issues. Implementation of two research projects continued, namely, (1) Product Development for Food Security, and (2) Product Development of Rabbit fish and Crustaceans. Forty six (46) processed food products from fish, coconut, bananas, rabbit fish, and crabs were developed and seven hundred twenty (720) clients tasted these products which they rated "like very much". The products are being studied for their storage properties.

CMI: Program staff collaborated with the Ministry of Internal Affairs' Women bureau to conduct a two days food processing and food safety workshop. More than twenty ladies participated in the event and received Certificate of Completion. The program staff participated in this year's 2nd Annual Bob (Pandanus) Day Festival. Demonstrated recipes using Bob (Pandanus) as the main ingredient recipes of Pandanus to the participants of the 29th Annual PIBBA (Pacific Islands Bilingual Bicultural Association) Conference. A large number of female participants completed an EFNEP sponsored workshop.

COM-FSM: Presentations and cooking demonstrations were carried out in the communities and participants learned to utilize local produce in preparation of family meals. A JICA volunteer had conducted cooking demonstrations on college campus, communities and private establishments and entertained catering ventures with local food outlets. Other activities included community workshops

2. Brief description of the target audience

The targeted audiences included communities with limited income, low formal education level, young children, , youths ages 9-19, home and school food handlers, food processors, people in the food business, and prospective food entrepreneurs.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	600	3000	300	1500

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

Year: 2010
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of community workshops conducted.

Year	Actual
2010	51

Output #2

Output Measure

- Number of coalitions strenghten.

Year	Actual
2010	15

Output #3

Output Measure

- Number of intervention conducted to individuals or small groups.

Year	Actual
------	--------

2010

55

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 nutrition related health issues.
2	Number of program participants adopting recommended practices after completing educational programs.
3	Annually increase the number of healthy food snacks or lunch programs in schools and communities.

Outcome #1

1. Outcome Measures

Number of program participants who increase awareness of nutrition related health issues.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	900	2200

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

PCC: Many local food resources abound in Palau and these can be processed into other products for the local consumers and tourists. There is a need to improve awareness of nutrition and health.

CMI: Diabetes is a condition that has plagued generations. The trend of diabetes is affecting the younger population with a gradual increase of cases in the 20 ? 35 years of age. The increased in the number of diabetic patients and people at risk of diabetes is mainly due to the changes in the lifestyles.

COM-FSM: The national, state and local governments as well as the public are concerned about the geometric increase in NCD prevalence, the stress to the family and government expenditures in terms of medical referrals, medications and soaring mortality rates.

What has been done

PCC: Programs were conducted to increase awareness and impart skills in nutrition and health related issues. Processed food products were prepared from local resources.

CMI: Five hundred clients participated and received certificate of completion after participating in nutrition workshops. The EFNEP Extension Agent continued to be an active member of several task forces organized by the Ministry of Health to address diabetes and to promote healthy living and wellness in the Marshall Islands. Not only did she work in the community and outer island, but she collaborated with the college's school nurse and both screened the employees and students for diabetes.

COM-FSM: A series of community workshops were conducted in nutrition education and healthy lifestyle to parents of children ages from birth to five years old. School enrichment program to ninth graders, nutrition promotion on local foods and food safety training were conducted in the communities.

Results

PCC: Ninety two percent of total participants followed recommended practices in nutrition and food safety during preparation of selected healthy recipes. A total of 720 clients consisting of 376 adults and 344 youths have tasted and liked processed food products from local food resources. Thirty three participants of Food Technology Classes in Palau have acquired knowledge in food processing.

CMI: Follow up visits with clients indicated that diets have changed where they were reported to eating healthy food.

COM-FSM: Clients have improved food and eating habits through eating more local nutritious foods with high vitamins, minerals, fibers, proteins and proper food portions/servings. Four hundred and sixty-two participants learned and were encouraged to utilize local produce in meals prepared for households and families.

4. Associated Knowledge Areas

KA Code	Knowledge Area
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
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

Year	Quantitative Target	Actual
2010	600	860

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

PCC: People are becoming obese because lack of knowledge in proper nutrition and healthy lifestyle. Many food products can be developed from local resources to replace imported products.

CMI: According to the Juumemmej: RMI Social and Economic Report 2005, malnutrition is a condition that does not appear to be improving. A recent study revealed that 60% of children in this age group (1 - 5 yrs) suffered vitamin A deficiency, and 25% were iron deficient.

COM-FSM: The national, state and local governments including the public are concerned about geometric increase and prevalence of NCD?s leading to disability, expensive medical referrals, loss in productivity, and stress to the family.

What has been done

PCC: Participants learned to prepare healthy, affordable meals. Thirty three participants were trained in processing different kinds of food products.

CMI: The EFNEP staff is a member of the malnutrition referral team. The Department of Public Health provided her with names of their patients and she visited the parents in the homes to counsel them on nutrition and also to demonstrate cooking healthy recipes.

COM-FSM: Inter-agency efforts conducted public awareness, campaigns, and public celebrations, provided informal education and cooking demonstrations on the role of healthy food choices and physical fitness like gardening, brisk walking in the prevention and control of NCD?s, and growing and consuming nutritious local foods.

Results

PCC: Eighty percent of the participants applied skills learned and have increased consumption of vegetables. They were able to prepare same recipes in the program. Armed with skills in food processing, the trainees can now prepare food products that they can sell to tourists and local consumers. Some participants who own food businesses have added new food items to their usual product lines.

CMI: The before and after results indicated positive changes in behavior and attitude of the parents and the health of the child. Numerous requests for recipes were received.

COM-FSM: More local foods, especially fruits and vegetables, were consumed by many people and more people observe serving portions of their regular meals and snacks and still more people do gardening and other physical fitness exercises.

4. Associated Knowledge Areas

KA Code	Knowledge Area
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
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

Annually increase the number of healthy food snacks or lunch programs in schools and communities.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	6	251

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

PCC: Sedentary life style and lack of knowledge in nutrition lead to obesity. Production of locally manufactured processed foods can reduce food importation and boost domestic food production.

CMI: Teenagers, who become parents, lack proper-parenting skills, indicating why they end up feeding their child unhealthy food causing them to become malnourished.

COM-FSM: Leaders, families and the general public care are concerned about the increasing hospital admissions and referrals, increased burden, decreased economic productivity, and increased morbidity and mortality.

What has been done

PCC: Skills in meals planning and physical activity were provided to the participants. Participants in Food Technology classes can sell their products in the market.

CMI: During her presentations and workshops, the Extension Agent usually chooses simple and healthy recipes that children, teenagers, and adults can prepare easily at homes. The coconut jam seems to be a popular recipe where everyone can easily prepare. Workshops with young parents were conducted.

COM-FSM: Inter-agency public campaigns, gardening and cooking demonstrations on local foods, healthy food choices and physical fitness programs were conducted. Staff conducted workshops in the communities addressing the effect of poor diet and benefit of healthy diet for the diabetic people and none diabetic people. Promotions on healthy eating were conducted in schools and communities.

Results

PCC: Participants are now aware of planning and preparing healthy meals. Forty five percent have increased their physical activity from 1 hour to 4 days a week. Locally processed food products are now available in the market. These products were prepared by participants of Food Technology Classes.

CMI: Results demonstrated that students and young parents are able to prepare healthy snacks and meals at home. The dorm students now know how to cook delicious meals instead of just eating fried chicken at all their meals. Home visits with young parents and their children showed that their health was improving.

COM-FSM: Health monitoring to establish any condition change will take many years. No results should be reported at this time.

4. Associated Knowledge Areas

KA Code	Knowledge Area
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
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: Prospective food processors who have attended Food Technology Classes could not immediately go into business because of strict government regulations on food preparation and expensive permits to operate.

COM-FSM: Low attendance of participants was observed when training coincided with bad weather, population migration of young and professionals to other countries puts burden on those left behind, limited funding for projects restricts frequent monitoring of far-flung clients, social obligations, e.g. funeral when participants will not attend for training for 3 or more days, hamper the development of skills of the intended clients.

Constraints are limited funding, long turn-around time for PO processing and lack to limited proper equipment and tools in order to carry out the activities of the program. And in between visits/monitoring is too long due to boat scheduling and limited transportation means

Increased importation of foods, more people are depending on the imported foods due to the high cost of the local produces and to increased exposure to outside diets due to frequency of travel. Statistics indicate a high rate of emigration which removes many of the best educated and most productive citizens from the region. Social changes have increased the use of processed foods and imported foods in community functions. On the positive side, may levels of government have mandated that local foods must be provided at state sponsored functions.

CMI: Couple of factors lead to the Extension Agent to not meet all her proposed activities. Due to cultural, community and government- sponsored events, clients had to cancel their original proposed scheduled. Local produce that were supposed to be used during the cooking demonstrations ends up getting spoiled and damaged.

Not all the parents participated in the referral program. It was due to being embarrassed on how the community might view them because their child was malnourished.

V(I). Planned Program (Evaluation Studies and Data Collection)

Evaluation Results

PCC: Pre and post test were administered at beginning and end of each program and interviews with clients done to find out if there was an increase in knowledge and change in behavior. Results of narrative evaluation of participants of Food Technology Classes showed that they have benefited from the training. The skills in food processing which the participants have obtained are long lasting. Also, the 720 clients who have tasted food products have rated them very much acceptable.

CMI: Clients' diets improved slightly during and after the participating in the workshops. The Extension Agent received numerous calls from clients wanting more recipes.

COM-FSM: Increased awareness, skills and knowledge for participating groups and communities in regards to nutrition, health, and management of meager resources available to them as compared with the non-participating groups or communities. More people are selective in what they're buying, eating and planting, the yellow fruits/vegetables over the other varieties. More people are using the yellow banana (taiwang) for baby foods. Local markets report an increased demand and delivery of Vitamin A rich varieties of local bananas and taro. More people are interested in preservation techniques of local foods. Former trainees of nutrition programs often volunteer to help future efforts in their communities. Anecdotal observations indicated that more stores are displaying out-of-date food items prominently signed for use as animal feeds only.

Key Items of Evaluation

PCC: More Food Technology classes in the communities have been requested by participants as they have been benefited by this outreach program. Local processed food products are now available to consumers. Food entrepreneurs have been selling products prepared from local food resources.

COM-FSM: Knowledge gained and application of the following, relationship of non-communicable diseases such as hypertension and diabetes to good diet, especially foods to avoid such as high salt, high saturated fats and high refined carbohydrates to prevent NCD, monitoring of NCD incidences and cost to the public health system over extended years is needed, regular physical fitness such as walking and gardening is being accepted and should be encouraged, food safety handling of local foods prior to and at market needs monitoring, superiority of local foods over imported and junk foods in healthy and nutritious diets are becoming internationally known and market demand may lead to export possibilities.

CMI: Diabetes and malnutrition are two major health issues in the country. More funding is needed to be able to reach out to the rest of the communities. Want to try out different recipes.