

# 2017 University of Guam Combined Research and Extension Annual Report of Accomplishments and Results

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**I. Report Overview**

**1. Executive Summary**

Guam, an unincorporated Territory of the United States, is located in the Western Pacific at 13 degrees north latitude and 144.4 degrees east longitude. It is the largest of 16 islands in the Marianas. It is approximately 3,600 miles west-southwest of the Hawaiian Islands and about 1,500 miles due east of Manila, Philippines. Guam's population is approximately 170,000 and increasing. The ethnic background of the island includes: Chamorro (indigenous islanders), Filipinos, Caucasians (including members of the U.S. Armed Forces and their dependents), other islanders (Micronesians) and Asians (Koreans, Japanese and Chinese). The University of Guam, an 1862 Land Grant institution and its College of Natural and Applied Sciences (CNAS) facilitates the tripartite functions of the college: research, extension, and teaching. The Dean of CNAS serves as Director of the Agriculture Experiment Station and the Director of Cooperative Extension & Outreach (CNAS C-E&O).

Since 2006, AES has operated as the Western Pacific Tropical Research Center (WPTRC), a title that reflects our broad mission and research priorities. The primary mission of WPTRC is to conduct applied and basic research in agriculture (and aquaculture) and to protect the natural environment. CNAS's C-E&O translates and delivers research and technical information, and conducts informal education programs for farmers, homemakers, families, youth, and the community.

Research productivity over the last years was good. In 2017, eight full time researcher faculty published 21 refereed journal papers, which placed us among other successful and productive research units on campus. Further significant growth in refereed journal publications as well as substantial increase in successful grant proposals in 2017 was evident. Unfortunately, there were also some setbacks that impacted our productivity. Recent investments related to the military buildup on Guam were put on hold due to US budgetary cuts. Declining island's economy affected University as well. Hiring freezes and permanent elimination of several faculty vacancies have been very challenging.

CNAS C-E&O is going through a refreshing with new faculty in family life and new faculty being recruited in other disciplines, and a clearer emphasis on lay-publishing, and more workshops. A new website is also bringing more content to the public and more data on operations. In addition, there is an increased focused on the development of externally-funded proposals.

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

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	22.0	0.0	24.0	0.0
Actual	20.0	0.0	29.8	0.0

## II. Merit Review Process

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

- Internal University Panel
- External Non-University Panel
- Combined External and Internal University Panel

### 2. Brief Explanation

Cooperative Extension & Outreach (C-E&O) of the College of Natural & Applied Sciences, of the University of Guam, has been in a rebuilding phased since November 2014 with more focus on bringing together content that can be packaged into Do-It-Yourself learning, on-site client coaching, and/or workshops. Our work spans the typical Land Grant offerings for growers, agricultural service providers, families, and youth, among other niche groups and topics. We are drawing some work topics from a November 5, 2015 all community Listening Session: <http://cnas-re.uog.edu/priorities/> This listening session not only provided CNAS with possible "to-dos" the list was also made available as stakeholder input for other service providers in the community.

Unlike the WPTRC, the amount of funds available for projects within C-E&O is relatively small - we want to encourage the acquisition of outside funding by all faculty members and some line staff. Faculty submit an annual plan of work called a, Comprehensive Faculty Evaluation System (CFES), that covers a range of activities that are within a typical University of Guam faculty portfolio. Non-faculty employees paid by Smith-Lever funds, use the same standard form developed by C-E&O for faculty, but their loads are very project based rather than broader like faculty. Each faculty member is given \$4,000/yr to support basic work activities within their CFES and that work plan is discussed, modified (as necessary), and approved by the Associate Director/Dean and the Director/Dean prior to the faculty receiving their funds. Non-faculty are given less money based on what tasks they need to accomplish.

During the time of this reporting, more than 200 new and revised publications have been posted on the College's website:

<http://cnas-re.uog.edu/new-and-refreshed-cn-as-publications-posters/> Most authors are from C-E&O. Additionally, there has been a great "harvesting" effort to scan and post historical documents from the college that have benefit to Guam's community. That database is here: <http://cnas-re.uog.edu/useful-cn-as-documents-posters/> And, as CNAS does not operate in a vacuum, Guam and regional content that did not come from our College but is of importance to our clients, has been placed here: <http://cnas-re.uog.edu/other-non-cn-as-publications/>

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For CNAS' WPTRC (AES), review of individual Plans of Work and projects has been conducted mostly by WPTRC administrators (Director and Associate Director). They usually utilize external reviewers as well as their knowledge and experiences to ensure that the planned programs and activities address the critical issues of strategic importance, including those identified by the stakeholders during the development of Strategic Plans. All new research proposals (such as Hatch, McIntire Stennis, Regional Research etc.) are submitted to WPTRC Associate Director who checks the proposal for completeness and format. There are very few peers at the university with expertise to review research proposals in agriculture fields. Therefore, a draft proposal that is ready for review may be submitted to an external ad hoc Peer Review Committee. The committee would be comprised of three faculty members from other universities who are familiar with the issues addressed by the project. Based on the review, that includes assessment of (1) significance, (2) need, (3) approach, (4) new knowledge to be generated, (5) potential for impact, and (6) potential for success.

The crucial issues addressed by WPTRC planned programs fall within the strategic goals of WPTRC adopted by the faculty during Strategic Planning Retreat. It was agreed that all programs must address issues that are relevant to the needs of the region, serve interest of scientific community and are linked to the needs of our stakeholders. Indeed, numerous research projects address environmental issues, integrated plant protection, bio-control as well as serve ethnic needs of local population. Some examples of work performed by WPTRC scientists in 2017 included: working on biological control in pest management systems, food safety education and traditional food modification, plant genetic resources conservation and utilization, carbon sequestration and distribution in eroded soils, eco-physiology of Guam's endemic and indigenous forest species, best management practices for papaya production production of local seeds and tissue-cultured plants, improvement of vegetable production, shrimp research and economics of aquaculture on Guam soil management practices for agricultural sustainability and environmental quality, integrated pest management of aphids and whiteflies on cucurbits and vegetables, genetic structure of the cycas population in the Mariana Islands, bionomics of the chromolaena gallfly, biological control of cycad aulacaspis scale semiochemical attractants and trapping systems for monitoring and control of invasive scarab beetles in Micronesia, development of sustainable aquaculture on Guam, research on diseases of traditional Pacific island crop plants, development of efficient semiochemical-based control methods for weevil pests, evaluating the influence of ant attendance on natural enemies and their hosts on *Cycas micronesica*, phytochemicals, biological properties, and safety of tropical and subtropical foods, plants, or herbals, small-scale integrated farming system in an insular urban environment, beneficial and adverse effects of natural, bioactive dietary chemicals on human health and food safety, as well as child obesity prevention. In addition, faculty participated in yearly meetings, exchanged information and coordinated their multistate activities.

WPTRC (AES) administrators require annual reports to be submitted for all projects. Reports must contain sections called outputs and outcomes. Reported outcomes are categorized as short, medium and long term. Overall, AES projects produce valuable outcomes and impacts for our stakeholders and represent sound investments of our federal funding. WPTRC (AES) faculty scientists have been able to obtain additional, significant funding from extramural federal and non-federal sources to support some of our programs. These types of funding mechanisms indicate that conducted research is appreciated and considered to be trustworthy.

### **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 non-traditional stakeholder individuals
- Targeted invitation to selected individuals from general public
- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals
- Survey of the general public
- Survey specifically with non-traditional groups

#### **Brief explanation.**

Both CNAS C-E&O and WPTRC employed several stakeholder input methods including gathering input from local community groups, individual farmers, farmer's groups and organizations,

representatives of the industry and representatives from federal and local agencies. Because of relatively small number of faculty and stakeholders on Guam, it has been a long-lasting practice to invite stakeholders for various functions in the college and give them frequent opportunities to express their needs in informal settings such as personal contact with faculty members. Periodically, stakeholders (farmers, golf course superintendents, owners of nurseries etc.) are invited to the college to make presentations and express their needs and concerns in more formalized manner. Both methods seem to work well and UOG administrators plan to continue with this way of providing stakeholders' input. Of particular importance is to generate good understanding (between stakeholders and UOG) why issues related to the natural environment receive so much of attention and need stakeholders' support.

In addition, CNAS held a all-community listening session on November 5, 2015, that has provided some guidance and "to-dos" for some of our efforts. Where appropriate, we tie in plans of work to this list.

<http://cnas-re.uog.edu/priorities/>

## **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.**

Stakeholders for both CNAS C-E&O and WPTRC are well identified. There are approximately 250 Bona Fide farmers on Guam and another 300 individuals who supplement their income with some sort of agricultural sales. Their participation and input to define agriculture research ranges from substantial (full time farmers) to insignificant. Farmers on Guam do not form strong and focused commodity groups. Their associations are rather loose and based on personal contacts, friendships, etc. In addition, we have extensive contacts within all government agencies and with trade groups. We use the newspaper and press releases to advertise our efforts. Our website includes a feature where clients can sign up to receive our news briefs. We also have deep relationships in other areas where we work - health, environment, families and youth. Our employees spend a lot of time with stakeholders and service providers in the community, and that is our main source of client information.

## **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 the general public (open meeting advertised to all)
- Survey of the general public
- Survey specifically with non-traditional groups
- Survey specifically with non-traditional individuals

**Brief explanation.**

Guam is a relatively small and close-knit community. Most UOG faculty work closely with stakeholders. These include community organizations, individual farmers, golf course superintendents, homeowners, school teachers, state legislature and government agencies. Informal and formal input was provided to UOG on a regular basis during workshops, open houses, telephone calls, and letters. Several faculty members conducted research on stakeholders' farms. Some faculty and administrators were invited for informal or formal meetings such as for example Guam Soil and Water Conservation District where UOG receives an input and feedback from stakeholder groups.

In the non-agriculture groups, we had the big listening session back in November 2015, but also spend a lot of time with clients and service providers. Most faculty are in meetings with the public on a monthly basis.

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

- To Identify Emerging Issues
- Redirect Extension Programs
- In the Staff Hiring Process
- To Set Priorities

**Brief explanation.**

Stakeholder input has been used extensively in planning new programs and improving existing programs/projects. As a result of the received input, faculty modify their research plans to improve service and to provide specific opportunities for continued feedback. Information is disseminated to communities through newsletters, local newspaper coverage, radio and sometimes television programs. Administrators use stakeholders input to prioritize resource allocations. Recommendations from various groups of stakeholders are useful in developing research programs that reach the island community. Again, the November 2015 listening session has helped provide ideas to our work. Faculty and administrators also have facilitated meetings where we have helped stakeholder surface issues needing attention.

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

Faculty maintain close contacts with local farmers, landscapers, aquaculture producers, and local environmentalists. Because of the breadth of experience on other islands in the region, UOG-CNAS scientists and extension agents are able to identify, characterize and provide a rational method of management for invasive species, new disease outbreaks and other concerns on Guam. After identifying the challenges, researchers apply for funding for more in depth investigations.

We also address the needs of non-agricultural clients. There are a variety of needs for information and education for youth, families, and the elderly on Guam. More information is found on our

November 2015 listening session notes: <http://cnas-re.uog.edu/priorities/>

#### IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
{No Data Entered}	{No Data Entered}	{No Data Entered}	{No Data Entered}

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	587414	0	700787	0
Actual Matching	713445	0	740341	0
Actual All Other	0	0	0	0
Total Actual Expended	1300859	0	1441128	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	834489	0	779892	0

**V. Planned Program Table of Content**

<b>S. No.</b>	<b>PROGRAM NAME</b>
1	Community Development
2	Food Safety
3	4-H and Youth Development
4	Childhood Obesity
5	Plant Health and Pest Management
6	Global Food Security and Hunger
7	Sustain, Protect, and Manage the Environment and Natural Resources of Guam and

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

**Program # 1**

**1. Name of the Planned Program**

Community Development

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	30%		0%	
704	Nutrition and Hunger in the Population	10%		0%	
801	Individual and Family Resource Management	10%		0%	
802	Human Development and Family Well-Being	10%		0%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	10%		0%	
805	Community Institutions, Health, and Social Services	30%		0%	
	<b>Total</b>	100%		0%	

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

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

Year: 2017	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	4.0	0.0	0.0	0.0
<b>Actual Paid</b>	4.0	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
123664	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
150199	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**

The majority of community development activities is concentrated in providing content and process expertise based on the various collaboration with community and government organizations. These activities range from community development workshops, training and program orientation. A large part of the program effort involved assisting various planning groups address their strategic reporting requirements and conducting outreach. Project partners continue to value and rely on the use of community asset and strategy maps, assistance in conducting needs assessments, developing policies and operating procedures for various programs. Other key activities include:

1. Technical assistance in survey design to help people understand the economic impact of policy changes, and implementation capabilities.
2. Accessing, interpreting and applying objective data and conduct assessments (survey design and field data collection).
3. Establish and maintain collaborations with local/regional and federal government organizations.
4. Establish partnership and/or collaborative memorandum of agreements/understanding.
5. Establish coalitions for placed based economic development (community-based entrepreneurship).

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

Community development audiences are distributed across both governmental and nongovernmental organizations and their stakeholders, The target audiences in the program include: local government agencies involved in comprehensive planning and statistical/survey work. Other key cooperators include the various local and regional boards and commissions overseeing a range of programs. Although the majority of the audiences are Guam based government and non-government groups, a growing number of audiences come from the regional areas (through various projects and program affiliations with Guam projects/programs) Other target audiences also include economic development professionals, small businesses and industries, community groups and the general public, regional collaborator.

**3. How was eXtension used?**

As a member in the various Communities of Practice (CoPs) I have access to the member networks and project discussions. eXtension continues to be an important source for accessing leading edge program innovations and practices. The eXtension platform provides a wealth of opportunities to access professional networks. Webinars continue to be a valuable tool to participate and learn about the latest

research and program interest areas. A current interest includes the use of the National Extension Web-Mapping Tool (NEWT) and exploring the options for including Guam in these discussions.

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

**1. Standard output measures**

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	100	200	50	25

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

**Patent Applications Submitted**

Year: 2017  
 Actual: 0

**Patents listed**

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

**Number of Peer Reviewed Publications**

2017	Extension	Research	Total
Actual	1	0	0

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

**Output Target**

**Output #1**

**Output Measure**

- number of extension articles

<b>Year</b>	<b>Actual</b>
2017	1

**Output #2**

**Output Measure**

- number of workshops

<b>Year</b>	<b>Actual</b>
2017	5

**Output #3**

**Output Measure**

- number of brochures

<b>Year</b>	<b>Actual</b>
2017	6

**Output #4**

**Output Measure**

- number of disseminated research results, new technology and information

<b>Year</b>	<b>Actual</b>
2017	0

**Output #5**

**Output Measure**

- number of surveys

<b>Year</b>	<b>Actual</b>
2017	0

**Output #6**

**Output Measure**

- number of focus groups conducted

<b>Year</b>	<b>Actual</b>
2017	0

**Output #7**

**Output Measure**

- number of popular articles in newsletters, magazines and newspapers

<b>Year</b>	<b>Actual</b>
2017	0

**Output #8**

**Output Measure**

- number of one to one assistance

<b>Year</b>	<b>Actual</b>
2017	80



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

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

O. No.	OUTCOME NAME
1	Number of organizations individuals increasing leadership skills.
2	Number of individuals and organizations increasing knowledge of program development skills.
3	Number of individuals and organizations increasing knowledge of effective strategies for public decision making
4	Number of individuals and organizations crafting, evaluating, and implementing alternative solutions to address public issues
5	Number of individuals and organizations building skills and identifying opportunities to enhance effective participation in public decision making processes

## **Outcome #1**

### **1. Outcome Measures**

Number of organizations individuals increasing leadership skills.

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

- 1862 Extension

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

Change in Action Outcome Measure

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

<b>Year</b>	<b>Actual</b>
2017	4

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

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

For the most part, government boards and commissions and councils continue to struggle with strategic planning and plan updates. This issue is seen in the need for addressing data, needs assessments and policy and operating procedures guidelines. Strengthening the planning capacity of these boards, commissions and council can alleviate programming challenges and funding issues for the various programs under their oversight.

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

Through both Extension's content and process expertise, planning assistance and evaluation of programs have been extended to these organizations. This includes drafting program plans and helping the organizations decide and prioritize their needs. Other efforts include helping boards prepare for program audits and evaluations.

#### **Results**

1. Strategic planning documents are completed
2. Boards and commission meetings are more productive and decision making are streamlined and efficient.
3. Increased collaboration and cooperation across the various organizations.

### **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

- 803 Sociological and Technological Change Affecting Individuals, Families, and Communities
- 805 Community Institutions, Health, and Social Services

**Outcome #2**

**1. Outcome Measures**

Number of individuals and organizations increasing knowledge of program development skills.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2017	8

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

**Issue (Who cares and Why)**

Strengthening of planning capacity continues to be a high interest area. The Government of Guam continues to fall short in addressing its broad planning roles and responsibilities as they continue to struggle in addressing and managing their collective social program delivery priorities.

**What has been done**

Extension continues to participate in the assembly of planners forum sponsored by the GovGuam. This forum provides an opportunity to gain insights and sharing and expanding program development knowledge and skill building. This forum provides for knowledge sharing and acquiring the latest information about program planning and development news.

**Results**

Extension continues to provide content and process expertise support through the various cooperator workgroups. This includes participating in various ad-hoc program development teams to address various technical program and project/proposal development.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
608	Community Resource Planning and Development
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
805	Community Institutions, Health, and Social Services

**Outcome #3**

**1. Outcome Measures**

Number of individuals and organizations increasing knowledge of effective strategies for public decision making

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2017	20

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

**Issue (Who cares and Why)**

Knowledge management continues to be a recurring issue among government and community organizations dealing with various public issues. Addressing public issues requires a knowledge platform to share and link data to policy for informed decision-making and program development. Data and planning teams struggle with compiling timely data sets and employing surveys to evaluate and use data for policy development and program adjustments. Stakeholder input and community engagement is important in public policy work.

**What has been done**

During this reporting period, the University of Guam proposed the establishment of a Regional Center for Public Policy to carry the broader engagement interest of the University of Guam as a land grant institution and helping communities address their knowledge needs through public issues research advocated through the UOG-RCPP.

**Results**

The UOG RCPP was approved by the University President establishing a formal public policy research program for public decision making.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
608	Community Resource Planning and Development
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
805	Community Institutions, Health, and Social Services

## **Outcome #4**

### **1. Outcome Measures**

Number of individuals and organizations crafting, evaluating, and implementing alternative solutions to address public issues

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

- 1862 Extension

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

Change in Action Outcome Measure

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

<b>Year</b>	<b>Actual</b>
2017	10

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

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

The Knowledge@Guam Initiative (K@GI) builds upon Extension's community development issues education work. Issues identification continues to be a planning challenge for planning agencies and community organizations struggling with limited resources and expertise. This leads to increased reliance on technical assistance in developing program/strategies to address both current and emerging public issues.

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

The K@GI continues to serve as the initiative to align the various public issues through the use of the community capitals framework (CCF). The CCF continues to guide the issues conversation through the use of various planning tools such as asset maps, strategy maps.

#### **Results**

K@GI continues to Extension's community development branding for managing and sponsoring conversations around public issues education. The CCF provides the issues platform aligned to the various data series and issues monograph.

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

<b>KA Code</b>	<b>Knowledge Area</b>
608	Community Resource Planning and Development
704	Nutrition and Hunger in the Population
801	Individual and Family Resource Management
802	Human Development and Family Well-Being
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

805 Community Institutions, Health, and Social Services

**Outcome #5**

**1. Outcome Measures**

Number of individuals and organizations building skills and identifying opportunities to enhance effective participation in public decision making processes

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2017	10

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

**Issue (Who cares and Why)**

The lack of reliable data and information around key public issues continues to be a challenge for community government planners. This is evident in the village arena where a total of 19 village mayors continue to struggle with their version of village based issues and engaging their stakeholders to participate in planned community growth. The main issue of non-existing village plans continue to hamper any type of orderly development and community planning discussions.

**What has been done**

The K@GI provides the platform for the development of an ongoing series of village monographs. Village monographs align with the CCF approach to frame the various community assets, data and issues. This is being promoted as the approach for the comprehensive planning for Guam.

**Results**

Extension continues to participate in the planning discussions in the Imagine Guam 2065. The CCF and K@GI continues to be the main approach for community planning discussions and engaging various stakeholders in the planning processes. The village monographs continue to be updated and used to demonstrate the need for community information.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
608	Community Resource Planning and Development
704	Nutrition and Hunger in the Population
801	Individual and Family Resource Management
802	Human Development and Family Well-Being

803	Sociological and Technological Change Affecting Individuals, Families, and Communities
805	Community Institutions, Health, and Social Services

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

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

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

##### **Brief Explanation**

Creating common planning standards for linking key data and information to public issues and policy continues to be a challenge by government organizations as they react to the various external factors impacting social delivery programs. Managing program resources competes with increasing pressure to alleviate population growth with less financial resources. Working with government planners to become proactive and address emerging trends can reduce the impact of these external pressures. This requires strengthening collaborations and partnerships both locally and regionally. Economic dislocation continues to be a hot issue across all government program areas.

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

##### **Evaluation Results**

The use of key surveys- Household Income Expenditure Survey and the Compact of Freely Associated States and other Labor force Surveys. These surveys are critical for Guam planners. Not having them done regularly contributes to the data gap for analyzing policy issues.

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

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

**Program # 2**

**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
501	New and Improved Food Processing Technologies	10%		15%	
502	New and Improved Food Products	40%		45%	
503	Quality Maintenance in Storing and Marketing Food Products	5%		0%	
604	Marketing and Distribution Practices	5%		0%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	35%		40%	
806	Youth Development	5%		0%	
	<b>Total</b>	100%		100%	

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

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	1.5	0.0	0.5	0.0
<b>Actual Paid</b>	1.5	0.0	1.0	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
46384	0	23516	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
56325	0	24844	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**

The input activities are to: (1) investigate factors affecting foodborne illness and food quality in food processing and preparation; (2) determine beneficial and adverse effects of natural chemicals and components in tropical and subtropical plants, fruits, and vegetables on human health and food safety; (3) develop tropical value-added food products; (4) provide workshops and trainings in food safety and food processing in the community; (5) provide consultant services of food safety and food technology in community; and (6) disseminate scientific-based information and technologies related to food safety, food processing, and marketing safe and wholesome food products in the community.

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

The target audiences included entrepreneurs, food manufacturers, food workers, food-safety educators, farmers, general consumers, college students, youth, and school children.

**3. How was eXtension used?**

eXtension was not used in this program

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

**1. Standard output measures**

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	1539	2619	1033	900

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

**Patent Applications Submitted**

Year: 2017  
 Actual: 0

**Patents listed**

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

**Number of Peer Reviewed Publications**

2017	Extension	Research	Total
Actual	0	1	3

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

**Output Target**

**Output #1**

**Output Measure**

- # of peer reviewed publications

Year	Actual
2017	1

**Output #2**

**Output Measure**

- # of non-peer reviewed publications

Year	Actual
2017	2

**Output #3**

**Output Measure**

- # of workshops

Year	Actual
2017	6

**Output #4**

**Output Measure**

- # of dissemination of science-based information

Year	Actual
2017	400

**Output #5**

**Output Measure**

- # of work with media

<b>Year</b>	<b>Actual</b>
2017	1

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

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

O. No.	OUTCOME NAME
1	Changes of participants (or residents) in gaining knowledge of principles and practices in food safety and food processing
2	Changes of participants (or residents) in improving practices and applying principles in food safety and food processing
3	Changes in magnitude of foodborne illness and marketing safe and wholesome value-added food products in the community

## **Outcome #1**

### **1. Outcome Measures**

Changes of participants (or residents) in gaining knowledge of principles and practices in food safety and food processing

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

- 1862 Extension

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

Change in Knowledge Outcome Measure

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

<b>Year</b>	<b>Actual</b>
2017	0

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

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

The frequency of foodborne illness on Guam is greater than that in the U.S. states. With estimation, each year about one of four residents experiences foodborne illness because of poor knowledge and practice in controlling temperatures in storage and cooking as well as avoiding unsafe food sources. In addition, ninety percent of foods are imported on Guam and value-added food products are lacking on the island.

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

Workshops of food safety and home food processing using local produces were provided to the residents in the community of Guam. One-to-one assistance in food safety and food processing were also provided to meet the specific needs of individuals. In addition, the FSMA FSPCA Food Safety Course "Preventive Controls for Human Food" were provided to the regional entrepreneurs.

#### **Results**

Through the educational activities, the target audiences improved their knowledge in food safety and food processing.

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

<b>KA Code</b>	<b>Knowledge Area</b>
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products
604	Marketing and Distribution Practices
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and

806 Naturally Occurring Toxins  
Youth Development

## **Outcome #2**

### **1. Outcome Measures**

Changes of participants (or residents) in improving practices and applying principles in food safety and food processing

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

- 1862 Extension

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

Change in Action Outcome Measure

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

<b>Year</b>	<b>Actual</b>
2017	0

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

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

U.S. states. With estimation, each year about one of four residents experiences foodborne illness because of poor knowledge and practice in controlling temperatures in storage and cooking as well as avoiding unsafe food sources. In addition, ninety percent of foods are imported on Guam and value-added food products are lacking on the island.

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

Workshops of food safety and home food processing using local produces were provided to the residents in the community of Guam. One-to-one assistance in food safety and food processing were also provided to meet the specific needs of individuals. In addition, the FSMA FSPCA Food Safety Course "Preventive Controls for Human Food" were provided to the regional entrepreneurs.

#### **Results**

Through the educational activities to targeted audiences, some learned to make food safety plan to conduct preventive controls for processing foods; others learned to make coconut kefir and products using local coconuts.

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

<b>KA Code</b>	<b>Knowledge Area</b>
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
503	Quality Maintenance in Storing and Marketing Food Products

604	Marketing and Distribution Practices
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
806	Youth Development

### **Outcome #3**

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

Changes in magnitude of foodborne illness and marketing safe and wholesome value-added food products in the community

Not Reporting on this Outcome Measure

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

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

- Economy
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges

##### **Brief Explanation**

Some research and extension projects in other areas competed with the time and efforts to the planned work. Funding is limited to hire research and extension professionals; it is challenging to make efforts for the planned work.

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

##### **Evaluation Results**

Pre- and post-tests, workshop evaluation, and direct observation in practicing learned skills were used to evaluate the results of educational activities in food safety and food processing. The evaluation results showed that target audiences learned the new knowledge and skills in food safety and home food processing. The target audiences were very satisfied with the workshops and other activities provided in the community.

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

Targeted audiences improved knowledge and behaviors in food safety. Targeted audiences used food processing skills to make value-added food products using local fresh fruits and vegetables.

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

**Program # 3**

**1. Name of the Planned Program**

4-H and Youth Development

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
806	Youth Development	100%		0%	
	<b>Total</b>	100%		0%	

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

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	3.0	0.0	0.0	0.0
<b>Actual Paid</b>	3.2	0.0	0.0	0.0
<b>Actual Volunteer</b>	30.0	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
98931	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
120159	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

To achieve the 4-H program ultimate goals the following activities will be conducted based research proven and curriculum adopted Experiential Learning Model promoting life skills.

05 new 4-H Clubs will be organized and supported annually,  
 15 4-H school enrichment programs will be established and later chartered as 4-H Clubs,  
 10 special interest/short-term programs/Day Camps and 5 overnight camps will be conducted,  
 10 School-Aged Child Care Education Programs will be offered yearly,  
 05 technology related workshops will be conducted and  
 02 planned workshops for 4-H individual study/mentoring/family learning activities will be implemented.

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

Primary target audience includes: children, youth, and families in the community, and schools including military establishments and their families including teachers, educators, and organizations that may request our services in a collaborative manner. Efforts will be made to reach targeted population who are underserved.

**3. How was eXtension used?**

Extension was used and other secured grants.

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

**1. Standard output measures**

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	0	0	11500	23000

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

**Patent Applications Submitted**

Year: 2017

Actual: 0

**Patents listed**

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

**Number of Peer Reviewed Publications**

2017	Extension	Research	Total
<b>Actual</b>	0	0	0

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

**Output Target**

**Output #1**

**Output Measure**

- (1) # of club members

<b>Year</b>	<b>Actual</b>
2017	204

**Output #2**

**Output Measure**

- (2) # of volunteer leaders

<b>Year</b>	<b>Actual</b>
2017	47

**Output #3**

**Output Measure**

- (3) # of workshops

<b>Year</b>	<b>Actual</b>
2017	435

**Output #4**

**Output Measure**

- (4) # of brochures

<b>Year</b>	<b>Actual</b>
2017	3

**Output #5**

**Output Measure**

- (5) # of surveys

<b>Year</b>	<b>Actual</b>
2017	4

**Output #6**

**Output Measure**

- (6) # of media articles and promotions

<b>Year</b>	<b>Actual</b>
2017	37

**Output #7**

**Output Measure**

- (7) # of focus group

<b>Year</b>	<b>Actual</b>
2017	2

**Output #8**

**Output Measure**

- (8) # of volunteers trained

<b>Year</b>	<b>Actual</b>
2017	11

**Output #9**

**Output Measure**

- (9) # of extension staff trained

<b>Year</b>	<b>Actual</b>
2017	4

**Output #10**

**Output Measure**

- (10)# of collaboration established

<b>Year</b>	<b>Actual</b>
2017	41

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

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

O. No.	OUTCOME NAME
1	(1) Number of youth through communication and expressive arts programming demonstrate increased self efficacy in public speaking, presentations, visual arts and performing arts
2	(2) Number of youth participants in 4H natural resources and environmental education programs demonstrate environmentally responsible behavior
3	(3) Number of youth participants who study plant, soil and entomology learn the interconnectedness of organisms and their environment
4	(4) Number of youth reporting positive attitude change and/or aspirations about learning and careers in a 4-H project area
5	(5) Number of youth increasing participation in science and technology educational programming/clubs
6	(6) Number of volunteers completing a training program and successfully leading a program, activity, event or club
7	(7) Number of youth indicating increased knowledge/skills related to economic education and/or entrepreneurship
8	(8) Number of youth indicating knowledge and/or skills related to leadership
9	(9) Number of youth reporting positive attitude change and/or aspiration related to volunteering and community service

**Outcome #1**

**1. Outcome Measures**

(1) Number of youth through communication and expressive arts programming demonstrate increased self efficacy in public speaking, presentations, visual arts and performing arts

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2017	1814

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

**Issue (Who cares and Why)**

To help build confidence and self-esteem within our youth attendants, Guam 4-H provides culturally appropriate workshops that made youth become reactive to challenges and promote creativity and innovation. Participant continues to build and gain faith and self-reliance in one's self.

**What has been done**

Through our summer and weekend workshops, students participated in numerous activities ranging from cultural driving topics, conservation of Guam's natural resources and environment to college and career path readiness. These lessons promoted and help build their creativity, innovation, self-responsibility, self-esteem, and self-confidence.

**Results**

Evaluation showed ninety-seven percent of all students stated an increased of knowledge by the end of the workshops but most impressive was the display of of work done by the students. High school and middle school students created mini presentation on what they learned and accomplished throughout the summer or during the weekend workshops. Students were also given "What If" scenarios relevant to the Pacific region and they had to find a solution with their teammates and present on it. While our younger participants exhibited their creative side through their art work and cultural pieces.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
806	Youth Development

**Outcome #2**

**1. Outcome Measures**

(2) Number of youth participants in 4H natural resources and environmental education programs demonstrate environmentally responsible behavior

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2017	9129

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

**Issue (Who cares and Why)**

As a tiny island in the vast Pacific with minimal land mass, Guam's environment and natural resources plays a vital role in the survival of its people. By instilling value and an responsibility through education, youth gain a better understanding of conservation and preservation practices needed to protect their environment and natural resources.

**What has been done**

Four hundred and five workshops were conducted during this reporting time frame. STEM and Horticulture lessons were taught with an underlining theme of natural resource and environmental responsibility.

**Results**

Ninety percent of all participants showed an increase of knowledge and understanding base on a pre and post evaluation test giving during the workshop. Students gained a better comprehension on the impact they can make whether positive or negative on their environment and the resources it provides.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
806	Youth Development

**Outcome #3**

**1. Outcome Measures**

(3) Number of youth participants who study plant, soil and entomology learn the interconnectedness of organisms and their environment

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2017	5007

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

**Issue (Who cares and Why)**

To cultivate their understanding in our student's knowledge on how interconnected and interrelated their environment and the organisms that call it home are and to foster a great interest in STEM.

**What has been done**

Through Horticulture and Entomology Workshops, students not only gained a better understanding on how the environment and all organisms are interconnected but they also comprehend the power they have to affect change and impacts on their environment and natural resources in a positive way.

**Results**

Base on our pre and post evaluation data collecting, eighty-four percent of participants increased their comprehension level in horticulture and entomology and were able to connect the relationship each had with each other and how mutually interdependent.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
806	Youth Development

#### **Outcome #4**

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

(4) Number of youth reporting positive attitude change and/or aspirations about learning and careers in a 4-H project area

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

- 1862 Extension

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

Change in Knowledge Outcome Measure

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

<b>Year</b>	<b>Actual</b>
2017	3306

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

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

With a competitive market and a limited job pool, island youth have to arm themselves with skills that are marketable, in demand and sometimes qualities that allow them to think outside the box of what is available in the traditional job market.

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

Guam 4-H provides opportunities for workshop participants to be exposed to the in and out of 4-H but the opportunity to meet a diverse group of employers, explore various fields in the job market, meet numerous community partners, and interview tradesman passionate about their work. 4-H also exposes young participants to volunteerism and giving back to their community through service learning.

###### **Results**

More than seventy percent of all youth participants gained a better understanding of the job market but most especially how unique and distinctive the 4-H Program with its volunteerism approach.

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

<b>KA Code</b>	<b>Knowledge Area</b>
806	Youth Development

**Outcome #5**

**1. Outcome Measures**

(5) Number of youth increasing participation in science and technology educational programming/clubs

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2017	9129

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

**Issue (Who cares and Why)**

Although Guam's youth have showed much improvement over the past several years in their standardize testing scores in math and science, they still fall below national average according to Guam's Pacific Daily News. To help address this issue, Guam 4-H offers various STEM workshops throughout the school year and on weekends.

**What has been done**

Participants and club members engaged in various STEM workshops through their schools, clubs and community sponsored events. All workshops and activities center on the our island and the surrounding Pacific region. Students focused on situations that affected them socially, culturally and economically. Students apply theories and principals of STEM that addressed issues such as global warming, raising sea water, bio-security, invasive plants and animals, and national and food security.

**Results**

Eighty percent of all our participants engaged in some form of STEM activity during this reporting period. Ninety-three percent of those individuals showed an increase of knowledge based on their post evaluation test after participating in various workshops offered throughout the year.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
806	Youth Development

**Outcome #6**

**1. Outcome Measures**

(6) Number of volunteers completing a training program and successfully leading a program, activity, event or club

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2017	11

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

**Issue (Who cares and Why)**

To continue to develop our youth volunteers' abilities, confidence, and mind set while up holding 4-H's Essential Element of Generosity. Also, to expand our volunteer pool and assist Guam's youth to meet their service hours requirements.

**What has been done**

Beside our Introduction to Volunteering, Code of Conduct, Stages and Ages and Volunteer Expectation, hands-on training and shadowing adult mentors played a bigger role in developing our youth volunteers' self assurance and skills.

**Results**

By the end of the hands-on training and shadowing adult mentors, 11 youth mentors were able to lead and present in various workshops. Youth mentors conducted either the life skill portion or a segment of the main curriculum with a 100% mastery and confidence in their ability.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
806	Youth Development

**Outcome #7**

**1. Outcome Measures**

(7) Number of youth indicating increased knowledge/skills related to economic education and/or entrepreneurship

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2017	5543

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

**Issue (Who cares and Why)**

On an island where a person's livelihood depends on goods being imported, finding alternative solutions for long-term sustainability, protection of natural resources and economic growth resonate in the minds of everyone. One way to help our island youth face these challenges is to provide them with the tools they need to prepare themselves. Instilling them with Life skills, ways to discover their passion or interest, provide guidance and mentorship will give them opportunities to excel and grow.

**What has been done**

As part of our college and career readiness path, youth finance and entrepreneurship lessons are incorporated into the workshop to give participants a broader understanding of economics, an alternative to the traditional path of school and work and help them to become self-sufficient.

**Results**

Seventy-three percent of all participants are able to illustrate their comprehension of the subject matter and formulate plans to benefit them in the future.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
806	Youth Development

**Outcome #8**

**1. Outcome Measures**

(8) Number of youth indicating knowledge and/or skills related to leadership

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2017	2172

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

**Issue (Who cares and Why)**

On an island where respect, humility and humbleness govern one's behavior based on cultural practices, youth find it difficult to assume a leadership role in fear of disrespect or belief that those with social position and status automatically fill those positions and need not assert themselves.

**What has been done**

Workshop activities were organized in a way to foster more team building, cultural awareness, leadership, public speaking and college and career path readiness. The workshop included Cultural Exchange Day, Citizenship, College & Career Path, Youth Finance, STEM, and Fisheries.

**Results**

Students participating in our summer and weekend workshops showed a growth of 45% in their leadership related skills between the time they started the program and the end of workshop cycle. Students had to perform various activities that forced them to work together, solve issues pertinent to them and present as a group.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
806	Youth Development

**Outcome #9**

**1. Outcome Measures**

(9) Number of youth reporting positive attitude change and/or aspiration related to volunteering and community service

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2017	11

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

**Issue (Who cares and Why)**

As a foundation for good citizenship, volunteering and community service help shape our youth to be positive and proactive members of society. Giving back or generosity helps our youth volunteers comprehend we are all interconnected as human beings and to look beyond their own bubble.

**What has been done**

Youth volunteers are given the opportunity to mentor at-risk youth throughout the island through various workshops and events whether a 4-H sponsored workshop or a community event with our partners and collaborates. Volunteers are given the opportunity to share their experiences and take the lead in mentoring these at-risk youth.

**Results**

Hundred percent of our youth volunteers showing a positive change in their mindset regarding volunteering. Their performance exceeded our expectation by them going beyond the program to volunteer within their school and their community on a regular base.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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
- Competing Programmatic Challenges

### **Brief Explanation**

Several external factors affecting program outcomes consisted extreme weather causing lessons to be postpone, disable company vehicles, delays in the MOU agreement, and last minute schedule changes due to unforeseen circumstances. Although these factors caused several setbacks, schedule adjustments and a back-up help to alleviate the impact.

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

### **Evaluation Results**

Based on pre and post evaluation test, youth participants showed an increase of knowledge and understanding by 66% after completing the workshop lessons. A 38% growth in their comprehension level from the time they first started the program. Overall, 97% of students stated they could demonstrate their grasp of the subject matter by applying it to their daily lives. Subjects such as STEM, Entomology, Horticulture, Art, Citizenship and College and Career Path Readiness were the focus of the lessons during this reporting period. More than 80% of preteens surveyed, stated they were willing to become future volunteers if given the opportunity while 100% of young adults who participated in our summer program had prior experience volunteering not only for the 4-H program but for other community driven organization.

### **Key Items of Evaluation**

Of the 11,500 youth participants, 125 of them are newly established community or club members; 1,083 were summer campers with several of them coming from parts of Asia and United States to specifically attend our summer workshops; 2,371 participated in community sponsored events celebrating their achievement in school or promoting wellness in their lives while 506 were youth dependents from 3 of Guam's military installations. In addition, more than 7,000 at-risk students from Guam Department of Education took part in numerous workshop to help develop and improve their competence in STEM. Also, during this time frame, Guam 4-H has seen an influx of request for culturally centered workshops ranging from weaving, traditional fishing techniques to dance and chanting most especially for visiting international students as well as an increase of newly established collaborators and youth volunteers.

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

**Program # 4**

**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
134	Outdoor Recreation	10%		10%	
701	Nutrient Composition of Food	15%		0%	
702	Requirements and Function of Nutrients and Other Food Components	10%		0%	
703	Nutrition Education and Behavior	10%		30%	
704	Nutrition and Hunger in the Population	10%		0%	
724	Healthy Lifestyle	20%		30%	
802	Human Development and Family Well-Being	10%		20%	
805	Community Institutions, Health, and Social Services	15%		10%	
<b>Total</b>		100%		100%	

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

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	4.0	0.0	0.5	0.0
<b>Actual Paid</b>	4.0	0.0	3.0	0.0
<b>Actual Volunteer</b>	1.0	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
123664	0	70549	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
150199	0	74531	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**

(1) Provide basic nutrition education classes on topics that relate to nutrition and food which include: 'MyPlate'; Food Safety (Kitchen & Safe Food Handling); Importance of Physical Activity; Fruits & Vegetables (Vitamins); Shopping Tips; Budgeting; Meal Planning; Reading Food labels; promoting use of herbs and spices to help reduce the intake of sodium; and chronic disease prevention. (2) Conduct nutrition workshops to target population. (3) Develop culturally relevant curriculum for physical activity; obesity prevention; nutrition education; and food safety. (4) Develop culturally relevant educational material promoting healthy lifestyle choices. (5) Conduct food demonstrations and taste tests of local dishes that incorporate healthful modifications. (6) Develop booklet and/or calendar that identifies locally grown fruits and vegetables with high nutritive value and suggest healthful ways to prepare the local produce. (7) Conduct workshops promoting locally grown fruits and vegetables with healthful recipes for both farmers and experienced cooks (marketing healthful recipes with locally grown produce). (8) Maintain and expand partnerships with local food sources and businesses and/or organizations to promote a greater variety of healthful foods and leverage resources to educate the community of ways to prevent obesity. (9) Develop and disseminate fact sheets on foods/beverages and common risk factors of preventable chronic diseases that are prevalent on Guam. (10) Develop and disseminate health and nutrition education curriculum for chronic disease prevention along with educational materials.

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

The target audiences of the program include: (1) school-aged children (elementary through high school level); (2) families in public assistance programs; (3) families with young children; (4) general consumers; (5) military families; (6) health educators; (7) school teachers, faculty, and staff; (8) local farmers; (9) working professionals; (10) other groups requesting services.

**3. How was eXtension used?**

eXtension was not used in this program

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

**1. Standard output measures**

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	1885	8182	10918	4697

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

Year: 2017  
 Actual: 0

**Patents listed**

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

**Number of Peer Reviewed Publications**

2017	Extension	Research	Total
<b>Actual</b>	0	0	0

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

**Output Target**

**Output #1**

**Output Measure**

- # of workshops

Year	Actual
2017	477

**Output #2**

**Output Measure**

- # of brochures

Year	Actual
2017	0

**Output #3**

**Output Measure**

- # of dissemination of research results and new technology and information

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

2017 4

**Output #4**

**Output Measure**

- # of one to one intervention

<b>Year</b>	<b>Actual</b>
2017	516

**Output #5**

**Output Measure**

- # of focus group

<b>Year</b>	<b>Actual</b>
2017	1

**Output #6**

**Output Measure**

- # of work with media

<b>Year</b>	<b>Actual</b>
2017	6

**Output #7**

**Output Measure**

- # of articles in newsletter, magazines, and newspapers

<b>Year</b>	<b>Actual</b>
2017	11

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

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

O. No.	OUTCOME NAME
1	# of participants exposed to nutrition, exercise, and obesity prevention information
2	# of participants gaining an increase in physical activity knowledge and skills, especially as it pertains to maintaining mental and physical well-being, prevention of chronic disease, and improving overall health
3	# of participants who have been exposed to health and nutrition education for chronic disease prevention

**Outcome #1**

**1. Outcome Measures**

# of participants exposed to nutrition, exercise, and obesity prevention information

**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>
2017	2352

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

**Issue (Who cares and Why)**

The most recent data on Guam report a high prevalence of overweight and obesity among adults and youth. The BRFSS and YRBS both report that adults and youth alike are not meeting the recommended fruit and vegetable servings and physical activity minutes. An increase in knowledge and skills of a healthy lifestyle promotes the willingness to adopt healthy behaviors.

**What has been done**

Developmentally appropriate and evidence-based curricula have been delivered to the target audience. Additionally, community-based programs have been implemented with extension and stakeholder collaboration to promote physical activity, healthy food choices, and meal planning. Media outlets and social marketing campaign have been used to support and enforce messages in the communities where the target audience frequent.

**Results**

Pre-/post-test, evaluations, and/or alternative assessments were administered to measure improvements in physical activity. The community-based program has provided a model for sustainable community-owned programs to be launched. Community relationships have been strengthened and more partners have been added to programs to support policy and sustainable programs.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
703	Nutrition Education and Behavior
724	Healthy Lifestyle

805 Community Institutions, Health, and Social Services

**Outcome #2**

**1. Outcome Measures**

# of participants gaining an increase in physical activity knowledge and skills, especially as it pertains to maintaining mental and physical well-being, prevention of chronic disease, and improving overall health

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2017	5131

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

**Issue (Who cares and Why)**

The high prevalence of chronic disease in Guam implies inadequate healthy behaviors. Health and nutrition education is a tool or vehicle for adopting healthy attitudes and behaviors and, in turn, reduce risk for chronic disease.

**What has been done**

In addition to the implementation of evidenced-based curricula, outreach events at health fairs, family engagement events, and worksite wellness activities have underscored exposure of health and physical activity education. Online outlets and extension products published and disseminated have reinforced health and physical activity education making information more accessible to target audience.

**Results**

Extension products, like 5-2-1-Almost None and Food Friends and Mighty Moves newsletters, webpage content posted on websites (e.g. Walk-A-Mile Maps), and local publications, have been developed to ensure exposure to health and nutrition information and education is far-reaching and sustained. Partnerships with community stakeholders and extension programs have been maintained.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
134	Outdoor Recreation

703	Nutrition Education and Behavior
724	Healthy Lifestyle
802	Human Development and Family Well-Being
805	Community Institutions, Health, and Social Services

**Outcome #3**

**1. Outcome Measures**

# of participants who have been exposed to health and nutrition education for chronic disease prevention

**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>
2017	497

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

**Issue (Who cares and Why)**

Childhood overweight and obesity is prevalent on Guam and the Pacific abroad related to children not meeting fruit and vegetable recommendations and/or exceeding energy and/or sugar recommendations. Healthy eating patterns implies a variety of healthy foods consumed routinely with little to no added sugars and saturated fat. A healthy eating pattern is possible with locally sourced Pacific foods.

**What has been done**

Extension programs have worked in collaboration to deliver evidence-based curricula involving nutrition and garden concepts to connect nutrition and health to the source of food and environment. Cooking demonstrations of healthy traditional recipes including local produce have been conducted . Programs have maintained partnerships with institutions to improve policy to support healthy choices and substitutes.

**Results**

Older adults reported their physical activity minutes and had their weight taken every class time. Cooking demonstrations were well-received throughout the year. Partnerships with community stakeholders are maintained to continue the efforts towards supporting policy.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
134	Outdoor Recreation
703	Nutrition Education and Behavior
724	Healthy Lifestyle
802	Human Development and Family Well-Being
805	Community Institutions, Health, and Social Services

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

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

- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

##### **Brief Explanation**

The Guam Non-Communicable Disease (NCD) consortium was established to reduce the burden of non-communicable diseases and has devised a strategic plan and collaborative programs addressing smoking, nutrition, alcohol, physical activity, and obesity. The collective consortium effort has raised awareness of public priorities - some of which compete with obesity prevention efforts with regard to priorities and programmatic challenges as new or expanding programs are targeted for the same audiences. Migration and the lack of government support to address the growing population continues to be an external factor related to population changes. Lastly, public policy lack the changes needed to support childhood obesity prevention efforts made; however, existing partnerships have been maintained to continue to update and improve supportive obesity prevention public policies with the support of program activities to enforce existing policies.

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

##### **Evaluation Results**

From pre-/post-assessments completed from direct nutrition and behavior education approximately half of all participants had improved, at least, one behavior/knowledge in healthy food/diet, food safety, food resource management, physical activity, and/or chronic disease prevention. Evaluations of the program reveal a desire for more integration of cultural traditions, foods/recipes, and language; as well as, internet-accessible products, like a Pacific e-cookbook. Community members shared the

interest in web-based video tutorials or "how-to's" and/or an "app" for researching nutrient value of, recipe using, or growing local produce. Community-based program evaluations revealed more community programs ingrained in the villages are welcomed as to support physical and social environments to promote physical activity and access to healthy foods. However, multi-lesson workshops or programs are challenging due to lack of transportation and competing family/work obligations underscoring cultural and economic challenges. The CHL Program Baseline Prevalence Results and Community Reports are the most recent data available on Guam to demonstrate that children do not meet the recommended fruit and vegetable servings and physical activity minutes; in addition to having a frequent consumption of sugar-sweetened beverages. As a result of the social marketing campaign of 5-2-1-Almost None, 5 elementary schools have adopted the campaign with regularly scheduled "Fit Days," where all children participate in physical activity, and administrators/teachers have adopted "healthy meetings"; 8 food stores have modified the food environment to identify school-approved Smart Snacks; and 1 mayor's office that has supported 5-2-1-Almost None activities. Results of the focus group that was conducted at the end of the year are pending with subsequent focus group data still be collected and analyzed.

### **Key Items of Evaluation**

- Media support (funding for technology-savvy products and for staffing expertise)
- web-based products or applications can assist with providing multi-lesson series.
- Cultural relevance, preservation, and perpetuation. Development of culturally-relevant curricula and educational material (extension and research funding).
- Physical and built environment support.
- Training in specialty areas for all extension staff, like working with minors and developmentally appropriate curricula and cross-training that will support the use of a curricula tool box and expand the skill set of staff to be more prepared for mobile lessons.

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

**Program # 5**

**1. Name of the Planned Program**

Plant Health and Pest Management

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	5%		0%	
205	Plant Management Systems	10%		25%	
211	Insects, Mites, and Other Arthropods Affecting Plants	5%		0%	
212	Pathogens and Nematodes Affecting Plants	20%		0%	
213	Weeds Affecting Plants	5%		0%	
214	Vertebrates, Mollusks, and Other Pests Affecting Plants	5%		0%	
215	Biological Control of Pests Affecting Plants	10%		50%	
216	Integrated Pest Management Systems	40%		25%	
	<b>Total</b>	100%		100%	

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

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

Year: 2017	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	2.0	0.0	0.5	0.0
<b>Actual Paid</b>	3.0	0.0	3.0	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
92748	0	70549	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
112649	0	74531	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**

The University of Guam Cooperative Extension Service's Plant Health and Pest Management group performed educational outreach to the public sector, private sector, and government agencies. Subject areas covered included pesticide application, Integrated Pest Management (IPM) strategies, plant propagation, insect identification, weed identification, plant disease identification, soil nutrition and fertilizers, invasive species, and grafting. The group also provided plant disease diagnostics and insect identification for the island through the Cooperative Extension Service's Plant Health Clinic.

With funding from a WSARE Professional Development Program grant, a 67 page publication "Index of Plant Diseases in Guam" was created. Justification for the Index is predicated on the belief that awareness of local plant diseases and their pathogens is essential for rapid diagnosis of specimens by local agricultural professionals. The purpose of the index is to update, and centralize, identified plant disease information in a form that is dynamic and easily revised. The Index is available for download on the University of Guam's College of Natural and Applied Science website. Contact information is also located on the website for those readers that have corrections or additions that they think should be included in future editions. The Index is entrusted to the University of Guam's Extension Plant Pathologist; thereby, entrees and required software are kept current. To allow for easy inclusions, references will be added sequentially, with the approval of the editor. The pathogen, host, and disease lists was arranged alphabetically. The Index can be found at the following link:

[http://cnas-re.uog.edu/wp-content/uploads/2018/01/small-File-Index-of-Plant-Diseases-in-Guam-Final\\_Submitted-01052018.pdf](http://cnas-re.uog.edu/wp-content/uploads/2018/01/small-File-Index-of-Plant-Diseases-in-Guam-Final_Submitted-01052018.pdf)

With funding from a WSARE Professional Producer grant, a 10-minute YouTube video "Symptoms of Guam's Ageratum Yellow Vein Virus (AYVV) on Tomato" was created. The video was created from project reports, materials created during the project such as posters, publications and an informative brochure/factsheet, and from footage of a presentation by the graduate student who assisted with the initial work of the project. The purpose of this video is to inform farmers, producers and other tomato growers about Guam's Ageratum Yellow Vein Virus (AYVV). Its identification was confirmed in 2013 but it may have occurred as early as 2007. The symptoms described in the video are those seen by University of Guam Plant Pathologist, Dr. Robert Schlub and local farmers and growers. AYVV commonly produces a range of symptoms that are depicted in the video as a severity scale. The video can be found at the following link:

<https://www.youtube.com/watch?v=-c9eOvGSgJk&feature=youtu.be>

Other major activities included outreach to landscape management workers in Rota, CNMI regarding coconut palm health. The primary topics were Tinangaja disease of coconut and eradication efforts for CRB in Rota. Also, undergraduate instruction and mentoring occurred, and a "Careers in Plant Pathology" presentation to undergraduates and high school students.

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

The target audience for this program includes local farmers, homeowners, nurseries, landscapers and golf course superintendents and their crews, teachers, school children, and government agencies.

**3. How was eXtension used?**

eXtension was not used in this program

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

**1. Standard output measures**

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	2745	5890	925	770

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

**Patent Applications Submitted**

Year: 2017  
 Actual: 0

**Patents listed**

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

**Number of Peer Reviewed Publications**

2017	Extension	Research	Total
Actual	4	0	0

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

**Output Target**

**Output #1**

**Output Measure**

- # of research papers

Year Actual  
 2017 0

**Output #2**

**Output Measure**

- # of research citations

<b>Year</b>	<b>Actual</b>
2017	75

**Output #3**

**Output Measure**

- # of extension fact sheets or articles

<b>Year</b>	<b>Actual</b>
2017	11

**Output #4**

**Output Measure**

- # of workshops/trainings/classes

<b>Year</b>	<b>Actual</b>
2017	16

**Output #5**

**Output Measure**

- # of brochures

<b>Year</b>	<b>Actual</b>
2017	0

**Output #6**

**Output Measure**

- # of research or new technology reports

<b>Year</b>	<b>Actual</b>
2017	0

**Output #7**

**Output Measure**

- # of one-on-one interventions

<b>Year</b>	<b>Actual</b>
2017	580

**Output #8**

**Output Measure**

- # of surveys

<b>Year</b>	<b>Actual</b>
2017	2

**Output #9**

**Output Measure**

- # of focus groups

<b>Year</b>	<b>Actual</b>
2017	6

**Output #10**

**Output Measure**

- # of news media activities (TV and radio)

<b>Year</b>	<b>Actual</b>
2017	4

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

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

O. No.	OUTCOME NAME
1	% of participants gaining skills in identification of insects and related pests
2	% of participants gaining skills in identification of plant diseases
3	% of participants gaining skills in identification of weeds
4	% of participants gaining knowledge about pesticides and their application
5	% of participants reducing indiscriminate use of chemical pesticides
6	% of participants adopting some established IPM practices

## **Outcome #1**

### **1. Outcome Measures**

% of participants gaining skills in identification of insects and related pests

### **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>
2017	95

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

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

Local farmers, homeowners, nurseries, landscapers and golf course superintendents and their crews, students, teachers, government agencies and the general public. Identification is essential in determining the difference between beneficial insects and insect pests, and to insure that proper management practices for IPM and pesticide application are employed. These practices lead to improved plant health and crop yield, and reduce negative impacts on human and wildlife health and the environment.

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

Workshops/trainings were held on insect identification.

#### **Results**

Ninety-five percent of participants showed a gain in knowledge.

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

<b>KA Code</b>	<b>Knowledge Area</b>
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
214	Vertebrates, Mollusks, and Other Pests Affecting Plants
216	Integrated Pest Management Systems

## **Outcome #2**

### **1. Outcome Measures**

% of participants gaining skills in identification of plant diseases

### **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>
2017	95

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

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

Local farmers, homeowners, nurseries, landscapers and golf course superintendents and their crews, teachers, students, government agencies and the general public. Plant disease identification of biotic and abiotic caused diseases is essential to insure that proper management practices for IPM and pesticide application are employed. These practices lead to improved plant health and crop yield, and reduce negative impacts on human and wildlife health and the environment.

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

Workshops/trainings were held on the identification of plant diseases.

#### **Results**

Ninety-five percent of participants showed a gain in knowledge.

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

<b>KA Code</b>	<b>Knowledge Area</b>
205	Plant Management Systems
212	Pathogens and Nematodes Affecting Plants
216	Integrated Pest Management Systems

**Outcome #3**

**1. Outcome Measures**

% of participants gaining skills in identification of weeds

**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>
2017	100

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

**Issue (Who cares and Why)**

Local farmers, homeowners, nurseries, landscapers and golf course superintendents and their crews, teachers, students, government agencies and the general public. Identification of specific weeds is essential to insure that proper management practices for IPM and pesticide application are employed. These practices lead to improved plant health and crop yield, and reduce negative impacts on human and wildlife health and the environment.

**What has been done**

Workshops were held on weed identification.

**Results**

One hundred percent of participants showed a gain in knowledge.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems
213	Weeds Affecting Plants
216	Integrated Pest Management Systems

**Outcome #4**

**1. Outcome Measures**

% of participants gaining knowledge about pesticides and their application

**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>
2017	90

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

**Issue (Who cares and Why)**

Local farmers, homeowners, nurseries, landscapers and golf course superintendents and their crews, teachers, students, government agencies and the general public. Knowledge of pesticides and their application is crucial for the health and safety of the applicator, consumers of produce, the health of humans and wildlife, and the environment.

**What has been done**

Farmers and home gardeners were given instruction on pesticide application over the course of the year.

**Results**

Ninety percent of participants showed a gain in knowledge.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
214	Vertebrates, Mollusks, and Other Pests Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

**Outcome #5**

**1. Outcome Measures**

% of participants reducing indiscriminate use of chemical pesticides

**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>
2017	95

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

**Issue (Who cares and Why)**

Local farmers, homeowners, nurseries, landscapers and golf course superintendents and their crews, teachers, students, government agencies and the general public. Correct application in this area leads to improved plant health and crop yield, savings on pesticide purchases, and reduces negative impacts on human and wildlife health and the environment.

**What has been done**

Farmers and home gardeners were given instruction on reducing pesticide application over the course of the year.

**Results**

Ninety-five percent of participants showed a change in action.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
214	Vertebrates, Mollusks, and Other Pests Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

**Outcome #6**

**1. Outcome Measures**

% of participants adopting some established IPM practices

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2017	95

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

**Issue (Who cares and Why)**

Local farmers, homeowners, nurseries, landscapers and golf course superintendents and their crews, teachers, students, government agencies and the general public. Correct application of IPM practices leads to improved plant health and crop yield, and reduces negative impacts on human and wildlife health and the environment.

**What has been done**

Workshops were held on Establishing IPM practices. Also, farmers and home gardeners were given instruction on and monitored for establishing IPM practices.

**Results**

Ninety-five percent of participants showed a change in condition.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
214	Vertebrates, Mollusks, and Other Pests Affecting Plants
215	Biological Control of Pests Affecting Plants

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

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

- Natural Disasters (drought, weather extremes, etc.)

#### **Brief Explanation**

Tropical storms slowed progress on completing objectives.

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

#### **Evaluation Results**

Evaluation results were a combined grade of ninety 95 percent.

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

Evaluation is based on internal review of the Plant Health and Pest Management group, stakeholder input, and pre/post testing.

**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%	
104	Protect Soil from Harmful Effects of Natural Elements	10%		10%	
125	Agroforestry	10%		5%	
205	Plant Management Systems	15%		35%	
302	Nutrient Utilization in Animals	10%		5%	
307	Animal Management Systems	10%		5%	
403	Waste Disposal, Recycling, and Reuse	10%		0%	
601	Economics of Agricultural Production and Farm Management	10%		10%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	0%		10%	
806	Youth Development	15%		10%	
	<b>Total</b>	100%		100%	

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

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	3.3	0.0	3.0	0.0
<b>Actual Paid</b>	3.3	0.0	8.8	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
102023	0	206944	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
123914	0	218624	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**

This program will address such areas such as:

1. Each year hold planning meetings between the cooperating agencies to identify priorities for grant funding to address these priorities. Funded grants and collaborative projects are a planned output of this POW, demonstrating capacity building through training, collaborative planning and presentation of needs.
2. Conduct applied research and field experiments at program demonstration sites, at both institutional and private (farmer) sites. Best management conservation and sustainable agricultural practices will be demonstrated on multi-agency, University, and farmer demonstration areas. New enterprises, varieties and production methods will also be demonstrated. Variety trials and potential new production enterprise identification are an ongoing effort.
3. Conduct workshops, trainings, field tours, conferences and other educational activities to local and regional producers, students, teachers and youth groups on program topics.
4. Identify producers on island and reach out on educational programs, also target farmers with agricultural land leases who are not utilizing the land for agricultural or under utilizing the land, for recruitment into the education and demonstration activities and survey them on barriers to their agriculture implementation.
5. Target producers (commercial, market gardener, and subsistence), and community groups starting school and community gardens for recruitment into these programs and programs on promoting edible landscapes.
6. Increase the skills of island agricultural and food professionals by holding train the trainer workshops on program curriculum prior to holding workshops for the general public.
7. Improve watershed management and use plant based contour technologies for trapping sediment and mulching and cover crops to control soil erosion on slopping lands and to slow storm water flow and trap sediment and nutrients for improving water quality downstream.
8. Promote waste management, mulching and composting as an alternative to land filling of solid organic waste and use of compost for soil quality enhancement as an alternative to synthetic fertilizers for crop production and for environmental integrity of natural resources. We will study the use of composted organic waste to increase organic matter content for improving soil physical properties in order to reduce soil erosion.
9. At least one workshop each year will be held on government (USDA) support and incentive programs

and funding opportunities for farmers.

10. For the subsistence/home/community garden portions of this program will identify gardeners/small farmers and their information needs on small (1/4 acre to 1 acre) production systems and develop outreach efforts to address these educational needs through workshops and extension publications, in order to increase the substitution of local production for the current imported produce and home grown produce for purchased produce.

11. This plan of work will develop home and community produced food as alternatives to store bought food through farm, home, community gardening, and animal production programs, thus increasing local food diversity and self reliance.

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

Primary local clients will include former, existing and potential new plant and animal producers including home, small-scale and subsistence level garden/micro farm plots. Over the past decade, the Chamorro Land Trust Commission signed 1,000+ new agriculture land leases and the DoAg identified 300+ existing full and part time commercial and subsistence agricultural producers. Many producers possess limited resources and desperately need education and technical support programs. Additionally, new village based needs assessments indicate that there are hundreds if not thousands of local homeowners and community groups that want training in sustainable food production practices so this effort is being adapted to include them. Also identified is a strong desire among many of our communities to start community gardens so this will be a new target group.

The secondary target audience is the agricultural professional (both plant and animal) community on Guam. This program is a collaborative effort to build capacity and enhance performance of Guam's Cooperative Extension Ag professionals and partner agencies so they can better identify issues and mobilize resources to provide broader technical assistance. Many non agricultural professionals are now promoting gardening and food production these professionals need agricultural training and materials to utilized in their outreach efforts. The Micronesian Chefs Association and Guam Community College Culinary program faculty have also become strong supporters of this program's efforts. Ag professionals with partner land grant programs throughout the American Affiliated Pacific have requested assistance. Regional workshops will address these requests.

The tertiary target group is island youth. The youth target population includes students, youth interested in entrepreneurial agricultural activities, and clients of mayors' offices interested in small scale and community agricultural activities.

A fourth audience is the University of Guam agricultural student cohort. The demonstration farm will be utilized as laboratory classroom for students enrolled in agriculture courses (Introduction to Agriculture and Introduction to Animal Science).

## **3. How was eXtension used?**

EXtension was used to identify financial management information materials, food security information, and for looking up individual crop/fruit information.

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

### **1. Standard output measures**

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	2192	14221	293	2410

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

Year: 2017  
 Actual: 0

**Patents listed**

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

**Number of Peer Reviewed Publications**

2017	Extension	Research	Total
Actual	0	0	0

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

**Output Target**

**Output #1**

**Output Measure**

- # of workshops or conferences

Year	Actual
2017	39

**Output #2**

**Output Measure**

- # of best management practice demonstrations conducted on private or institutional sites

Year	Actual
2017	7

**Output #3**

**Output Measure**

- # of popular articles in newsletters, magazines and newspapers, or TV and Radio presentations.

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

2017 2

**Output #4**

**Output Measure**

- # of extension publications (fact sheets, white papers, web-based learning modules, etc.)

<b>Year</b>	<b>Actual</b>
2017	17

**Output #5**

**Output Measure**

- # of research and extension advisory councils and boards consulted in program planning and implementation.

<b>Year</b>	<b>Actual</b>
2017	10

**Output #6**

**Output Measure**

- # of new educational/workshop curriculum developed and/or piloted with program partners

<b>Year</b>	<b>Actual</b>
2017	23

**Output #7**

**Output Measure**

- # of either: Memorandums of Understanding, cooperative agreements, partnerships, or shared demonstrations initiated or continued

<b>Year</b>	<b>Actual</b>
2017	9

**Output #8**

**Output Measure**

- Number of Poster presentations.

<b>Year</b>	<b>Actual</b>
2017	0

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

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

O. No.	OUTCOME NAME
1	# of program participants indicating intent to adopt recommended program practices, activities, and technology
2	# of producers indicating decreased imported ag production inputs
3	# of program participants indicating improved knowledge and skills of recommended practices
4	# of community strategic plans and policies implemented as a result of this program
5	# of cooperating agency and organization personnel adopting and utilizing curriculum materials developed under this POW (both Guam and Distance Education)
6	# of producers indicating intent to utilize recommended new varieties/species in production.

**Outcome #1**

**1. Outcome Measures**

# of program participants indicating intent to adopt recommended program practices, activities, and technology

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2017	188

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

**Issue (Who cares and Why)**

Many of our producers are new farmers and learning new production and soil and water conservation practices. So their adoption of the practices we demonstrate and teach will improve their output, protect their soil, and keep the soil erosion from damaging our island's reef and surrounding waters. Also, Islands, Growing Lettuce on Guam, and Growing Hot Pepper on Guam workshops learned various aspects of agriculture technology including horticultural techniques, soil quality, business and marketing, and overall sustainability.

**What has been done**

Workshops on sheet mulching, living mulches, container, pruning, tree planting, Farm record keeping, business planning, marketing, plant propagation methods, poultry production, composting, mulching, government programs (EQIP)promotion, and proper plant care.

**Results**

Several participants have called upon UOG CE&O assistance as they have engaged in practicing plant propagation and soil-building technologies taught from agricultural professionals in the workshop. Over 7 developed farm plans and conservation plans.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements

125	Agroforestry
205	Plant Management Systems
302	Nutrient Utilization in Animals
307	Animal Management Systems
601	Economics of Agricultural Production and Farm Management
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
806	Youth Development

**Outcome #2**

**1. Outcome Measures**

# of producers indicating decreased imported ag production inputs

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2017	85

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

**Issue (Who cares and Why)**

Livestock feed and soil amendments are very expensive to import to our remote island from the Continental US.

**What has been done**

Workshop were held on growing local feed inputs and on use of restaurant waste (tourism largest industry). Workshops were also held on utilizing compost, green waste and other high carbon wastes like shredded paper and use of chicken manure to replace imported soil amendments.

**Results**

Much higher soil organic matter content and lower input costs. Also much lower feed cost for hog and chicken producers that adopted.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
---------	----------------

102	Soil, Plant, Water, Nutrient Relationships
125	Agroforestry
205	Plant Management Systems
302	Nutrient Utilization in Animals
307	Animal Management Systems
403	Waste Disposal, Recycling, and Reuse
601	Economics of Agricultural Production and Farm Management
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources

**Outcome #3**

**1. Outcome Measures**

# of program participants indicating improved knowledge and skills of recommended practices

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2017	331

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

**Issue (Who cares and Why)**

The many workshops and one on one contacts are assumed to have a knowledge impact but we have realized that if we do not assess this we will not know.

**What has been done**

We conduct evaluations after every workshop to identify knowledge change and planned action change by each participant. These numbers indicate participants who noted or later demonstrated knowledge change.

Follow up visits where we see impact from one on one work with clients are also noted.

**Results**

The 331 represents numbers of documented perceived knowledge change.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
---------	----------------

102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
125	Agroforestry
205	Plant Management Systems
302	Nutrient Utilization in Animals
307	Animal Management Systems
403	Waste Disposal, Recycling, and Reuse
601	Economics of Agricultural Production and Farm Management
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
806	Youth Development

**Outcome #4**

**1. Outcome Measures**

# of community strategic plans and policies implemented as a result of this program

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2017	1

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

**Issue (Who cares and Why)**

Ag producers and others working in policy often seek the CE&O assistance in developing strategic plans.

**What has been done**

The Farmer's Cooperative Association of Guam (FCAG) sought our assistance in developing a plan for a new market facility with other partners we assisted them in the development of the plan.

**Results**

The FCAG was able to complete the development of the first stage of their business plan for their new market facility.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management

#### Outcome #5

##### 1. Outcome Measures

# of cooperating agency and organization personnel adopting and utilizing curriculum materials developed under this POW (both Guam and Distance Education)

##### 2. Associated Institution Types

- 1862 Extension

##### 3a. Outcome Type:

Change in Action Outcome Measure

##### 3b. Quantitative Outcome

Year	Actual
2017	6

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

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

Collaboration with partnering agencies (Guam Department of Agriculture and USDA-NRCS -FSA-Rural Development) have resulted in shared clients receiving assistance from CE&O, Dept. of Ag, Small Business Development Center, and USDA-NRCS-FSA-Rural Development.

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

Often these professionals co-develop curriculum or use UOG developed curriculum or modifications of our curriculum. This increases respective agencies assistance to each other and clients. Clients obtain knowledge of what type of assistance is available from respective agencies.

###### **Results**

Clients receive increased professional technical assistance on improving plant and animal production while sustaining natural resources from a common shared collection of educational materials.

#### 4. Associated Knowledge Areas

KA Code	Knowledge Area
---------	----------------

102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
125	Agroforestry
205	Plant Management Systems
302	Nutrient Utilization in Animals
307	Animal Management Systems
403	Waste Disposal, Recycling, and Reuse
601	Economics of Agricultural Production and Farm Management
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources

### **Outcome #6**

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

# of producers indicating intent to utilize recommended new varieties/species in production.

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
- Other (Change in government leaders)

##### **Brief Explanation**

While there has been a significant drop in local funds to both the Experiment Station and Cooperative Extension & Outreach, we have managed to maintain our client outreach and research efforts by seeking outside funds and grants. We have been fortunate the past few years to not experience any natural disasters.

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

##### **Evaluation Results**

In order to get a higher return of completed evaluations in one of our programs we gave a raffle ticket for plants (fruit trees, herbs, and vegetable seedlings). From one workshop series we surveyed the participants ( 37 ) at the end of the workshop series on how many plants they planted as a direct result of the work shop. Listed are the number of fruit plants planted as a result of this idea.

##### **Fruits**

Atis - 3, Banana - 22, Calamansi - 17, Coconut - 2, Dragon fruit - 1, Fig - 3, Guava - 1, Lemon - 2, Mango - 5, Melon - 1, Mulberry - 1, Orange - 1, Papaya - 15, Soursop - 4,

Talisay (Pacific Almond) - 2

So this effort resulted in over 80 fruits trees planted on island from this one small sub-set of our workshops. We will expand this effort of rewarding participants for filling out evaluations since this increases the numbers of fruits on island. This also provided us with the comments below.

### **Key Items of Evaluation**

Noteworthy trainee quotes or stories from our workshop participants that we would like to share.

- Beneficial to setting up my farm plan
- Extremely grateful for everything I've learned!
- I'm learning a whole lot with this class. I think you need a part 2.
- Great hands-on demo! Thanks for the plant samples!
- "Right Place; Right Time" It is a pleasure to participate in this workshop. Thank you.
- I found the training particularly interesting today because of the venue. Offsite training at markets maybe farms, hydro farms, Fisherman's Co-op, etc. ... Helpful and very informative. Would love to see Dr. Barber's farm.
  - Thank you for inspiring more farms for Guam.
  - It is a wealth of information; an eye opener and information and participation.
  - Template for business plan will help a lot!
  - Need more farming class like this one to learn more farming techniques & practices.
  - Awesome! Having a class project like the garden: larger scale; business/field work.
  - Growing my own food and avoid buying groceries as much as possible

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

**Program # 7**

**1. Name of the Planned Program**

Sustain, Protect, and Manage the Environment and Natural Resources of Guam and Micronesia.

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%	
136	Conservation of Biological Diversity	15%		15%	
202	Plant Genetic Resources	10%		10%	
205	Plant Management Systems	15%		15%	
211	Insects, Mites, and Other Arthropods Affecting Plants	20%		20%	
215	Biological Control of Pests Affecting Plants	15%		15%	
216	Integrated Pest Management Systems	10%		10%	
723	Hazards to Human Health and Safety	5%		5%	
	<b>Total</b>	100%		100%	

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

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

Year: 2017	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	2.0	0.0	12.0	0.0
<b>Actual Paid</b>	0.0	0.0	14.0	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
0	0	329229	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	347811	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**

Little fire ant (LFA) was detected on Guam in Nov 2011 and continued to spread in 2017. Ants have been found infesting forest and residential properties at many sites throughout the island. LFA infestations are still quite small but growing. Most of the infestation sites in residential areas cover about 100 sq meters or less. This suggests that eradication from some sites is still within the realm of possibility if the spread of LFA by humans can be stopped, and if funds can be obtained to purchase chemicals and baits and to hire personnel to apply them periodically over the space of 1 to 2 years. Methods to eradicate and control LFA populations developed by the University of Hawaii-Hilo and the Hawaii Dept of Ag are now being adopted on Guam.

Work on coconut rhinoceros beetle (CRB) on Guam continued. Field releases of fungal spores into rhino beetle breeding sites were not sufficiently successful. Biocontrol with Rhino specific virus imported from New Zealand failed. Foreign exploration for a highly pathogenic isolate of virus has begun. Also doing surveillance trapping for CRB, LFA, Asian Citrus Psyllid, Varroa mite, and other invasive species in throughout Guam and Micronesia.

An insect forest pest survey was initiated in FY2015 and continued into FY2017. The goal is to build a list of native and invasive species of insects attacking forest plants on Guam. We are an active member of the National Plant Diagnostic Network. We serve on local and regional invasive species councils, and provide training on invasive species identification, first detection and management, and biosecurity.

Plant inventories of urban landscapes are continuing. Data is entered into the Plan-it Geo Treeplotter database. Propagated and out-planted Guam rare plant species in protected sites Plants are monitored and maintained using adaptive management until they are established. Monitoring included documenting pest problems.

We have developed soil management practices to maintain agricultural sustainability and environmental quality under different farming practices, soil improvement for climate change resilience by land application of bio-char for carbon sequestration to enhance soil quality and health. We are studying the effects of surface crop residues and subsurface macroporosity on water infiltration into the soil profile.

We evaluated using the Vetiver Technology (VT) for watershed management by trapping sediment, bio-remediation of sewage as well as drainage from the storm water and controlling soil erosion on sloping lands and trapping sediment as well as nutrients for improving water quality. We have been applying the VT for water quality improvement and for restoration of water reservoirs and marine environments near Guam's seashores.

We are evaluating the effects of no-tillage management and inter cropping strategies on chemical, physical and biological properties of the soil. We are promoting waste management and composting of organic waste in Guam. We are using lysimeters to trace and measure chemical concentrations and their movement through the soil profile following the application of synthetic fertilizers as compared to land

application of compost.

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

Our target audience is the general public, farmers, landscapers, the research community at large, and federal, territorial, and regional government agencies and NGO's

**3. How was eXtension used?**

eXtension was not used in this program

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

**1. Standard output measures**

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	1112	60320	1316	2576

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

**Patent Applications Submitted**

Year: 2017  
 Actual: 0

**Patents listed**

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

**Number of Peer Reviewed Publications**

2017	Extension	Research	Total
<b>Actual</b>	0	17	17

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

**Output Target**

**Output #1**

**Output Measure**

- # of workshops

<b>Year</b>	<b>Actual</b>
2017	16

**Output #2**

**Output Measure**

- # of one-to-one contacts

<b>Year</b>	<b>Actual</b>
2017	635

**Output #3**

**Output Measure**

- # of popular articles in newsletters, magazines and newspapers

<b>Year</b>	<b>Actual</b>
2017	115

**Output #4**

**Output Measure**

- # of Extension publications (fact sheets, white papers, web-based learning modules, etc)

<b>Year</b>	<b>Actual</b>
2017	19

**Output #5**

**Output Measure**

- # of research or extension advisory boards and councils

<b>Year</b>	<b>Actual</b>
2017	11

**Output #6**

**Output Measure**

- # of peer-reviewed research publications

<b>Year</b>	<b>Actual</b>
2017	17

**Output #7**

**Output Measure**

- # of presentations at professional international, national, or regional conference

<b>Year</b>	<b>Actual</b>
2017	28



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

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

O. No.	OUTCOME NAME
1	# participants indicating improved knowledge and skills or recommended practices
2	# of strategic plans and policies implemented as a result of this program
3	# of cooperative agreements/partnerships initiated or continued as a result of this program

**Outcome #1**

**1. Outcome Measures**

# participants indicating improved knowledge and skills or recommended practices

**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>
2017	52

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

**Issue (Who cares and Why)**

Protecting island resources from invasive species continues to be a major concern on Guam. Island resources and public health are continually put at risk by the increasing flow of commercial, military and public commerce that increases the threat of new and dangerous introductions. On top of that, we are currently battling at least 3 uncontrolled outbreaks of invasive species (cycad scale, CRB, and LFA) which are decimating local ecosystems and pose a hazard to human health.

**What has been done**

Hands-on workshops to train local and regional plant protection professionals, farmers, and private land owners. Also conducting applied research to find solutions to these ongoing problems. Research and Extension faculty contributing to the development local and regional policies regarding invasive species and agricultural issues.

**Results**

We have local PPQ workers maintaining CRB and LFA surveillance on their home islands. Due to our increasing presence in the region, the number of requests for information and assistance has increased considerably.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
102	Soil, Plant, Water, Nutrient Relationships
136	Conservation of Biological Diversity
202	Plant Genetic Resources

205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
723	Hazards to Human Health and Safety

**Outcome #2**

**1. Outcome Measures**

# of strategic plans and policies implemented as a result of this program

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2017	2

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

**Issue (Who cares and Why)**

Many plans have been developed by local and federal government agencies, but implementation remains problematic due to funding limitations and lack of professional capacity.

**What has been done**

Guam Invasive Species Master Plan and CNMI Invasive Species Master Plan both completed, published, and submitted to the respective legislatures in 2017. The Micronesia-Hawaii Biosecurity Plan is currently under review.

Will continue to inform policy makers of the need to take action.

**Results**

Guam Invasive Species Master Plan and CNMI Invasive Species Master Plan both completed, published, and submitted to the respective legislatures in 2017.

In addition, there is continued growing awareness on the part of policy makers and general public.

**4. Associated Knowledge Areas**

KA Code	Knowledge Area
---------	----------------

102	Soil, Plant, Water, Nutrient Relationships
136	Conservation of Biological Diversity
202	Plant Genetic Resources
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
723	Hazards to Human Health and Safety

**Outcome #3**

**1. Outcome Measures**

# of cooperative agreements/partnerships initiated or continued as a result of this program

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

Year	Actual
2017	7

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

**Issue (Who cares and Why)**

Protecting island resources from invasive species was cited as one of the top 5 concerns during a recent island-wide stakeholders seminar. Island resources and public health are continually put at risk by the increasing flow of commercial, military and public commerce that increases the threat of new and dangerous introductions. On top of that, we are currently battling at least 3 uncontrolled outbreaks of invasive species (cycad scale, CRB, and LFA) which are decimating local ecosystems and pose a hazard to human health.

**What has been done**

- FIA (Forest Inventory Analysis) cooperative agreement between UOG and US Forest Service.
- CNMI Dept. of Forestry and UOG have cooperative agreement, where UOG provides entomological expertise on issues deemed important by CNMI
- USDA APHIS PPQ - UOG research scientists are collaborators and provide inspection services, technical and scientific assistance
- DAWR (Guam Department of Agriculture) cooperative agreement to work on conservation of endangered butterflies

- Ag Research New Zealand and UOG have cooperative agreement to work on virus to control CRB
- UOG collaboration with Canada Agriculture and Agrifood to identify invasive aphids throughout Micronesia
- Collaboration with UH Hilo Ant Lab to develop control techniques for LFA in Micronesia
- Participate in National Honey Bee Survey
- Collaborate with SPC in plant protection, quarantine, biological control, and in training professionals
- Advise U.S. Fish & Wildlife on issues regarding federally listed plant species

### Results

UOG expertise contributes to nearly all facets of island life by the amelioration of the natural and urban environments throughout Micronesia

## 4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
136	Conservation of Biological Diversity
202	Plant Genetic Resources
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
723	Hazards to Human Health and Safety

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

### External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Appropriations changes
- Government Regulations

### Brief Explanation

Typhoons are always possible on Guam and Micronesia and may delay advances of research and extension services,

Lack of funding (cuts in formula funds and unsuccessful efforts for competitive funds) may reduce the scope of research and extension services

Limited and declining number of highly trained individuals in disciplines critical to natural resource management on Guam and Micronesia.

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

### Evaluation Results

Programs are being evaluated formally and informally by stakeholders and internally within the University; and feedback has been positive. Federal agencies lacking on-island

personnel rely heavily on UOG scientific expertise. This is also true for private environmental firms and pest control companies.

Recently had a new graduate program in "Sustainable Agriculture, Food and Natural Resources" was approved and implemented by the University of Guam upon recognition of its strategic importance in the region. In addition, 98% of our graduates successfully find employment in agriculture and environmental fields or acceptance into PhD and certification programs.

### **Key Items of Evaluation**

## 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.