2007 University of Guam Research Plan of Work

Brief Summary about Plan of Work

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Brief Summary
The University of Guam (UOG) is the only 4 year public institution of higher education on Guam. Agriculture Experiment Station being a part of UOG since 1975 has had major impact on the agriculture research on Guam as well as many islands in the American Western Pacific. AES scientists educated many students, provided valuable information to general public, businesses, decision-makers, government agencies and numerous community leaders.
Over many years, AES faculty and staff have effectively served a broad range of stakeholders through its research as well as academic and extension programs. It is an AES desire to provide an excellent and relevant research results, and reliable service to stakeholders. AES is currently involved in the process of developing a strategic plan on which this POW is based. Presented plan of work took to the account an extensive input from faculty, staff, and stakeholders. AES faculty, staff, and administrators developed both research strategies and also identified and prioritized management and administrative goals to both increase its resources and improve its efficiency. Strategic planning and development of POW has been aligned with the strategic plans of the university and the college.
Guam's economy is driven by tourism therefore the natural beauy and fragile environment of the island is the major concern for the island's future prosperity. The military is Guam's second largest industry in terms of value. An agriculture even relatively small, has a significant importance. In the recent years the majority of AES activities revolved around preserving natural environment, protecting natural tropical forests, as well as landscapes around businesses and various residential areas. Military build-up that will result in moving over 20,000 military personnel and their dependents to Guam will require an increase in environmental research, waste management research, improvements in landscape management around newly build residential areas and increases in ornamental horticulture research in general. Besides environmental and ornamental research, there has been a strong demand for research allowing production of fresh vegetables and local fruits. Unfortunately current Guam's market prices are not competitive. AES researchers look for ways to increase added value of existing products and/or increase consumer demand for new products. Overall, there are nine faculty members in AES actively involved in research and each of them covers one major area of agriculture related to their field.

Estimated number of professional FTEs/SYs to be budgeted for this plan.

Year	Extenion		Research	
	1862	1890	1862	1890
2007	0.0	0.0	9.0	0.0
2008	0.0	0.0	9.0	0.0
2009	0.0	0.0	9.0	0.0
2010	0.0	0.0	9.0	0.0
2011	0.0	0.0	9.0	0.0

Merit Review Process

The merit review process that will be employed during the 5-Year Plan of Work cycle

- External University Panel
- Expert Peer Review

Brief explanation

Because of the small size of AES, review of individual Plans of Work and projects has been conducted mostly by AES 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 2006-2011 Strategic Plan. All new research proposals (such as Hatch, McIntire Stennis, Regional Research etc.) are being submitted to AES Associate Director who checks the proposal for completeness and format. A draft proposal that is ready for review is being submitted to external ad hoc Peer Review Committee. Committee is 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, AES administrators are making decisions regarding allocation of resources.

Evaluation of Multis & Joint Activities

1. How will the planned programs address the critical issues of strategic importance, including those identified by the stakeholders?

The crucial issues addressed by AES planned programs fall within the strategic goals of AES adopted by the faculty during Strategic Planning Retreat. It was agreed that all programs must address issues that and relevant to the needs of the region, serve interest of scientific community and are linked to the needs of our stakeholders. Indeed, numerous new research projects address environmental issues, integrated plant protection, biocontrol as well as serve ethnic needs of local population. Giving some examples of many projects that will be conducted by AES researchers in the near future, two of them will investigate spread of the gallfly from the release site, asses its effect on plant growth, and the interaction between pest and parasite. One will study the biology of the gall-fly and evaluate their efficacy in the laboratory and field. One aims to develop control mechanisms for eradication/ suppression of non-indigenous/invasive species, to improve and implement effective early detection and prevention strategies, and to develop Integrated Pest Management strategies for major exotic plant and animal pests and diseases. Another important research project will attempt to define the genetic structure of the Cycads populations among the island habitats of Guam, Rota, Yap, Palau, and the Philippines, and then apply this knowledge to define critical conservation efforts on Guam. In addition AES is active in developing and providing knowledge and technologies to generate and improve food products, and processes for existing and new markets for local producers. AES has been and will continue to focus on issues that insure the understanding, protection, and sustained management of precious natural resources. Research activities will target waste management, water quality, invasive species, enhancing and protecting forest resources, species diversity, and many others issues.

2. How will the planned programs address the needs of under-served and under-represented populations of the State(s)?

The vast majority of Guam's inhabitants belong to the ethnic groups and cultures that often are not sufficiently served by federal programs. AES administrators encourage new programs that address specific needs of under-served populations on Guam.

3. How will the planned programs describe the expected outcomes and impacts?

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. AES scientists have been able to obtain additional, significant funding from non-federal sources to support some of our programs. These types of funding indicate that conducted research is appreciated and considered to be trustworthy.

4. How will the planned programs result in improved program effectiveness and/or efficiency?

University of Guam used to have organizational structure that integrated agricultural research, and agricultural extension. After the split of AES and CES within UOG, agricultural programs became less effective. AES hopes that extension faculty will return under the college umbrella and our faculty will again establish integrated projects that incorporate extension and education activities with our research efforts.

Stakeholder Input

1. Actions taken to seek stakeholder input that encourages their participation (Check all that apply)

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

Brief explanation.

AES will employ several of stakeholder input methods including soliciting input from individual farmers, farmers 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 AES administrators plan to continue with this way of providing stakeholders' input.

Of particular importance is to generate good understanding (between stakeholders and AES) why issues related to the natural environment receive so much of attention and need stakeholders' support. We plan that our future stakeholders will include producers, consumers, decision-makers, students, alumni, and members of the business community.

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

1. Method to identify individuals and groups

- Open Listening Sessions
- Other (Guam□s stakeholders are well identified)

Brief explanation.

Guam's stakeholders are well identified. There are not more than 50 farmers and not more than 200 individuals who supplement their income with some sort of agricultural production. Their participation and input to define agriculture research ranges from substantial (full time farmers) to insignificant. Farmers do not form strong and focused commodity groups. Their associations are rather loose and based on personal contacts, friendships, etc.

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

1. Methods for collecting Stakeholder Input

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

Brief explanation

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

3. A statement of how the input will be considered

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

Brief explanation.

Stakeholder input has been used extensively in developing the current AES Strategic Plan. As a result of the received input, AES faculty modify their research plans to improve service and to provide specific opportunities for continued feedback. Information will be 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.

1. Name of the Planned Program

Development and Protection of Guam's Diversified Tropical Plant Systems, and Aquaculture.

2. Program knowledge areas

- 215 30% Biological Control of Pests Affecting Plants
- 202 20% Plant Genetic Resources
- 212 15% Pathogens and Nematodes Affecting Plants
- 601 5% Economics of Agricultural Production and Farm Management
- 216 10% Integrated Pest Management Systems
- 211 15% Insects, Mites, and Other Arthropods Affecting Plants
- 307 5% Animal Management Systems

3. Program existence : Mature (More then five years)

4. Program duration : Long-Term (More than five years)

5. Brief summary about Planned Program

Guam's commercial agriculture is small and almost all food is imported. This is not likely to change and only small quantities of high value specialty crops for certain niche markets will be produced by Guam's farmers.
Guam relies heavily on its environment to provide excellent living conditions for the residents as well as major attractant for the visitor industry. Diversity and health of plants plays an essential role by providing tropical character to hotels, shops and residential areas. In addition the golf industry attracts many visitors who come to Guam specifically to play golf. The planned research program will address development of specialty crops produced on Guam, ornamental plants in our landscapes, as well as protect a diversified flora in natural environments.
Pests threaten agricultural products as well as natural and urban ecosystems. Through basic and applied research, host-pathogen interactions can be identified; control measures can be developed and researched. An important component of ecosystems management is mitigation of alien invasive species. Invasive species threaten Guam's native plants and damage economically important ornamental species.
The invasion of new pests and pathogens, including insects, and disease causing organisms, can devastate the expensive niche crops that Guam's farmers produce thereby destroying their limited economic opportunities. Plant pathologist and entomologist identify new pests that continually invade our island and destroy our high value crops and landscapes. New technologies are being developed at AES to control insects by biocontrol methods. Plant pathologist is investigating resistance and control methods of numerous plants such as papayas, bananas, and taro. Horticulturists will evaluate genotypes of hot peppers (Capsicum spp.) for adaptability to tropical agro-climate in order to increase field production of the superior fruit-bearing lines. They will determine field performance of Capsicum genotypes for their adaptability to Guam's agro-environment, characterize physical and chemical properties, and conduct a consumer preference tests on hot pepper. They will also study taxonomy and ecophysiology of native plant species, as well as toxicology and pollination biology of cycads.

6. Situation and priorities

Physical isolation of the island and its year round favorable growing conditions created unique ecosystems, extremely susceptible to invasion by undesirable plants, insects, microbes, and other invasive species. Invasive species, especially insects are considered the greatest threat to Guam's economy and natural environment. Invasive species cause great losses, sometimes the extinction of native species, and in general significant destruction of native forests. Sometime pests such as brown tree snake, change natural environment and quality of life forever. Despite federal and state quarantine regulations, many species become imported mostly with shipped products. Some are harmless but some cause a significant impact on Guam's economy. Research will be aimed at eradication of invasive species in localized outbreaks. In areas where eradication may not be immediately possible, control measures will be researched to minimize its spread and reducing the population.

7. Assumptions made for the Program

Other agencies will cooperate. External funds and resources will be available. Several faculty will actively work and collaborate on IPM projects. At least two faculties will devote their research efforts to address issues related to increased production of cash crops.

8. Ultimate goal(s) of this Program

Eradicate specific invasive species or at least improve management of targeted invasive species.
Reduce introductions of invasive species to Guam.
Quickly detect new introductions and eradicate them as soon as possible.
Increase collaboration with USDA National Resource Conservation Service and other territorial and federal agencies.

9. Scope of Program

- In-State Research

Inputs for the Program

10. Expending formula funds or state-matching funds : Yes

11. Expending other then formula funds or state-matching funds : Yes

12. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2007	0.0	0.0	6.0	0.0
2008	0.0	0.0	6.0	0.0
2009	0.0	0.0	6.0	0.0
2010	0.0	0.0	6.0	0.0
2011	0.0	0.0	6.0	0.0

Outputs for the Program

13. Activity (What will be done?)

Here is an outline of the major research thrusts of the next 5 years.

Continue to develop biorational pest management strategies.
Assess the biodiversity and genetic structure of homopteran populations.
Assess the genetic structure of aphidiid parasitoid populations.
Assess the biodiversity, biology and ecology of ants in Micronesia.
Examine crops for host resistance to insect pests.
Monitor the spread of invasive insects to the various islands of Micronesia.
Participate in developing economic models for assessing the impact of insect, disease and vertebrate pests on Guam and Micronesia.
Evaluate of plant material for use in Guam's landscapes.
Study the environmental factors affecting the establishment of native trees and shrubsConduct a survey of Guam for current weeds and monitor the spread of newly introduced invasive plant species in Guam.
Conduct a survey of medicinal plants used historically in Guam.Determine how Guam’s cycad population relates to populations in the Mariana and West Caroline Islands.
Study responses of native plants of Guam to various edaphic and climate factors Study management practices for precocity and early yields.
Study cycad pollination biology, cycad toxicology and biochemistry.
Develop environmental safe control methods for the invasive species by integration of semiochemicals and biocontrol agents.
Research biological control of banana borer and sugarcane weevil.
Evaluate banana cultivars against panama wilt and banana bunchy top diseases
Identify causal agent of bud rot and its control methods.

Survey fungal, bacterial and viral diseases on orchids.
Evaluate local and transgenic cultivars for papaya ring spot virus resistance.
Continue the research on biological control of the Cycad Aulacaspis Scale,
Chromolaena odorata, Coccinia grandis, Mimosa diplotricha, and pink hibiscus mealy bug.
Introduce specific pathogen free shrimp production and development of an export market
Investigate the integration of hard coral production for the aquarium fish trade and develop an exportable product.
Investigate the local production of rabbit fish to help diversify the local industry.
Research ways to implement Aquaculture Development Plan for Guam.

14. Type(s) of methods to be used to reach direct and indirect contacts

Extension	
Direct Methods	**Indirect Methods**
• {NO DATA ENTERED}	• {NO DATA ENTERED}

15. Description of targeted audience

No extension, this is research Plan of Work only.

16. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2007	0	0	0	0
2008	0	0	0	0
2009	0	0	0	0
2010	0	0	0	0
2011	0	0	0	0

17. (Standard Research Target) Number of Patents

Expected Patents

2007 : 0 2008 : 0 2009 : 0 2010 : 0 2011 : 0

18. Output measures

Output Target

Journal publications

2007: 12 2008: 12 2009: 12 2010: 12 2011: 12

Output Target

Newspaper, magazine, and other non peer reviewed publications.

2007: 15 2008: 15 2009: 15 2010: 15 2011: 15

Output Target

Abstracts and conference presentations.

2007: 12 2008: 12 2009: 12 2010: 12 2011: 12

Outcomes for the Program

19. Outcome measures

Outcome Text: Awareness created

Outcome Target

{NO DATA ENTERED}

Outcome Type:

2007: {NO DATA ENTERED} 2008: {NO DATA ENTERED} 2009: {NO DATA ENTERED} 2010: {NO DATA ENTERED} 2011: {NO DATA ENTERED}

20. External factors which may affect outcomes

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

Description

Typhoons are always possible on Guam and may delay advances of research.

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

21. Evaluation studies planned

- During (during program)

Description

Program will be avaluated every year

22. Data Collection Methods

- Sampling
- Observation
- Tests

Description

Research data will be collected and analyzed according to the standard methods.

1. Name of the Planned Program

Sustain, Protect, and Manage Guam's Natural Environment and Resources.

2. Program knowledge areas

- 403 55% Waste Disposal, Recycling, and Reuse
- 111 10% Conservation and Efficient Use of Water
- 102 35% Soil, Plant, Water, Nutrient Relationships

3. Program existence : Mature (More then five years)

4. Program duration : Long-Term (More than five years)

5. Brief summary about Planned Program

With less than 1% of arable land on Guam and just a handful of truly commercial farms, AES research efforts concentrate on the protection of natural environment. Major areas addressed by research include: agricultural waste management, forest resource management, nutrient management, soil erosion, soil quality, biological diversity, rehabilitation of degraded soils, and water use efficiency. Research efforts into preserving, protecting, and renewing Guam's natural resources continue to be an area of focus. This planned program will strengthen our capabilities in management of agricultural and natural resources, and to manage the impacts of human activities in ecosystems and mitigate environment and waste management problems.

6. Situation and priorities

Guam is a home for 170,000 inhabitants as well as tourist destination, mostly from Asia. The sustainability of natural resources, its use and management is vital for maintaining prosperity of the island. Increased tourism as well as systematic increase of consumption on the island resulted in some harm to the environment as well as increased production of waste. For example, parts of coral reef around Guam are severely damaged and existing landfill is overloaded. A new landfill has to be constructed regardless of strong opposition from residents who do not trust its safety. Effective management of the environment and natural resources must balance competing interests. Developing and applying sound management strategies, combined with thorough understanding of complex interdependences of natural systems, can yield sustainable benefits from land resources and urban development. AES will focus on development of knowledge base that achieves maximum benefits from natural resources. Through advances in scientific knowledge and effective application of that knowledge. AES can help in achieving harmony between economic growth and preservation of Guam's precious natural resources.

7. Assumptions made for the Program

At least one qualified researcher and supporting staff is available.
Additional external funds and other resources are available.
Partnerships with other agencies such as NRCS and other universities will continue, will coordinate efforts and share resources.
Basic Information on best management practices exists for the management of natural resources.
Government and other stakeholders are willing to implement best management practices.

8. Ultimate goal(s) of this Program

Guam achieves the balance between urban development and sustainability of natural resources.

9. Scope of Program

- In-State Research

Inputs for the Program

10. Expending formula funds or state-matching funds : Yes

11. Expending other then formula funds or state-matching funds : Yes

12. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2007	0.0	0.0	2.0	0.0
2008	0.0	0.0	2.0	0.0
2009	0.0	0.0	2.0	0.0
2010	0.0	0.0	2.0	0.0
2011	0.0	0.0	2.0	0.0

Outputs for the Program

13. Activity (What will be done?)

Improve soil quality for agriculture productivity and for controlling soil erosion from the agriculture lands.

Improve watershed management and use of Vetiver-grass Systems to mitigate soil erosion, and sedimentation to stop coral reef degradation.

Develop an organic waste management strategy for the island of Guam.

Use of composted organic waste to increase organic matter content for improving soil physical properties in order to reduce soil erosion.

Use plant residue surface management to reduce runoff in order to control soil erosion.

Improve efficiency of irrigation that will result in the reduction of used water.

14. Type(s) of methods to be used to reach direct and indirect contacts

Extension	
Direct Methods	Indirect Methods
• {NO DATA ENTERED}	• {NO DATA ENTERED}

15. Description of targeted audience

This program does not have formal extension component.

16. Standard output measures

Target for the number of persons(contacts) to be reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
2007	0	0	0	0
2008	0	0	0	0
2009	0	0	0	0
2010	0	0	0	0
2011	0	0	0	0

17. (Standard Research Target) Number of Patents

Expected Patents

2007 : 0 2008 : 0 2009 : 0 2010 : 0 2011 : 0

18. Output measures

Output Target

Conference Presentations

2007: 4 2008: 4 2009: 4 2010: 4 2011: 4

Output Target

Journal Publications

2007: 4 2008: 4 2009: 4 2010: 4 2011: 4

Output Target

Newspaper, magazine and other non peer reviewed publications.

2007: 4 2008: 4 2009: 4 2010: 4 2011: 4

Outcomes for the Program

19. Outcome measures

Outcome Text: Awareness created

Outcome Target

{NO DATA ENTERED}

Outcome Type:

2007: {NO DATA ENTERED} 2008: {NO DATA ENTERED} 2009: {NO DATA ENTERED} 2010: {NO DATA ENTERED} 2011: {NO DATA ENTERED}

20. External factors which may affect outcomes

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

Description

Natural disasters such as typhoons do occur on Guam frequently. Damage to research plots, and equipment can be very extensive. When the economy is poor, funding decreases. Such a small institution as UOG/AES feels impact of financial difficulties very suddenly.

21. Evaluation studies planned

- Before-After (before and after program)
- During (during program)

Description

Program is long term. Journal and other types of publications measure its success.

22. Data Collection Methods

- Sampling
- Observation
- Journals

Description

Typical for basic and applied research.