

**Pacific Islands Assistantship
Guam
Project Plan for David Burdick
Updated May 17, 2004**

Introduction

The Pacific Islands Technical Assistant for Guam provides support to the Guam Coastal Management Program (GCMP), the University of Guam (UOG) Marine Laboratory, and other Guam government agencies, in integrating quality spatial data into new and existing applications, while also supporting grant projects involving spatial data and providing training to agency staff and UOG students utilizing spatial data and Geographic Information Systems (GIS). The 2004-2006 assistant will continue projects initiated during the previous (2001-2003) assistant's tenure as well as begin new projects designed to further increase GIS capacity and spatial data quality within Guam's coastal management community.

Mentorship for the 2004-2006 assistant will be administered jointly by Evangeline Lujan, the GIS Manager/Acting Administrator for the GCMP, and Dr. Mark Tupper, Associate Professor at the UOG Marine Lab. The GCMP, housed within the Government of Guam's Bureau of Statistics and Plans, administers the Coastal Zone Management Act (CZMA) and works with various local and federal agencies to manage and protect the island's valuable coastal and marine resources. The University of Guam Marine Laboratory, established as a research unit of the University of Guam in 1970, is an internationally-renown institution that plays an important role in local, national, and regional research. The UOG Marine Lab conducts basic and applied research on the biology of tropical marine organisms, with an emphasis on the conservation and development of marine resources of the near-shore waters of Guam and Micronesia. In addition to providing services within the GCMP and UOG Marine Lab, training and support will also be provided to GCMP networking agencies, including the Department of Agriculture, Department of Public Works, Department of Land Management, Department of Parks and Recreation, UOG's Water and Environmental Research Institute, and Guam Environmental Protection Agency. These services will not necessarily be limited to the GCMP, UOG Marine Lab, and networking agencies, however, as they may also be provided to other agencies, including the Department of Civil Defense, Guam Water Authority, Guam Power Authority, and the Department of Mental Health and Substance Abuse.

Goals for the assistantship include increased GIS capacity within the UOG Marine Lab, the GCMP and its networking agencies, support for grant projects involving spatial data, and enhanced spatial data quality, quantity and access. These goals were developed with certain long-term effects in mind, including educated staff that can perpetuate the use of GIS in their respective agencies, improved resource management capacity resulting from better spatial information, and ultimately, the improvement in resource quantity/quality resulting from better management decisions. Specific, measurable objectives were developed for each goal. These include:

Goal: Increased GIS capacity

Objectives:

- To have at least one person per networking agency capable of using GIS for daily procedures and for management decision-making
- To have at least two UOG students/Research Assistants each year capable of using GIS for marine/coastal research

Goal: Support grant projects involving spatial data

Objectives:

- To produce Essential Fish Habitat maps for 5 reef fish species at two Marine Protected Areas and two control sites on Guam, Palau, Pohnpei, and Kosrae
- To produce a Coral Reef Atlas in CD and printed formats

Goal: Enhanced spatial data quality and access

Objectives:

- To help facilitate the creation of spatial data standards for Guam
- To produce a CD containing all applicable spatial data for Guam's coastal and resource managers and educational institutions, complete with metadata and data standards
- To update Guam's ArcIMS site

The following projects were developed in order to meet the objectives outlined above. Some projects are intentionally broad and may include several related tasks. This list should not be considered complete, as new projects may emerge throughout the assistantship. These changes will be reflected in future versions of the project plan.

Project List

1. Weekly training sessions
2. Agency-specific training and support, hardware/software installation and support
3. Introductory GIS/Coastal Applications of GIS course for UOG Marine Biology graduate students
4. Assist with Essential Fish Habitat mapping on Guam, Palau, Kosrae, and Pohnpei
5. Assist with coastal erosion monitoring, mitigation and management
6. Facilitate creation of spatial data standards
7. Assist with Introductory GIS and Coastal Applications of GIS courses offered by the NOAA Coastal Services Center on Guam
8. Production of the Guam Coral Reef Atlas
9. Assist in coral reef protection, management, monitoring, and information analysis
10. Update ArcIMS site
11. Production of Guam spatial data CD

Project Descriptions

Project 1: Weekly training sessions

Training sessions are held weekly to provide training to GCMP as well as networking agency staff that are currently using GIS or are interested in using GIS. Each training session provides an opportunity to discuss current GIS-related problems, offer new applications of GIS, and provide training on a wide array of skills/topics. The goal of the weekly training is to increase GIS capacity within the networking agencies and increase awareness of new applications of GIS that may benefit existing or future projects. The previous technical assistant for Guam provided weekly training sessions for part of 2002, but due to extenuating circumstances, training sessions did not occur during 2003. A needs-assessment involving informal interviews and a questionnaire was performed prior to the commencement of the new round of training. Results of the needs assessment indicated a wide range of GIS experience, suggesting the need for training sessions that would accommodate users with different skill levels. Training sessions are held at the same time each week; attendees are informed in advance about the content of up-coming sessions. Each session typically lasts 1-2 hours, but is not necessarily limited to this time frame. Teaching materials, including PowerPoint presentations and lecture notes are made available upon request. These materials may be posted on the GCMP website for easier access in the near future.

Project 1	Weekly training sessions
Activity	<ul style="list-style-type: none">▪ Development of teaching materials, including presentations and lecture notes▪ Provide weekly training sessions for the staff of GCMP and networking agencies
Deliverable(s)	<ul style="list-style-type: none">▪ Weekly training sessions▪ Teaching materials▪ Database of participants, including name, agency, training dates, and training session topics
Date	On-going; to be completed at end of assistantship

Project 2: Agency-specific training/support

Several networking agencies have recently acquired, or are in the process of acquiring, ESRI's ArcGIS software; however, most of the staff are unfamiliar with these products. Because not all the staff that will be using ArcGIS software will be able to attend the weekly training sessions, more extensive, one or two-day introductory training sessions may be provided to interested agencies. If necessary, the training will provide the trainees the ability to perform basic ArcGIS functions, including importing, viewing, and querying data. Some editing skills, including updating a database, will be covered. These training sessions will be tailored to meet the needs of each agency. It is not yet clear whether this training will be provided at a regular interval (e.g. quarterly) or on an as-needed basis. In addition to the introductory training, the assistant will

provide technical support, including hardware and software installation.

Although no formal training has occurred prior to the composition of this project plan draft, ArcView 8.3 has been installed on 11 Department of Public Works (DPW) computers and training will likely occur in the near future. The assistant may not be required to play a large role in GIS training or maintenance with DPW and possibly other agencies, as a contractor is currently being sought to provide these services.

Project 2	Agency-specific training/support
Activity	<ul style="list-style-type: none"> ▪ Hardware/software installation ▪ One or two-day introductory GIS training sessions
Deliverable(s)	<ul style="list-style-type: none"> ▪ Training sessions ▪ Training materials
Date	Quarterly or on an as-needed basis throughout duration of assistantship

Project 3: Introductory GIS/ Coastal Applications of GIS course for UOG Marine Biology graduate students

The assistant will develop and teach a one-credit hour course to students within the UOG Marine Biology Graduate Program. UOG faculty and staff will also be encouraged to attend. The course will provide introductory training as well as coastal applications training, with emphasis on applications related to the students’ thesis research projects. The goal of the course is to demonstrate the range of capabilities of a GIS within the realm of marine science research and encourage more widespread use of GIS in this field. It has not yet been determined when the course will be offered, but will most likely occur during the summers of 2004 and 2005.

Project 3	GIS course for UOG graduate students
Activity	<ul style="list-style-type: none"> ▪ Development of teaching materials ▪ Course instruction
Deliverable(s)	<ul style="list-style-type: none"> ▪ Teaching materials ▪ Course instruction
Date	TBD – possibly summers of 2004 and 2005

Project 4: Assist with Essential Fish Habitat (EFH) mapping

The assistant will provide support for Dr. Mark Tupper on projects involving the mapping of Essential Fish Habitat at two marine protected areas and two control sites in Guam, Kosrae, Palau, and Pohnpei. Sites designated as Essential Fish Habitat are specific habitats utilized by target fish species (in this case, Humphead Wrasse and four species of groupers) at various stages in their life

history. These sites are identified using local knowledge and extensive exploration and surveying. If possible, the assistant will participate in field excursions to Palau, Kosrae, and Pohnpei, during which GPS will be used to map the boundaries of previously identified as well as new EFH sites. These data will be imported into a GIS and used to create EFH data layers. Interpretation of IKONOS satellite imagery will also be required to classify benthic habitat types in and around the EFH sites. Maps of EFH sites at all locations will be produced using the collection of data layers.

The data layers and maps will be used for research, management, and outreach and education endeavors.

Project 4	
Assist with EFH mapping	
Activity	<ul style="list-style-type: none"> ▪ Collect data with GPS, participate in fish surveys and investigate potential EFH sites during field excursions to Palau and/or Kosrae ▪ Create GIS layers using GPS and fish survey data ▪ Produce maps of EFH sites for Guam, Palau, Kosrae, and Pohnpei
Deliverable(s)	<ul style="list-style-type: none"> ▪ GIS layers with EFH location, attribute information, and metadata ▪ Maps of EFH sites for each location
Date	TBD

Project 5: Coastal erosion monitoring, mitigation and management support

The assistant will provide GIS support and will participate in the management process with the GCMP and other agencies involved in coastal erosion mitigation and management. Assistance has already been provided in the development of an emergency plan to prevent damage to important public assets (e.g. roads, facilities, land) at Talofof Bay as a result of accelerated rates of erosion.

The assistant participated in shoreline change data collection using GPS, provided input into an emergency plan, participated in multi-agency meetings, and provided some level of oversight during the construction of the erosion-control structure. Short-term plans for Talofof Bay (over the course of the next year) will include the creation of a technical advisory group comprised of local and off-island engineers, geologists, hydrologists, and other experts to develop a long-term restoration project. Long-term plans may involve altering/removing existing anthropogenic structures to restore the bay’s natural physical and biological processes and providing landscaping in an attempt to stabilize the sediment and restore the park’s aesthetic appeal. The assistant will continue to monitor shoreline change at Talofof Bay and other sites, and will participate in further mitigation and management activities if the need arises.

Project 5	Coastal erosion monitoring, mitigation and management support
Activity	<ul style="list-style-type: none"> ▪ Monitor shoreline change using data collected with GPS at sites exhibiting accelerated rates of erosion ▪ Assist in the development of an emergency mitigation plan for Talofofo Bay ▪ Assist in development of long-term shoreline restabilization plan for Talofofo Bay
Deliverable(s)	<ul style="list-style-type: none"> ▪ Multi-agency meetings ▪ Shoreline change data layers for Talofofo Bay and other erosion-prone sites prone ▪ Summary Report
Date	End of assistantship

Project 6: Facilitate creation of spatial data standards

Although spatial data and GIS has been used on Guam for several years, spatial data standards have not yet been adopted. Spatial data standards, including standards for data format, spatial reference system, and metadata are necessary for efficient and effective creation, implementation, and sharing of spatial data between agencies and other spatial data users on Guam. The assistant will work closely with the GIS-user community on Guam to establish spatial data standards. In order to increase the compatibility of Guam’s spatial data among other U.S. territories, states, and commonwealths, as well as among other nations, Guam’s spatial data standards will, to the extent that it is feasible, incorporate federal and international spatial data standards.

Project 6	Assist in development of spatial data standards
Activity	Facilitate creation of spatial data standards for Guam
Deliverable(s)	Spatial data standards
Date	TBD

Project 7: Assist with courses offered by the NOAA Coastal Services Center on Guam

The assistant will provide support to ESRI-authorized GIS trainers from the NOAA Coastal Services Center when courses are provided on Guam. Trainers from the Coastal Services Center were brought to Guam in June, 2002, but the recent surge in interest in GIS has increased the need for additional training on Guam. Currently, Introduction to ArcGIS 8.3 and Coastal Applications of GIS are scheduled to occur on Guam during the week of May 24th, 2004. The assistant will help orient the trainers to Guam, set up equipment and provide assistance during the actual training.

Project 7	Assist with GIS courses offered by the NOAA Coastal Services Center on Guam
Activity	<ul style="list-style-type: none"> ▪ Orient trainers to Guam, facilitate introductions, etc. ▪ Assist with hardware/software set up ▪ Provide support during training
Deliverable(s)	
Date	May 28 th , 2004

Project 8: Coral Reef Atlas

The Guam Coral Reef Atlas will be an updated version of the *Atlas of the Reefs and Beaches of Guam*, published in 1976 by R. H. Randall and L. G. Eldridge. This atlas contained black and white, hand-drawn maps of selected stretches of coastline; the location and extent of beaches and benthic habitat types were interpreted from aerial photographs. The updated atlas will consist of a series of maps comprising Guam's entire coastline created using IKONOS imagery, aerial photographs, and a GIS. Recently acquired draft benthic habitat data created by NOAA will be utilized in the atlas, although further verification of benthic habitat classifications using photographs captured during low-altitude aerial surveys and *in situ* surveys may also be utilized; however, time constraints may restrict verification surveys. Additional GIS data, including marine protected areas, spawning aggregations, and Essential Fish Habitat sites, may also be included on the maps (although it may be determined that certain sensitive sites should not be included in the maps). Marine protected areas, including the Piti Bomb Holes, Achang Reef Flat, Tumon Bay, and Pati Point Marine preserves will be mapped using relatively small minimum map units (yet to be determined), while the rest of Guam's coastline and reefs will be mapped using larger map units (also yet to be determined).

Work by the previous technical assistant, including a detailed benthic habitat map of Cocos Lagoon completed as part of a pilot study for NOAA's Benthic Habitat Mapping Project on Guam, will also be utilized in the Guam Coral Reef Atlas. A grant proposal for the updated atlas had already been submitted and funds have been available for the purchase of necessary equipment (plotter, software, etc.), but due to extenuating circumstances (mainly, typhoons), little progress has been made. Presently, any previous work is being gathered and a needs assessment is being conducted to determine what equipment will be necessary and what data layers need to be created.

Project 8	Coral Reef Atlas
Activity	<ul style="list-style-type: none"> ▪ Collection/assessment of previous work ▪ Needs assessment ▪ Habitat digitization ▪ Map production ▪ Atlas production in CD and hard copy formats
Deliverable(s)	<ul style="list-style-type: none"> ▪ Guam Coral Reef Atlas
Date	Draft version in September, 2004

Project 9: Assist in coral reef protection, management, monitoring, and information analysis

Another responsibility of the assistant is to assist with coral reef management and monitoring activities, particularly U.S. Coral Reef Task Force directives. The assistant will provide GIS support and information analysis as needed, but may also participate in meetings, workshops, etc. regarding the management of Guam’s coral reefs. The assistant is currently participating in the production of the 2002-2004 NOAA State of the Reefs Report for Guam, by attending regular meetings, composing a section of the report concerning coastal development and runoff, and reviewing and providing comments on drafts of the report. The assistant has also participated in meetings aimed at developing a scope of work for a coral reef valuation study that will be funded by NOAA. The scoping phase of the study is being guided by John Dixon, a renowned environmental economist, but the study itself will be conducted by company/organization selected through a bidding process. Although it is not yet clear, the assistant may also be required to provide support during the actual study.

Project 9	Assist in coral reef protection, management, monitoring, and information analysis
Activity	<ul style="list-style-type: none"> ▪ Assist with development of the 2002-2004 NOAA State of the Reefs Report ▪ Assist with development of scope of work for coral reef valuation study
Deliverable(s)	<ul style="list-style-type: none"> ▪ 2002-2004 State of the Reef Report meetings ▪ 2002-2004 State of the Reef Report ▪ Coral reef valuation study meetings
Date	<ul style="list-style-type: none"> ▪ State of Reefs Report meetings – end April 13, 2004 ▪ Coral reef valuation study scope of work meetings – end April 8, 2004

Project 10: Update ArcIMS site

An ArcIMS Website was create in 2001 by the Bureau of Statistics and Plans with assistance from the Management Information Services of the Superior Court of Guam to provide public access to

GIS data for Guam. The overall design of the site will be updated and the site will be revised to accommodate new data and changing needs of the GIS user community.

Project 10	Update ArcIMS site
Activity	Revision of ArcIMS site
Deliverable(s)	Revised version of ArcIMS Website
Date	TBD

Project 11: Production of Guam spatial data CD

A CD product containing all available spatial data layers and the associated metadata will be produced in order to facilitate data distribution to Guam’s GIS user community. All spatial data available for Guam will first be inventoried and their quality assessed. Metadata for all data will be created or revised as necessary. All data will be projected in Guam 93 or WGS 84. The data will be organized on the CD using an html/java script framework, possibly including interactive maps, data previews, and other features increasing the product’s functionality and ease of use.

Project 10	Update ArcIMS site
Activity	<ul style="list-style-type: none"> ▪ Inventory all spatial data available for Guam ▪ Assessment of spatial data quality, including metadata ▪ Creation/revision of metadata ▪ Creation of html/java script framework ▪ Production of CD
Deliverable(s)	Guam spatial data CD
Date	TBD

Professional Development Allowance

Travel Events and Cost:

Event (including location)	Dates	Estimated Cost
Technical Training in Charleston, SC*	May 10-14, 2004	\$2700
All Islands Management Meeting in Saipan, CNMI / 22 nd Annual Pacific Islands Environment Conference*	June 21-25, 2004	\$700
International Coral Reef Symposium in Okinawa, Japan	June 28-July 2, 2004	\$2100
ESRI International Users Conference in San Diego, California '04	August 9-13, 2004	
Coastal Zone Asia Pacific Conference in Brisbane, Australia	Sept 5-9, 2004	
GeoTools '05 in Myrtle Beach, SC*	March 2005	\$2500
All Islands Management Meeting*	Summer 2005	TBD
Coastal Zone '05 Conference in New Orleans, LA	July, 2005	TBD
ESRI International Users Conference in San Diego, California '05	August, 2005	TBD

*Denotes required events

Potential Training opportunities:

ESRI Virtual Campus: 3D analyst, Spatial analyst, Conservation GIS, Hydrology, Understanding Map Projections and Coordinate Systems, ArcIMS
Data base training (Oracle?)

Additional Costs:

Training materials: \$245.00

- Book: Geographic Information Systems and Science
- Book: Getting to know ArcGIS Desktop
- Book: Marine and Coastal Geographic Information Systems
- Book: Marine Geography: GIS for the Oceans and Seas
- Book: Undersea with GIS
- Book: Using ArcGIS Spatial Analyst
- Book: Using ArcToolbox

Approval

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