

The NOAA Pacific Islands Assistantship
Program at Work on Guam: Spatial
Technology Support and Local Capacity
Building Within Guam's Coastal
Management Community

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THE NOAA PACIFIC ISLANDS ASSISTANTSHIP PROGRAM AT WORK ON GUAM: SPATIAL TECHNOLOGY SUPPORT AND LOCAL CAPACITY BUILDING WITHIN GUAM'S COASTAL MANAGEMENT COMMUNITY

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OVERVIEW OF NOAA PACIFIC ISLANDS ASSISTANTSHIP PROGRAM

The National Oceanic and Atmospheric Administration's (NOAA) Pacific Islands Assistantship (PIA) program was established in 2001 to provide on-site support for the integration of technology with coastal and marine resource protection and management within the coastal management programs of Hawai'i, Guam, American Samoa, and the Commonwealth of the Northern Marianas (CNMI). The PIA program matches highly qualified recipients of professional degrees in geography, environmental studies, marine affairs, urban and regional planning, or related fields, with hosts from the four Pacific Island coastal resource management organizations. The assistants are also required to have experience using Geographic Information Systems (GIS), the Global Positioning System (GPS), and other geospatial technologies; experience working in multicultural teams and living in remote locations is also desired. New assistants are placed at each location every two years for two-year terms. The assistants receive a salary, benefits, and relocation and travel/professional development funds.

The type of projects with which each assistant is involved depends on the needs of the programs and partners. The first round of assistants, who served from 2001 to 2003, focused on integrating technology tools, such as GIS, remote sensing, and GPS, into Pacific Island coastal program management. The 2004-2006 assistants are focusing on similar needs with some programs requiring a greater emphasis on land-use planning and application development.

On-island support is provided to the assistant by the technical manager for each coastal resource management organization, who serves as a mentor to the assistant throughout the duration of the assistantship. The technical manager provides support on project-specific issues and helps to integrate the assistant into the daily life of the organization. In addition to the support provided by their mentors and other resources on-island, the assistants also benefit from the NOAA Pacific Services Center and the NOAA Coastal Services Center, which offer administrative support, technical and process skills training, and technical support.

NOAA PACIFIC ISLANDS ASSISTANTSHIP PROGRAM ON GUAM

The Pacific Islands Assistant for Guam provides support to the Guam Coastal

Management Program (GCMP), the University of Guam (UOG) Marine Laboratory, and other Government of Guam 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 GIS. The 2004-2006 assistant is continuing projects initiated during the previous (2001-2003) assistant's tenure as well as beginning new projects designed to further increase GIS capacity and spatial data quality within Guam's coastal management community.

Mentorship for the 2004-2006 assistant is administered jointly by Evangeline Lujan, the Administrator for the GCMP, and Dr. Mark Tupper, an Associate Professor at the UOG Marine Lab. The GCMP, housed within the Government of Guam's Bureau of Statistics and Plans, administers the United States Coastal Zone Management Act and works with various local and federal agencies to manage and protect the island's 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 to the GCMP and UOG Marine Lab, training and support is also 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 the Guam Environmental Protection Agency. Additionally, some support is also 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.

Specific goals for the 2004-2006 assistantship include increased GIS capacity within the UOG Marine Lab and the GCMP and its networking agencies, support for University of Guam Marine Lab coastal mapping/research projects, 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 and quality resulting from better management decisions.

CURRENT PROJECTS ON GUAM

One of the primary goals of the assistant on Guam is to strengthen and expand spatial technology capacity within the coastal management community and to increase awareness of new applications of GIS that may benefit existing or future projects. In order to achieve this goal, several training-focused projects are currently underway or are in development for future implementation. Training sessions are currently held weekly to provide training to GCMP as well as networking agency staff that are currently using, or

interested in using, spatial information technologies. Because of its widespread use and user-friendly interface, Environmental Systems Research Institute's (ESRI) suite of ArcGIS software is the main focus of the training sessions. Each training session provides an opportunity to discuss current GIS-related problems, provide training on a wide array of skills/topics, and offer new applications of GIS. The sessions also serve as an opportunity for employees from various agencies to interact with each other on a regular basis, thus facilitating data and information exchange as well as forming and strengthening working relationships. Training sessions are held at the same time each week; attendees are informed in advance about the content of up-coming sessions. The assistant is also developing a one-credit hour GIS course for UOG graduate students. The course will provide introductory GIS 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.

The assistant also provides support for coastal mapping/research projects, including a coastal atlas for Guam and Essential Fish Habitat mapping in Palau, Guam, and other Western Pacific locations. Support is provided to Dr. Mark Tupper for 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. The assistant's primary contribution to the Essential Fish Habitat Mapping project is the development of benthic habitat data for each of the locations mentioned above. These data, created using recently acquired IKONOS imagery and validated with ground-truthing surveys, will be incorporated into a model in combination with fish survey data to identify habitats utilized by certain species at various stages in their life history.

The Guam Coastal 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. The *Atlas of the Reefs and Beaches of Guam* 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 focus primarily on benthic habitat information and will consist of a series of maps comprising Guam's entire coastline created using pan-sharpened 2004 IKONOS imagery and ArcGIS. Recently acquired draft benthic habitat data created by NOAA's Biogeography Program is being utilized in the atlas, although extensive ground-truthing surveys are presently being conducted within several of Guam's marine preserves in order to attain benthic habitat data with greater resolution and improved accuracy for these sites. Additional information, including marine protected area boundaries, point-source pollution sites, and Essential Fish Habitat sites, may also be included on the maps. The benthic habitats of marine protected areas, including the Piti Bomb Holes, Achang Reef Flat, Tumon Bay, and Pati Point Marine preserves, as well as habitat within the shallow waters of the reef flat, will

be mapped at a larger scale (1:5000) and will use a relatively small minimum map unit (approx. 1/10 acre), while the rest of Guam's coastline and reefs will be mapped at a smaller scale (1:15000) and will use larger map units (approx. 1 acre).

The assistant also provides GIS support and participates in management activities 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 Talofofo 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. The assistant will continue to monitor shoreline change at Talofofo Bay and other sites, and will participate in further mitigation and management activities if the need arises.

Another responsibility of the assistant is to support coral reef management and monitoring activities, particularly U.S. Coral Reef Task Force directives. The assistant provides GIS support and information analysis as needed, but also participates in meetings and workshops regarding the management of Guam's coral reefs. The assistant has participated 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 draft versions 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.

Although spatial data and GIS has been used on Guam for several years, official spatial data standards have not yet been adopted. Spatial data standards, such as 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.

A compact disc 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 then be created or revised as necessary. All data will use the projection the GIS user community of Guam chooses as the standard projection. 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

SUMMARY AND RECOMMENDATIONS

Since 2001, the NOAA Pacific Islands Assistantship program has provided a range of valuable services to the coastal management communities of Hawai'i, Guam, the CNMI, and American Samoa by providing the islands with highly trained technical assistants. By integrating new technologies, particularly emerging geospatial technologies, into the islands' coastal management programs, the assistantship program aims to help the islands to better manage and protect their coastal and marine resources. In addition to providing support for each state/territory, the assistantship program fosters the assistant's professional development through guidance by one or more mentors and with funding for attending conferences, workshops, and other training opportunities.

The 2004-2006 Pacific Islands assistant on Guam is continuing to build and expand upon the groundwork established by the 2001-2003 assistant, focusing on building GIS capacity within the Guam Coastal Management Program and its networking agencies and offering new applications of GIS and other geospatial technologies to improve the agencies' effectiveness and efficiency. The assistant's support on projects such as the Guam Coral Reef Atlas and Essential Fish Habitat mapping on Guam and throughout Micronesia will help produce relevant, quality products using the latest available technologies, while the development of spatial data standards, a spatial data CD product, and an updated ArcIMS site, will help improve the quality, quantity, and distribution of spatial data on Guam.

Although still a relatively young program, the NOAA Pacific Islands Assistantship Program can serve as a model to other organizations interested in increasing technical capacity within their coastal management communities, with the goal of improving the management of their vital coastal resources.

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