



# HIGICC newsletter

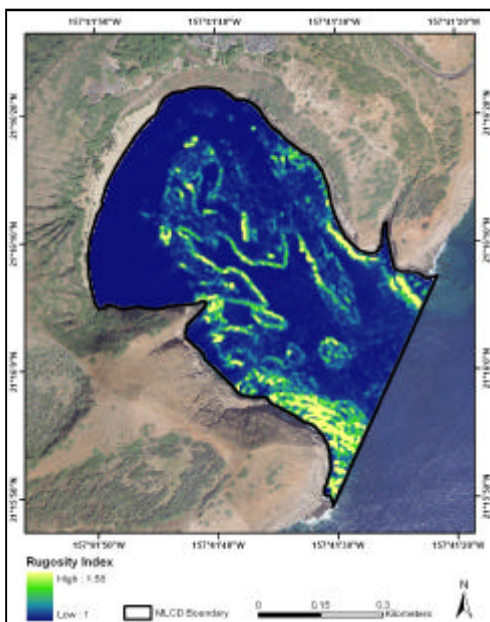
Volume 2, Issue 1 March 2008

## HIGICC Scholarship Awardee Uses GIS & Remote Sensing for Coral Reef Management Applications

*President's Note: Ms. Lisa Wedding, who is getting her Ph.D. at UH Manoa, was our recipient of the 2007-08 HIGICC scholarship. Below Lisa gives us a brief summary of her activities using GIS and remote sensing as tools to complete her research as a graduate student.*

I have had the opportunity to utilize GIS in many capacities for my work as a graduate research assistant with the NOAA Biogeography Branch and during my dissertation research at the UH Department of Geography. The research for my dissertation extensively involves the use of GIS and remote sensing for coral reef research and management applications. Considering the economic, cultural and biological resources that coral reefs provide to Hawaii residents, it is important to apply new geospatial approaches that will provide decision support for the best management of our important coastal resources.

As part of my graduate studies, I recently completed a pilot study at Hanauma Bay to (1) determine if remotely sensed LIDAR (Light Detection and Ranging) data can provide a measure of habitat complexity on a coral reef and (2) to evaluate the relationship between LIDAR-derived rugosity and fish assemblage structure (e.g. abundance, diversity, richness, and biomass). Many scientists believe that habitat complexity is an important measure of the seascape because it



plays an important role in structuring fish assemblages in the marine environment. Complex benthic habitat harbors a greater abundance of fishes, represents important biodiversity hotspots, and has significant implications for conservation and management.

I used the benthic habitat maps created by the NOAA

Biogeography Branch to guide our stratified random sampling design for the fish surveys ([http://ccma.nos.noaa.gov/ecosystems/coralreef/main8hi\\_mapping.html](http://ccma.nos.noaa.gov/ecosystems/coralreef/main8hi_mapping.html)). Random points were generated in order to collect fish assemblage data at transect locations, and fish surveys were conducted at 33 transects in hard and soft bottom habitats in Hanauma Bay, Oahu. The in-situ rugosity was also measured using a small brass chain that was draped along the profile of the centerline of each 25 m transect.

To obtain a measure of habitat complexity, the U.S. Army Corps of Engineers Shoals LIDAR data was interpolated into a digital elevation model (DEM) at multiple grid sizes (4, 10, 15 and 25 meters). LIDAR-derived rugosity, a measure of habitat complexity, was calculated by obtaining the ratio of the seascape surface area to the planimetric area in a neighborhood analysis using the 'Benthic Terrain Modeler Tool for ArcGIS' (<http://www.csc.noaa.gov/products/btm/>). LIDAR-derived rugosity (at 4 m grid size) was found to be highly correlated with in-situ rugosity and represents a viable method for measuring rugosity in analogous coral reef environments.

LIDAR-derived habitat complexity (hard and soft bottom habitats) was found to be a good predictor of fish biomass at all spatial scales. Transect sites in hard bottom habitats alone demonstrated strong, positive correlations with LIDAR-derived habitat complexity and numerical abundance, species richness, and biomass. The results of this pilot study suggest that LIDAR derived rugosity may be used for predictive mapping of fish assemblages across a range of benthic habitat types using GIS layers (e.g. benthic habitat, LIDAR rugosity, depth). Establishing predictive relationships between LIDAR and fish assemblage structure will allow for the prediction of fisheries potential of an area by identifying specific locations that are biodiversity hotspots and offer greater natural protection to fishes through habitat structural complexity. The next step is to expand this approach to the Main Hawaiian Islands in order to use GIS to create predictive maps that can inform ecosystem evaluation, MPA design, and ultimately better conservation and management practices.



~ Lisa Wedding

# Indigenous Names Grant Awarded

The HIGICC has received a grant from the U.S. Geological Survey (USGS) NGPO (National Geospatial Program Office) to begin enhancing the Hawaii State Board on Geographic Names' (HBGN) web page (<http://www.hawaii.gov/dbedt/gis/bgn/>). In addition to some basic background information, the HBGN web page currently includes spreadsheets showing decisions made by the HBGN on Hawaiian place names.

In 1999, at the request of USGS, the HBGN began a process of reviewing every Hawaiian place name that appears on the USGS quadrangle maps for the purpose of adding diacritical marks to the names. Adding diacritical marks helps define a name as well as providing guidance on pronunciation.

Borrowing an idea that has been instituted by the Coeur d'Alene Native American tribe in Idaho, HIGICC prepared a grant proposal to USGS to fund an initiative to begin adding audio sound files to supplement the written place names on the existing HBGN web page. Representatives of the Coeur d'Alene tribe have made a number of presentations on how they have included both writ-



ten and audio versions of Native American names on their web site: <http://gis.cdatribe-nsn.gov/NativeNames/>. This idea is now being applied to Hawaiian place names.

Both the Coeur d'Alene Tribe and the Hawaiian community are facing similar issues and interests with respect to preserving native place names and the correct pronunciation of those names. The Internet is an

effective means of helping to facilitate the preservation of native names. In addition to the actual pronunciation of the names, where applicable, video clips will be added to provide further context to the names. These video clips may include legends or stories as to how a place was named, e.g., a video clip might be added to relate the story about Haleakala, which was said to be where the demigod Maui lassoed the sun. Video clips of kupuna (elders) explaining name origins may also be used to enhance the

HBGN web page.

To carry out this project, HIGICC has hired Renee Louis, who recently defended her dissertation entitled: "Hawaiian Placenames: Storied Symbols in Hawaiian Performance Cartographies." Ms. Louis, who is an HIGICC member, has also been instrumental in helping the HBGN in their efforts to review the Hawaiian place names.

~ Renee Louis and Craig Tasaka

## Did You Know?

The word "map" comes from the Latin word, "mappa", and means napkin, cloth, or sheet.



Don't forget to check out the HIGICC Website for the latest news & updates!

<http://www.higicc.org>

# A NEW LOOK FOR GIS DAY...

*"GIS Day is part of the National Geographic Society's Geography Action, a year-long initiative encompassing key educational achievements such as GIS Day and Geography Awareness Week... The National Geographic Society has sponsored Geography Awareness Week since 1987 to promote geographic literacy in schools, communities, and organizations, with a focus on the education of children..."*  
[GIS Day website](#)

Here in Honolulu, HIGICC volunteers from federal, state, county and private sectors have hosted a GIS Day event at McCoy Pavilion each year for hundreds of 4th and 5th graders from a number of public and private schools on Oahu. The event included presentations, as well as hands-on and computer-based activities. On Maui a day-long, youth focused event is held at the mall featuring

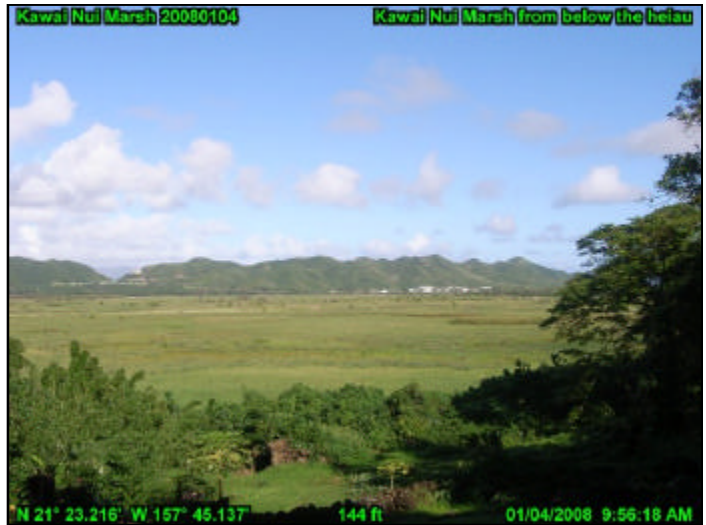
10-15 groups providing booth activities.

This year HIGICC is re-evaluating the form and content of the local GIS Day events in an effort to reach more students and to provide teachers with effective and useful tools that support classroom instruction. Our volunteers are developing fun and educational activities with geography components to bolster existing 4th and 5th grade curricula in a variety of subjects including, of course, geography. Our goals are to reinforce:

1. **map reading skills and comprehension;**
2. **an understanding of coordinate systems (in GIS and GPS);**
3. **the ability to link geographic features with data; and**
4. **the ability to recognize spatial patterns and relationships between data and features.**

Some aspects of this development will be classroom-based, others will be hands-on, suitable for field trips or discovery-based activities. We are working with a number of teachers, administrators and activity coordinators to ensure that the result is a flexible and meaningful resource for teachers, as well as a memorable educational experience for the kids.

Tentatively titled "Map Your Field Trip", we've been working with leaders of an ongoing program based at Lanikai Elementary to build a pilot Map



Your Field Trip activity set. The program combines classroom and field experiences – this year students are learning at Kawainui Marsh. Included are some pictures of the areas of the Marsh students visit, and hopefully will complete some Map You Field Trip Activities! We plan to use the activities and experience of the pilot as the foundation for a finalized curriculum.

~ Brian Loomis and Arthur Buto

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 If you are interested in either volunteering or having HIGICC visit your classroom, please contact Brian Loomis at: [Brian@Hitushawaii.com](mailto:Brian@Hitushawaii.com).  
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## Message from the President

Congratulations! HIGICC is a recipient of a \$50,000 grant from the 2008 FGDC Fifty States Initiative program. HIGICC will be working with you over the next year to develop a Strategic Plan for the Council. The kick off meeting for grant recipients is on Sunday, March 9th in Annapolis, Maryland at the NSGIC mid-year conference. The original HIGICC application is found at [www.higicc.org/strategic\\_plan.html](http://www.higicc.org/strategic_plan.html). It describes the goals of the project and the schedule we will follow. Past recipients and their projects can be viewed at: <http://www.fgdc.gov/grants/2007CAP/Category3/>



More info about the CAP grant that HIGICC was awarded will be discussed at the Data Discovery Day 2008 and in the next newsletter.

*Aloha! ~Ron Salz*

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## Schedule of Upcoming Events

- **Mar 3-5, 2008;** Developing Applications with ArcGIS Server Using the Microsoft .NET Framework, Honolulu - ESRI
  - **Mar 6, 2008;** Data Discovery Day 2008, Honolulu — HIGICC
  - **Mar 6-27, 2008;** Thursdays, 5:00 pm - 8:00 pm; 4 mtgs GIS Essentials (Using GeoMedia) - Intergraph
  - **Mar 7, 2008;** ESRI Technology Showcase - Honolulu
  - **Mar 10-11, 2008;** Introduction To ArcGIS I, Honolulu - ESRI
  - **Mar 12-14, 2008;** Introduction To ArcGIS II, Honolulu - ESRI
  - **Apr 21-22, 2008;** Introduction To ArcGIS Server, Honolulu - ESRI
  - **May 12-13, 2008;** Geodatabase Design Concepts, Honolulu - ESRI
  - **May 14-16, 2008;** Building Geodatabases, Honolulu - ESRI
  - **June 2-5, 2008;** Intergraph 2008 - Las Vegas
  - **Aug 4-8, 2008;** ESRI International User Conference (ESRI UC) - San Diego
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