



The Society for Conservation GIS

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Upcoming Events

June 18-22	ESRI 27th Annual International User Conference, San Diego, CA Service at Sea in Map Gallery and Ceremonial Launch Friday
June 25-28	SCGIS Tenth Annual Conference, Monterey, CA
July 18-20	SCGIS Kenya Inaugural Conference, Nairobi, Kenya
Aug 6-13	Course: Remote Sensing & GIS for Conservation Biology, Sao Paulo, Brazil
Sept 22-26	The Wildlife Society 14th Annual Conference, Tucson, AZ

Note from the Editor

The contributions to this issue of the newsletter are outstanding. Melissa Songer writes about how the Washington National Zoo's Conservation GIS Laboratory is assisting colleagues in China in applying GIS technologies for research and reserve management. Jose Beltran, a former SCGIS scholar, writes about the new Biosphere Reserve at Bahia de Los Angeles in Baja California. Also in this newsletter are articles from SCGIS members volunteering around the world: Lisa Pierce in Thailand; John Schaeffer and Patti Bailey in Mexico.

I recently completed my first volunteer training assignment, for The Nature Conservancy in Brazil. This newsletter contains an account of this experience, as well as articles from class participants describing their innovative work in South America. Read up on Galapagos Cartography, Pacific Coastal Habitat Mapping, and Brazil's Legal Reserve Strategy.

My volunteer training opportunity was facilitated by SCGIS, and I think about how we can facilitate future volunteer efforts by SCGIS members. Similar lines of thought are occurring throughout SCGIS: how can we make it easier to match resources with needs? Don't miss the article from Leslie Backus about one effort underway to organize SCGIS volunteers.

It has never been easier for a Conservation GIS professional to volunteer their services. Through the GISCorps, I'm currently advising a graduate student in Pakistan remotely by email and Skype. The GISCorps draws from a database of over 1,000 volunteers when contacted for assistance. Could SCGIS to develop a similar system or share information with GISCorps?

These are interesting questions to ponder during the ESRI and SCGIS conferences. At the ESRI User Conference, don't miss Service at Sea's Special Exhibit in the Map Gallery, or the Ceremonial Launch on Friday 22. Service at Sea is an innovative ship-based way to bring GIS support where it is needed around the world.

This will be my last issue as e-Newsletter editor. It has been a great opportunity and privilege for me to serve SCGIS and the Conservation community through this newsletter over the past

Membership Address

Dear SCGIS Members,

This year's SCGIS conference theme is *Community Building*, a very appropriate one given the origins and deeper meaning of this common expression. The English word "community" is comprised of three elements: "com", a Latin prefix meaning with or together; "munis", meaning the exchanges that link; and "tatus", a suffix suggesting that something is small or intimate. The expression *Community Building* then, in the context of the SCGIS conference and the organization as a whole, could be loosely interpreted as enhancing the relationships that bind this small and intimate group of conservationists.

Building community is obviously what we're all here for. Each year we gather for a few short days in an intimate setting such as the Asilomar Conference Grounds, to build new relationships, and enhance existing ones. When we all disperse again to our respective workplaces scattered across the globe, those links will remain. They help sustain us, our technology, and our conservation efforts until we meet again.

This year, at the 10th annual SCGIS conference, I will be keeping this in mind while participating in the sessions, greeting old friends, and making new ones. GIS conferences, workshops, papers and projects abound, but opportunities for true community building are rare and special.

Enjoy the conference everyone, and don't be a stranger!

Mark van Bakel
Vice President, SCGIS Board of Directors

four years. August Froehlich, SCGIS Communications Committee Chair, will be the new newsletter editor, and I will continue to assist as needed, and hope to work on other publications for SCGIS. Thanks to all who have contributed material to the newsletter – it really makes a difference!

Miguel Garriga
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SCGIS International Outreach and Network Program

Leslie Backus, SCGIS Advisory Board.

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The Society for Conservation GIS's (SCGIS) new international outreach program is an evolving model program which would send professional volunteers globally to non-profit conservation organizations to aid in GIS training as well as a host of other conservation based assistance (field/conservation/data collection/statistical analysis/grant writing). This program is directed at assisting non-profit organizations developing new or already existing GIS-conservation program. Currently, we have an ongoing international scholarship program which enables scholars from international countries to come to the United States for GIS training. This program has been incredibly successful both in the capacity to train these scholars in GIS and also in networking individuals on a global scale. Most of our scholars stay in touch with each other over many years and some are even returning to the United States for additional training.

We are looking to develop a new program to go hand-in-hand with our existing international scholarship program. We are interested in developing a program where we would send SCGIS representatives (scientists and trained GIS professionals) to other countries to do a collaborative training with non-profit conservation organizations. SCGIS feels that the cost-benefit of sending a volunteer to organizations needing aid versus bringing scholars here is highly beneficial. One trainer, essentially the cost of one airfare, can train 20-40 individuals versus bringing those same individuals to the United States would cost the price of airfare for each of them.

This support program would function collaboratively between SCGIS, a host organization and other regional non-profit conservation organizations. Training would be provided, free of charge, to non-profit organizations by SCGIS volunteers. Funding would be raised by SCGIS through outside sources. This funding would go towards acquisition of volunteer's travel needed to get to

and from the host organization's location. SCGIS, through donations, would also provide software and needed materials for the trainings. The training would be individually crafted to aid the participating organizations in whatever manner seems valuable. Examples may be grant writing workshops, GIS training, data acquisition, field techniques, use of GPS units and data-loggers. The host organization would provide a training facility, room and board for the SCGIS volunteers, and local transportation. Host organizations would receive primary choice on the number of seats at each workshop; additional seats will be open to other organizations. Attending organizations would be asked to host at least one collaborative meeting (paper presentations, workshops, etc.) within 2 years after the first training sessions are initiated.

The purpose of this program is not only to provide training within the organization's own region but also to develop and maintain long term networking and support for these organizations. Some networking support would be provided through remote/email support from volunteers assigned to each attending organization. If funding allows, it would be appropriate to hold workshops/trainings annually for 2-3 consecutive years to ensure the growth of each organization's GIS/conservation program, and to maintain and grow the networking connections between all attending organizations. Organizations participating within the program would commit to a 3 year networking program which would help develop an internal support system within a region of a country or continent.



Volunteering: Geodatabase Training in Brazil

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IPE Training facility

In October of 2006 I went to Brazil to do Advanced Geodatabase training as a volunteer. I have been in the GIS field for over 20 years, and have always been interested in Conservation, but never actually worked in Conservation. This changed in 2004, when I started my own GIS consulting company. At the onset, I decided to devote part of my company's time to volunteer work for Conservation, and other causes I believed in. I joined SCGIS, and signed up for the GISCorps.

The training came together gradually at first. I talked to Frank Biasi, Susan Miller, and Demian Rybock of The Nature Conservancy about volunteering my services as an ESRI Authorized ArcGIS Instructor. I told them I would be glad to volunteer wherever they needed me, if they could cover my travel expenses. I wanted to volunteer, but could not afford to lose money doing it.

TNC focused on Latin America, where Leo Sotomayor had already identified a need for training. Leo and I communicated by email and Skype to discuss the training needs. The participants were experienced using ArcGIS with Shapefiles, but lacked Geodatabase expertise. We decided on a full week of Geodatabase training. We combined the three day ESRI Authorized "Introduction to ArcGIS II" course, which includes Geodatabase material, and supplemented it with my own 2 day "Using ArcGIS with Geodatabases" course.

Leo worked out the logistics, including the training location and a schedule that would work for all participants. We requested a donation of the ESRI course materials from the ESRI Conservation Program, and we cleared the ESRI Authorized training with Imagem, ESRI's International distributor in Brazil.

The location selected for the training was the Institute for Ecological Research (IPE) in the small town of Nazare Paulista, outside of Sao Paulo, Brazil. The IPE is a Conservation NGO dedicated to research and education. The facility included training rooms, dormitories, dining and recreation rooms. The peaceful rural setting lent itself to relaxed learning and conversation.

The training brought together an interesting group of people. In addition to TNC staff, Leo invited William Goulart (WWF) and Lino Verduga from CLIRSEN. Altogether, we were four Brazilians, two Ecuadorians, two Bolivians, and myself, from Puerto Rico. The course materials were in English. My lectures were in English and Spanish. Questions were posed in Spanish or Portuguese. We understood each other perfectly most of the time. After the formal training, during dinners and evening get-togethers, I met with the participants to talk about their recent and current projects. Some of their projects are presented in this newsletter.

Towards the end of the week, we took a boat to a nearby farmhouse restaurant, for a hike and dinner. We hiked to the top of a hill, where we were rewarded by beautiful views of the surrounding countryside. We could see smoke from fires burning in the surrounding hills and valleys, where land was being cleared for pasture. Less than 5% of Brazil's Coastal Atlantic forest remains untouched. The lush forest we just hiked through was secondary growth, notable by the absence of large trunks.



After our hike, dinner was a traditional Feijoada - a bean, pork, and beef stew cooked slowly in a big clay pot over a wood-burning stove. We played cards and joked until our transportation arrived to take us back to the IPE.

Everyone who has done this kind of work knows it can be difficult to part with new friends you have shared so much with. At the end of the training, we headed back to Sao Paulo for our respective trips home. We had one final dinner at the hotel, and the next day went our separate ways.

This training was a direct result of contacts made through SCGIS and the Conservation community. SCGIS is the vehicle that allowed me to find an organization that could make use of my time. The project was facilitated by informal communication among SCGIS members, matching a volunteer with a need. Once this connection was established, it became mostly a matter of logistics - course content, training location, timeframe, and of course funding and donations to cover the expenses. I have the greatest respect for all the people out there who volunteer their time - especially if they take unpaid leave or use their vacation time to do it. It took me a while to find a way to make volunteering work for me, but I think I have found it. I look forward to future opportunities, and am confident SCGIS will continue to facilitate additional volunteer activities for all members.



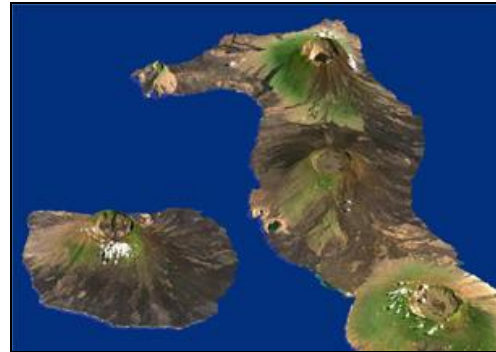
From left to right: Miguel Garriga, Leo Sotomayor, Marcelo Guevara, Eric Armijo, Lucyana Barros, William Goulart (WWF), Milena Ribeiro, Marcelo Matsumoto, Lino Verduga (CLIRSEN)

Miguel Garriga is President of Geographic Systems LLC, and SCGIS e-Newsletter editor.

Galapagos Cartography

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The Nature Conservancy and the Government of Ecuador have recently completed the most comprehensive mapping project for the Galapagos Islands since World War II. The project lasted 10 months, and was completed in October 2006.

Approximately 97% of the Galapagos Islands make up Galapagos Islands National Park. About 3% of the archipelago's land area is inhabited, with population centers in Puerto Ayora on Santa Cruz island, Puerto Baquerizo Moreno on San Cristóbal island, and Puerto Velasco Ibarra on Floreana island.

The mapping project had three main objectives:

1. To develop base cartography in accordance with international standards and Ecuador's national cartographic standards at a scale of 1:50,000
2. To map the extent of human impact on the islands. This included delineating areas of primary forest, vegetation cover, human land use and actual use of soils, recent and historical lava flows, and erosion.
3. Develop a methodology to discern invasive species of flora on the 5 most important islands being attacked by this phenomenon (Santa Cruz, San Cristobal, Isabela, Isla Floreana, and Santiago).

Base Cartography

The cartography had to comply with the official national map standards and specifications required by CLIRSEN and the Military Geographic Institute (IGM). Map Templates were generated from existing standards. The legend and symbology was arrived at through

consensus among TNC, CLIRSEN, National Park of Galapagos Islands, the Department of Environment and Agriculture of Ecuador, and the Oceanographic Institute of the Navy of Ecuador.



The base cartography was developed with ArcGIS 9.0. Contour lines were derived from SRTM (Shuttle Radar Topography Mission). The teams gathered control points on all the islands to assist with Georeferencing.

Digital classification of Satellite Imagery

Satellite imagery for the project was compiled from Terra Aster (15 meter resolution), SPOT (5 meter resolution) and EROS (1.8 meter resolution) imagery. The raster analysis was done using ERDAS Imagine 8.7, and involved supervised and unsupervised classifications of the raster imagery, and calculating normalized digital vegetation index (ndvi) values to distinguish vegetated areas. To perform the supervised classification of invasive species, staff took field radiometric samples (reflectance measures) of the different kinds of invasive vegetation on the island, such as Guayaba (*Psidium guajava*), Mora (*Rubus* spp), Pomarrosa (*Syzygium jambos*), and Cascarilla (*Cinchona pubescens*). They also measured the density of the canopy or vegetative cover. With these measures, the field technicians would go back to office and define the spectral signatures for each species and extrapolate their existence from the raster imagery.

Marcelo Guevara Nogales is a GIS Specialist with The Nature Conservancy's Northern Tropical Andes Program in Quito, Ecuador, and Scientific Director of the Galapagos

Cartography Project. Lino Verduga Moreira is a Geomatics Specialist / Project Coordinator with CLIRSEN (Center for Integral Surveys of Natural Resources using Remote Sensing) in Quito, Ecuador.

Humboldt Current Marine Project

An Effort to Map Habitats and Prioritize Ecoregions

Eric Armijo, GIS Specialist, The Nature Conservancy.

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Photo by Eric Armijo, South American Sea Lions

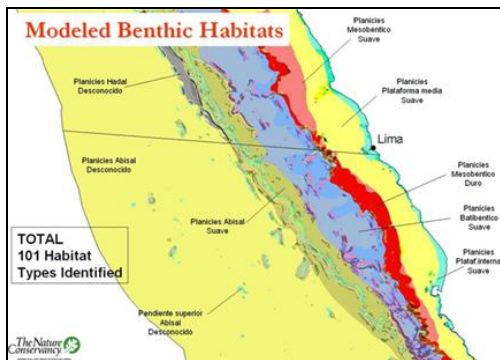
There are major activities underway in the Southern Andes Conservation Program dealing with Marine habitats, including an ongoing, multi-year project to map coastal habitats along Peru and Chile. This activity is also going on in the northern Andes program under the guidance of Marcelo Guevara. TNC scientists are working with local science experts, creating proposals for methodology on prioritized action areas, and conducting workshops presenting methodology on mapping habitats, and gathering feedback in terms of conservation goals we should meet. At this stage we have some preliminary products for habitat mapping.

Benthic and coastal mapping.

This mapping effort involves a lot of GIS work, with a significant need for compilation of geology for both terrestrial and benthic habitat mapping. Benthic (ocean floor) geology identifies the kind of substrate material present, i.e. soft mud, rock, pebbles. There was also a need to compile bathymetry (depth) information. In the investigation of the data available for our study area, we discovered that our best source of information came from old Russian charts. These charts were used for submarine

navigation, so they included detailed information on the ocean floor. The charts were available for the entire study area, which is very large and spans multiple countries. The charts were digitized, and from these charts we got the bathymetry and geology of the ocean floor.

The project also required a really good coastline definition. Datasets available were not consistent between countries. TNC contracted the digitizing of the coastline based on the interpretation of Landsat satellite images - regular Thematic Mapper resolution of about 30 meters. They visually digitized thousands of kilometers of coastline for the study area.



Benthic Habitats along the coast of Peru

Why we chose a marine project

In the past TNC has done a lot of work in the terrestrial world, but recent studies indicate there are major threats in the marine and fresh water realms, so there is a need to refocus attention on conservation in these areas. That's why TNC is putting a lot of effort into science and methodologies for defining our priorities.

There is a major phenomenon related to the Humboldt Current, which brings very cold water up from Antarctica to this part of the continent. Once it comes close to the tropics – right around Peru/Ecuador – it goes west, and that's where its effect on the continent ends. All of the coastal area covered by this current has particular characteristics – it is very dry, especially in north, the water is very cold, associated with particular conditions for fish and food availability. Plankton is especially important. This is one of the most productive areas of the world in terms of fish catch - Chile and Peru are two of the largest fish producing countries.

At the end we expect we are going to have reports on the status of these areas, a good

compilation of knowledge and datasets for biodiversity and human activities.

Up to now research has been limited to small areas, mostly near urban areas. There are large areas where there has not been a lot of research. For areas where there is a lack of knowledge for habitats, we are using models to map both benthic and coastline habitats. In Peru there is an important marine national park, but there has not been any systematic effort to cover the rest of the coast. The same is true for Chile – the coastline is very long, and it would take a lot of time, people, and resources to acquire the data. There hasn't been enough marine research for defining habitats.

Potential or natural condition for habitats

There are many factors to consider in delineating marine habitats. For benthic habitats, we are using bottom morphology, geology, plus depth (bathymetry). For coastline habitats, we are using marine and terrestrial geology, beaches, coastline definition, and gradient slope near the coast. It has been a challenge to get accurate measures of fish data. TNC is working with many sources of information, primarily government agencies, but also NGOs, and universities, to gather available data and create accurate databases. We are not only considering fish habitats, but also birds and mammals near water that depend on the fish, that can be clearly defined as marine fauna.

The study started in the fourth quarter of 2005 and is being completed at this time. We already have drafts of preliminary products, and are in the stages of incorporating feedback from country specialists for final versions of habitat maps and layers of defined human activities. The results will be shared with the governments and used to guide a prioritization process to help identify areas for conservation work in the future. These areas will typically be highly threatened and have significant biodiversity which is of interest to conserve. They could be areas near major pollution centers or major agricultural activities. TNC is very interested in presenting the governments of Peru and Chile with the whole analysis process and the results, as this information helps both TNC and government efforts. We expect the project will result in guiding some management policies. In some cases we will suggest managing protected areas and strategies for groups we should work with. For instance if we identify agriculture has

a major impact in these areas we will work with them to reduce this impact.

We approach government organizations by offering support. Some environmental organizations may lack experience on systematic planning. We can provide the governments with support on the planning process to identify priorities and define what to do in conservation. Governments are usually receptive to help and participation. Usually TNC approaches with some resources, such as people, experts, funds for workshops, meetings. Organizations like TNC are trying to support the national activities. A key part of success is to have the local authorities supporting what we are doing, and vice versa.

Eric Armijo works with The Nature Conservancy's Southern Andes Conservation Program in Santa Cruz, Bolivia.

Legal Reserve Strategy for Conservation

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In Brazil, rural property owners must keep some percentage of the original vegetation on their properties according to national legislation. This percentage varies depending on the region. Landowners in Mato Grosso must reserve 35 to 80% of their property, depending on what part of the state the property is in. The percentage in other regions may be higher or lower. For example, in the Amazonian area, the requirement is 80%.

In 1992, in the São Lourenço river watershed in Mato Grosso state, there were 435 natural cover remnant polygons. By 2004, the number of remnants had increased to 775, with a reduction in the total area of remnants. Many remnants were cut into, creating more remnant polygons and smaller total remnant area. To aid in the conservation of these remaining natural fragments, the Nature Conservancy is working together with local governments and partners to implement a legal reserve conservation strategy.

The Legal Reserve conservation strategy consists of four phases:

1. Property Mapping
2. Landscape Planning
3. Negotiation
4. Monitoring System – to see if strategy has been successful or not (take measures)

Phase 1: Cadastre / Map Property

The objective is to have all rural properties in the watershed mapped, to calculate how much 'remnant' forest exists in each property, and to note what kind of agricultural activity exists in each property. Data is collected for all parcels by watershed, such as the São Lourenço river watershed. Field staff and partners collect GPS points to map individual properties, and information is gathered on what kinds of vegetation or crops (soy, sugar, cotton) are planted in the property. TNC works with an Association of Agricultural Producers NGO and land owners to gather GPS points on their land with their permission. A local company was hired to develop a tool in ArcGIS to map these properties.

Phase 2: Landscape Planning

With property polygons mapped on top of satellite images, and using VISTA extension from NatureServe, TNC determines what portion of each property is best for conservation, and where wildlife corridors can be created to incorporate and improve ecological processes. The VISTA extension to ArcGIS is used to develop optimal solutions for biodiversity conservation, economic considerations, and legal requirements, and to determine where legal reserves should be placed on each property (and between properties).

Phase 3. Negotiation

TNC involves stakeholders, NGOs, State and Federal Environmental agencies, private agricultural producers, and private cattle ranchers. We work closely with organizations like the State Federation of Agricultural Producers (FAMATO) because farmers want to follow the law, and export their produce.

According to Presidential decree #2166, each land owner has 3 options for meeting the quota of land to be preserved:

- Fence off the entire area that needs to be preserved and leave it alone to regenerate.
- Every 3 years, set aside another 10% of the area that needs to be preserved. In 30 years 100% of the requirement would be met.

- Compensation in a different property. If a farmer does not have enough remnant vegetation, they can buy land in another area of same class of vegetation.

In most of the farmed areas, there are no remnants anymore, and there is no knowledge of the previous original natural coverage. In this case, soil type is used as a surrogate to determine original vegetation types, because there is a good degree of association between vegetation and soil type. In areas of intensive agriculture, no owner will want to establish a legal reserve because it is not economically viable. Instead, they can compensate in a different area, outside of their property. For compensation, those areas must be the same type of ecosystem, and same equivalent of ecological importance. The landowners can buy or lease the land to meet the requirement. Or the owner can pay the government to buy land where the state wants to preserve.

Phase 4. Monitor Compliance

This phase is to see if the legal reserve strategy has been implemented successfully or not. There are different parameters and indexes used to monitor compliance: Satellite Imagery, Landscape Metrics, and Management Plans. Satellite imagery is the cheapest way to determine if land is a remnant of natural cover or agriculture. Landscape metrics calculate the degree of connectivity between fragments, and the shapes of remnants. This includes a measure of the “Edge Effect” - the relationship between size and shape, or area and edge. Less edge is better. The best shape is circular because it has the best ratio between area and perimeter. The worst shape is long and skinny. Studies will track to see if edge is reducing or increasing over time. The objective is to evaluate at the landscape level if the strategy applied is bringing value for conservation by increasing the total area of fragments and reducing the proportion of edges.

Marcelo Matsumoto is a GIS Specialist with The Nature Conservancy's Central Savannas Conservation Program in Brasilia. Milena Ribeiro is a GIS Specialist with the Atlantic Forests Conservation Program in Curitiba, and Lucyana Barros is a GIS Specialist with the Amazon Conservation Program in Belem, Brazil.

Juniper GIS provides GIS services for the Costa Maya Station of Global Vision International in Mahahual, Mexico.

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Juniper GIS Services, Inc. spent five weeks last year working with Global Vision International (GVI) Mexico at the Costa Maya Station in Mahahual, Mexico. The objective was to monitor the health of fish and coral along the Mesoamerican barrier reef which runs along the Caribbean from the Yucatan to Honduras and is the second largest coral reef system in the world.



Initially John and Patti learned to identify and monitor all fish and coral in the area. They then developed a plan to incorporate existing data into a GIS. Information about this area came from a variety of sources, including GVI monitoring sites and GVI local partners, Amigos de Sian Ka'an, and the Mexican Navy.

The end result was GIS imagery and data for the region that GVI has monitored in its two years at the Costa Maya Station. With ArcGIS, they began to blend satellite imagery, GPS and cartographical information, and, most excitingly, the growing database GVI Mahahual has been amassing.

Juniper GIS provided a laptop for the project and obtained a donation from ESRI of the latest release of ArcGIS. “The time and effort that John and Patti have put into GIS during their time here has been such a useful step for us,” says GVI Mexico’s Director of Programmes, Danny Ponce Taylor. “Now we can really begin utilizing this powerful analytical tool, and add a new dimension to our work here in Mexico. GVI

Mahahual and GVI Mexico would like to take this opportunity to say thank you to both Juniper GIS and ESRI for their amazing support and generosity, and hope that we can begin to use these new tools to further our GIS analysis in the future.”

For additional information go to www.junipergis.com and www.gvi.co.uk.

Mexico Decrees Bahia de los Angeles Biosphere Reserve in Gulf of California

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The Mexican government has designated the “Bahía de los Angeles y Canales de Ballenas y Salsipuedes” Biosphere Reserve, a 3,880 km² Marine Protected Area (MPA) located along the eastern coast of the Baja California Peninsula, in the Midriff Island Region of the Gulf of California. The presidential decree was published on June 5th 2007, culminating a process initiated in 2001 by Pronatura Noroeste, a Mexican NGO, and supported by a large number of Mexican and US academic institutions and environmental organizations.

The Bahia de los Angeles region has the highest marine productivity in the Gulf of California, generated by the upwelling and vertical mix of cold, nutrient-rich waters, pumped to the surface in the deep Ballenas and Salsipuedes channels by the action of tidal currents and wind. This supports a food web that involves a rich benthic

fauna (including cold water corals and dense soft corals fields, found from a depth of -5 m), whale sharks, five species of sea turtles, massive seabird colonies, dolphins and fin whales. The National Commission for Conservation of Biodiversity (CONABIO) and the Commission for Environmental Cooperation (CEC) designated the region as a priority for biodiversity conservation at the national and continental levels, respectively.

The first three years of the process were dedicated to design the MPA with local stakeholders (mostly dedicated to fishing and tourism). This moved 80% of the inhabitants of Bahia de los Angeles to support the proposal, which became also endorsed by the municipal and state governments.

The final design included 250 km of pristine coastline, covering all wetlands, sandy beaches and reefs, the coastline of all islands in the Bahia de los Angeles and Angel de la Guarda archipelagos (the islands themselves were already protected as part of the “Islas del Golfo de California” Wildlife Reserve), and all marine areas and fishing grounds in the Ballenas and Salsipuedes channels. Five coastal wetlands and only one small bay were designated as core zones (no-take) areas of the reserve.

The designation of a minimum no-take area (\approx 0.05% of the protected area) reflects the intention of this MPA to serve as a laboratory for fisheries management, facilitated by a relatively small fishing community, and by the intense fisheries research efforts carried out in this region since 1998. As a result of the fisheries research implemented in the area, this is the first Mexican MPA to have a baseline of the status of its fishing resources since the moment of its creation –an important tool to evaluate management affectivity in the future.

The basic operation of this reserve will be supported in perpetuity by a US\$ 2 million endowment fund designed by the Mexican Fund for Natural Protected Areas and Pronatura Noroeste, and created thanks to several private donations. A second phase of the fund, equal in size and still in its planning stage, shall be used to acquire and operate the patrol boats required to cover the area.

The designation of this MPA establishes a continuous of five terrestrial and marine

protected areas (Vizcaino, Valle de los Cirios, Islas del Golfo de California, Archipiélago de San Lorenzo, and Bahía de los Angeles), covering 55,600 km² in the central portion of the Baja California Peninsula, and extending from the Pacific Ocean to the Gulf of California.

This initiative was supported in 2001 with the creation of the Pronatura's Center of Information for Conservation (CPIC) our GIS Lab in the Northwestern Mexico (CTSP Grant ID 2001-079), and since then through the ESRI Conservation Program, the Society for Conservation GIS and the SCGIS Leadership Program that helped to build the GIS Capacity of Pronatura Noroeste in the Northwestern Mexico.

Saving the Giant Pandas - One Researcher at a Time

Melissa Songer, Ph.D, Smithsonian National Zoological Park (the National Zoo)
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With an estimated 1,600 giant pandas remaining in the wild, according to results of China's national panda survey published in 2004, there is widespread concern for the future of the species. Found only in China, pandas rely almost entirely on bamboo for their nutrition and therefore have very specific habitat requirements.



Photo by Ann Batdorf

During the past 30 years, human activities such as bamboo harvesting, poaching, land cover conversion, and habitat fragmentation have depleted their habitat in China by almost 25%—estimated to be 29,500 km² (11,390 square miles) during the first national survey in 1974, but down to 23,000 km² (8,800 square miles) in the 2004 survey.

These remaining areas are made up of deciduous and coniferous forests, interspersed with dense patches of bamboo and covering high mountains (panda habitat ranges from 4,000 to 11,000 feet in elevation). In many of these areas, the pandas live in close proximity to farmers who plant crops in the river valleys and the lower mountain slopes.

To help sustain wild panda populations the National Zoo in Washington, DC puts a lot of effort and funding toward research in China and capacity building for panda reserves to help bolster the number of wild pandas. There are nearly 50 protected areas in China, some of which are linked by wildlife corridors designed to facilitate movement and interbreeding between the separated wild panda populations. Currently, pandas are separated into 24 different populations, dispersed across six mountain ranges.

Applying Geospatial Technology

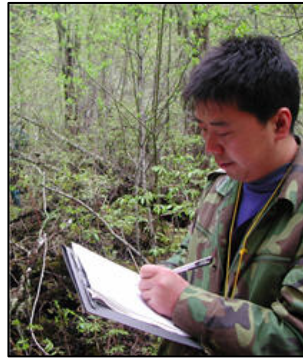
The National Zoo received our pair of pandas, Mei Xiang and Tian Tian, from China in 2000. Now midway through their ten-year stay, they have become symbolic of a much larger effort to save their natural habitat overseas.

In 2001, we began holding workshops with our Chinese colleagues to collaborate on wildlife research projects and to support their panda conservation efforts. One area they prioritized and requested support for was in learning how to apply geospatial technologies for research and reserve management.

Our Conservation GIS Laboratory has adapted our "GIS and Remote Sensing for Wildlife Managers" course for this purpose. We teach this course annually at the National Zoo's Conservation and Research Center in Front Royal, Virginia. To make it more relevant in China, we used data specific to local panda research and aided with local data collection on terrain and vegetation. All training materials are translated into Chinese, and bilingual instructors facilitate communication.

For the past five years, we have traveled to China over the summer to conduct the course. Many reserves do not have the hardware to run GIS and to help bridge the technology gap the National Zoo provides PCs, a GPS, and other essentials to several participating reserves each year.

The course provides step-by-step instructions for using Global Positioning System (GPS) units to collect data on the ground, the ERDAS IMAGINE software suite



(Leica Geosystems, Norcross, GA) to rectify, view and mosaic imagery, and GIS software for analysis and data presentation. This year's course was held during summer 2006 at the Tangjiahe Nature Reserve, an official conservation partner of the National Zoo. We expected 25 students, but nearly 40 panda researchers and reserve staff enrolled.

Keeping it Real

During the course we try to make our case studies as realistic as possible, using examples from different reserves to give the students a good sense of what we do in assessing a protected area. These modules teach students important operations as well as encourage them to think about the possibilities of using remote sensing and GIS in their own reserves.

For example, one module illustrates how panda survey data can be used to assess habitat selection. Prior to habitat analysis, the students start by learning how to extract areas of interest from a satellite image. After they have extracted the data, they learn how to perform an unsupervised land cover classification using ERDAS IMAGINE. Once they have the basics of image classification, they move to the next module for habitat analysis.

The habitat selection analysis is based on data collected during surveys of panda dung and recorded via GPS in Wanglang Nature Reserve, Sichuan Province. Other data layers included are habitat, elevation, roads, and streams. By combining databases using spatial joins, querying attributes, buffering features and searching databases, the students identify what habitat characteristics are most important to pandas. Next, they use these characteristics to map suitable habitat.

One objective is to build the capacity of the trainers as well as the students. As we train more trainers, we anticipate that some sites will be able to hold their own geospatial training courses. At that point, we hope to become a supplemental resource brought in when needed. Since we've initiated this program staff members representing most of the reserves have attended. We hope that as a side benefit we'll see increased collaboration among the reserves to share data and findings using geospatial technology as their common medium.

As their capabilities improve, both in technology and trained personnel, we anticipate being able to bring a wider understanding of panda conservation and challenges in terms of habitat loss and infringement. As geospatial technology becomes an ingrained part of research programs in China, it can be used to examine habitat and challenges of other endangered species: takin, golden monkeys, and even red pandas. And, of course, the same approach can be taken in other regions to understand and protect native plants and animals and the habitats they need to thrive.

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GIS Training Program in Thailand

Herbal Uses, Organic Rice Farming and Thai Silk & Textiles Mapping

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ESRI Authorized ArcGIS Instructor Lisa Pierce recently spent a month with Thailand's Surindra Rajabhat University (SRRU) staff and students, developing a strategy for their GIS efforts. The President of the University, Dr. Achara Phanurat, is working very aggressively to develop their GIS capabilities for many topics within the conservation realm. The faculty are interested in developing their GIS program within the context of a variety of environmental concerns.

The highlights of Lisa's visit included a GIS Overview Seminar for about 150 people and training for about 30 for an afternoon. Ms. Pierce developed introductory GIS training material using data obtained from the Thailand Distributor and international researchers from various organizations. She enhanced some of the data, and added Metadata to the datasets, using ISO Metadata standards.

The GIS seminars and discussions included:

- Sustainable Agriculture and mapping of their Organic Rice Program & Herbal Resources Management. This effort is in coordination with the Thai government sponsored Organic Jasmine Rice farming cooperatives program, and relates to water quality protection as well as soil sustainability.
- Suoi Tribe Elephant Management and GIS mapping of their village and herbal remedies uses. There is interest in the elephant's historical habitat and the change of their limited range.
- Cultural Heritage of Silk and mapping of silk patterns & styles by regions or towns.
- Surin Tourism management and GIS support for habitat management of waterways used for tourism.
- Training for Staff & GIS curriculum development included a general training material using Thailand data.



Rice Paddy Mapping

Proof of concept – the team discussed how they could use GIS to show where organic and non-organic farming is occurring based on rice paddy boundaries. It is sometimes difficult to get GIS parcel layers from government entities, so some mapping was done on top of scanned parcel maps. One of the topics of the training included how to work with government officials to get the parcel data in GIS format, so that data creation is not their main focus. Analysis and improving use of organic rice farming methods defined by parcels would allow the region to protect their

goal of maintaining pesticide and fertilizer free zones. The Surin Province prides itself on having organic production methods when possible.



Silk Mapping

The history of silk in Thailand shows that most textiles are representative of their place of origin. It is a growing trend around the world to map where textile patterns come from before these patterns disappear. This project of mapping the pattern of a place, or the distribution of one pattern trend from one part of the country to another is a goal of the University President. People have copied and modified patterns based on trade. As the history of world is shifting, it is no longer the case that traditional patterns tell people where you are from. Modern methods of textile weaving are being integrated into or replacing traditional patterns, and traditional patterns' histories are getting lost. The goal of the GIS for textiles project involves capturing where traditional patterns are from, and how events and place influence the pattern. There are all sorts of stories embedded in the patterns. Some textile patterns show evidence of advanced mathematics. This brings math alive through cultural methods, showing how mathematics relates to the real world.

Regional GIS Center

The University President is interested in developing a regional GIS center, and creating a local SCGIS chapter. Their program includes graduate student participants from neighboring Laos, China, Vietnam, and Cambodia. The University is located about an hour from Cambodia, and about three hours from Laos. Laos and Cambodia can benefit from the SRRU existing IT structure to support a regional GIS effort, so the SRRU can help in meeting the region's GIS educational needs.

Course Announcement: Remote Sensing and GIS Applied to Conservation Biology.. To be taught at IPE, near Sao Paulo, Brazil on August 6-13.

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The course is from August 6 to 13 at the Instituto de Pesquisas Ecológicas (Institute for Ecological Research, IPÊ). IPÊ is a conservation non-profit, located about an hour from São Paulo, Brazil. The course is open to anyone, although students need to understand Portuguese and at least some English. A Portuguese description of the course is at <http://www.ipe.org.br/html/cursos.asp?mes=Agosto&id=103>.

The cost is R\$ 1.020,00 (approximately \$500 US Dollars) and that includes housing and meals at the IPE. Students are responsible for their own travel. Some scholarship support is available. Those interested in more details should contact cbbc@ipe.org.br. An online registration form is also available through www.ipe.org.br.

I developed the course in collaboration with Dr. Alexandre Uezu at IPE. This will be my 5th time teaching the course since 2001. The title is, Curso de Sensoriamento Remoto e SIG (ArcGIS) aplicado à Biologia da Conservação. In English, Course in Remote Sensing and GIS (ArcGIS) applied to Conservation Biology.

The course originated when Alexandre Uezu participated in a similar course that I helped teach in Everglades National Park in Florida in 2000. Seeing a need for such training in Latin America, Alexandre encouraged the development of this course at IPE. In the past 6 years, we have had roughly 100 students from 6 different countries, with many going on to careers in applied conservation. Alexandre also teaches another short course in only ArcGIS that is done one or two times per year.

The teaching environment at IPE is truly exceptional. The students stay on site and have access to the software and instructors at all times. Social events are organized so that students get acquainted and several collaborations have resulted. I myself wrote a book with one of my former students. So we generally have a grand time while learning a new tool for saving life on earth.

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