Costa Rica 2004 Summer Institute for Educators: Geographic Information Systems, Biodiversity, Ecotourism, Geography, and Sustainability

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Summary

GISetc hosted a 9-day intensive institute in Geographic Information Systems (GIS), Global Positioning Systems (GPS), biodiversity, sustainability, physical and cultural geography, science, and ecotourism in Costa Rica. The institute was held at the Sarapiquí Conservation Learning Center (SCLC) and attended by 25 educators and college students from Ecuador, Germany, and the United States who study and teach geography, environmental studies, general education, technology, and science at the college, secondary, and primary school levels. These educators were joined by researchers and students from the SCLC, local community members, and local Costa Rican high school and adult students.

Teaching the institute were Anita Palmer and Roger Palmer of GIS ETC, Joseph Kerski of the USGS, Jeffrey Lash of the University of Houston-Clear Lake, and Ashok Wadwani of Applied Field Data Systems.

Twelve participants took advantage of the graduate credits for the course offered by Texas State University. We appreciated the efforts of Dr. Richard Boehm and Judy Behrens of the Texas State University Department of Geography for making this possible.

Why teach the institute in Costa Rica? First, Costa Rica is one of the best places to teach geography, biodiversity, ecotourism, and environmental issues, because the country is one of the most rich in biodiversity in the world, containing an estimated 5% of all the world's species—over ½ million, of flora and fauna. Second, Costa Rica has been active in preserving its land. An amazing 30% of the land is protected in private reserves and in national parks. This institute provided teachers with the opportunity to incorporate authentic field research and provide them with skills to be able to analyze these field data within a GIS.

The goals of the institute were to (1) give educators an opportunity to use GIS and GPS technologies and methods in one of the most biologically diverse regions of the world, and (2) work with local students and community members to begin to assemble a data set that would become a decision-making tool for the community. The objectives were to provide teachers with the confidence that they could use these same tools to address community issues in the areas surrounding their own schools, and also to give something back to the communities surrounding the area where the institute was conducted.

Scale was a theme that ran through the institute—we examined issues from global change, ecotourism, to trash bins for a community, and everything in between.

Our primary emphases included GIS, natural history, cultural awareness, and active adventure. Educational connections included technology, biodiversity, rain and cloud forests, ecosystem ecology, conservation, and cultural geography. The two environments where the institute was taught included Chilamate—lowland rainforest, and Monteverde—cloud forest. The institute also included some of the capital city of San Jose and the Institute for Tropical Studies at La Selva, Heredia. We used much spatial data collected by the Organization throughout the workshop: http://www.ots.ac.cr/en/laselva/gis.shtml. The bulk of the institute was conducted at Selva Verde, http://www.selvaverde.com/, which includes 500 acres of primary and secondary growth rainforest—a truly magnificent place. We also made contact with a large variety of other organizations leading up to the workshop, including Earth University—http://www.earth.ac.cr.

The Sarapiquí Conservation Center (SCLC) at Selva Verde--http://www.learningcentercostarica.org, is a nonprofit organization created to preserve and improve the cultural integrity of Chilamate, via programs that foster education, environmental conservation, artistic expression, and responsible tourism. It was created to aid community self-development, supplement (not supplant) indigenous cultures, and encourage cultural exchange. Examples of projects they have been involved in are home improvement, improving playing fields, removing trash, new classrooms, and preparing for the upcoming census. We worked closely with the SCLC Director Greg Basco and his staff and enjoyed an excellent working relationship with them. Angeline, the Community Development volunteer, provided connections to the community. Everyone at the SCLC shares a goal of not just community development, but community-centered development.

Above, the SCLC with Greg Basco on the right.

Our guide, Jimmie Trejos, was extremely amiable, knowledgeable, and essential to the success of the entire institute.

Victor, our bus driver, was also wonderful to work with and we appreciated both of them so much.

Background

GISetc focuses on providing connections to geo-spatial technologies for the educational community, including training, curricular materials, and research in the effectiveness and implementation of GIS technology and methods.

Holbrook Travel, who owns the Selva Verde Lodge and who managed the travel logistics for the institute participants, (http://www.holbrookeducationtrips.com) http://www.holbrooktravel.com/NatureTours/default.aspx has been in the educational travel business since 1974, with a goal to increase understanding of the world so that individuals can become agents for global change. We worked extensively with Debbie Sturdivant, educational program consultant, Sandy Doss, Vice President of Academic Offerings, Lisa Palmese and Christa Dillabaugh. All were extremely professional, wonderful to work with and we appreciate their support of education.

Institute Description

Day 1

After landing in San Jose, we drove through the capital city, noting its diverse physical and cultural characteristics. Joseph Kerski did a bit of additional exploring of the capital a week later on his quest to find the point where 10 degrees North latitude and 84 degrees west longitude cross. This point is 15 km northeast of the capital.

Streetside vendors selling cell phones and peripherals in San Jose.

After driving over the mountains and enjoying the cloud forests, we checked into the Selva Verde Lodge.

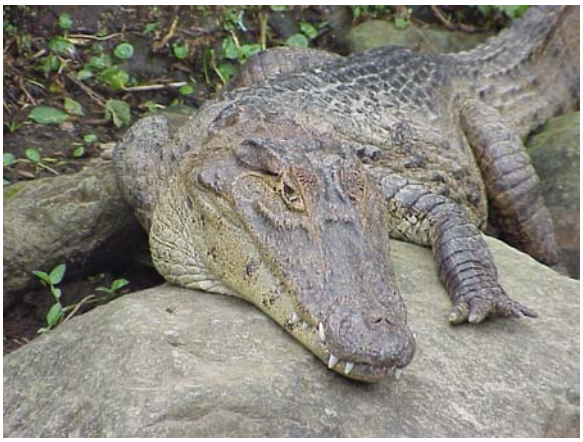
Sarapiqui River as it passes through Selva Verde (Green Jungle).

Immediately upon our arrival, we were stunned by the biodiversity of the rainforest. The above frogs were photographed on the self-guided trail that runs through Selva Verde. We also saw numerous iguanas, spiders, turtles, and a few snakes.

We held an orientation session, after which Dr Jeffrey Lash of the University of Houston-Clear Lake gave a presentation on ecotourism. Above, one of the buildings at the wonderful Selva Verde Lodge.

Birds for viewing in the area included the

Great Tinamou, the Violaceus Trogon, the Keel-billed Toucan, the Rufous-tailed hummingbird, and the red-lored parrot.



Animals in the area were wonderfully diverse; we discovered the locations of such species as sloths, howler monkeys, and crocodiles (above).

Day 2

The second day began with two GIS-based lessons that we wrote specifically for this institute. We used ArcView software by ESRI, Inc., and examined world population and plate tectonics. Both lessons focused on Costa Rica, Central America, and South America. The purpose of these lessons was to introduce spatial analysis concepts within a GIS environment to the educators.

After completing our work on GIS, we toured part of the La Selva Biological Reserve.

Following La Selva, our group visited a Dole Banana Plantation. The plantation was enormous, and we were given a very thorough tour of the entire process, from how banana plants grow, to harvesting and packaging. Introducing the study of banana plantations with students touches on many important science and social studies themes that can be examined through the lens of sustainable agriculture and the pros and cons of large-scale agricultural plantations.

A member of our group practiced tying off bananas.

We ended the day with a presentation on local life told by Lydia (below, at right), who works in ceramics nearby. We visited her at her store to see her wonderful creations several days later.

Day 3

On the third day, we examined the local base project that we assembled from a variety of sources—3-meter digital orthophotograph and land use data from InBIO, Landsat from the USGS, and a series of excellent digital layers from the LaSelva Reserve.

Next, we split into three groups:

(1) those who wanted to study and map water quality at Selva Verde,

(2) those who wanted to visit the local community and speak with the residents about local and regional issues of concern to them, and

(3) those who wanted to map the infrastructure (trails, buildings, covered walkways, and so on) and plants at Selva Verde.

Roger Palmer explains the water quality testing and GPS work before going into the field with the participants.

Field equipment included GPS receivers, water chemistry testing equipment, portable computers, and digital cameras.

Measuring water quality in streams and water wells in the area.

We were fortunate to have Ashok Wadwani's expertise and equipment to help improve the accuracy of the coordinates collected with the GPS units. The dense tree canopy cover in the rainforest makes for poor satellite reception, but the laser range finders and Trimble GPS helped mitigate this problem somewhat.

Ashok Wadwani, right, explains GPS collection procedures to the group.

One of the participants uses the laser range finder.

The main challenge with the field collection was that we did not know ahead of time exactly what was needed. On purpose, we did not micromanage what the participants would collect, to enhance the learning experience: After the first collection day, participants had a better idea not only of what the main community issues were, but how to design the databases so that they would be the most efficient and useful in the future. I joined the group who walked to La Esperanza, a community two kilometers east of Selva Verde.

One of the participants took extensive video footage during her interviews of local residents.

I took this photograph after talking with these three beautiful children in La Esperanza.

We spoke with children and adults at their homes in the community as well as business owners. We were very fortunate to have local community members with us. This experience helped us discover that water quality and trash collection are among the issues of concern to the residents. It also gave us a much-needed opportunity to practice our Spanish.

In the afternoon, we began to enter the field-collected information into the GIS

software, building on the base data that we had examined earlier.

Day 4

We began Day 4 as we had Day 3, by letting the participants choose which group they wished to participate in. Participants were free to move between groups.

Our institute was greatly benefited by the participation of local students, some of whom were part of the high school scholarship program (above).

On this day, I chose to work with the group that was mapping trails and buildings at Selva Verde. We used the laser range finder equipment and the portable computers, and I was amazed to find how valuable and easy-to-use these devices were, particularly after Ashok Wadwani's excellent tutorials in the use of these devices.

After our fieldwork, we went rafting down the river that we had been studying—the Rio Sarapiqui. This was highly enjoyable and allowed us the opportunity to view additional plants and animals along the way—one of the participants even took her GPS unit and mapped our route!

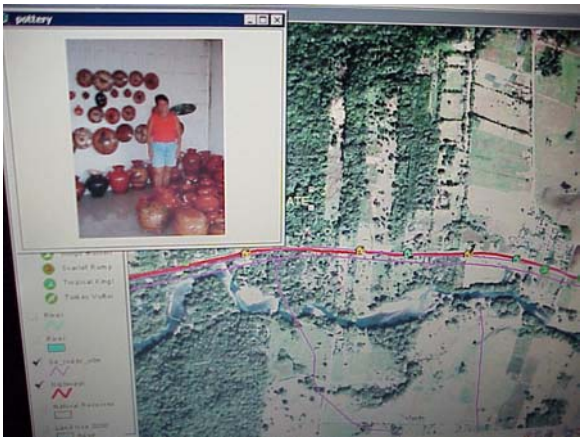
We ended the day with a Costa Rica cooking lesson given by our colleague Denissia who helped us with the community studies.

Day 5

This day marked our final day of data collection, where we had the opportunity to refine some of our techniques and put the final adjustments in place for our presentation to the local community

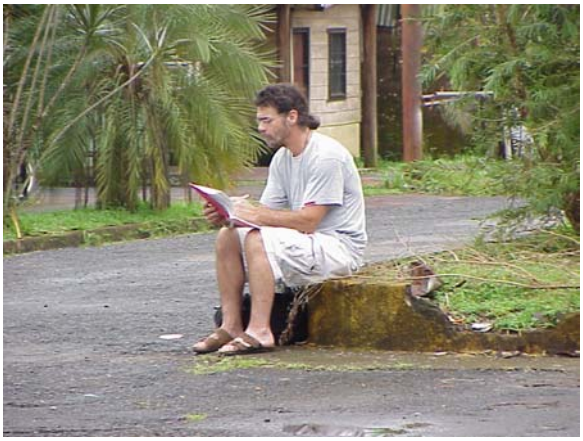
members.

Teacher examining termite pod in a tree.



Screen shot showing the data we were preparing in the GIS—ground photographs, tabular information, and spatial data (aerials, satellite images, roads, rivers, and so on).

Analyzing data with the GIS software in the SCLC. After collecting and assembling our data, we began to see patterns emerge through spatial analysis.



Sketching and writing were an important part of our data collection.

Following this activity, we took a boat tour on the Rio Sarapiqui, where we once again had the opportunity to understand more of the local people, plants, and animals. The river rose at least a meter during our trip, completely covering the dock upon our return.

Bats on the Rio Sarapiqui.

During the evening, all of us, together with the local students gave a presentation to the community members at the Sarapiqui Conservation Learning Center. This was a wonderful event, as we were able to not only show the community members why we were there, but also show what they could do with the data that was being assembled in a sustainable way well into the future. We ended the day with a merengue and salsa lesson taught by local students, which provided us an additional opportunity to get to know the community members better.

Day 6

During the next day, we departed Selva Verde for La Fortuna and the area near Arenal Volcano. Jimmie, our guide, explained things as diverse as the living fences that were planted around the countryside to the cultural diversity of the local villages to the history of volcanic eruptions there. The day's stops included Los Lagos hot springs with its pools, wonderful gardens, and frogs, crocodiles, butterflies, and more.

Participants gather at the base of Arenal Volcano after investigating Selva Verde and its surrounding communities.

Arenal Volcano erupted while we were near its base.

Joseph Kerski enjoys the countryside near

Arenal.

We ended the day at Monteverde, the cloud forest.

Day 7

Our full day at Monteverde included an exhilarating zip line tour through the cloud forest.

On the zip lines high above the forest.

We also hiked along the sky bridges in the forest, and a visit to two hummingbird gardens. This was followed by a hike through the montane rainforest itself, and true to form, we became completely soaked. It was a wonderful experience. The Cloud Forest preserve was established by the Alabama Quakers, who moved here in the 1950s. Monteverde lies where the northeast trade winds meet the Continental Divide in the Cordillera de Tilaran. It receives over 3 meters of rain annually, and hosts over 2500 plant species, including over 300 orchid species and 200 types of ferns.

Day 8

On this day, we drove south from Monteverde toward the lowlands, spotting the Pacific Ocean along the way along with wonderful vistas of the forested and agricultural lands.

We stopped at the city of Sarchi en route to San Jose. Sarchi is famous for its painted

carreton—the oxcart—which carried coffee from the highlands to the Pacific for export.

At San Jose, we visited INBio—the National Institute of Biodiversity: http://inbio.ac.cr./inbioparque. The staff focused on GIS and gave a wonderful explanation of how GIS is applied to understand the biodiversity of Costa Rica. They have created a series of land cover and biodiversity spatial data sets based on satellite imagery and aerial photographs.

Additional resources for data about Costa Rica:

www.ecfa.or.jp/english/pdf/aas.pdf

http://data.geocomm.com/catalog/CS/

www.eosl.eas.ualberta.ca/maps/costaricamaps.asp

www.idrc.ca/adventure/radar.html

http://www.cnr.uidaho.edu/remotesensing/Projects/Costa_Rica.html

Day 9

We left San Jose on this day but made plans to continue working with the community, the SCLC and with the educators who attended the institute.

View of San Jose from the Buenavista Hill.

Conclusion

This institute was powerful and changed lives. It emphasized interdisciplinary linkages between geography, science, technology, and community-based issues. It sought to contribute to local science and community issues and projects. It focused on examining real-world standards-based issues in education in a problem-solving, inquiry-based, spectacular setting.

Sunset near the lake just west of Arenal Volcano.

*** End of Costa Rica July 2004 GIS Institute Report ***