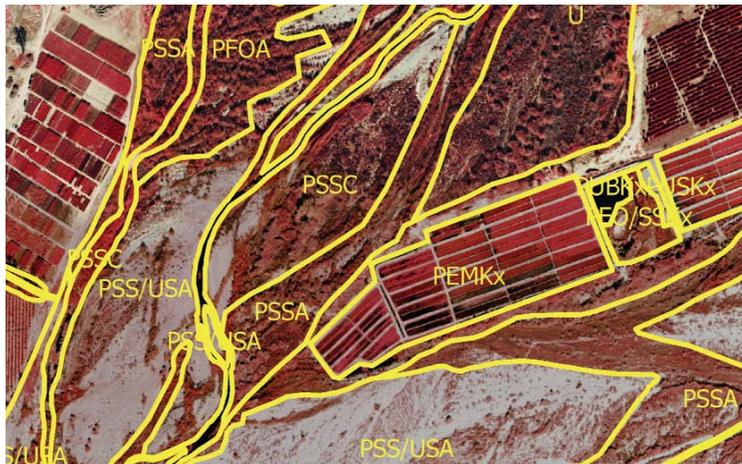


Northridge

Wetlands Inventory in Southern California

The importance of wetlands in serving essential ecological functions is clear. California has lost most of its wetlands. Critical to restoring and protecting such a vital resource is knowledge of the type and extent of the remaining wetlands in California.

In the Geography Department at California State University, Northridge Dr. Shawna Dark and several graduate students are working on a contract with the National Wetlands Inventory (under the U.S. Fish and Wildlife Service), to update and create new inventories of wetlands throughout the southern California bioregion. Using GIS and remote sensing techniques, Dr. Dark and the students have recently completed an inventory of wetlands in Ventura County as part of a larger inventory of wetlands along the south coast of California from Ventura County to the Mexican border. The goal of this work is to provide an updated and more comprehensive inventory of wetlands in critical conservation areas of Southern California. In Northern California, a similar project is being conducted by Dr. Ellen Hines from the Geography Department at San Francisco State University.



Excerpt from wetlands classification for the Santa Clara River at Fillmore.

In Ventura County, 1-foot resolution color infra-red aerial photography was used to map the extent of wetlands using the hierarchical Cowardin classification and a new hydrogeomorphic classification. The hydrogeomorphic classification, when applied to wetlands, accounts for the physical/abiotic characteristics which define the dominant hydrology of such features. In turn, greater insight as to the origin and structure of specific wetlands may be derived, enabling sound management and effective restoration practices. The use of two classification methods will provide a more detailed approach in the identification of unique wetlands. Such an inventory is vital to the conservation of wetland resources. Upon completion of each project, the Southern California data will be folded into the nationwide wetlands inventory under the National Wetlands Inventory program and posted on their Web page, www.nwi.fws.gov.

MORE INFORMATION:

Shawna Dark, Ph.D., Department of Geography, California State University, Northridge, Shawna.dark@csun.edu

California

Statewide GIS Organizations

The California Geographical Information Association (CGIA), www.cgia.org, and the California Geographical Information Systems Council (CGISC), gis.ca.gov/council, are two major statewide GIS organizations whose complementary relationship continues to evolve.

CGIA promotes the use of Geographical Information Systems within the state. CGIA's membership reflects the broad GIS community, both governmental and non-governmental. The CSU GIS Specialty Center is a sustaining member of CGIA.

The main role of CGISC is to organize GIS among state agencies and their counterparts at local and federal government levels. Robert Slobodian at CSU, Fresno holds a higher education elected seat on the CGIA Board and at the direction of the Chancellor's Office, he represented the CSU GIS community on the council.

An executive order implementing California's Geospatial Strategic Plan is anticipated shortly. The long vacant position of Geographic Information Officer is expected to be filled. Another part of the Strategic Plan bolsters the California GIS Council. Its new structure will continue and perhaps strengthen the role of the Regional GIS Councils which cover the state.

Both CGIA and CGISC recognize the contribution of higher education in the development and practice of GIS. These developments at the state level may produce real benefits for the CSU GIS community. Since CSUs are also located throughout the state, Regional GIS Councils may provide opportunities for the CSU GIS community to become more involved in collaborative partnerships. The CSU's history of spatial data and applications development, student internships, and partnering on grants and contracts positions it well to take advantage of revitalized statewide GIS activity.

If you are a member of the CSU GIS community, consider becoming a member of CGIA. To find out more about the Regional GIS Council in your area, please see the link from the CSU GIS Specialty Center's Web page, csugis.sfsu.edu.

2 Director's Message

Chico > "Every Place Counts!"

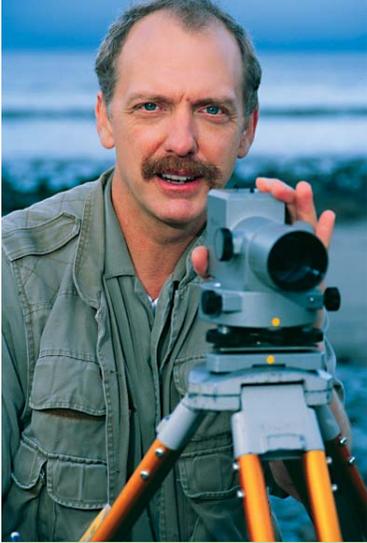
3 San Francisco > Microclimate Variability in Complex Terrain

Curricular Development Grant Program

4 Long Beach > GIS Goes Global

5 Chico > Mapping Vernal Pools in Northeastern San Joaquin Valley

6 Remote Sensing Committee Software Challenge



Director's
Message 2005

GIScience in the CSU: More than Surviving

BUDGET CUTS

can put a damper on academic work. Given the kinds of budget cuts the CSU has been dealing with, we would expect our pro-

ductivity to take a hit as we all crawl into our respective holes. Yet we can clearly see that GIScience continues to grow on our campuses. We continue to pursue important research, statewide and worldwide, and more disciplines and subdisciplines are getting into the act. The diversity of projects continues to grow, with the educational scope of our work ranging from K-12 to post-graduate and professional.

This issue includes articles on wetland mapping and microclimatological applications. Students at two campuses are systematically mapping wetlands in southern and northern California as part of the National Wetlands Inventory program. The GIC at CSU, Chico has mapped vernal pools. Another study looks at the microclimatology of landscapes in New Zealand and Indiana. Other reports look at how we can connect with related GIS specialists at home and abroad.

A major goal of our group is to promote intercampus research projects in a variety of specialties. We'd like to hear about how you are using GIScience methods in your field. For example, I was just speaking with Andrew Oliphant (andrew@sfsu.edu) about his micrometeorological and microclimatological work and he is very interested in finding like-minded scientists on other campuses who might want to pursue a statewide network of observation stations. Our campuses are located in and near a wide variety of environments; we should take advantage of this.

During the past year, the Remote Sensing Committee elected Doug Stow (San Diego) as its Chair and had its first actual face-to-face meeting. I was impressed by the level of interest and latent energy in this group. We are looking at ways to expand remote sensing interests and software and data availability. To this end, the Remote Sensing Committee has planned a workshop to explore software options that help to keep the CSU the premier GIScience system in the state, and a major player on the national scene.

Jerry Davis
Director, CSU GIS Specialty Center
San Francisco State University

Chico

"Every Place Counts!"

The GIS lab maintained by California State University, Chico's Geography and Planning Department (the Department) recently hosted over 125 young scholars from the surrounding schools who were participating in an Educational Talent Search. Every school year, this program seeks out exemplary 7th and 8th grade youngsters to spend a day on a college campus.

The teenagers who visited CSU, Chico were taught how to fly over the landscape of a local lake using 3-D ArcScene™, a specialized 3-D viewing application that is part of ESRI, Inc's ArcGIS® software. The students viewed various Web sites featuring remote sensing, space images, natural resources, watershed conservation, and mapping of all kinds and places. Skill levels ranged widely. Some newcomers quickly flew right through the virtual lake bottom to get lost in outer space. Other veteran gamers toodled along the bumps and turns of the shoreline. Most students were also enthralled to find images of their homes or schools from the air, courtesy of TerraServer.com, Inc, at its Web site, www.terraserver.com. Brochures describing CSU, Chico's GIS certificate program were provided to those who wanted more information

about this exciting field.

The Educational Talent Search coordinators were inspired by the uses of this technology while attending the Department's GIS Day held last November. During that event, CSU, Chico student posters lined the hallways, public displays showcased antique maps from the Department's collection, rare map books were available for perusal, and other geographical oddities were on hand, including levitating globes. Visitors could explore various websites or attempt a flyover with ArcScene™, or watch the video, "The World in a Box," produced by ESRI, Inc explaining how geographic information affects our everyday lives.

These events convinced November visitors and the students participating in the Education Talent Search that geography today is more than just finding state capitols on an atlas—it's sophisticated 3-D visualizations of digital Earth data, clearly demonstrating that "Every place counts!" 

MORE INFORMATION:

Catherine Benjamin, IST,
Department of Geography
and Planning, CSU Chico
530/898-5285

Allan Bee, Educational
Talent Search, CSU Chico,
530/898-4429



Young students explore a 3-D scene.

Microclimate Variability in Complex Terrain

Improved prediction of spatial patterns of microclimates in complex terrain is an underlying goal for many applications in ecology, biogeography, hydrology, agriculture and boundary layer meteorology. At San Francisco State University's Department of Geography, studies of spatial distribution and scale of surface radiation and energy fluxes have been undertaken for locations ranging from a 12 km² section of forested fluvial hill country to a 2500 km² alpine watershed with a range in elevation of 2 km. These studies have utilized the GIS framework to incorporate spatial data from satellite imagery, topographic and radiation model output and tower-based observations to examine spatial variability in evapotranspiration, surface energy balance components and absorption of photosynthetically active radiation (PAR).

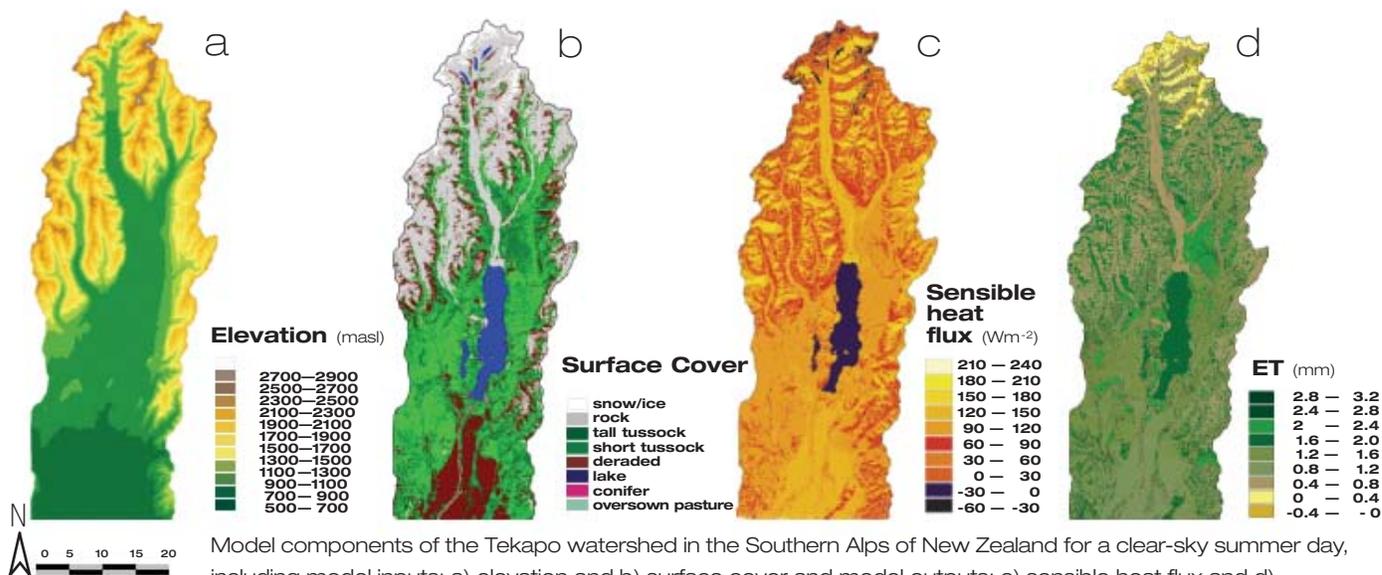
Surface topographic attributes such as slope angle, aspect and sky-view-factor are first calculated in ArcGIS from digital elevation models ranging in spatial resolution from 5 to 500 m. Satellite imagery (IRS-1 25 m, IKONOS 4 m) is used to assign spatial information for other physical properties such as leaf area index (LAI) or albedo. These properties are either derived directly from the imagery (LAI) or assigned spatially by surface cover classes derived from ground-truthed supervised classification of the imagery. In the latter case, properties such as albedo and energy balance ratios are generated from empirical models from tower-based measurements over each major surface class in the study area. Layers are extracted as grids and applied to theoretical radiation calculations (using FORTRAN) which incorporate cloud and aerosol effects based on local measurements of solar radiation.

Modeled radiation fluxes have compared well with observations to date giving some confidence in the topographic radiation modeling and the parameterization of cloud effects. Spatial variability shows strong sensitivity to relief and can be scaled linearly using mean slope angle. Increases in clouds and other atmospheric scattering agents (dust, air pollution) have a strong impact on reducing both the spatial average and variance of radiation components. Rates of absorption of PAR are estimated from topographic calculations of incident PAR and LAI derived from NDVI from a summer IKONOS image. Clear seasonal patterns existed in both spatial average and variance with summer producing the largest mean values and weakest spatial variability due to smaller solar zenith angles and seasonality in atmospheric scattering indices. There remains a great deal to learn about patterns and controls of microclimate variability in complex terrain and effectively modeling their distribution in a framework readily transferable to a variety of applications and study sites. ☞

MORE INFORMATION: Andrew Oliphant, Ph.D., Department of Geography and Human Environmental Studies, San Francisco State University, andrew@sfsu.edu

GIScience Curricular Development Grant Program

In order to support GIScience curricular excellence in the CSU, the CSU GIS Specialty Center has announced a new grant program for faculty to develop GIScience course modules. Proposals will be accepted from all disciplines and may even be discipline specific—the idea is to encourage sharing ideas among our campuses. Grants will cover one course assigned time plus a limited budget for costs (for data acquisition, media and other materials). The recipient will be expected to produce course modules (exercises, related instructional materials and datasets) suitable for distribution to interested faculty in the CSU. Please submit 2-page proposals describing your proposed modules, its audience (types of courses), and a short budget, with a 2-page CV, to CSU GIS Specialty Center, San Francisco State University, 1600 Holloway Avenue, San Francisco, CA 94132, by 15 August 2005. Up to two proposals will be funded for AY 2005/2006.



Model components of the Tekapo watershed in the Southern Alps of New Zealand for a clear-sky summer day, including model inputs; a) elevation and b) surface cover and model outputs; c) sensible heat flux and d) evapotranspiration, all at 100 m resolution.

Long Beach

GIS Goes Global

This Spring 2005 California State University, Long Beach (CSULB) celebrated the third session of its *"International Cooperation with GIS mini-Exchange Program."* The program was designed to give California students both a "study abroad" and a service-learning experience. Using GIS as the common theme, students from the University of Salzburg in Austria and Long Beach State join forces to work, learn and play.

Less than one percent of CSU, Long Beach students enjoy the luxury of taking a semester or two to study abroad. In recognition of this, Professors Frank Gossette (CSULB) and Josef Strobl (Univ. Salzburg) jointly designed a brief, but intensive, program of travel, study, and public-service GIS projects. A local GIS project is undertaken and completed within two weeks.

The Austrian spring semester runs from March through June. During their semester break in February, ten students from Salzburg arrived at LAX. The Long Beach students housed, fed and entertained the Austrian visitors in their own homes or apartments. The projects in California are typically urban in nature. This year, the students mapped a public housing project for the County of Los Angeles to assist in their facility management, public safety and emergency response.

At the end of spring semester, the Long Beach students will travel to Salzburg and be met by their Austrian hosts. Even students who have never traveled abroad find it a snap coping with the trains, buses and currency when their new Austrian friends help them from the beginning. These students get a short, but unique, exposure to student life in Europe—spending two weeks living, working and playing in one of the world's most beautiful and charming cities. Projects there focus on Dr. Strobl's interests in environmental geography and GIS; last year's project looked at environmental change in Berchtesgaden National Park.

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On a visit to the National Mapping Center in Vienna, Long Beach students get a chance to see how 3-D maps are produced for an interactive computer atlas.

Using GIS as the common theme, students from the University of Salzburg in Austria and Long Beach State join forces to work, learn and play.

By June, over fifty Long Beach and Salzburg students will have participated in this unique class. Costs are kept to a minimum—students enroll as part of the Spring semester classes and only need to purchase their airfare. Everyone, regardless of family, job or other obligations, can get away for two or three weeks and get to have a truly life-enriching experience. As they say in Austria, "Gute Fahrt!"

MORE INFORMATION:

Frank Gossette, Ph.D., Department of Geography, California State University, Long Beach, gossette@csulb.edu

The CSU GIS Specialty Center

In 1992 the CSU GIS Specialty Center was established to promote the use of geographic information systems (GIS) and other geographic techniques for spatial analysis within the CSU system. Member campuses participate in software site licenses with Environmental Systems Research Institute, Inc. (ESRI) for GIS software, and Leica Geosystems, LLP for remote sensing and image processing software. Benefits of these two programs include training, technical workshops, membership in the University Consortium for Geographic Information Science (UCGIS) and in the California Geographic Information Association, and complimentary registrations for ESRI's User and Education User Conferences. Perhaps most importantly, the GIS Specialty Center promotes intercampus dialogue on teaching, research and application issues within the field of Geographic Information Science. For more information regarding the GIS Specialty Center and the programs it offers, please see the web site at www.calstate.edu/gis or contact Debra Dwyer, the site license administrator, at gis@sfsus.edu

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GIC Maps Vernal Pools in Northeastern San Joaquin Valley

Vernal pools are seasonal wetlands that provide habitat for rare and endangered plant species and serve as breeding sites for several amphibian species. In 1999, the California Department of Fish and Game (DFG) contracted the Geographical Information Center at California State University, Chico (GIC) to classify and map vernal pools in northeastern San Joaquin Valley (SJV). The project area included portions of six SJV counties and incorporated the Merced Grasslands, one of the largest and most intact vernal pool grassland habitats in the world.

The GIC had the project area flown at the scale of 1:24,000 using color infrared film. The resulting aerial prints were scanned at 400 DPI (approximately 1.5 meter resolution) and ortho-rectified using PCI Geomatics' Ortho Engine® software. Vernal pools and associated features were "heads up" digitized using ArcView® GIS.

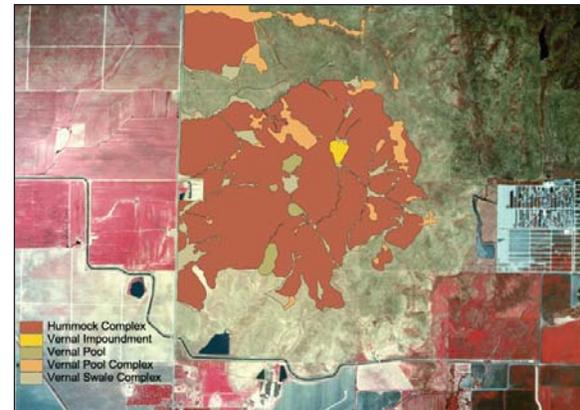
Mapping was completed in 2001, but the coverage was never field checked. In part, funding was an issue since original agency funding was based on a one- to two-county area rather than a multi-county region. In addition, there was increased development in urban centers bordering the wetland areas. This made some areas difficult to reach as access

was through private lands.

In 2002 the project funding cycle concluded. Due to a downswing in the California economy, the project was not renewed. While DFG is still very interested in seeing this project completed, to date no further funding has been available. The GIC is pursuing other funding sources to complete this important work.

GIS shape files from this effort are available from the GIC either electronically or by mail. Mapping included complexes, pools, impoundments, and seven categories of altered pools. Although the files are still in draft form, they were compared to available vernal pool coverages and peer-reviewed. Metadata is available by contacting Chuck Nelson. A sample image may be viewed at www.gic.csuchico.edu/projects_pools.html.

MORE INFORMATION: *Chuck Nelson, Director, Geographical Information Center, CSU, Chico, cwnelson@csuchico.edu*



Vernal pool distribution—No. San Joaquin Valley.

What is Geographic Information Science (GISci)?

GEORGAPHIC INFORMATION SCIENCE is the synthesis of spatial theory, methods and technologies used to study and map geographic relationships, distributions, networks, temporal change and other spatially aware information in order to better understand and manage limited earth resources. It includes:

GEOGRAPHIC INFORMATION SYSTEMS (GIS)

Comprehensive databases tied to location, with an integrated set of tools for querying, analyzing, and displaying information. Important classes of GIS tools include those that support: 1. logical map overlay, 2. proximity analysis and spatial buffering; 3. network analysis (e.g. of roads or streams); 4. geocoding and address matching; and 5. three-dimensional surface modeling.

REMOTE SENSING

Analysis of the earth's surface and interpretation of its features using imagery collected from air or space platforms. Image processing methods use visible and invisible (e.g. ultraviolet and infrared) parts of the electromagnetic spectrum as well as active radiation (RADAR and LIDAR) to interpret land cover patterns of vegetation, soil, land use, and environmental systems, including up-to-the-minute changes in these systems.

CARTOGRAPHY

The art and science of making maps. Cartographical theories and methods focus on information content, symbolization and design to appropriately communicate the results of studies.

GLOBAL POSITIONING SYSTEMS (GPS)

Provides a means for determining earth location and navigation, using a constellation of satellites and the technology for interpreting their signals. Field data collection for GIS and remote sensing projects is increasingly dependent on GPS.

WHILE HAVING ITS ROOTS in geography, many disciplines have contributed to the development and use of Geographic Information Science. In the CSU System, anthropologists, biologists, business marketers, computer scientists, economists, engineers, environmental scientists, foresters, geologists, historians, journalists, landscape architects, natural resource planners, oceanographers, political scientists, sociologists, urban planners, and wildlife scientists also use these technologies in their classes and for their research.

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CSU Remote Sensing Committee Software Challenge

At a workshop and meeting on June 11, 2005 at San Francisco State University, the California State University Remote Sensing Committee (RSC) will be looking at the hyperspectral and image segmentation capabilities of some leading remote sensing software packages. Hyperspectral methods, related to the long-established image spectroscopy used in mineral analysis (applied both on Earth and on Mars probes), take advantage of sensors such as AVIRIS that collect more than 100 bands of data in narrow spectral widths. Image segmentation methods take a new approach to image classification, combining spatial metrics with spectral properties. We'll compare approaches to related feature extraction methods.

RSC was formed in Fall 2003 with the mission "to facilitate excellent teaching and research in the domain of remote sensing and image processing, within the CSU System." The Committee's first physical meeting was held at San Jose State University on August 20, 2004. The committee is chaired by Doug Stow (SDSU) and currently includes representatives from thirteen campuses. All CSU campuses are welcome to participate.

One of the primary functions of the RSC is to provide guidance to the GIS Specialty Center on image processing needs and CSU-wide software licensing agreements. Presently, a CSU-wide license agreement exists with Leica Geosystems AG for ERDAS Imagine software. The basic package includes a 35-seat license for each participating university, with an option to purchase an additional

35 seats. Participating universities pay on a fiscal year basis (July through June). Following the August 2004 meeting, an e-mail survey was circulated on current uses and future needs for image processing software. Interest has been expressed for similar license agreements for ENVI, Idrisi, and possibly other commercial image processing and related software.

In August 2004 the RSC also discussed educational remote sensing data sets. Members agreed that it would be worthwhile to share educational data sets containing image and ancillary data for study areas in California. The focus of this discussion was on Landsat TM time series that many of the universities have developed or are interested in developing, and how to augment the time series with current imagery. With the recent scan-line gap problems of Landsat-7 ETM+, the RSC decided to explore acquisition of current SPOT multispectral data through a CSU-wide agreement. SPOT has agreed to capture five image data sets for this purpose. An acquisition request was submitted, and the imagery has been delivered.

The upcoming June 11 workshop and meeting follows a week of Leica/ERDAS Imagine advanced training courses at SFSU on Multispectral Classification, Spatial Modeling and Expert Systems, and Hyperspectral. Later in the month two training sessions for beginning RS users will occur at Cal Poly, Pomona. These trainings are limited to representatives of campuses currently participating in the site license. 

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