LTER
Network News
Newsletter of the Long Term Ecological Research Network
Vol. 23 No. 1 Spring 2010

LTER Network Awarded 2010 AIBS Distinguished Scientist Award

LTER Chair, Phil Robertson (*r*) accepts the 2010 AIBS Distinguished Scientist Award on behalf of the LTER Network from AIBS President Joseph Travis (*l*). (Photo: Julie Palakovich Carr, AIBS)

The Long Term Ecological Research (LTER) Network is the recipient of the 2010 Distinguished Scientist Award by the American Institute of Biological Sciences (AIBS).

According to AIBS, the Distinguished Scientist Award (previously named the Distinguished Service Award) has been presented annually since 1972 to individuals or groups who have made significant scientific contributions to the biological sciences, in particular, integrative and organismal biology.

The Chair of the LTER Science Council and Executive Board, G. Philip Robertson, accepted the Award on behalf of the LTER Network during the award ceremony, held May 18, 2010, in Washington, DC. Robertson, Principal Investigator for the Kellogg Biological Station LTER site and professor of Ecosystem Science in the Department of Crop and Soil Science at Michigan State University, observed: "We are both grateful for and humbled by this high honor, which recognizes the collective contributions of several thousand Network scientists working to advance ecological knowledge in ecosystems facing unprecedented environmental change."

The Award is a significant recognition of the LTER program's contribution to the field of biological sciences since its creation in 1980 by the National Science Foundation (NSF). "AIBS is pleased to recognize the contributions of the LTER Network in this, its 30th Anniversary year," said Dr. Richard O'Grady, AIBS Executive Director. "A shining example of excellence in our nation's scientific enterprise, the LTER program focuses on large-scale, multi-disciplinary research and has truly transformed ecological and environmental science in the U.S. and worldwide. The program and the scientists and students that have conducted research at LTER sites or with LTER data, have fundamentally advanced human understanding."

See "AIBS", p. 3

LTER site acronyms: AND=H.J. Andrews ; ARC=Arctic; BES=Baltimore Ecosystem Study; BNZ=Bonanza Creek; CAP=Central Arizona–Phoenix; CCE=California Current Ecosystem; CDR=Cedar Creek; CWT=Coweeta; FCE=Florida Coastal Everglades; GCE=Georgia Coastal Ecosystem; HFR=Harvard Forest; HBR=Hubbard Brook; JRN=Jornada Basin; KBS=Kellogg Biological Station; KNZ=Konza Prairie; LNO=LTER Network Office; LUQ=Luquillo; MCM=McMurdo Dry Valleys; MCR=Moorea Coral Reef; NWT=Niwot Ridge; NTL=North Temperate Lakes; PAL=Palmer Station; PIE=Plum Island Ecosystem; SBC=Santa Barbara Coastal; SEV=Sevilleta; SGS=Shortgrass Steppe; VCR=Virginia Coast Reserve.

In This Issue

The Network News

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LNO completes Operational Plan

The proposal for the renewal of the LTER Network Office (LNO), submitted in March 2008, was funded in two Cooperative Agreements (CA) dated May 1 and September 1, 2009. The second CA includes funds to expand research synthesis efforts and to advance the development and implementation of the Network Information System (NIS). In 2009, about $235,000 were allocated to research working groups and synthesis prospectus working teams from this CA. Funds for the second CA come from American Recovery and Reinvestment Act (ARRA) finances.

As one of the requirements for ARRA funding, the National Science Foundation (NSF) requested a detailed operational plan describing tasks and expenditures of funds and provided the LNO six months to complete this plan. NSF further requested that the LTER Executive Board be closely involved in the development of the operational plan, and that external experts be consulted to assure interoperability between the NIS and other information management approaches.

The first draft of the LNO operational plan was distributed to the LTER Executive Board, the Information Management Committee, and the Network Information System Advisory Committee on December 1, 2009. The plan was prepared to address the requirements in the General Programmatic Terms and Conditions that govern the Decadal Plan Cooperative Agreement. The LTER Executive Board provided advice and guidance on the scope and structure of the operational plan.

Specifically, the Executive Board requested that the operational plan cover all 17 activities proposed in both LNO Cooperative Agreements, rather than just the 10 activities in the Decadal Plan Cooperative Agreement, as requested by NSF. Comments on the initial draft were incorporated in a second draft that was sent to the Executive Board, Information Management Committee, and the Network Information System Advisory Committee for additional review.

In addition, the second draft was reviewed by a panel of external reviewers, who met with the Executive Board and NISAC in January, 2010. A final draft was prepared from this meeting and was approved by the Executive Board. A revised version of the operational plan, covering only the 10 ARRA-funded activities, was submitted to NSF on February 28, 2010.

The existence of this plan provides a roadmap for synthesis and information management activities for the LNO during the next five years. Annual reviews of LNO goals by the LTER Executive Board and the Network Information System Advisory Committee (focusing on NIS activities) will provide opportunities to adjust the operational plan to meet changing needs.

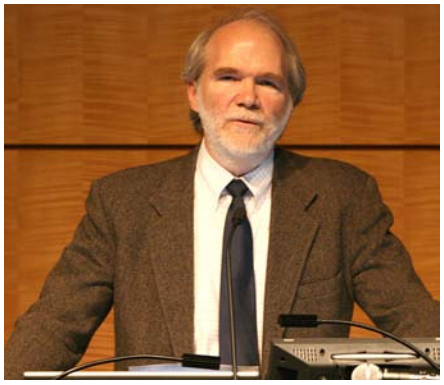
By Robert B. Waide,
Executive Director, LNO

AIBS President Joseph Travis with the 2010 AIBS award winners. From left: Dr. Kathleen K. Smith, Outstanding Service Award; Dr. Joseph Travis, AIBS President; Dr. Philip Robertson, Distinguished Scientist Award; Dr. Michael Ruse, key note speaker; and Dr. Jo Handelsman, Education Award. (Photo: Julie Palakovich Carr).

AIBS (continued from p. 1)

According to Robert B. Waide, the Executive Director of the LTER Network Office and biology professor at the University of New Mexico, "the Award represents the cumulative efforts of more than 2000 LTER scientists, students, information managers, educators, and staff working on experiments and observational studies that will inform present and future understanding of ecological systems."

Accepting the award, Robertson noted that the Network was a child of many disciplines, benefiting from every one of them in creative ways, and drawing strength from the willingness – even eagerness – of ecologists, geoscientists, marine scientists and others to collaborate in asking questions otherwise intractable. "Over the years, several thousand scientists have participated in and contributed towards the Network's scientific accomplishments," he said, adding: "as we've transitioned from a loose federation of individual sites to one more focused on network-level questions and experiments, we've become a network with value greater than the sum of individual sites, representing a new strength that will become all the more valuable as we move into a new era in US science of environmental observatories."



Phil Robertson speaks on behalf of the LTER Network after accepting the 2010 AIBS Distinguished Scientist Award. (Photo: Julie Palakovich Carr).

Consequently, Roberson said, he was accepting the award on behalf of "mid-career and senior scientists like myself, who have spent a significant part of our careers conducting science at single and multiple LTER sites…as well as "junior scientists, including hundreds of graduate students and postdocs who have and are using sites in the network to ask career-launching questions ranging from evolutionary genetics to ecosystem processes at scales that range from the micro to the landscape."

Present at the award ceremony were several NSF program officers, including Bette Loiselle (Director, Division of Environmental Biology), Todd Crowl (LTER Program Officer), and Jim Collins, former Assistant Director for Biology at NSF. Robertson thanked the NSF for its role in creating, nurturing, and growing the Network, noting that "The Foundation and its visionaries deserve a huge amount of credit for the Network's success." He pointed out that although LTER's home is in NSF's Biological Sciences Directorate, the Network involves many other directorates and programs, including the directorates of Geosciences; Social, Behavioral, and Economic Sciences; Education and Human Resources; Cyberinfrastructure and Systems Engineering; and Polar Programs and International Programs.

Other awardees were Duke University Professor of Biology Dr. Kathleen K. Smith (Outstanding Service Award), Dr. Jo Handelsman, the Howard Hughes Medical Institute Professor in the Department of Molecular, Cellular and Developmental Biology at Yale University (Education Award), and Dr. Mark A. McPeek, the David T. McLaughlin Distinguished Professor of Biological Sciences at Dartmouth College (President's Citation).

The LTER Network comprises 26 sites funded by NSF to pursue basic research in ecology and environmental science. Since 1980, site scientists have conducted research to better understand long-term ecological phenomena in both natural and managed ecosystems. A broad variety of ecosystems are represented in the Network, including tundra, forest, grassland, desert, agricultural, urban, and marine sites, among others. For further information, including a list of current sites and principal investigators, see *www.lternet.edu*.

By McOwiti O. Thomas, LNO

NEON developing Airborne Spectrometer

The National Ecological Observatory Network (NEON) has begun construction of a new airborne imaging spectrometer that will provide high-resolution remote sensing data over NEON sites and other regions requested by science investigators. The spectrometer, which becomes available in 2015, will measure sunlight reflected from the ground and plant canopies in many narrow spectral bands extending over visible, near- and shortwave-infrared wavelengths. By identifying features in the reflectance spectrum associated with light absorption or scattering within the leaf, for example, it is possible to extract quantitative information about the biochemical properties of vegetation.

The NEON airborne system, when fully operational, will include the imaging spectrometer, a scanning, small footprint waveform-recording LiDAR (Light Detection and Ranging), and a high-resolution digital camera. Together, these instruments will provide spatially explicit information on the canopy biochemistry and structure, land use, and land cover of regional vegetation. Three complete airborne systems are planned for installation into Twin Otter aircraft to cover NEON sites each year. The systems will provide data in response to Principal Investigator requests to support specific research projects and experiments, regional studies, and follow-up after extreme events. Furthermore, the Observatory is planned to operate for 30-plus years, collecting measurements at the scale of organisms for decades over thousands of square miles, a previously unheard of science capability for studying the plant community, physiological, and evolutionary ecology.

Imaging reflectance spectroscopy was originally developed in the 1970s, based on insights derived from laboratory analysis of natural materials. The first airborne demonstration of this technique was with the Airborne Imaging Spectrometer, built by the Jet Propulsion Laboratory (JPL) in 1982. JPL has continued to lead development of state-of-the-art airborne spectrometers over the last decade driven largely by scientific work with the follow-on Airborne Visible and Infrared Imaging Spectrometer (AVIRIS).

Recent improvements in optical design and component fabrication at JPL coupled with new detector array technology have enabled finer image resolution and a higher degree of spectral precision than before. This makes possible meter-scale resolution at the level of individual plant canopies or small groups of organisms from aircraft. JPL is building an airborne spectrometer incorporating these technologies in partnership with NEON as a demonstration of its performance capabilities; this spectrometer will become a key component of the NEON instrumentation.

Science investigators needing NEON airborne data will apply through a process familiar to oceanographers and atmospheric scientists. Principal Investigators will submit a research proposal to the National Science Foundation (NSF) or another sponsoring agency for the resources needed to support their activities. NEON will, in turn, give NSF an assessment of the request in terms of cost, synergy with and potential impacts on other NEON activities, implementation challenges, and other resources required. Based on the review and assessment of the science proposal, the Foundation will decide whether or not to support the requested investigation. A similar but streamlined process will be available to investigators for immediate consideration in response to extreme or unexpected events.

For more information about the National Ecological Observatory Network, visit *www.NEONinc.org*.

By Brian Johnson, NEON, Inc.

EcoTrends update

The EcoTrends Project continues to make progress in aggregating long-term datasets from all 26 United States Long Term Ecological Research sites and an additional 24 U.S. research sites into a common framework for publication and access.

The book, "Long-term trends in ecological systems: a basis for understanding responses to global change," was edited by both LTER and federal scientists from nine sites and the LTER Network Office: Deb Peters (JRN, USDA ARS), Christine Laney (JRN, USDA ARS), Ariel Lugo (LUQ, USDA FS), Scott Collins (SEV), Charley Driscoll (HBR), Peter Groffman (BES), Morgan Grove (BES), Alan Knapp (SGS, KNZ), Tim Kratz (NTL), Mark Ohman (CCE), Bob Waide (LNO, LUQ), and Jin Yao (JRN, USDA ARS).

The EcoTrends book consists of five parts: (1) eight chapters illustrating the importance of long-term data in addressing cross-site science questions, (2) four chapters showing maps of trends in different types of drivers or ecosystem responses (climate, precipitation and stream water chemistry, human demography and economy, plant and animal production, abundance, and richness), (3) three chapters on recommendations for future cross-site projects based on the history of EcoTrends, (4) site descriptions, and (5) appendices of data and regression coefficients. A subset of these figures and maps is currently available on the EcoTrends web site (*http://www.ecotrends.info*). The book was revised following external review, and then submitted in May, 2010 to the USDA publisher for design, layout, and printing, with an expected publication date in late 2010 or early 2011.

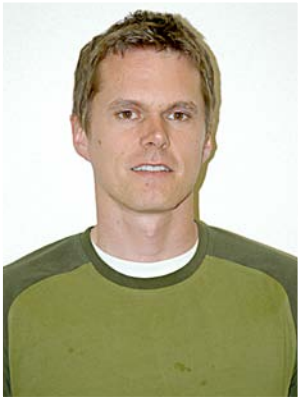
By Deb Peters, JRN

LATE BREAKING NEWS...

"Long Term Trends in Ecological Systems: a basis for understanding responses to global change" was submitted to the USDA publisher in late June after final formatting (in manuscript form), data cleaning, and author/photographer permission issues were resolved. The USDA publishing office will work on the design and layout of the book followed by final review and edits by authors with publication expected in early 2011.

Comings and Goings

The LTER Network Office experienced many changes during the past year, among them the addition of new staff:



JAMES MOSS (NIS Programmer): James was raised in Madison, WI, and completed his undergraduate studies in Computer Science and Economics at St. Olaf College in Northfield, MN. He has lived in Albuquerque for about two years, having lived in Pittsburgh prior to that. A member of the NIS group, James is actively engaged in developing software for the PASTA framework. Away from work, he enjoys spending time outdoors.

YANG XIA (Information Manager): Before Joining LTER Network Office as a new Information Manager in February 2010, Yang worked as a research scientist for five year at the Sevilleta LTER, and 10 years before that at the Xinjiang Institute of Ecology and Geography of Chinese Academy of Sciences. Yang's current interests include maintaining database consistency and integrity, content management, data analysis, report documentation, and research project coordination.

LEANNE YANABU (Web Designer): Leanne was born in Los Angeles and raised in Hilo, Hawaii. She graduated from Haverford College and received her Masters of Fine Arts in Photography from Southern Illinois University at Carbondale. In between earning her degrees, she served as a Peace Corps volunteer in Mali, West Africa. Upon relocating to New Mexico, Leanne joined the University of New Mexico as a web designer for several departments, including the Center for Radioactive Waste Management, the Tamarind Institute, and the Latin American Institute. She joined LNO in early 2010 and currently helps manage and maintain the website with open source content management software. You can view Leanne's website at *www.olopua.com*.

RINA OUELLETTE (Administrative Assistant): Born on Long Island, New York, Rina earned her BS at the University of Texas at Austin in Radio-TV-Film, and earned her MA in Archetypal Art Therapy / Art Education at the University of New Mexico. Rina has lived in Japan and taught English and French at Berlitz School of Languages in Nagoya, Japan. Before returning to Albuquerque, Rina worked at Holt, Rinehart and Winston as a Book Designer. In her spare time, Rina enjoys making beaded jewelry using seed beads, walking, reading books by her favorite author Doris Lessing, and studying Accounting.

JOE TIGHE (Account/Fiscal Services Tech): Born in Texas and relocated to New Mexico when nine years old, Joseph attended Saint Pius X High School in Albuquerque then moved on to obtain a Bachelors in Business Administration from Texas A&M University in 2006. His responsibilities at the Network Office include reconciling all expenditures related to the LNO and projecting and balancing budgets for working groups and supplements to the LNO. In his free time Joseph likes to go camping and travelling, but his favorite thing to do is play golf. He is a member at the UNM North Golf Club, and when not at the LNO can most likely be found there.

OTHER COMINGS AND GOINGS

In January 2010, CAP welcomed **Phil Tarrant** as the new information manager. Phil gained extensive experience in software project management at IBM before becoming a biologist / remote sensing specialist. He has worked off and on with CAP as a bird technician and student.

Corinna Gries replaced Barbara Benson as Information Manager at NTL right after the LTER ASM in 2009.

Also in 2009, **John Chamblee** replaced Barrie Collins at CWT; **Adam Skibbe** replaced Jin Gao at KNZ; **Sue Welch** replaced MCM's Chris Gardner. Earlier, in March 2008, **Gastil-Buhl** had replaced Sabine at MCR.

LNO posts mini-symposium webcasts online

Every spring, scientists from the Long Term Ecological Research (LTER) Network presented a mini-symposium at the National Science Foundation (NSF) in Arlington, VA. Now, the LTER Network Office (LNO) has posted online webcasts from the 2010 symposium, whose theme was "Ecosystem Services in a Changing World."

Now in its ninth year, this annual mini-symposium brings together scientists and educators from several LTER sites and disciplines to NSF to share with agency peers and policy makers the status of ongoing LTER research, important findings, and future plans.

Ecosystem services are grouped into four main categories: provisioning, such as the production of food and water; regulating, as in control of climate and disease; supporting, such as nutrient cycles and crop pollination; and cultural, including spiritual and recreational benefits. It's important, LTER and other scientists say, to understand how ecosystem services are responding in a changing world, so these ecosystems may be managed in ways that sustain life on Earth.

Presentations addressed ecosystem services in agricultural systems, in temperate forest harvest systems, and in residential landscapes. Also covered were subjects such as changing urban water supplies in the tropics, the impacts of marine reserves on fisheries, and the implications of wildfires on human subsistence. The topics included: "Overview of Ecosystem Services" by Steve Carpenter, NTL; "Ecosystem Services and Agricultural Systems" (Scott Swinton, KBS); "Ecosystem Services in Temperate Forest Harvest Systems" (Barbara Bond, H.J., AND); "Changing Preferences for Ecosystem Services Over Time" (Christopher Boone, BES); "Ecosystem Services in Residential Landscapes: Perceptions, Tradeoffs, and Cross-Site Research Opportunities" (Kelli Larson, CAP); "Social and Ecological Impacts/Implications of Marine Reserves on Trap Fisheries" (Hunter Lenihan, SBC); "Changing Urban Water Supplies in a Tropical Context" (Fred Scatena, LUQ); and "Ecosystem Service Impacts/Implications of Fire Regime on Human Subsistence" (Terry Chapin, BNZ).

The symposium was webcast live by the LTER Network Office, which worked closely with NSF media experts to make sure the event went smoothly. The high quality video presentations were recorded and posted online shortly thereafter, and are available for viewing at *http://mtsmediasite.unm.edu/unm/Catalog/pages/catalog.aspx?catalogId=d1bf5a0e-03f0-48cd-8a7f-fe6d12e9f298*

A section of the audience during the 2010 LTER Mini-Symposium at NSF in Arlington, VA. (Photo: John Vande Castle).

Viewers generally need the Microsoft Silverlight Player plugin for their browsers to view the webcast (Moonlight player for Linux). Most people already have Silverlight installed in their computers, but an installation link will be presented on the viewing page for those who don't. For more information about the 2010 LTER Mini-Symposium, see: *www.nsf.gov/news/news_summ.jsp?cntn_id=116382&org=SBE&from=news*

By McOwiti O. Thomas, LNO

Presenters and their audience during the Mini-symposium. Clockwise from top left: Hunter Lenihan (SBC); Kelli Larson (CAP); Terry Chapin (ARC); Todd Crowl (LTER Program Director, NSF); Fred Scatena (LUQ); LTER Chair Phil Robertson, Larson, and Scatena; Christopher Boone (CAP); Barbara Bond (AND). (Photos: John Vande Castle).

NSF completes 2009 site reviews and initiates 30-Year review of the LTER program

The year 2009 was a very busy review year for LTER sites. In all, nine sites were reviewed by NSF review panels during the year. Each LTER project is funded independently for six-year periods with site reviews held midway through the funding period. Review teams evaluate the quality of science, education and outreach as well as how well the site is managed and how integrated the sites are with the entire LTER network. This year, we paid special attention to the quality and quantity of data products, their accessibility and availability and their integration with the LTER network.

The NSF Biological Sciences Directorate Advisory Committee has commissioned a review team, co-chaired by Allison (Sonny) Powers and Anthony Michaels, to conduct a 30-year review of the whole LTER program. We have asked this committee to be very forward thinking in their review. This review is intended to be prospective, rather than retrospective, articulating a strategic vision that will strengthen the core science agenda for the LTER network over the coming decade.

We have also asked them to consider the role LTER should play in data synthesis, management and analysis, particularly with respect to NSF investments such as NEON, CZO, and NCEAS, and how LTER should interface with these other investments. Issues might include long-lived data access and interoperability; the types of questions that NEON and other observatories will allow LTER to address, and LTER cyberinfrastructure considerations.

Finally, 12 LTER sites will be evaluated for renewal in April, 2010. All relevant Program Officers in NSF have been invited to participate in the running of the panels and to attend site reviews as observers, as well as to provide input to the construction of the review/award/decline letters. Currently eight jackets are managed outside the Division of Environmental Biology (DEB)--five in the Biological Oceanography Program, two in the Office of Polar Programs, and two are jointly managed by DEB and Social, Behavioral and Economic Sciences (SBE).

All in all, it has been a busy, but productive year for the LTER program officers, scientists and ecological community that we rely on so heavily for our peer review process.

By Todd A. Crowl, Matt Kane, & Henry Gholz, NSF

LTER site review teams visited nine sites, including (top to bottom) Harvard Forest, Cedar Creek, Sevilleta, and Florida Coastal Everglades, where researchers are shown here explaining aspects of their research activities. (Photos courtesy of NSF).

Tornado touches down at SGS LTER

A tornado bears down on Long-term experimental plots (in the foreground), looking east from the SGS LTER field station at site manager's residence in northern Colorado. (Photo: Mark Lindquist).

Tuesday, May 18 started out as a lovely warm spring day at the Shortgrass Steppe (SGS) LTER—a welcome relief after a cold winter. But around mid-day severe weather warnings were posted for most of the Front Range, south of Denver to Cheyenne, Wyoming.

By 3 p.m., the weather looked sufficiently threatening to the west of Fort Collins and the Colorado State University campus that SGS LTER staff on campus checked the weather radar. There were two very bright and very tight storm cells over northern Colorado, just south of the Wyoming line and probably on top of our research site. Shortly after that the online news from Denver's Channel 9 TV posted pictures taken in Cheyenne of a tornado on the ground to the south, most likely in northern Colorado.

Meanwhile, back at the SGS LTER field site, Mark Lindquist and the 26 participants in the Rocky Mountain Sustainability and Science Network Summer Academy at the new SGS Research Interpretive Center were standing on porches watching the sky. There was plenty of rain and some wind. Mark says he "noticed these huge cells forming" and went to check the National Weather Service (NWS) online. He discovered that NWS "had posted tornado watch and then warning for our immediate area," he said.

Tornado to the north-northeast of the SGS LTER field headquarters and site manager's residence. (Photo: Mark Lindquist).

Mark went back outside to check on the storms and saw what he describes as "clouds rotating with a tail forming." He grabbed his camera from the field station and started taking pictures as the tornado moved east to west over 30–45 minutes before dissipating. Using binoculars, he could see rotation clearly and debris being thrown around.

Although he thought the tornado was on the ground about 7–10 miles north of the SGS LTER headquarters building, NWS storm track information later indicated that the twister was only 2–3 miles north of the field station. There were at least four additional tornados and potential tornado-generating storm cells later that afternoon and evening. Around 6 p.m. Mark reported that there had been other storms going around the station and over it, but nothing as severe as the tornado in the afternoon. Although we were all relieved that no injuries or damages were reported, Mark says these severe storms emphasize the importance to field researchers of paying attention to the weather conditions around them, not only their research subjects and activities.

By Sallie Sprague, SGS

SGS hosts Danish researchers

University of Copenhagen students Louise Bach and Anne Pedersen at the Shortgrass Steppe LTER. (Photo courtesy of SGS LTER).

Two students from the University of Copenhagen arrived early in February to continue investigation of the swift fox on the shortgrass steppe in Colorado. Anne Petersen and Louise Bach were looking at communication between foxes by manipulating chemical scents in fox latrines.

Prior work by Safi Darden documented swift fox behavior at latrines and proposed that this behavior communicated not only territorial boundaries, but also potentially reproductive state. By altering the scents in the latrines, Bach and Peterson hoped to provoke territorial behavior, such as over-marking, by the resident fox.

Darden and several subsequent researchers from the lab of Torben Dabelsteen at the University of Copenhagen have attached radio collars to swift foxes, tracked them through the seasons, and mapped their home territories. Bach and Peterson subsequently used radio telemetry to locate individuals and their dens. Our very snowy winter made this more difficult than usual and the first fox they found had succumbed to the rough winter. Thereafter, they continued monitoring several dens in the hope that they would collect enough data for their theses before returning to Denmark in April.

By Sallie Sprague, SGS

During their stay Louise and Anne joined in the winter rabbit count at the Shortgrass Steppe LTER. Although they are used to cold winters and snow in Copenhagen, they were not prepared for four hours in the back of a pickup truck in the dead of a windy, Colorado winter night. (Photo courtesy of SGS LTER).

SGS scientist co-authors special issue of journal

Mike Antolin, lead PI for the SGS LTER and Professor of Biology at Colorado State University, co-wrote the lead article and served as guest editor for a special issue of the *Vector-Borne and Zoonotic Diseases* journal. The special issue reported on an international symposium, "The Ecology of Plague and its Effects on Wildlife" that was held in Fort Collins in November, 2008.

Antolin's research, in collaboration with SGS LTER Scientists Jim Detling, Paul Stapp (California State U. Fullerton) and David Augustine (USDA-ARS), focuses on plague outbreaks on prairie dog towns on the shortgrass steppe in Colorado. The frequent outbreaks decimate towns when they occur, and influence diversity of associated plants and animals, including small rodents, birds like mountain plovers and burrowing owls, and pollinating insects. The group studies metapopulation dynamics of the prairie dogs as well as the epidemiology of plague, how that may be influenced by climate variability, plague transmission by fleas, and molecular genetic analyses of the spread of the plague bacterium, Yersinia pestis.

The international symposium brought together many leading researchers studying plague world-wide. More information on the conference can be found on the journal's website: *http://www.liebertonline.com/toc/vbz/10/1* and in an article written by Emily Wilmsen at CSU: *http://www.today.colostate.edu/story.aspx?id=3297*.

By Sallie Sprague, SGS

Thirty years of old-growth research

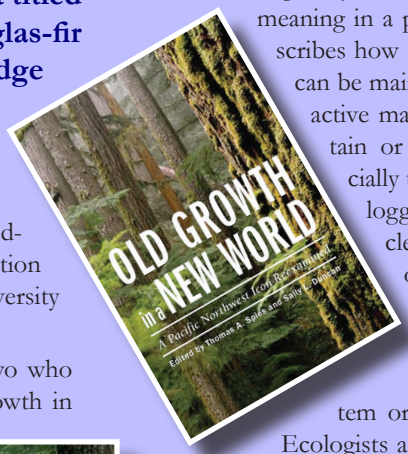
Changing view of old-growth forests

Nearly 30 years ago scientists from the Andrews published a Forest Service General Technical Report titled "Ecological Characteristics of Old-Growth Douglas-fir Forests." That report, which laid out our knowledge of the composition, structure, and function of old growth conifer forests, helped create a sea change in forestry in the Pacific Northwest.

During the intervening years forest management on federal lands shifted from a dominance of timber production to management to protect and restore biological diversity and other forest values.

Recently, several scientists from the Andrews (including two who contributed to the 1981 report) produced a book "Old Growth in a New World: A Pacific Northwest Icon Reexamined" (Thomas A. Spies and Sally L. Duncan eds., Island Press 2009). The book considers how our understanding of old growth has changed over the last 30 years and the implications for future forest conservation policies in the Pacific Northwest.

One of the findings of the book is that the power of the old-growth icon to instigate change in forest management across millions of acres of land resulted from a convergence of the science of ecological complexity with society's needs for mystery and meaning in a post-modern world. The book describes how forest values, including old growth, can be maintained in the future. For example, active management will be needed to maintain or restore some older forests, especially those that have been altered by past logging and fire suppression. It is also clear from the historical perspective of the book that our future ecological and social views of old growth will continue to change.



Old growth is not a static ecosystem or a fixed idea and never has been. Ecologists and social scientists will continue to explore these magnificent forests scientifically and examine our perceptions of them. For example, it is becoming clear that forest values, including biological diversity, cannot be maintained by only focusing on the old-growth stages of forest development.

Old growth is part of a complex web of structural stages that include early seral forests, all of which contribute to maintaining ecosystem structure and function and landscape diversity, and providing ecosystem services. Perspectives from social sciences and humanities are critical if we are to better understand and conserve these forests in a changing social and biophysical environment.

Watershed gage house at the HJ Andrews Experimental Forest LTER site. Photo by Al Levno.

By Thomas A. Spies, USDA Forest Service

Reflections Writer-in-Residence receives Burroughs Award

In 2009, Scott Russell Sanders from Indiana wrote a wonderful essay drawing on his residency in the HJ Andrews Experimental Forest LTER. That essay, Mind in the Forest, recently received the John Burroughs Association's recognition as the outstanding published natural history essay for 2009, based on the work's content and literary value.

With this award Sanders becomes the first writer to be recognized twice since the award began – a tribute to his remarkable skill and grace with thought and word.

Excerpt from the essay: "I touch trees, as others might stroke the fenders of automobiles or finger silk fabrics or fondle cats. Trees do not purr, do not flatter, do not inspire a craving for ownership or power. They stand their ground, immune to merely human urges. Saplings yield under the weight of a hand and then spring back when the hand lifts away, but mature trees accept one's touch without so much as a shiver. While I am drawn to all ages and kinds, from maple sprouts barely tall enough to hold their leavers off the ground to towering sequoias with their crowns wreathed in fog, I am especially drawn to the ancient, battered ones, the survivors."

Sanders continues to consider our place in the natural world and the instincts that lead to mutual nurturing – and the forces that work against it. Read the full essay and reader comments at *http://www.orionmagazine.org/index.php/articles/article/5099*.

Information on the Andrews Forest LTEReflections program is online at *http://andrewsforest.oregonstate.edu/research/related/writers.cfm?topnav=167*.

By Lina DiGregorio, AND

Andrews researchers discover how water moves through soil

A new report of hydrology study at the HJ Andrews Experimental Forest LTER profoundly changes our view of the movement of water through mountain soil and into streams.

Several years of diligent study of the isotopic composition of precipitation, soil water, and streamflow within Watershed 10 at the Andrews Forest reveal that early wet season precipitation becomes tightly bound within the dry, end-of-summer soil. Water from later fall and winter precipitation washes by this sequestered water without mixing and eventually contributes to streamflow. The sequestered water exits the watershed via transpiration in subsequent dry seasons.

This work by Renee Brooks (EPA), graduate student Holly Barnard (OSU), and Jeff McDonald (OSU), substantially modifies a century of hydrologic theory that in a climate system like the Andrews Forest rain and snowmelt enter the soil, mix with soil water, and displace it downslope and eventually into the stream. These new findings suggest that soil contains two semi-independent water reservoirs: tightly-held water that is accessed by plants and loosely-held water that supplies streamflow.

Ecohydrologic separation of water between trees and streams in a Mediterranean climate. 2010. J. Renée Brooks, Holly R. Barnard, Rob Coulombe & Jeffrey J. McDonnell. Nature Geoscience. 3, 100 - 104 (2010). For more information, see *http://www.nature.com/ngeo/journal/v3/n2/full/ngeo722.htm.*

By Lina DiGregorio, AND

Andrews LTER RET wins National Environmental Prize

Andrews LTER Research Experience for Teachers (RET) participant, Jill Semlick, will receive a Richard C. Bartlett Environmental Education merit Award for her outstanding contributions to environmental education. The Bartlett Environmental Education Award and two merit awards are given annually by the National Environmental Education Foundation to recognize teachers who inspire their students and their peers during National Teacher Appreciation Week, held this year from May 3–7.

A veteran high school teacher with 24 years experience, Semlick, a biology, ecology and chemistry teacher at Pauling Academy of Integrated Sciences in Portland, OR, integrated the concepts of Expeditionary Learning – comprising standards-based learning adventures and community-service activities – with her own teaching methods. Her projects have included the "Northern Flying Squirrel" project, in which students gain hands-on experience in fieldwork and natural resource management while providing valuable data to the US Forest Service and Bureau of Land Management. Her students have also created an original play for elementary school children about conservation. In the past seven years, Semlick has also obtained more than $300,000 in grants for her programs, students, and the school.

Ms. Semlick has been a participant and continues as an instructor in teacher professional development programs as part of the Andrews Schoolyard LTER program. As an Andrews LTER RET in 2008, she took video and still images of Andrews researchers in action, which she wove together into several presentations titled "How Biologists 'Do' Biology." In her classroom, Semlick shares a video with her students each week.

Teacher Jill Semlick (Photo: courtesy of Andrews LTER).

The Richard C. Bartlett Environmental Education Award is sponsored by the Baxter Healthcare Corporation. For information on past winners, visit: *http://www.neefusa.org/bartlettaward/bart_award.htm*

By Kari O'Connell, AND

SGS RIC hosts Wyoming writers

For one week in January 2010, the SGS Research and Interpretation Center (RIC) provided a retreat for seven Master of Fine Arts writing students from the University of Wyoming. The new facility, which is adjacent to the SGS LTER headquarters, currently has three 5-bedroom houses with spectacular views of the Colorado shortgrass steppe.

The writers found the solitude and vast landscape provided an ideal respite from the hustle and bustle of their normal lives. Student participant Evie Hemphill's story about her experience at the Center, along with photos by Julie Church, can be seen at the SGS LTER web site, *http://sgslter.colostate.edu/*.

In addition to housing, the SGS RIC has a classroom/meeting/workshop building. All are surrounded by generous porches for watching the light change and the sun set across the shortgrass steppe. The large classroom in the RIC building seats 100 and can be split into two classrooms if needed, while two smaller rooms can accommodate groups of 10 or 20. The meeting facility and the houses are open for use by classes, workshops, and retreats. Local GK-12 groups have used the classroom as a base for some of their Schoolyard LTER activities.

Future plans call for the construction of a laboratory to support SGS LTER investigations as well as research by visiting scientists. For more information please visit or contact the SGS LTER site directly.

By Sallie Sprague, SGS

BES Project Director chats with "Leaf Litter"

BES Project Director Steward Pickett. (Photo courtesy of BES LTER).

The Leaf Litter newsletter, which is published by Biohabitats, recently featured the Baltimore Ecosystem Study (BES) LTER. Biohabitats is a national firm that does ecological design and restoration.

Reporter Amy Nelson interviewed BES Project Director Steward Pickett about BES and the nature of long-term ecological research. Among the issues covered were challenges and benefits of urban ecological research, reasons why Baltimore was a suitable site for urban research, multi-institutional partnerships, the nature of integrated research, and the policy relevance of BES findings. The entire interview can be found in the Spring 2010 newsletter at *http://www.biohabitats.com/*.

By Holy Beyar, Project Facilitator, BES

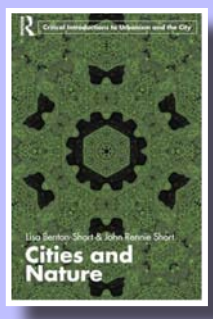
BES LTER recognized in new urban ecology textbook

Lisa Benton-Short and John Rennie Short (2008) have published a book in the Routledge series, "Critical Introductions to Urbanism and the City."

Titled *Cities and Nature*, the book consists of three major sections: I. The Urban Environment in History; II. Urban Environmental Issues; and III. (Re)aligning Urban-Nature Relations. Within this broad scope, general issues of global trends and conditions of urbanization, the status of urban ecology, various forms of contamination and vulnerability, environmental justice, and sustainability are addressed.

Of particular interest to the LTER community is the fact that the book uses insights from BES work and frameworks, and notes the contribution of our Long-Term Ecological Research project to building contemporary urban ecological research. Indeed, both BES and the Central Arizona Phoenix LTER sites are described in a text box. The linking of social and biophysical approaches is noted as one of our contributions, helping to balance the traditional bias of urban research primarily toward the social.

By Steward Pickett, BES



Cities and Nature (Routledge Critical Introductions to Urbanism and the City).

Effects of a rare cold snap on Everglades biota

What are the long-term consequences for the ecosystem?

ENSO (El Niño) events tend to produce cooler and wetter winter conditions in the southeastern United States. Warm-phase ENSO events also produce a strong subtropical jet stream, which in January 2010 resulted in frigid temperatures reaching South Florida, the Everglades, and our Florida Coastal Everglades (FCE) sites. The cause appeared to be a pronounced pattern of high pressure over the Arctic that allowed the cold air of the jet stream to be deflected further south than usual.

As a result, South Florida experienced extremely low temperatures, including a record low at Key West of 6°C, the second lowest temperature since 1873. In Miami, air temperatures reached 2°C, but dipped as low as -2°C in the Everglades. Temperatures this low were last recorded in the winters of 1989 and 1977. However, what was most notable about this cold snap was its duration. Air temperatures did not go above 11.5 °C for a record 12 days, the coldest period since 1940. Hydrological stations throughout Everglades National Park (ENP) recorded water temperatures as low as 5-6 °C in freshwater marshes and coastal habitats.

The effects of the cold snap appeared to be particularly strong in the estuarine and marine region of ENP. Mortality and defoliation strongly affected red mangroves (Fig.1), which have little capacity to resprout after freeze damage (Ross et al. 2009). Canopy structure, exposure, and proximity to the warmer marine environment appeared to influence the damage pattern. Tall forests near the coast were relatively unaffected, while at our SRS5 site several miles upriver, mangrove mortality was extensive on the west side of the Shark River, perhaps a result of cold westerly winds (Gilmore et al. 1978).

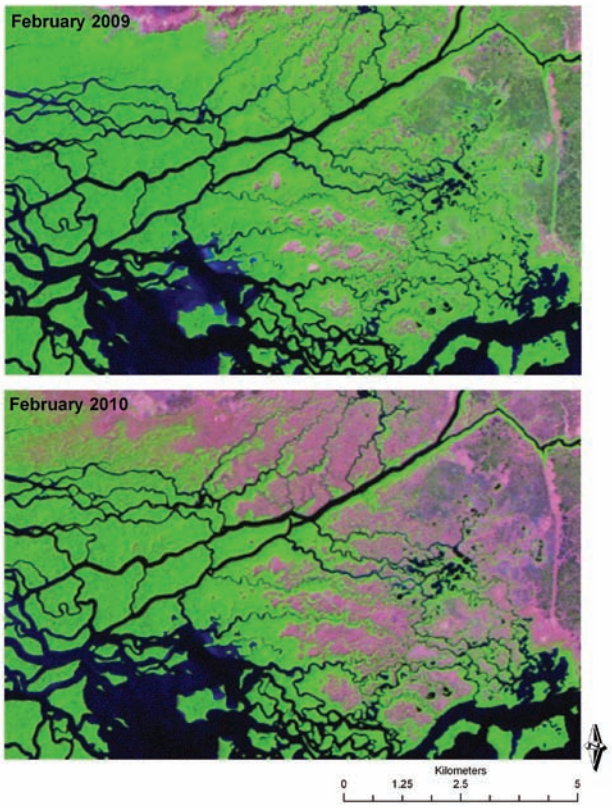


Fig. 1. February 2009 and 2010 Landsat TM imagery (bands 5, 4, & 3) of Shark River, Everglades National Park, depicting changes in the spectral reflectance of mangroves and marshes as a result of the January 2010 freeze.

Faunal mortality effects were severe on 28 species of native marine fishes, on endangered West Indian manatees, and threatened American crocodiles. Mortality was severe for important game species such as snook and tarpon, and for goliath grouper, a species of conservation concern. Effects on bull sharks may have been high as well. Unlike the past 5 years when longlining proved effective at sampling bull sharks (Heithaus et al. 2009), sampling efforts so far have failed to yield a single capture.

Concern over the long term impacts of the cold snap on saltwater recreational fisheries is high. In 2006, 1 in 10 anglers

See "Everglades", p. 14

Left: An angler shows off his catch of bull shark. ***Right:*** non-native African jewelfish and spotfinned eels. (Photo courtesy of FCE LTER).

Everglades (continued from p. 13)

fishing in the U.S. were fishing in Florida, the largest proportion of any state (USFWS 2006). Recreational fishing in ENP approaches 45,000 fishing trips per year, and 40 percent of anglers target snook (Osborne et al. 2006).

Among the positive effects of the cold snap was the extensive mortality of nonnative fishes and Burmese pythons. Lethal limits were reached for 14 of the 16 nonnative fishes established in ENP. In the vicinity of our SRS3 site, over 93 percent of fish mortality was nonnative.

Top: dead ladyfish and catfishes in mid Whitewater Bay. ***Left:*** a large adult snook along the mangrove shoreline. ***Bottom:*** Mangrove mortality & defoliation at SRS5 along the west side of the Shark River 5 days after the cold snap (Photos: J.S. Rehage).

Our understanding of how these rare cold snaps affect ecosystem structure and function is limited. Of particular interest is how the effects of cold mortality will interact with other stressors to affect ecosystem health, resilience, and its ability to provide for key services (e.g., fisheries). We expect that our long-term research efforts will provide important insights into ecosystem responses to this particular type of pulsed effect.

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By Jennifer Rehage, Evelyn Gaiser, Mike Heithaus, Mike Ross & Pablo Ruiz, FCE

Education News

Making interdisciplinary research work

The LTER network provides a unique opportunity to facilitate synthetic research across sites. Indeed, linking social and ecological systems through interdisciplinary collaborative research is essential for addressing contemporary research questions. Yet, many graduate students find this kind of research extremely challenging. This "collaboration conundrum" was the focus of a 2009 LTER ASM working group meeting, from which we present three pertinent benefits and barriers for graduate students, along with reommendations for addressing the outlined challenges.

Collaboration

Cross-site collaborative research advances students' knowledge of theory and research methods, which can inform their research questions. Collaboration also allows students to develop the necessary expertise to work collectively — a skill that is highly valued and will be critical as they advance in their careers. However, students may have difficulty identifying collaborators, especially amongst fellow students. Additionally, students working within a limited time frame find it difficult to establish meaningful collaborations. Lastly, students may be challenged by dissimilar language and theoretical approaches used by different disciplines.

Connectivity

Increased connectivity across sites and disciplines may broaden a graduate student's existing paradigms and help create and synthesize new ones. Unfortunately, this connectivity may be undermined by institutional and educational constraints ranging from disparate training across disciplines to logistical issues, such as cross-listing courses. While the structure of many graduate degree programs lean toward specialization, successful integration of interdisciplinary research requires a working knowledge of many subjects beyond one's chosen field.

Synthesis

Graduate students engaged in cross-site interdisciplinary research are well positioned to generate new insights by drawing on colleagues' perspectives and juxtaposing multiple long-term datasets from disparate biomes. Comparing systems with different biophysical characteristics, histories, cultures, and other drivers can lead to interesting questions and a broader, synthetic understanding of the social and ecological functioning of ecosystems. However, such research can be hindered by difficulties in obtaining data—often collected and analyzed through disparate methods from multiple sites. The problem becomes increasingly complicated when combining social and ecological data, perhaps easily integrated at one research site but not meaningfully transferable across many sites.

Drawing on the experiences of working group members, we offer three recommendations to graduate students and one general recommendation to facilitate cross-site interdisciplinary research among graduate students. First, make collaborative interdisciplinary research part of your dissertation as early as possible and select a program and advisor who is supportive of this type of research. Second, select committee members who will foster collaborations and facilitate interdisciplinary training. Third, commit to learning the language of the different disciplines in your collaboration to enable effective communication with your collaborators. Finally, it is essential that LTER provides graduate students with more opportunities for training in interdisciplinary theory and methods, and increases funding for graduate students to engage in collaborative research.

We hope that our acknowledgment of the benefits and barriers to cross-site socio-ecological research will act as a catalyst to encourage conversations between undergraduate and graduate students, advisors, and institutions about strengthening these important partnerships.

By Sydne Record (HFR), Kirsten Schwarz (BES), Elizabeth M. Cook (CAP), & Greg Losada (FCE)

The Graduate Student Symposium during LTER All Scientists Meetings gives students not only a chance to learn from established scientists, but also a platform from which to share their ideas with fellow aspiring scientists. (Photo: McOwiti O. Thomas).

Acknowledgements: Our working group collaborators, who were instrumental in sharing their ideas and experiences, included: O. Bartlett, F.S. Chapin III, M. Chen, L. Cray, G. Koch, R. Garvoille, S. Geiger, R. Hale, A. Hamilton, D. Iwaniec, Y. Marusenko, J. McConaghie, J. Munyon, D. Nidzgorski, O. Pisani, C. Rebenack, M. Romolini, M. Smith, and B. Warner.

Grad student updates

Sally Koerner recently joined Chelse Prather as replacement for Amber Hardison in the Graduate Student Committee (GSC) co-chair position. We thank Amber, who will be starting a postdoc position at Brown University this summer, for her service in this position especially for her work organizing the graduate student symposium, and we wish her luck in her future endeavors.

Sally, a University of New Mexico student and a Konza Prairie LTER affiliate, is excited about working with LTER Network Office (LNO) staff to develop a more effective website for graduate students. Sally's current research focuses on plant community structure and dynamics in grasslands. She has, so far, spent most of this year in South Africa collecting data at her field research site in the Kruger National Park. Sally represented the graduate students during the recent LTER Science Council meeting in Massachusetts in May.

Chelse will soon be finishing her PhD, whereupon she will rotate out of her co-chair position. Calls for nominations for Chelse's replacement will be sent out mid-summer, 2010. Please contact Chelse (*cprather@nd.edu*) or Sally (*skoerne@unm.edu*) for more information if you are interested in this position.

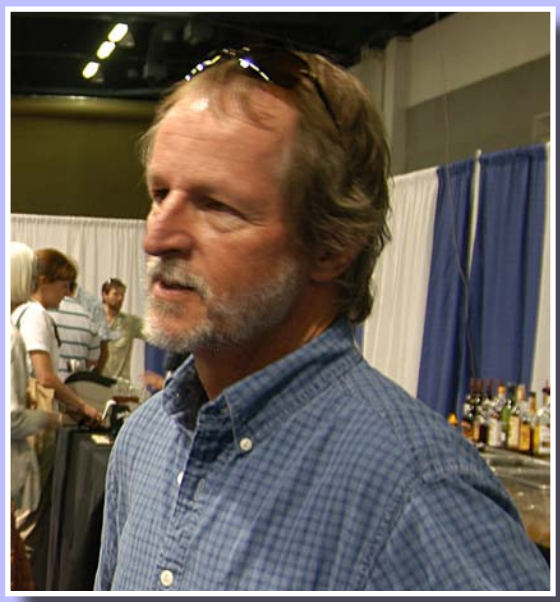
During the forthcoming Ecological Society of America (ESA) annual meeting August 1–6, 2010, the LTER graduate students will sponsor an organized oral session entitled "The Role of Student Research in Long-Term Studies: Insights into Climate Change and Disturbance Theory." This session, organized by Amber and Chelse, will be held on Tuesday, August 3, from 1:30–5:00 p.m. Speakers will include current and former LTER graduate students whose work relate to climate change and/or disturbance across a wide range of LTER sites and ecosystems. Please check the official program for location details. We are very excited about this first of what we hope will be annual LTER graduate student sessions at ESA.

By Chelse Prather (LUQ)
& Sally Koerner (KNZ)
GSC co-chairs

News Briefs

Scott Collins voted LTER Chair-elect

The LTER Science Council (SC), assembled at the Plum Island Ecosystem LTER site for its annual meeting, selected Scott Collins (SEV) as the next Chair-elect of the Executive Board and Science Council. Collins will take over from Phil Robertson at the 2011 SC at the Georgia Coastal Ecosystems site. In the meantime, he will serve as a non-voting member of the Executive Board.



Scott Collins was recently voted LTER Chair-elect. (Photo: McOwiti O. Thomas).

Runner-up Peter Groffman graciously reiterated his desire to serve the LTER Network, which he is currently doing by chairing the ad hoc data prospectus committee. Congratulations to Scott Collins on his election, and to the LTER Network for another successful exercise in democracy.

NSF releases "Sensational 60" scientific advances

In honor of the 60th anniversary of its founding, the National Science Foundation has published its "Sensational 60", honoring "60 discoveries or advances that NSF believes have had a large impact or influence on every American's life" (*http://www.nsf.gov/about/history/sensational60.pdf*).

Work from the LTER program is acknowledged in three of these scientific advances. The establishment of the LTER Network and its subsequent accomplishments is recognized in bullet 40, The Web of Life—And Ecological Research Too.

Bullet 21, Fire and Brimstone, describes work on acid rain conducted at Hubbard Brook site. The Math and Science Partnership project, which involves several LTER sites, contributes to the activities described in bullet 38, Kid's Stuff: Science and Technology Education.

Careful inspection would probably show LTER contributions to several of the other advances listed in the Sensational 60 (e.g., Global Climate Change, International Cooperation). The contributions of LTER scientists to this list of NSF's most significant accomplishments reaffirm the stature of LTER as one of the nation's most important research programs.

By Robert B. Waide, LNO

Scientific Report

Endocrine disrupting chemicals in the environment

In recent years, a growing body of scientific research indicates that certain substances in the environment, natural or synthetic, may interfere with the normal functioning of the endocrine system (which is made up of glands that produce and secrete hormones such as estrogen) in wildlife and even humans. Generally, these substances are called "endocrine disruptors". Those that mimic estrogen and anti-estrogens are receiving more attention because they have been shown to produce effects such as neurologic, immunologic, and developmental disorders in vertebrates [1, 2].

A soybean field: Runoff from farmlands carries pesticides and natural and synthetic livestock hormones into the rivers and groundwater.(Stock photo).

Natural estrogens are secreted by the adrenal cortex (the outer portion of the adrenal gland located on top of each kidney), testis, ovary and placenta in humans and animals. Other estrogens are commonly used as contraceptives or in estrogen substitution hormonal therapies. Steroid estrogens are among the most potent endocrine disrupting chemicals (EDCs), causing effects in aquatic organisms even at trace-level concentrations [3].

Water is, without a doubt, one of the biggest transporters of these compounds. Runoff from farmlands carries pesticides and natural and synthetic livestock hormones into the rivers and groundwater. Effluents from industrial and sewage treatment plants are full of chemical residues that are constantly being released in minute amounts into surface waters, ubiquitously contaminating them and harming the wild life living near the effluents. It is to be expected that drinking water can also get contaminated since water treatment plants are not designed to remove all of these compounds. It is also worth mentioning that a wide range of natural compounds and synthetic chemicals dominate the long list of EDCs.

Some scientists have hypothesized that little amounts of these chemicals are able to disrupt the endocrine system and harm both male and female reproductive systems and even cause cancer in humans[4]. In both animals and humans, exposure to endocrine-disrupting substances in the egg or in the womb can alter the normal process of development. Adult organisms can also be affected, but it is the developing organism that is especially vulnerable. Experts suggest that endocrine disruptors could be a great risk during fetal development [5-8], which is regulated by hormones at specific levels. In humans, hormonal alterations due to maternal exposure during pregnancy could lead to harmful effects on learning ability, behavior, reproduction, and increased susceptibility to cancer and other diseases.

These effects may not be evident until later in life, yet the standard tests used by the U. S. Environmental Protection Agency (EPA) to evaluate reproductive and developmental disruption often fail to consider the impact of doses lower than those producing no evident adverse effects [4, 9]. All of this raises concern about the extent to which EPA protocols are able to accurately evaluate endocrine-disrupting effects. More research is needed to develop new methods for assessing reproductive and environmental disruption and to determine which changes in the policies are in serious need of evaluation to protect the wellbeing of all ecosystems.

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By Sheila M. Soler, PhD Grade Student and IGERT Fellow, LUQ

Note: This report is based on the literature review for a proposed study that Sheila is contemplating at the Tropical Limnology lab, University of Pureto Rico at Rio Puedras..

LTER introduces LTERMapS

The first product from the LTERMapS (LTER Map Services), an information portal built on the Google Maps™ API, was recently migrated to the LTER Network Office (LNO) and made available at *www.lternet.edu/map/*. This product was developed by a subset of the Information Managers GIS (Geographic Information Systems) group and represents the first of a two phased approach designed to accommodate both the needs of the general populace as well as those of researchers interested in a more robust system.

Top: A meeting of LTER Information Managers' Geographic Information Systems group at the LTER Network Office included a video conference with other IMs. ***Left:*** LTERMapS website showing how information from the database is displayed when a user clicks on a bubble. (Photo courtesy of LTER).

Phase one of LTERMapS provides a valuable information portal that offers a network-wide mapping solution targeted at a broad range of user groups. The Google Map™ is customized to dynamically harvest and display information from the LTER Network's site database (SiteDB) and to reflect any content changes in real time. For each LTER site a popup balloon shows the site description, contacts, and clickable links for outside resources. An image tab provides access to a shadowbox popup photo utility that displays images from the LTER Media Gallery (*http://www.lternet.edu/gallery/main.php*). Additionally, user clickable layers can be used to view and download geographic data for site locations (view only), boundaries, ecoregions, gauging stations and weather.

The migration of this phase to LNO was completed this spring during a post-All Scientists Meeting working group meeting in Albuquerque, NM. This migration centralizes the resources of the application at LNO to provide a better end user experience. During the meeting, the group continued to develop specifications for phase two of LTERMapS.

See "LTERMapS", p. 19

(LTERMapS continued from p. 18)

Phase two of the project is focused on expanding site level data with added emphasis on creating a more robust set of tools, both cartographic and analytical, aimed at the scientific community. This phase will move away from the Google Maps™ API and, instead, focus on more robust GIS products from ESRI. The final version of this phase will ultimately depend on a combination of performance, programmability, functionality, and ease of use.

This product is intended to employ a standardized set of data and tools for all LTER sites (elevation, infrastructure, hydrography, structures, and high resolution aerial photography), and be modifiable to fit each site's specific needs. In addition to the cartographic and analytical tools, phase two of LTERMapS is being built to integrate closely with the Network Information System (NIS) modules.

In the coming months we will be soliciting each site for further input (both content and data) to help us fine tune our specifications for phase two of LTERMapS. We encourage feedback on phase one and help in guiding our efforts with phase two. Please contact us with any comments on what you would like to see included in LTERMapS.

By Adam Skibbe (KNZ), Jonathan Walsh (BAL), Theresa Valentine (HJA), Jamie Hollingsworth (BNZ), John Carpenter (GCE), John Vande Castle (LNO), & Marshall White (LNO)

LNO enters 2nd year of DRYAD

The LTER Network Office (LNO) is gearing up for its second year of work as a partner in the Dryad project--a digital repository for data underlying scientific publications, with an initial focus on evolution, ecology, and related fields. Dryad is designed to manage the multitudes of data underlying published articles that would otherwise be scattered about, hard to find, or lost to science. It enables researchers to archive their data at the time of publication, dedicate it to the public domain, and get a citable Digital Object Identifier (DOI) for it. Thus, Dryad promotes the discovery and reuse of data by others.

Dryad is being developed by the National Evolutionary Synthesis Center (NESCent) and the University of North Carolina Metadata Research Center, in coordination with a large group of journals and societies in evolutionary biology and ecology. NESCent is a joint effort of Duke University, the University of North Carolina, and North Carolina State University.

The Dryad project grant, funded by the National Science Foundation, includes a two-year subcontract award to LNO, the first year of which focused on completion of two specific software tasks:

1. Metadata crosswalks between the Ecological Metadata Language (EML) and Dublin Core (DC); and
2. Development of an Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) that complies with the Metacat service interface to perform as both a "provider" and "harvester" service.

In the second year, LNO will participate in Helping Interdisciplinary Vocabulary Engineering (HIVE), an Institute of Museum and Library Services-funded project involving the Metadata Research Center and NESCent. HIVE will provide a dynamic approach to integrating discipline-specific controlled vocabularies that enable queries against one or more vocabularies to return Simple Knowledge Organization System (SKOS)-formatted records for each term, including hierarchical (narrower and/or broader) and related terms.

Specifically, LNO will:

1. Complete a metadata crosswalk from EML to the Dryad Application Profile;

2. Provide the LTER Network's controlled vocabulary in SKOS format to the HIVE project, making LTER's vocabulary one of the existing interdisciplinary vocabularies within the HIVE repository; and

3. Develop prototypical applications that utilize the SKOS vocabulary content returned by HIVE, including an application to help discover metadata documents from the Metacat repository server and an application to assist in the generation of descriptive metadata documents.

This work is scheduled to conclude in September 2010.

By Duane Costa, LNO

Don't forget to read DataBits, the Information Managers' newsletter, online at www.lternet.edu.

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Calendar

Coming Events of Interest to the LTER Community

JULY 2010

July 15: 19th Jornada Basin LTER Symposium, Rangeland Research at New Mexico State University and the USDA-ARS Jornada Experimental Range. Wooton Hall - NMSU Campus

AUGUST 2010

August 1-6: 95th Ecological Society of America Annual Meeting 2010, The David L. Lawrence Convention Center, Pittsburgh, Pennsylvania. Website: ***http://www.esa.org/pittsburgh/***

SEPTEMBER 2009

September 21-24: Annual LTER Information Managers Committee meeting, Kellogg Biological Station, Hickory Corners, MI. Contact George Garcia (***ggarcia@LTERnet.edu***) for more information.

OCTOBER 2009

October 6-8: 2nd Annual Argonne National Lab Soils Workshop to discuss the next generation of ecologically meaningful soil metagenomics. For more information: mkane@nsf.gov . Website: ***http://www.mcs.anl.gov/events/workshops/soils/***

October 17-19: Global Land Project (GLP) 2010 Open Science Meeting (GLP OSM), Arizona State University (ASU). For more information, please contact Dennis Ojima (***ojima@heinzcenter.org***). Website: ***http://www.globallandproject.org/***