

VIEW FROM THE CANOPY

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LONG-TERM STUDIES REVEAL ALARMING FINDINGS

Over the last four decades, it has become evident that lowland tropical forests are far more dynamic than once thought. Long-term datasets are critical for understanding biotic cycles and, increasingly, for distinguishing natural variation from that caused by anthropogenic factors. The La Selva Biological Station is in an unparalleled position to understand and detect such change.

In the last five years, a growing body of evidence from long-term studies and longitudinal metadata studies has revealed that a broad range of taxa and abiotic factors from La Selva are experiencing dramatic variability and often directional change. Until recently, the global amphibian decline had been thought to be restricted mostly to montane, stream-dependent species. Recent studies (Whitfield et al 2007) at La Selva clearly indicate declines in populations of lowland leaf-litter frogs and lizards over the past 35 years. Total density of all amphibians declined an order of magnitude between 1970 and 2005 in primary forest. This is an unexpected and alarming finding.

Similarly, a metadata analysis of bird studies reaching back 45 years has also revealed that at least 50% of insectivorous, forest-interior species – once common at La Selva – have declined in abundance or disappeared; not a single one has increased in abundance (Sigel et al. 2006, in preparation).

Tree populations also appear to be dynamic: a 22-year record from La Selva of annual growth by the canopy trees has shown that forest-wide rates of tree growth have been strongly negatively related to the average nighttime temperature in a given year. The tree-growth variation also closely paralleled large inter-year changes in net carbon dioxide exchange between the global terrestrial tropics and the atmosphere, as inferred from atmospheric

sampling. In years of peak temperatures, when tree growth was strongly depressed at La Selva, the terrestrial tropics produced large carbon dioxide emissions to the atmosphere (Clark et al. 2003).

Changes are also being detected in abiotic systems. An 18-year dataset on the solute chemistry of streams draining the La Selva property reveals that El Niño Southern Oscillation (ENSO) events exert differential effects on pH among streams, with solute-poor streams exhibiting episodic drops in pH and solute-rich streams maintaining a relatively constant neutral pH. During a recent ENSO event, solute-poor streams displayed a startling drop in pH from 6 to 4 (Pringle et al., in preparation).

La Selva is among only a handful of old-growth lowland tropical forest sites across the globe that has long-term data spanning such a wide range of taxa.

Understanding the forces driving these changes – both natural and anthropogenic – is of critical importance as scientists endeavor to understand the links between global change, tropical biodiversity, and carbon cycles. On May 12 and 13, 2007, the Organization for Tropical Studies hosted a two-day workshop to look at global change, tropical biodiversity and carbon cycles. Entitled, Tropical Forest Change at La Selva Biological Station in Costa Rica, the workshop brought together more than 40 participants – primarily long-term La Selva researchers – who shared their long term data on trees, birds, frogs, lizards, bats, non-volant mammals, fresh water fish, stream invertebrates, and dung beetles. The primary objective of this workshop was to evaluate and synthesize demographic and compositional trends across taxa at La Selva, evaluate possible mechanism causing change, identify additional unanalyzed datasets,

and develop plans for further collaborative research and monitoring.

Among the most profound outcomes of the workshop were:

- The workshop participants, representing a wide range of disciplines, found the La Selva forest ecosystem to be more sensitive to change than had previously been realized.
- The hypothesized drivers of forest change at La Selva included climate change (i.e. increased temperature, dry season variability, frequency of ENSO events), fragmentation and land use change, increased pesticide use, natural succession, predator release, and change in arthropod abundance. Research strategies for determining mechanisms of change were outlined. New collaborations are now being formed to test these hypotheses.
- Presented data revealed that climate change appears to be an important and perhaps primary driver of change in a few of the systems studied (e.g. tree demography, low-solute stream acidity); however, climate change does not appear to be the primary driver of change in most of the mammals, birds, amphibians, and reptiles for which scientists have long-term data at La Selva. Drivers of change appear to be many-fold and perhaps cumulative.
- New collaborations between OTS and other organizations such as the Smithsonian Tropical Research Institute on issues of research, data management, global information systems, climate monitoring, and other subjects was advanced, leading the way for extended comparative work on the two largest and longest data sources for the New World Tropics.



EMBRACING CHANGE AT OTS

BY ELIZABETH C. LOSOS, PRESIDENT AND CEO



As we are all aware, changes are occurring within OTS. Much of it is very positive: our strategic plan calls for OTS to continue to change in order to address the needs of the future. One area, for example, is to identify and catalyze research in emerging frontiers of tropical science. Over the course of the past several years, Global Change and Tropical Ecosystems has become a critical area of research in the tropics. OTS' contribution to this important field will be in stimulating activities in science, policy, and action.

In terms of science, four decades of research and monitoring at OTS stations have put us in a perfect – and unique – position to understand the impact of climate change on

tropical biodiversity. Our inaugural activity was an experts' workshop at La Selva last May on Tropical Ecosystems in Transition. We now have a proposal with the US National Science Foundation to sponsor a broader network of scientists to address the changing nature of New World tropical ecosystems.

In terms of policy, we are seeking to sponsor courses for Latin American decision makers that address the impact of climate change on tropical biodiversity and how tropical countries can adapt to such changes.

In terms of action, we are decreasing our own environmental impact, especially our carbon footprint. Our goal is to make the organization carbon neutral. We hope to do this by improving the energy efficiency of our facilities and also by offsetting our carbon emissions through reforestation near Las Cruces and La Selva and deforestation

abatement (preservation of forests that would otherwise be cut down) near La Selva. The reforestation and deforestation abatement projects will have strong conservation and biodiversity benefits, as we target key areas to ensure the ecological health of our stations. I am proud to say a Green Ethics Implementation Team, led by a member of our Board of Visitors, Mike Taylor, is taking the lead on reducing our carbon footprint. I might add that we also are negotiating with the Association of Rent-a-Car agencies in Costa Rica to support our Global Change and Tropical Ecosystems Initiative by donating each year a small contribution for each car that they rent.

OTS has a strong foundation and we are prepared to meet the challenges in our future. We hope you will join us on this exciting journey.

OTS REMEMBERS

Bruce Lee Haines

Bruce Haines, a long-time friend of OTS and researcher at La Selva and most recently, at Las Cruces Biological Station passed away on February 16, 2007 from a sudden illness. Bruce was a very devoted researcher to Las Cruces who developed close relationships with many of individual there as well as at the University of Georgia, where he taught for many years. His energy and quirky sense of humor will be very much missed by all. A tree will be dedicated to his memory on the Wilson Botanical Garden grounds.

Edmund (Ted) Warner Stiles

Ted Stiles passed away on March 7, 2007. Ted's first experience with OTS began as a student in 1970. Two years later he became a graduate assistant and then moved on to coordinate his first course in 1977. Through the years, he wore many hats for OTS: advocate, VP for Education, Advisory Committee member, and of course, dear friend. In addition, he was a long-standing faculty member at Rutgers University. All who knew him remember him with great fondness

and he was well-known for his breadth of knowledge and genuine concern for others. Ted will be greatly missed by his friends, colleagues and students.

Gerald Selzer

Gerald Selzer, a dear friend and advocate of OTS and the program officer for the Field Stations and Marine Laboratories Program at the National Science Foundation, died suddenly after a short illness on February 19, 2007. He was known for his unwavering commitment to help biological field stations. His dedication and professionalism were complemented by his outgoing and friendly demeanor. He will be dearly missed by all who knew him.

Gary Paukstis

This past summer, OTS was saddened to learn about the loss of a dear friend, Gary Paukstis. He retired from a successful career in the data communication industry to spend time with his family and to pursue his many passions - photography, biology, genealogy,

music, tennis, and spending time at his cabin. In addition to his full time career, Gary had a Master of Science degree in biology and had nearly completed his Ph.D. Gary was one of OTS' newest board members and was recently elected as the Vice Chair for Marketing and Development and also served on the OTS Board of Visitors.

His wife, Diane, and three children remember Gary's quick wit, sense of humor and fondness of OTS and in particular, the La Selva Biological Research Station. In honor of Gary's memory, The Paukstis family created a memorial fund to recognize Gary's love of nature and belief in the natural sciences. In a fitting tribute, the funds raised will be used to improve the facilities at La Selva. Individuals interested in honoring Gary's memory through a contribution to the "Gary Paukstis Memorial Fund," should make their gift to "OTS/Gary Paukstis Memorial Fund" and mail their contribution to: OTS/Paukstis Fund, Box 90630, Duke University, Durham, NC 27708-0630.



EXPLORING CORCOVADO NATIONAL PARK

BY KAREN COLLIGAN-TAYLOR – BOARD OF VISITORS

Last March, the Las Cruces Biological Station hosted the annual joint gathering of the Assembly of Delegates, Board of Directors, and Board of Visitors. Holding our annual meetings at a different field station each year allows all of us to keep in touch with improvements, needs, and current research projects taking place there. At Las Cruces, meetings were held at the new Visitor and Conference Center. Chief Executive Officer, Liz Losos, talked about new directions in the strategic plan and introduced two new staff members: Mayco Castro, VP for Marketing and Communications, and Liana Babbar, Education Director. Ed Stashko, VP for Global Programs, discussed the OTS presence in Peru, including university partnerships, and the development of field courses and curriculum guides with support from the Andes-Amazon Initiative of the Gordon and Betty Moore Foundation and the John D. and Catherine T. MacArthur Foundation.

After three days of meetings, a number of delegates from the OTS consortium of universities and members of the Board of Visitors spent three days exploring Corcovado National Park at Sirena Biological Station. Erika Deinert, coordinator of the OTS graduate fundamentals course, hosted the group and proved to be an excellent guide.

Taking to the trails together in the morning, we seemed to fall naturally into different paces and groups: those looking for ants and wasps, those adding to their bird list, and the slowest of all—our two botanists, who found something fascinating every few feet. We happened to converge, however, for small moments of rainforest drama: a white-whiskered puffbird alights on a branch, a huge cicada in its beak; seconds later, its meal is snatched away by two “robber” puffbirds on a fly-by. The curtain closes in a whirl of feathers. At another moment, white-lipped peccaries, warned of our approach, sound off like a chain of firecrackers. Or, we suddenly step into a carpet raid of army ants. Jay Savage led an evening herp hike, on which we discovered a rare canopy frog hanging out on a vine. A few of us were fortunate to see tapirs along the Rio Sirena; the rest of us settled for crocodiles. We did leave only footprints, but we took back more than photos—many days would pass before we dislodged the last tick!

In April 2008 delegates and board members will meet together at Palo Verde Biological Station in Palo Verde National Park, Guanacaste Province. The park incorporates both the largest wetland in Costa Rica, bordering the Tempisque River, and some of the last remnants of seasonal and transitional dry forest in the Neotropics. Our post-meeting

trip is scheduled for Cabo Blanco on the tip of the Nicoya Peninsula.



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COME VISIT US!

OTS Receives Diversity Award

OTS is proud to announce that we have received the first Annual Human Diversity Award from the **Organization of Biological Field Stations (OBFS)**. This award is designed to recognize a research station that demonstrates impressive success in recruiting underrepresented groups to field science activities. The award was presented at the OBFS Annual Meeting in Junction, Texas on September 15 2007. For more information, please go to www.ots.duke.edu.

ATTENTION TEACHERS!

Rainforests and Reefs offered at La Selva Summer 2008

This summer, a new course for secondary school teachers will provide participants with hands-on experience in tropical natural history and field research methods. In 2008, the course will study at the La Selva Biological Station and the Cabo Blanco Absolute Reserve. Participants will explore tropical ecosystems, learn field research techniques, and carry out their own research project. Faculty will be Dr. Barbara Bentley, a plant ecologist from the University of Utah and leader of many RET trips, and Dr. Joe Levine, a noted science writer and producer.

The course meets July 15-29, 2008. Cost is \$2,295, which includes in-country room and board, transportation, and field station use sites.

International air fare is not included. Scholarships are available to qualified participants. For more information, contact Dr. Bentley (variicolor@earthlink.net) or Jonathan Giles (jgiles@duke.edu).

GRADUATE EDUCATION OPPORTUNITIES

Neotropical Herpetology:

May 16-27, 2008; Application deadline February 15, 2008 Sponsored by Peace Frogs

Conservation and Biodiversity Genetics:

May 18-31, 2008; application deadline February 15, 2008 Sponsored by the American Genetics Society

Tropical Ferns & Lycophytes:

January 9-23, 2008; (spaces still available at time of printing)

Tropical Plants Systematics:

June-July 2008, application deadline March 22, 2008.

For more information, please visit us online at www.ots.duke.edu

About OTS

OTS is a non-profit consortium of over 60 research institutions, colleges and universities from the United States, Latin America, Africa and Australia. OTS' mission is to promote education, research and the responsible use of natural resources in the tropics.

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