



**Organization for
Tropical Studies**



Annual Report

Fiscal Year 2006
July 1, 2005-June 30, 2006.



A Letter from the President

ELIZABETH LOSOS, PH.D., PRESIDENT AND CEO

Changing the Way We Think about the Tropics

Many exciting new opportunities are within reach of OTS; to make the most of these, the organization has needed to define and prioritize our goals for the decade ahead. OTS spent much of the last fiscal year focused on change. I am delighted to report that, by the end of FY06 we completed a new strategic plan for the organization.

Three fundamental tenets in the new strategic plan highlight how OTS will adapt to its changing environment. First, OTS will elevate its commitment to education by broadening its educational offerings. Responding to the needs of an increasingly diverse and global audience, OTS will offer a wider array of undergraduate, graduate, and professional courses in the natural, physical, and social sciences. Second, OTS will strengthen the field of tropical studies by developing institutional capacity throughout the tropics to teach the next generation of scientists, practitioners, and policymakers. OTS' past educational expansion outside of Costa Rica has revealed an enormous and unmet demand for field-based educational programs. To sustainably meet this demand over the long term, capacity must be developed within home-country institutions. Under the new strategic vision, OTS will partner with institutions and offer 'Train the Trainers' and programs to help build these skills throughout the tropics. Third, OTS will extend its traditional role of facilitating research to that of catalyst. OTS will harness its unparalleled network of global tropical researchers on emerging frontiers in tropical science. Modern and forward looking facilities and infrastructure at OTS stations will be a critical ingredient to implementing this new strategic direction.

I hope you will visit our website to view our strategic plan at www.ots.duke.edu/en/about/strplan.shtml.

It is an exciting time to be a part of OTS! I welcome your input and hope you will contact me at elosos@duke.edu regarding any questions or suggestions you may have.



Member Institutions

University of Arizona
Arizona State University
University of Arkansas
Auburn University
University of California - Berkeley
University of California - Davis
University of California - Irvine
University of California - Los Angeles
University of California - Santa Cruz
University of Cape Town, South Africa
University of Chicago
University of Colorado
University of Connecticut
Cornell University
Universidad de Costa Rica
Duke University
Universidad Estatal a Distancia, Costa Rica
University of Florida
Florida International University
University of Georgia
Harvard University
Howard University
University of Illinois - Urbana/Champaign
Indiana University
Instituto de Ecología, México
Instituto Tecnológico de Costa Rica
Iowa State University
James Cook University, Australia
University of Kansas
University of Kentucky
Louisiana State University
University of Maryland
University of Miami
Michigan State University
University of Minnesota
University of Missouri - Columbia
University of Missouri - St. Louis
Museo Nacional de Costa Rica
Universidad Nacional de Costa Rica
Universidad Nacional de la Amazonía, Perú
University of North Carolina
North Carolina State University
University of Pittsburgh
Providence College
University of Puerto Rico
Purdue University
Universidad de San Antonio de Abad, Perú
Smith College
Smithsonian Institution
Southern Illinois University
State University of New York - Stony Brook
Syracuse University
University of Tennessee
University of Texas - Austin
USDA Forest Service Research
University of Utah
University of Washington
Washington University at St. Louis
University of Wisconsin - Madison
University of Witswatersrand, South Africa
Yale University

Education Program

FY06 has been a year of transition for OTS' Education Program. The management of the education program was divided between those programs taking place in Costa Rica and those located elsewhere. The Costa Rican Education Program is now operated out of the Costa Rican Office in San José. The non-Costa Rican education programs – which includes a strong institutional capacity building component – will be part of a new division, Global Programs and Partnerships (see section that follows).

To address the challenge set forth by the strategic plan to offer a greater diversity of educational courses at all levels, OTS is initiating a series of specialized graduate courses. These courses will be aimed at the graduate level, but be open to advanced undergraduates as well as post-docs and junior faculty. The courses are intended primarily for consortium member students.

The strategic plan also calls for the integration of graduate, undergraduate, and professional programs in Costa Rica into one program. Administrative transitions are being put in place to readjust work loads in the Education Program within and between the North American and Costa Rican offices. Over the next year, this will include reinstating the professional environmental policy courses in Costa Rica and incorporating existing courses for wetlands managers into OTS' educational program. Recruiting for students will be managed by the Marketing and Communications Division.

Graduate Programs

In FY06, as OTS developed a suite of new courses, to be offered in the coming year, five graduate courses were offered: four in Costa Rica and one in Brazil. The courses provided and the students who participated follow:

Tropical Biology: An Ecological Approach (2005-3)

Tropical Biology: An Ecological Approach was offered June 14 – July 29, 2005. The course is designed for students in the early stages of graduate study in biology or related fields. Its principal goal is to train the next generation of tropical biologists in research methods by providing intensive field experience in the diverse tropical ecosystems of Costa Rica. The course coordinator was Erin Lindquist, co-coordinator was José Edgardo Arévalo and the teaching assistant was Pablo Allen.

Student Participants:

Kevin Barry, University of Maryland
Kathleen Coates, Purdue University
Rebeca de Jesus, University of Puerto Rico
Michael Ferro, Louisiana State University
Arietta Fleming-Davies, Duke University
Emma Greig, University of Chicago
Erik Johnson, Louisiana State University
Erin Kuprewicz, University of Miami
Lucinda Lawson, University of Chicago
Luke Mahler, Washington University, St. Louis
Barbara Martinez, University of Minnesota
Jeffrey Norris, University of Missouri - St. Louis
Megan Paustian, University of Maryland
Andrew Ritchie, Univ. of California - Berkeley
Kari Roesch, Univ. of California - Berkeley

Kia Ruiz, Florida International University
Gaston "Chip" Small, University of Georgia
Nathan Swenson, University of Arizona
Ximena Velez, University of Puerto Rico
Rebecca Weaver, Tulane University
Philipp Wiescher, University of Utah

Ecologia da Floresta Amazônica (2005-12)

Ecologia da Floresta Amazônica was offered August 7 – September 7, 2005 in collaboration with the Instituto Nacional de Pesquisas da Amazônia (INPA), the Smithsonian Institution, and the Universidade Estadual de Campiñas (UNICAMP). The course is designed for Brazilian and other graduate students who are fluent in Portuguese. It emphasizes the ecology of the flooded and terra firme forests in the region around Manaus in Brazil. Coordinating the course was Glauco Machado from UNICAMP and Henrique Nascimento from the Smithsonian's Biological Dynamics of Forest Fragments Project (BDFFP). The teaching assistant was Bráulio Almeida dos Santos and the field assistants were Osmaildo Ferreira da Silva and Ocírio de Souza; all from the BDFFP.

Student Participants:

Agustín Camacho Guerrero, Universidade Federal da Bahia (Spain)
Alison Melissa Gainsbury, University of Texas (USA)
Ana Carla Barros de Souza, Museu Paraense Emilio Goeldi (Brazil)
Bruno Spacek Godoy, Instituto Nacional de Pesquisas da Amazônia (Brazil)
Daniel Pereira Munari, Universidade de São Paulo (Brazil)
Dilermando Pereira Lima Jr., Universidade Federal de Viçosa (Brazil)
Emília Zoppas de Albuquerque, Universidade do Vale do Rio dos Sinos (Brazil)
Glauco Schüssler, Universidade Federal do Rio Grande do Sul (Brazil)
Joyce Costa Barbosa, Universidade Federal do Rio de Janeiro (Brazil)
Juan Ernesto Guevara Andino, Universidad Católica del Ecuador (Ecuador)
Maíra Figueiredo Goulart, Universidade Federal de Minas Gerais (Brazil)
Maria Isabel Guedes Braz, Universidade Federal do Rio de Janeiro (Brazil)
Murilo Guimarães Rodrigues, Universidade do Estado de São Paulo (Brazil)
Paulo Enrique Cardoso Peixoto, Universidade Estadual de Campinas (Brazil)
Paulo Sávio Damásio da Silva, Universidade Federal de Pernambuco (Brazil)
Roberta Rocha de Figueiredo, Universidade de Brasília (Brazil)
Carla Rezende, Universidade Federal do Rio de Janeiro (Brazil)
Thaise Emilio Lopes de Sousa, Instituto Nacional de Pesquisas da Amazônia (Brazil)
Victor Trivério Cardoso, Universidade Estadual do Rio de Janeiro (Brazil)
Walkiria Rejane de Almeida, Universidade Federal de Pernambuco (Brazil)

Sistemática de Plantas Tropicales (2005-18)

Taught in odd-numbered years, *Sistemática de Plantas Tropicales* was offered June 2 – July 6, 2005 and is the Spanish language version of *Tropical Plant Systematics*. It emphasizes a strong conceptual foundation in phylogenetic systematics in an intensive field setting. The course travels to diverse habitats in Costa Rica, from cloud forest and páramo to monsoonal dry forest and Atlantic lowland rainforest. It is primarily intended to serve Latin American graduate students regardless of institutional affiliation, although Spanish-speaking graduate students from OTS member institutions are encouraged to apply. The course coordinators were Fabián Michelangeli and Mauricio Bonifacino. The teaching assistant was Alvaro Idárraga.

Student Participants:

Diego Angulo, Centro de Investigación Científica de Yucatán A.C. (México)
María de las Nieves Barranco, Universidad Nacional Autónoma de México (México)
Cecilia Blundo, Universidad de Tucumán (Argentina)
María Gabriela Doria, Universidad EAFIT – Medellín (Colombia)
Luis Enrique Gámez, Universidad de los Andes (Venezuela)
Paula Giraldo, Fundación EcoAndina (Colombia)
Sirli Leython, Fundación Instituto Botánico de Venezuela “Dr. Tobias Lasser” (Venezuela)
Mónica Tatiana López, Universidad de Antioquia (Colombia)
Aurimar Magallanes, Ministerio del Ambiente y de los Recursos Naturales (Venezuela)
Libertad Mendizábal, Universidad Nacional Autónoma de México (México)
Shingo Nozawa, Fundación Instituto Botánico de Venezuela “Dr. Tobias Lasser” (Venezuela)
Paola Olaya, Fundación EcoAndina (Colombia)
Nora Oleas, Florida International University (Ecuador)
Alicia Pardo, University of Colorado (Colombia)
Sandra Pozo, Fundación Charles Darwin (Ecuador)
Alonso Quesada, Museo Nacional de Costa Rica (Costa Rica)
Fredy Ramírez, Universidad Nacional de la Amazonía Peruana (Perú)
Yocupitzia Ramírez, Instituto de Ecología (INECOL) - Centro Regional del Bajío (México)
Nohora Robles, Jardín Botánico Joaquín Antonio Uribe de Medellín (Colombia)
Giovanna Romero, University of Texas at Austin (Ecuador)
Guillermo Suárez, Fundación Miguel Lillo / Universidad de Tucumán (Argentina)

Tropical Biology: An Ecological Approach (2006-1)

Tropical Biology: An Ecological Approach, held January 25 – March 19, 2006, has been offered continuously since 1964. This was the second offering in FY06. Erika Deinert and Katja Poveda were the coordinators. The teaching assistant was Diego Salazar.

Student Participants:

Julia Boland, Oregon State University
Elizabeth Burton, University of Tennessee
Jennifer Costanza, University of North Carolina – Chapel Hill
Katie Cramer, University of California - San Diego
Jennifer Deitloff, Iowa State University



Kristiina Hurme, University of Connecticut
Alexander Kendrick, University of Wisconsin – Madison
Eben Kirksey, Univ. of California - Santa Cruz
Quinn Gabriel Long, University of Kansas
Laura Marx, Michigan State University
Evi Paemelaere, Auburn University
Danielle Palow, University of Florida
Carolina Quintero, University of Colorado
Sara Ress, University of Arkansas
Jennifer Riddell, Arizona State University
Haldre Rogers, University of Washington
Amy Savage, Rice University
Anne Schmutzer, University of Tennessee
Christopher Stieha, University of Kentucky
Lisa Taylor, Arizona State University
Elizabeth Wheat, University of Washington

Ecología Tropical y Conservación (2006-2)

Ecología Tropical y Conservación is the Spanish language analog of *Tropical Biology: An Ecological Approach*. It was offered January 12 – February, 2006, and is intended to serve Latin American graduate students regardless of institutional affiliation, although Spanish-speaking students may apply regardless of nationality. Gilbert Barrantes and María Clara Castellanos were the coordinators. The teaching assistant was Pablo Allen.

Student Participants:

Diego Alvarado, Pontificia Universidad Católica de Ecuador (Ecuador)
Sabrina Amador, Universidad de Costa Rica (Costa Rica)
Ezequiel Aráoz, Universidad de Tucumán (Argentina)
Eduardo Chacón, Universidad de Costa Rica (Costa Rica)
Paula Coca, Colección Boliviana de Fauna (Bolivia)
Krystal Del Rosario, Smithsonian Tropical Research Institute (Panama)
María José Endara, Pontificia Universidad Católica de Ecuador (Ecuador)
Julio César Gallardo, Universidad Veracruzana (México)
Leonardo Hernández, Universidad de los Andes (Venezuela)
Adriana Herrera, Universidad de Puerto Rico - Río Piedras (Puerto Rico)
Ingrid Holzmann, Universidad de Tucumán (Argentina)
Gloria Dyana La Rosa, Stephen E. Austin State University, Texas (Perú)
Carolina López, Fundación EcoAndina (Colombia)
Rodolfo Martínez, Instituto de Ecología A.C. (INECOL) (México)

Leticia Ochoa, Universidad Nacional Autónoma de México (México)
 José Luis Ponce de León, Universidad de la Habana (Cuba)
 Alejandro Rico, Universidad Nacional de Colombia (Colombia)
 Gustavo Rojas, Universidad de Costa Rica (Costa Rica)
 Keysa Rosas, Universidad de Puerto Rico - Río Piedras (Puerto Rico)
 Mauricio Roverssi, Universidad de Costa Rica (Costa Rica)
 Dhalton Luiz Toso, ECOVITAL (Brazil)
 Jenny Urbina, Universidad de Antioquía (Colombia)

Summary of FY06 Graduate Research Fellowships

OTS awarded 45 research fellowships (43 individual and 2 joint projects) for a total of \$58,937 from July 1, 2005 through June 30, 2006. Of these fellowships, 22 were Post-Course Research Awards (\$10,271; mean \$467), five received Pilot Research Awards (\$6,189; mean \$1,238) and 18 received Pre-doctoral Thesis Research Fellowships (\$42,477; mean \$2,360). Following is a complete list of FY06 fellowship recipients organized in the format of Name, Nationality (Institution), Project Title [English translation of title], Sites, Type of Award and/or Course (Fund Name), Award Date, Award Amount.

Post-Course Research Awards:

Amador, Sabrina, Costa Rica (U de Costa Rica), División de labores en *Pseudomyrmex spinicola* para la defensa de plantas aisladas con claros de vegetación [Division of labor in *Pseudomyrmex spinicola* in the defense of isolated plants with vegetation clearings], Palo Verde, PC Ecología Tropical y Conservación 06-2 (Christiane and Christopher Tyson Fellowships), 21 February 2006, \$470.
 Angulo, Diego, Mexico (Centro de Investigación Científica de Yucatan, A.C.) and Robles, Nohora Carolina, Colombia (Jardín Botánico Joaquín Antonio Uribe de Medellín), Distribución y abundancia de domacios en diferentes condiciones ambientales en un bosque muy húmedo tropical de Costa Rica [Distribution and abundance of leaf domatia under different environmental conditions in a tropical wet forest in Costa Rica], La Selva, PC Sistemática de Plantas Tropicales 05-18 (Glaxo Wellcome Endowment), 8 July 2005, \$614.
 Aráoz, Ezequiel, Argentina (U Nacional de Tucumán), Cambio en el crecimiento de árboles deciduos de Palo Verde en respuesta a cambios en factores ambientales [Change in the growth of deciduous trees of Palo Verde in response to changes in environmental factors], Palo Verde, PC Ecología Tropical y Conservación 06-2 (Rowe Family Fellowships), 21 February 2006, \$500.
 Fleming-Davies, Arietta, USA (Duke U), Specificity of a facultative ant-plant mutualism: Fidelity and activity patterns of ant mutualist partners of *Pentaclethra macroleoba*, La Selva, PC Tropical Biology 05-3 (F. Christian and Betty Thompson Fellowship), 29 July 2005, \$307.
 Hernández, Leonardo, Venezuela (U de los Andes), Las palmas como indicadores de la edad de un bosque húmedo tropical [Palms as indicators of the age of a tropical wet forest], La Selva, PC Ecología Tropical y Conservación 06-2 (Christiane and Christopher Tyson Fellowships), 21 February 2006, \$420.
 Holzmann, Ingrid, Argentina (U Nacional de Tucumán), Estructura del microhábitat en tiendas de *Artibeus watsoni* en palmas de *Asterogyne martiana* [Microhabitat structure of *Artibeus watsoni* tents on *Asterogyne martiana* palms], La Selva, PC Ecología Tropical y Conservación 06-2 (Christiane and Christopher Tyson Fellowships), 21 February 2006, \$414.
 Hurme, Kristiina, USA (U Connecticut), Acoustic freedom in a non-sympatric population of *Hyla ebraccata*, La Selva, PC Tropical Biology 06-1 (Donald and Beverly Stone Fellowships), 17 March 2006, \$500.
 Kuprewicz, Erin, USA (U Miami), Determining seed dispersal efficacy of terrestrial mammal seed predators within different habitat types, La Selva, PC Tropical Biology 05-3 (Dole Food Fellowship), 29 July 2005, \$500.
 López, Mónica Tatiana, Colombia (U Antioquia), Morfología del tejido de aerénquima en plantas acuáticas sumergidas y flotantes del humedal Palo Verde, Costa Rica [Morphology of aerenchyma tissue in submerged and floating aquatic plants in the Palo Verde marsh, Costa Rica], Palo Verde, PC Sistemática de Plantas Tropicales 05-18 (Glaxo Wellcome Endowment), 8 July 2005, \$308.
 Mendizábal, Libertad, Mexico (U Nacional Autónoma de México) and Blundo, Cecilia, Argentina (U Nacional de Tucumán), Distribución de helechos epífitos en el gradiente altitudinal en un bosque montano en la vertiente del Pacífico en la Cordillera de Talamanca [Distribution of epiphytic ferns over an altitudinal gradient in montane forest on the Pacific slope of the Talamanca Mountain Range], Cuerici, PC Sistemática de Plantas Tropicales 05-18 (Lillian and Murray Slatkin Fellowship), 8 July 2005, \$870.
 Oleas, Nora, Ecuador (Florida International U), Actualización del listado de Amaryllidaceae de la Estación Biológica Las Cruces [Updating of the list of Amaryllidaceae at the Las Cruces Biological Station], Las Cruces, PC Sistemática de Plantas Tropicales 05-18 (Glaxo Wellcome Endowment), 8 July 2005, \$300.
 Palow, Danielle, USA (U Florida), Photosynthesis or Defense? Nitrogen allocation in *Inga* seedlings, La Selva, PC Tropical Biology 06-1 (David and Deborah Clark Fellowship and Emily P. Foster Memorial Fellowship), 17 March 2006, \$481.
 Rico, Alejandro, Colombia (U Nacional de Colombia), Relaciones de alometría en frutos de almendro (*Dypterix panamensis*) e interacciones con sus dispersores y/o depredadores [Allometric relationships in fruits of the Mountain Almond (*Dypterix panamensis*) and interactions with its dispersors and/or predators], La Selva, PC Ecología Tropical y Conservación 06-2 (Lillian and Murray Slatkin Fellowship), 21 February 2006, \$500.
 Rojas, Gustavo, Costa Rica (U de Costa Rica), Efecto del estado sucesional del bosque sobre la diversidad y abundancia de abejas euglosinas y su actividad polinizadora de orquídeas [The effect of forest successional stage upon the diversity and abundance of euglosine bees and their activity in orchid pollination], La Selva, PC Ecología Tropical y Conservación 06-2 (Rowe Family Fellowships), 21 February 2006, \$500.
 Roverssi, Mauricio, Costa Rica (U de Costa Rica), Efecto de la abundancia de *Lipokophila eberhardi* (Hemiptera, Plokiophilidae) sobre la abundancia de *Mysmenopsis tengellacompa* (Araneae, Mysmenidae) en las telas de *Tengella radiata* (Araneae, Tengellidae) [Effect of the abundance of *Lipokophila eberhardi* (Hemiptera, Plokiophilidae)

tura del microhábitat en tiendas de *Artibeus watsoni* en palmas de *Asterogyne martiana* [Microhabitat structure of *Artibeus watsoni* tents on *Asterogyne martiana* palms], La Selva, PC Ecología Tropical y Conservación 06-2 (Christiane and Christopher Tyson Fellowships), 21 February 2006, \$414.
 Hurme, Kristiina, USA (U Connecticut), Acoustic freedom in a non-sympatric population of *Hyla ebraccata*, La Selva, PC Tropical Biology 06-1 (Donald and Beverly Stone Fellowships), 17 March 2006, \$500.
 Kuprewicz, Erin, USA (U Miami), Determining seed dispersal efficacy of terrestrial mammal seed predators within different habitat types, La Selva, PC Tropical Biology 05-3 (Dole Food Fellowship), 29 July 2005, \$500.
 López, Mónica Tatiana, Colombia (U Antioquia), Morfología del tejido de aerénquima en plantas acuáticas sumergidas y flotantes del humedal Palo Verde, Costa Rica [Morphology of aerenchyma tissue in submerged and floating aquatic plants in the Palo Verde marsh, Costa Rica], Palo Verde, PC Sistemática de Plantas Tropicales 05-18 (Glaxo Wellcome Endowment), 8 July 2005, \$308.
 Mendizábal, Libertad, Mexico (U Nacional Autónoma de México) and Blundo, Cecilia, Argentina (U Nacional de Tucumán), Distribución de helechos epífitos en el gradiente altitudinal en un bosque montano en la vertiente del Pacífico en la Cordillera de Talamanca [Distribution of epiphytic ferns over an altitudinal gradient in montane forest on the Pacific slope of the Talamanca Mountain Range], Cuerici, PC Sistemática de Plantas Tropicales 05-18 (Lillian and Murray Slatkin Fellowship), 8 July 2005, \$870.
 Oleas, Nora, Ecuador (Florida International U), Actualización del listado de Amaryllidaceae de la Estación Biológica Las Cruces [Updating of the list of Amaryllidaceae at the Las Cruces Biological Station], Las Cruces, PC Sistemática de Plantas Tropicales 05-18 (Glaxo Wellcome Endowment), 8 July 2005, \$300.
 Palow, Danielle, USA (U Florida), Photosynthesis or Defense? Nitrogen allocation in *Inga* seedlings, La Selva, PC Tropical Biology 06-1 (David and Deborah Clark Fellowship and Emily P. Foster Memorial Fellowship), 17 March 2006, \$481.
 Rico, Alejandro, Colombia (U Nacional de Colombia), Relaciones de alometría en frutos de almendro (*Dypterix panamensis*) e interacciones con sus dispersores y/o depredadores [Allometric relationships in fruits of the Mountain Almond (*Dypterix panamensis*) and interactions with its dispersors and/or predators], La Selva, PC Ecología Tropical y Conservación 06-2 (Lillian and Murray Slatkin Fellowship), 21 February 2006, \$500.
 Rojas, Gustavo, Costa Rica (U de Costa Rica), Efecto del estado sucesional del bosque sobre la diversidad y abundancia de abejas euglosinas y su actividad polinizadora de orquídeas [The effect of forest successional stage upon the diversity and abundance of euglosine bees and their activity in orchid pollination], La Selva, PC Ecología Tropical y Conservación 06-2 (Rowe Family Fellowships), 21 February 2006, \$500.
 Roverssi, Mauricio, Costa Rica (U de Costa Rica), Efecto de la abundancia de *Lipokophila eberhardi* (Hemiptera, Plokiophilidae) sobre la abundancia de *Mysmenopsis tengellacompa* (Araneae, Mysmenidae) en las telas de *Tengella radiata* (Araneae, Tengellidae) [Effect of the abundance of *Lipokophila eberhardi* (Hemiptera, Plokiophilidae)



upon the abundance of *Mysmenopsis tengenllacompa* (Araneae, Mysmenidae) in the webs of *Tengella radiata* spiders (Araneae, Tenggellidae)], La Selva, PC Ecología Tropical y Conservación 06-2 (Christiane and Christopher Tyson Fellowships), 21 February 2006, \$491.

Ruiz, Kia M., USA (Florida Intl U), Influence of *Typha domingensis* removal on the anuran community in the Palo Verde Marsh, Palo Verde, PC Tropical Biology 05-3 (F. Christian and Betty Thompson Fellowship), 29 July 2005, \$278.

Small, Gaston E., USA (U Georgia), Microhabitat partitioning by fish in a tropical stream, La Selva, PC Tropical Biology 05-3 (David and Deborah Clark Fellowship), 29 July 2005, \$493.

Suárez, Guillermo Martín, Argentina (U Nacional de Tucumán), Diversidad Briológica en la Estación Biológica La Selva, Heredia, Costa Rica [Briological Diversity at La Selva Biological Station, Heredia, Costa Rica], La Selva, PC Sistemática de Plantas Tropicales 05-18 (Christiane and Christopher Tyson Fellowships), 8 July 2005, \$490.

Swenson, Nathan, USA (U Arizona), Comparative anatomy and physiology of the *Heliconia* species at La Selva, La Selva, PC Tropical Biology 05-3 (Rexford Daubemire Fellowship), 29 July 2005, \$500.

Taylor, Lisa, USA (Arizona State U), Sexual selection and signal content of bright male coloration in tropical jumping spiders (Family Salticidae), La Selva, PC Tropical Biology 06-1 (Donald and Beverly Stone Fellowships), 17 March 2006, \$500.

Urbina, Jenny, Colombia (U Antioquia), Uso de hábitat por la lagartija *Norops cupreus* (Polychrotidae) en el Parque Nacional Palo Verde, Costa Rica [Habitat use by the lizard

Norops cupreus (Polychrotidae) in Palo Verde National Park, Costa Rica], Palo Verde, PC Ecología Tropical y Conservación 06-2 (Lillian and Murray Slatkin Fellowship), 21 February 2006, \$500.

Wheat, Elizabeth, USA (U Washington), Food Web Dynamics of the Golden Apple Snail in the Palo Verde Marsh, Palo Verde, PC Tropical Biology 06-1 (Emily P. Foster Memorial Fellowship), 17 March 2006, \$335.

Pilot Research Awards:

Andrade, Juan Manuel, Costa Rica (U Costa Rica), A collaborative study assessing the carbon and nitrogen content of terrestrial and epiphytic Glomalin-Related Soil Proteins (GRSPs) at La Selva Biological Station (OTS, Costa Rica) and Barro Colorado Island (STRI, Panamá), La Selva, Pilot Research (A.W. Mellon OTS-STRI comparative research), 15 December 2005, \$1,404.

Fleming-Davies, Arietta, USA (Duke U), Interactions among plants with extrafloral nectaries: detecting competition or facilitation effects of sharing ant mutualists, La Selva, Pilot Research (Emily P. Foster Memorial Fellowship), 8 December 2005, \$1,500.

Larimer, Anna, USA (Indiana U), The effects of fungal endophyte infection of tropical grasses on biodiversity and forest succession along an altitudinal gradient, Las Cruces, Pilot Research (Rowe Family Fellowships), 8 December 2005, \$1,500.

Pinto-Tomás, Adrian, Costa Rica (U Wisconsin-Madison), Analysis of symbiont diversity and specificity within the leaf-cutting ant-microbe symbiosis across different ecosystems, La Selva and Palo Verde, Pilot Research (Rowe Family Fellowships), 8 December 2005, \$1,500.



Soley, Fernando, Costa Rica (U Costa Rica), Ajustes complejos del comportamiento de *Philoponella vicina* (Araneae: Uloboridae) basados en una integración sofisticada de estímulos de la presa [Complex adjustments in the behavior of the spider *Philoponella vicina* (Araneae: Uloboridae) based on a sophisticated integration of stimuli from the prey], Escazú, Pilot Research (Hovore-Horn Entomology Fellowship), 30 June 2006, \$285.

Pre-doctoral Thesis Research Fellowships:

- Amador, Sabrina, Costa Rica (U Costa Rica), Impacto de los comedores artificiales sobre la ecología de forrajeo de los colibríes [Impact of artificial feeders on the foraging ecology of hummingbirds], La Selva, Thesis Research (Donald and Beverly Stone Fellowships), 31 January 2006, \$2,000.
- Araya, Yimen Gerardo, Costa Rica (U Costa Rica), Reconocimiento grupal por medio del canto en el ave seguidora de hormigas, *Phaenostictus mcleannani* [Group recognition by way of song in the Ocellated Antbird, *Phaenostictus mcleannani*], La Selva, Thesis Research (Glaxo Wellcome Endowment), 15 December 2005, \$3,000.
- Barquero, Karla, Costa Rica (U Costa Rica), Estructura y comportamiento social de *Rhynchonycteris naso* (Emballonuridae) en Costa Rica [Community structure and social behavior of the Sharp-nosed Bat *Rhynchonycteris naso* (Emballonuridae) in Costa Rica], La Selva, Thesis Research (Rowe Family Fellowships), 31 January 2006, \$1,100.
- Eduarte, Marcela, Costa Rica (U Nacional Estatal a Distancia), Diversidad de aves de sotobosque de un bosque continuo y tres fragmentos, Sarapiquí, Provincia de Heredia, Costa Rica [Bird biodiversity in the understory of a continuous forest and three forest fragments, Sarapiquí, Heredia Province, Costa Rica], La Selva, Thesis Research (Glaxo Wellcome Endowment), 15 December 2005, \$754.
- Fernández, Mauricio, Costa Rica (U Costa Rica), Análisis demográfico para poblaciones de *Euterpe predatoria* (Arecaceae) en la Estación Biológica La Selva [Demographic analysis of populations of the palm *Euterpe predatoria* (Arecaceae) at the La Selva Biological Station], Thesis Research (Donald and Beverly Stone Fellowships), 31 January 2006, \$2,500.
- Gamboa, Nancy, Costa Rica (U Estatal a Distancia), Regeneración temprana de especies arbóreas con diferentes sistemas reproductivos y agentes dispersores en fragmentos de bosque, Sarapiquí, Costa Rica [Early regeneration of

tree species with different reproductive systems and dispersal agents in forest fragments, Sarapiquí, Costa Rica], La Selva, Thesis Research (Glaxo Wellcome Endowment), 15 December 2005, \$1,160.

- Kuprewicz, Erin, USA (U Miami), Seasonal effects of food availability on the behavior of the Central American agouti *Dasyprocta punctata*, La Selva, Thesis Research (Emily P. Foster Memorial Fellowship), 8 December 2005, \$3,000.
- Leoni, Marco, Italy (U Chicago), Sexual selection and reproductive competition in *Alouatta palliata*, Palo Verde, Thesis Research (Rowe Family Fellowships), 8 December 2005, \$3,000.
- Perez, Lina, Colombia (U Costa Rica), Biología de la polinización de palmas de sotobosque en La Selva, Costa Rica [Polinization biology of understory palms at La Selva Biological Station, Costa Rica], La Selva, Thesis Research (Glaxo Wellcome Endowment), 31 January 2006, \$3,000.
- Rojas, Gustavo, Costa Rica (U Costa Rica), Estratificación vertical de orquídeas euglosófilas y sus polinizadores en el interior y el borde de un bosque tropical húmedo [Vertical stratification of euglossine bee orchids and their pollinators in the interior and edge of a tropical wet forest], La Selva, Thesis Research (Donald and Beverly Stone Fellowships), 31 January 2006, \$2,500.
- Rosero, Yessenia Paulina, Ecuador, (U Central del Ecuador), Efectos del hábitat sobre las especies de escarabajos de dosel (Coleoptera: Carabidae y Cerambycidae) en bosques de tierras bajas de la Amazonia Ecuatoriana [Effects of habitat on species of canopy beetles (Coleoptera: Carabidae and Cerambycidae) in lowland forests in the Ecuadorian Amazon], Ecuador, Thesis Research (Hovore-Horn Entomology Fellowships), 30 June 2006, \$1,000.
- Roverssi, Mauricio, Costa Rica (U Costa Rica), Ecología y comportamiento de *Tengella radiata* (Araneae: Tengelidae) y de los simbiosistas que habitan su tela [Ecology and behavior in the spider *Tengella radiata* (Araneae: Tengelidae) and the symbionts that inhabit its web], La Selva, Thesis Research (Christiane and Christopher Tyson Fellowships), 30 June 2006, \$3,000.
- Smilanich, Angela, USA (Tulane U), The effects of diet chemistry on herbivore-enemy interactions, La Selva, Thesis Research (Emily P. Foster Memorial Fellowships), 26 June 2006, \$2,963.
- Stein, Adam, USA (Syracuse U), Plumage evolution in bearded manakins, *Manicus* spp., La Selva, Thesis Research (Christiane and Christopher Tyson Fellowships), 26 June 2006, \$3,000.
- Suárez, Andrea, Costa Rica (U Nacional Autónoma de Costa Rica), Degradación de materia orgánica en dos quebradas boscosas y dos quebradas dentro de una bananera, Sarapiquí, Costa Rica [Decomposition of organic matter in two forested streams and two streams within a banana plantation, Sarapiquí, Costa Rica], La Selva, Thesis Research (Glaxo Wellcome Endowment), 15 December 2005, \$1,500.
- Sun, Jennifer, USA (U of California Los Angeles), Floristic and ecological diversity of Neotropical understory herb communities in succession, La Selva, Thesis Research (Christiane and Christopher Tyson Fellowships), 26 June 2006, \$3,000.

Thomsen, Edward, USA (U California-Davis), Fragrance collection and mating behavior in orchid bees (Apidae: Euglossini), La Selva, Thesis Research (Christiane and Christopher Tyson Fellowships), 8 December 2005, \$3,000.

Whitfield, Steven, USA (Florida International U), Litter dynamics and the La Selva herpetofauna: Ecological determinants of an 'enigmatic' decline?, La Selva, Thesis Research (Christiane and Christopher Tyson Fellowships), 8 December 2005, \$3,000.

OTS Undergraduate Programs in Costa Rica

As in past year, our primary goal has been to provide undergraduate students from diverse backgrounds with high-quality, academically rigorous opportunities for field study that: give an in-depth introduction to field ecology and natural history; offer rigorous training in field research techniques and scientific inquiry; provide future biologists with the skills to critically assess environmental issues; provide future non-biologists with in-depth exposure to field ecology; and contribute to students' understanding of and empathy for the cultural, social and economic factors that impact conservation and sustainability in developing countries

OTS Undergraduate Semester Abroad Program

The OTS Fall and Spring semester program provide students with an in-depth understanding of scientific ecology, complemented by a strong foundation in social, political, economic, and scientific aspects of resource management. The semester program, designed for biology majors but open to students from all disciplines, represents a unique hands-on opportunity to learn about field ecology under the direct guidance of experienced ecologists. Accredited by Duke University, the two 15-week programs are academically rigorous and field-based.

Students participating in the program in the fall of 2006 and spring of 2007 enrolled in four courses and receive the equivalent of four semester hours for each course: The first course, *Fundamentals of Tropical Biology*, integrates field and classroom instruction to introduce students to the fundamental principles of tropical ecology. Costa Rica, with its diverse array of tropical ecosystems, provides a perfect context to study the biological complexity of the tropics. *Environmental Science and Policy of the Tropics* incorporates a variety of case studies from the challenges and achievements of conservation efforts in Costa Rica. This course blends global with local perspectives in order to identify and understand environmental issues in developing tropical countries. *Field Research in Tropical Biology* gives students the opportunity to learn science by doing science. Lectures and faculty-led projects introduce the principles of hypothesis formation, experimental design, sampling, and the application of basic statistics to the interpretation of data. *Spanish Language and Latin American Culture* runs intensively during the initial three weeks of the program. The chief goals are to expand vocabulary and conversational skills, strengthen grammar, and introduce key social, cultural, and environmental issues in Costa Rica. During this period, students attend formal classes up to five hours a day and live with a Costa Rican family.

Fall Semester (2005)

Student Participants:

Elsa Catherine Bledsoe, Univ. of North Carolina-Chapel Hill
Jacob Robert Bledsoe, Northwestern University
Benjamin Z. Blom, Colgate University
Heather Cringan, Cornell University
Amanda Eva DeLoureiro, Lafayette College
Nathan Charles Emery, Duke University
Juliet Evans, Northwestern University
Javier Fernandez, Instituto Tecnológico de Costa Rica
Rebecca Drummond Fink, Duke University
Andrew Scott Goltermann, Duke University
Meredith Louise Holt, Claremont McKenna College
Courtney Garvin Kluger, Duke University
Carmen D. Llanes, University of Chicago
Elise Marie Madeck, Duke University
Rosemary Louise Malfi, Bryn Mawr College
Andrea Laura Martin, Univ. of North Carolina-Chapel Hill
Margo Daria Moss, Tulane University
Brooke Taylor Moyers, Reed College
Karly Lauren Newton, Grinnell College
James Emmet Owens, Colgate University
Jessica Ann Palmisano, Providence College
Elizabeth Anne Riley, Providence College
Ross Rozycki, Emory University
Gitanjali Elam Sidhu, Smith College
Jennifer Alyse Silber, Duke University
Natalie Barton Small, Duke University
Karen Ann Stahlheber, Middlebury College
Katelyn Ray Walker, Harvey Mudd College

Spring Semester (2006)

Student Participants:

Erin Brennan, Cornell University
Currie Saray Dugas, Brown University
Christina Dunn, Davidson College
Mary Catherine Duryea, Cornell University
Vaughn Travers Edelson, Brown University
Nicole Hanson, Dickinson College
Clarmyra Anne Hayes, Harvard University
Lena Marllise Hyatt, Univ. of North Carolina - Chapel Hill
Christina Emilie Imrich, College of the Holy Cross
Cora Ann Johnston, Hampshire College
Kristen-Marie Siena Kirkby, Whitman College
Rachel Danielle Moseley, Bucknell University
Terrance Antonio Platt, Morehouse College
Amanda Azize Rahi, Bryn Mawr College
Tammy Sabrina Ram, University of Michigan
David Alan Rasmussen, Reed College
Laura Sauls, The College of William and Mary
Julian Montana Sosebee, Tulane University
Sarah J. Sullivan, McGill University
Rebecca Anne Susko, Reed College
Laurel Symes, Denison University
Heidi Elisabeth Woehrlé, Tulane University

Plantains, Iguanas and Shamans: An Introduction to Field Ethnobiology (2005)

Field Ethnobiology offered students the opportunity to study the medicinal, ceremonial, esthetic, and subsistence use of plants and animals by humans in Central America over the summer. Topics covered include archeology, bioprospecting, linguistic diversity, and medicinal plants. Course design emphasizes intensive field work and visits all three OTS field stations, as well as other sites. Students are introduced to a variety of Central American ethnic groups in the context of a diversity of tropical habitats. This is a six-week program accredited by Duke University that included two courses, *Spanish Language and Culture* and *Ethnobiology*.

Student Participants:

Benjamin James Baldner, Univ. of North Carolina-Chapel Hill
Alexander Arkin Berger, Univ. of North Carolina-Chapel Hill
Jennifer Eiseman Bronson, University of Pennsylvania
Jonathan Eiseman Bronson, University of Pennsylvania
Noriko K. Brubeck, The New School University
Amy Lauren Dombrower, Univ. of North Carolina-Chapel Hill
Megan Burke Fitzpatrick, University of New Mexico-Albuquerque
Christopher Roth Hardy, Duke University
Katherine Thayer Hardy, Duke University
Daniel Ray King, Duke University
Aashna Ahmed Kircher, Duke University
Anita Krishnarao, Duke University
Elaine Graham Leddy, Duke University
Eldon Cameron Peters, Univ. of North Carolina-Chapel Hill
Allison Kate Puleo, The New School University
Shaina Devi Wahl, Duke University
Colleen Jo Walsh, University of Notre Dame
Wan Nadiyah Yaakob, Harvard University

Field Tropical Biology (2006)

Field Tropical Biology offered students the opportunity to study first-hand the evolutionary ecology of important plant and animal taxa in tropical ecosystems. Course design emphasizes intensive field work and visits all three OTS field stations as well as other sites over a four-week period. Students are introduced to a diversity of tropical habitats, each possessing distinctive biotas that in turn demonstrate unique evolutionary histories and ecological dynamics. As part of the course, students work closely with resident professors in the design, implementation, and interpretation of their own independent research project in field ecology.

Student Participants:

Shannon Barry, Duke University
Sara Dellman, University of Wisconsin – Green Bay
Emily Fay, University of North Carolina – Chapel Hill
Mark Fisher, Yale University
Tiffany Grade, University of Wisconsin –Madison
Linda Hyatt, Connecticut College
Amanda Keledjian, Grinnell College
Roxanne Nanninga, Linfield College
Caitlin Nielsen, University of Puget Sound
Jesse Oppenheimer, Washington University at St. Louis
Michael Pender, Earlham College
Mary Shackelford, University of Texas
Rachel Sircar, University of North Carolina – Chapel Hill
Mary Stoddard, Yale University

Valerie Vaughn, Duke University
Rena Wainberg, University of Florida

Research Experiences for Undergraduates (REU) Program (2006)

The OTS Research Experiences for Undergraduates (REU) Program is funded by the US National Science Foundation and designed for biology students interested in conducting field research under the supervision of experienced tropical ecologists. In the summer of 2006 OTS supported twelve undergraduates for a ten-week research program at the La Selva Biological Station in the Caribbean lowlands of Costa Rica. In collaboration with a research mentor, students designed, conducted, and presented field research projects. Students from minority-serving institutions and non-R1 schools were strongly encouraged to apply.

Student Participants:

Monica Bauer, San Bernardino Valley College
Rose Butler, University of North Carolina – Asheville
Danielle Califano, Siena College
Kimberly Carmill, State University of New York-Albany
Holly Cooper, Rocky Mountain College
Rachel Moseley, Bucknell University
Julia Parish, University of Hawaii – Manoa
John Riggs, Carroll College
Marcus Roberts, North Carolina State University
Pedro Torres, University of Puerto Rico
Jolene Trujillo, University of New Mexico
Rachel Zuercher, Valparaiso University

Native American and Pacific Islanders Research Experiences (NAPIRE) Program

The NAPIRE Program is funded by the U.S. National Science Foundation and is designed to introduce Native American and Pacific Islander undergraduate students to the biodiversity of the tropics. As part of the program, students completed a field project, including experimental design, data gathering, and analysis and presentation of results, in collaboration with fellow students and a research mentor. Students experienced the process of applying the scientific method to ecological inquiry and discovery in a collaborative and team-oriented environment. In addition to completing a research project, students participated in lectures, seminars and field activities that focused on tropical ecology and conservation. Participants also had the opportunity to interact with indigenous groups of Central America, allowing a first-hand look at the role of Native Peoples in tropical forest conservation. An eight-week summer program based at Las Cruces, NAPIRE integrated a research experience with a basic introduction to tropical ecology and Costa Rican indigenous culture.

Student Participants:

Megan Deffner, University of Hawaii-Manoa
Ryanna Fernandez, University of Hawaii-Manoa
Annalee Herrera, University of Washington
Sheena Hillstrom, Washington State University
Sara Kisson, Haskell Indian Nations University
Monica Pamaska, College of Menominee Nation
Trisha Soares, University of Hawaii-Hilo
Tanya Tavares, University of Hawaii-Hilo
Deidre Wolfe, College of Menominee Nation

OTS Undergraduate Program in South Africa

In the true OTS tradition, the overall aim of the South Africa Study Abroad program is to provide students with an inquiry-based field course in which they learn science by doing science, under the guidance of scientists who are leaders in their field. The course was intellectually, emotionally, and sometimes physically challenging, and provided a real life-changing experience. In addition to the traditional emphasis on individual research experience, the South African course had a focus on savanna ecosystem ecology and conservation in protected areas. Students were also exposed to the country's vast cultural diversity, its tumultuous history, and the challenges of an emerging democracy. A unique aspect of this course was the cultural experience achieved by a mix of students from the USA and South Africa.

South Africa's rich biological and cultural diversity made it an exceptional location in which to examine issues related to ecology and conservation. The course was based primarily in biologically-rich Kruger National Park. In the fall of 2005 and spring of 2006 students took four core courses: The first course, *South African Ecosystems and Diversity* integrated field and classroom instruction to provide an interdisciplinary understanding of South Africa's diverse ecosystems. Although the emphasis was on savannas, students were also introduced to freshwater, marine and fynbos ecosystems. The faculty introduced functional, population, community and landscape ecology in unraveling ecosystem pattern and process. The second course, *Field Research Skills*, was comprised of a combination of philosophy of science and statistics lectures, insect and plant collections, 6-8 faculty led field projects, and two independent research projects, provided the basis for teaching field research skills. Projects covered a very wide range of organisms and ecological processes. A few examples are: ant/tree mutualisms, bat echolocation, bat/elephant feeding relations, elephant impacts on vegetation and biodiversity in general, the effects of fire on tree survival, termites influence on soil and vegetation structure, influences of herbivory and fire on insect diversity, and many others. Next, in the *Conservation and Management of Protected Areas in South Africa* course, scientists and practitioners exposed students to protected area conservation – its imperatives, principles, policies, and practices. South African examples dominated because the country finds itself at the nexus of social, ecological and legislative challenges faced by conservation world wide, and the Kruger National Park is recognized as leading the field internationally. Finally, in *History and Culture of South Africa*, South African and American students alike were taught the rich history and cultural diversity exposed by some of the countries leading historians, artists, and social scientists. The course began with early hominoid evolution and took students through the tortuous colonial and apartheid eras of South Africa to the current emergence of democracy and all its challenges.



Fall Semester 2005

Student Participants:

Adasme Ryan, North Carolina State*
Berg Russell, Wesleyan University
Cerulli Andrea, Emory University
Chan Sara, Bryn Mawr College*
Colen Henry, Duke University
Cosgrove Christopher, Duke University
Ford Kevin, Duke University
Mercies Erin, Lewis and Clark College
Morrow Amy, Grinnell College
Parker Elizabeth, Wits University RSA
Prager Case, Wellesley College
Royston Aaron, Duke University
Schultz Luke, Wits University RSA
Tarsi Jessica, Washington Univ. St Louis
Van Dijk Alexander, Duke University

Spring Semester 2006

Student Participants:

Aaron Beaudette, Cornell University
Andrew Bouley, Duke University
Robin Burke, Beloit College
Adityarup Chakravorty, Grinnell College*
Katherine Grant, Duke University
Rachel Herold, Clemson University
Nitin Sekar, University of North Carolina*
Emily Rude, Wellesley College
Calia Talmor, Cornell University
Lindokhuhle Hlogwani, Wits University RSA*
Marco Viera, Wits University RSA
Tessa Hampson, University of Cape Town RSA
Katy Lanas, University of Cape Town RSA*

* Minority (USA) and previously disadvantaged (RSA) students.

Global Programs And Partnerships

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As part of its new strategic vision, in 2006 OTS launched a new initiative, Global Programs and Partnerships (GPP). This program builds on decades of experience in education and training that have revealed an enormous and unmet need for OTS-style education programs throughout the tropics. Current OTS courses offered in Spanish regularly receive five to eight times as many applicants as there are spaces available; requests are frequently and continually made for OTS to offer field-oriented courses in new locations. In response to such demand, OTS has established its new GPP program to help build capacity within tropical-country institutions to offer OTS-style graduate education and professional training courses. In this 'second-generation education model,' OTS will focus on training trainers in OTS-style pedagogy, developing locally adaptable curriculum in biological and environmental science and management, establishing 'industry' standards and assessment tools for field-based courses, and building institutional partnerships. This partnership approach will allow OTS to increase its education and training impact over a wider geographic area while reducing the need for costly infrastructure. New partner institutions, through their engagement of OTS' 'second generation model,' will themselves become active and valuable new members in all aspects of the OTS consortium and activities.

GPP has two strategic pillars that underpin these activities. First, *transparent standards* are the foundation for the reproducible and certifiable delivery of OTS-quality education and training. Second, *partnerships* are the vehicle through which OTS will expand its global impact. Partnerships will be developed with tropical country institutions that have the interest, need, and capability to deliver OTS quality programs and with international organizations that have similar regional/global focus but complementary skills, geographic focus, and networks.

GPP will initially focus its second generation activities within Latin America, where the organization is already well recognized as a premier and objective provider of academic field courses and OTS alumni in Latin America is broad and deep.

As OTS defined the scope of the Global Programs and Partners initiative, the following programs were offered in FY06:

Protected Areas Management – Andes-Amazon

Supported by the Gordon and Betty Moore Foundation's Andes-Amazon Initiative, this course ran September 4 – October 1, 2005 in Peru and trained 13 national park managers from Bolivia, Ecuador and Peru responsible for almost 11 million hectares of protected land on the fundamental knowledge and skills associated with biodiversity conservation – including such topics as conservation planning, wildlife monitoring, local community engagement, education and outreach, fundraising enforcement, and administration.

Participants:

Elias Mamani Yañez - National Protected Areas Service (Bolivia)
Jorge Alberto Landivar Cabruja - National Protected Areas Service (Bolivia)
José Ávila Vera - National Protected Areas Service (Bolivia)
Byron Alfredo Amaya Capelo - Ministry of Environment (Ecuador)

Gumerindo Eras Pasiche - Ministry of Environment (Ecuador)
Orley Ochoa Quezada - Ministry of Environment (Ecuador)
Miguel Angel Acuña González, Ecuador - Ministry of Environment

Germanico Medina - Ministry of Environment (Ecuador)
Felipe Rengifo Angulo - Intendency of Protected Areas (Peru)
Rosaura Yvanoa Minaya Callirgos – Intendency of Protected Areas (Peru)

Mario Augusto Soto Barboza – Intendency of Protected Areas (Peru)

Benjamin Lau Chiong – Intendency of Protected Areas (Peru)
Walther Camus Loayza – Intendency of Protected Areas (Peru)

Peruvian Decision Makers Course – Role of Protected Areas in Conservation

Supported by the Moore Foundation's Andes-Amazon Initiative, this field course ran November 14 – 18, 2005 and trained 13 members of the regional government established in Peru, mayors, and other local decision makers on the establishment and role of protected areas in conservation and their contribution to a local sustainable economy.

Participants:

Bella Margot Núñez de Reátegui, Dept. of Loreto– Regional Gov. Committee

Carlos Augusto Escudero Amado, Dept. of Loreto– Regional Government

Javier Carranza Gonzáles, Peru National Ecological Police
Leonardo Agustín Inga Vásquez, Municipality of Alto Amazonas

Lourdes Mariella van Heurck de Romero, Dept. of Loreto – Regional Gov. Env. Committee

Nélida Barbagelata Ramírez, Dept. of Loreto – Div. of Resources and Environment

Sergio Páez Tello, Coast Guard (rivers within protected areas)

Víctor Raúl Reátegui Paredes, Municipality of Putamayo
Eduardo Pinedo del Águila. Dept. of San Martin, Economic Advisor, Regional Government

Catalina Paredes, Municipality of Picota
Luis Santiago Castañeda Sanguinetti, Dept. of San Martin – Div. of Commerce and Tourism

Pedro Antonio Carrasco Guerra, Dept. of San Martin – Environmental Extension

Ruth Mercedes Ruiz Ríos, Dept. of San Martin – Div. of Project Supervision and Delivery

Protected Areas Management Course – Brazil

Supported by the US Fish and Wildlife Service, this collaboration among OTS, the State Government of Amazonas Sustainable Development Ministry (Brazil) and the Biological Dynamics of Forest Fragments Project ((National Institute for Amazonian Investigation and Smithsonian Institution) provided park management fundamentals training January 30 – February 24, 2006 to 20 park managers newly-hired to staff the State's recently-expanded protected areas system.

Participants (from the Amazonas Sustainable Development Ministry):

Ana Maira Bastos Neves
Carla Veronica Aguilar
Cristina Zulma Escate Lay
Evandro Sidney Caldas Machado
Felipe Mosqueira
Gelson da Silva Batista
Henrique Santiago Carlos
Izac Francisco Theobald
Liane Lima
Maria Bernadete Ribeiro Chagas

Maria do Carmo Gomes Pereira
Maurício Pessoa
Monaliza Sayuri Queiroz
Nara Lúcia da Silva
Rafael Santos Valente
Rômulo Fernandes
Rosicleide Soares Brasil Ferreira
Wandete da Rocha Sousa
Wilde Itaborahy Ferreira
Wilzer Cristiane Lopes Gonçalves

OTS Science Program And Field Stations

Significant advances have been made at each of OTS' three biological field stations over the last year. Details of these activities can be found in the subsequent station reports. This overview, however, focuses on two organization-wide science initiatives, both resulting from the new strategic plan that transcend the individual stations.

The first of the scientific initiatives set forth by OTS' new strategic plan is to identify and catalyze emerging themes in tropical science. The inaugural theme, *Changing Tropical Ecosystems*, has been selected. To launch activities under this theme, an experts workshop on *La Selva: A Forest in Transition* was held at La Selva in May, 2007. A synthesis paper and research proposal are planned outcomes of the workshop.

Coordinating scientific programs and support across the field stations is the second initiative. Consistent with the new strategic plan, OTS is working toward more integrated, standardized, and accessible scientific databases, tools, and support across the three stations to allow scientists to broaden their focus and impact regionally and nationally. For example, during the last year, each of the stations worked on the development of a standardized digital florula. La Selva has taken the lead in this effort, having developed the tools and built the taxonomic and photographic database for its digital flora for nearly a decade.

Global Information Systems (GIS) databases represent another area of significant consolidation, standardization, and integration among the three stations. OTS now has GIS lab managers at all three field stations working in an integrated fashion, standardizing processes and formats, identifying core datasets, and defining metadata standards. An important improvement has been the additional GIS layers being developed for the areas outside the OTS field stations. The development of regional databases, loosely defined within the watersheds in which the stations are located, are increasing significantly the information available for researchers.

Removal and monitoring of exotic species is also a priority at all stations. Elimination of plants from *Musa* and ginger species, is now underway at Las Cruces and La Selva. Meanwhile the control of the native invasive *Typha* at



the Palo Verde Lagoon has continued at a much lower rate (maintenance phase) out of the Palo Verde Station.

Improving internet access and capacity continues to be of great importance at all three station and in the Costa Rican Office (CRO). All three stations and CRO have wireless access. Increasing bandwidth in OTS internet connection has been a priority. OTS has been able to secure a 3 Mbps connection for La Selva and a 1.5 Mbps connection for Palo Verde. Constraints in infrastructure from the national provider have limited the Organization's capacity to increase bandwidth out of Las Cruces.

Modest improvements on the facilities dedicated to scientific programs have been and will continue to be implemented at the three OTS field stations. More information on station improvements is included in the following reports.

Las Cruces Biological Station

Research

Station day-use by researchers has fluctuated over the last 5 years (Table 1). The peak years of FY 2004 and 2005 are attributable to two long-term doctoral dissertation projects. The conclusion of these projects resulted in a decrease in researcher days for FY06. However, the development of the REU-like NAPIRE (Native American & Pacific Islander Research Experience) program is leading to the development of several research projects in the Las Cruces area and bringing in a number of new researchers. In FY06, NAPIRE helped bring in five senior researchers and 3 graduate students.

A total of 38 researchers visited Las Cruces during FY06 and worked on 24 research projects – including a number of long-term studies (> 5yr). Research was highly variable and included work with radiotelemetry, bird and bat surveys in fragments, bee movement among fragments and pollination syndromes, tropical pasture restoration (several projects), forest succession, seed dispersal, seed predation, specific species-level studies on a number of organisms, and lastly the discovery of a wood-nesting bee new to science. Over 25 peer-reviewed publications came out of Las Cruces this fiscal year.

Databases, Library and Living Collections

The Las Cruces library was moved to a new home in November 2005 and represents an enormous improvement over the old library, making the library more accessible to visitors and researchers alike. To date the library has over 1,250 books and subscriptions to over fifteen journals. Five new dissertations and master's theses were added to the library in FY06. The new Las Cruces herbarium was inaugurated in June 2006. The space is adjacent to the library and is sealed and fully climate controlled. To date over 250 specimens have been accessioned and at least 300 – 400 remain to be processed. The new herbarium has also encouraged researchers to actively collect specimens and augment the current collection.

The living collections are in good condition and a number of new species have been added to the collections, among them an endangered arid-zone cycad from Columbia. A substantial effort has been made to re-tag many of the specimens in the garden, and we are slowly reclaiming some of the more sidelined areas of the garden and opening them up again by removing weedy colonizing trees and shrubs. In the forest, the entire trail network (over 9 km) was overhauled and

repaired and two new trails were added. One of these new trails provides access to the Melissa restoration plots, which is being developed as a self-guided trail. A forest brochure will be made available to visitors to encourage use of the forest trail network as well as the botanical gardens.

Environmental Education and Outreach

During FY2006, the station received a total of 165 participants, of which 130 were elementary students and 35 were university students. A naturalist guide hired in January 2006 has taken over environmental education and outreach and is developing a more expansive and elaborate program. Las Cruces also provides environmental education activities outside the station. Lastly, the University of Florida Alternative Breaks program returned to Las Cruces in March 2006. These undergraduate students work with communities around Las Cruces and assist in cleaning and gardening school buildings, parks, and organic gardens. They also taught English at local schools and helped with fieldwork in coffee farms that promoted sustainable farming practices.

Facilities and Infrastructure Improvements

In FY06 the area in the Wilson House where the library used to be was turned into two new rooms for students and the classroom on the ground floor was expanded. The downstairs offices were remodeled and became the director's office and the office for the GIS technician and Naturalist Guide. A new storage shed was completed next to the back entrance of the station in November 2005 and all of our gardening equipment was moved into the building. Finally, in FY06 wireless internet access was implemented throughout the Wilson House, the library and herbarium, the researcher cabins, and the laboratory. This was an important addition and allows researchers, students, and visitors alike much greater freedom of movement and better access to the internet. This also allowed more users to be connected to the web at any given time. Bandwidth at the station was also increased to 128kbps early in FY06, and outdated equipment such as computers were replaced.

Visitation

Overnight visitation for FY06 was variable. Many courses visit Las Cruces on a bi-annual basis, with a core group that visit annually. FY06 continues this trend. Natural History overnight visits increased in FY06. Las Cruces experienced a large drop in natural history visitors between FY 2004 and 2005 due to an itinerary change by a large travel operator. The operator reduced the number of days spent at Las Cruces to accommodate an excursion into Panama. The rebound in overnight visitors in FY06 is due largely other operators.

Table 1. Overnight station use at LCBS in person days for FY 2002 – 2006.

	2002	2003	2004	2005	2006
Student/ Course	2391	3951	3168	4339	3288
Researchers	982	971	1198	1259	868
Natural History	1200	1445	1723	1297	1621
Total	4573	6367	6089	6895	5777



La Selva Biological Station

Databases

The La Selva Digital Flora project (funded by NSF and CRUSA) made excellent progress. By the end of FY06 more than 1,100 species of La Selva's vascular plants were represented with images posted on the web. This web site receives approximately 22 visitors daily—this represents hits from over 74 countries. The ALAS database of arthropods is also available and a database of La Selva mammals was developed as a prototype (soon to be posted). Data on La Selva researchers and their projects (title, funding source, etc.) have been standardized for the past four years. Over 2,000 reprints based on La Selva research were entered into BINABIOTROP, the OTS bibliographic database, and most of these are also available online as pdf files. Additionally, systematic analysis of the temperature data for the past ten years was completed and the corrected data are now available on the La Selva website.



Environmental Education and Outreach

La Selva hired two half-time environmental education coordinators who have initiated an ambitious program to bring local school groups to La Selva, to coordinate with other environmental education groups in the area (e.g., CRENASA, Tirimbina, Selva Verde), to work with SACRO (Save Costa Rica's Orchids) to help develop video and printed materials, and to develop a La Selva version of the Challenge program based on the well-known Fairchild Botanical Garden program.

La Selva began to actively participate in a Rainforest Alliance program to gain certification in sustainability. This effort has been led by Mariechen Lang (administrative director of La Selva) with strong support from the administrative staff. Some of the activities (besides a thorough review of all policies) include a program of "Clean the Puerto Viejo River" (undertaken one day per month with local high school students), a new electricity saving program, purchasing of biodegradable cleaning supplies, and a recycling program within the station.

Fund-raising

At the end of FY06, we kicked off a fund-raising campaign called Adopt A Trail to support "green projects" at La Selva, such as environmental education, work in the biological corridors, trail maintenance, sustainability, swamp access, and alien invasive species control. Please check out the La Selva website for additional details.

Visitation

Visitation for FY06 was at an all-time high of more than 34,000 person/days.

Most user categories have been relatively stable over the past three years with the exception of natural history visitors. The natural history visitors have increased by almost 50% since FY04 but most (approximately 80%) of these people are day visitors and have less impact on La Selva infrastructure than the overnight visitors.

	FY01	FY02	FY03	FY04	FY05	FY06
Researchers	12,565	11,463	13,791	18,738	17,242	17,819
Education & Workshop	8,874	8,365	7,181	7,442	7,953	7,510
Natural History	6,022	5,820	5,831	5,780	7,140	8,449
Staff & Guest	717	677	782	906	469	764
Other	261	364	260	197	300	115

Palo Verde Biological Station

In fiscal year 2006, OTS began a research experience program for graduate students, funded by NSF's International Research Experience for Students (IRES). Through this three-year-grant five graduate students from the United States will have a 10-week research experience at Palo Verde working with Costa Rican research mentors. Enrollment is open and the program is just underway.

Visitation

Overnight use at the Palo Verde Biological Station in person days for FY 1999 – 2006.

Facilities and infrastructure improvements

One of the research laboratories was renovated and converted to a library, herbarium, and computer laboratory. The old library space now houses the GIS equipment and staff. All labs were installed with air conditioning units.

A new 6-meter-section with recycled plastic boards was added to the board walk thanks to the donation given by Mr J. Struck and his family.

Databases, Library, and Living Collections

Under Luis Diego Gómez leadership, in December 2005 the research staff of Palo Verde initiated a digital flora for Palo Verde. Although still underway, up to 450 plants species have already being included. In order to standardize the database format, this project is closely coordinated with La Selva Digital Florula Project.

As part of Palo Verde's expanded GIS activities, an easy-to-use Map Server containing digital information from the Palo Verde GIS-Database has been developed and is now available on the web (www.ots.ac.cr/en/paloverde/sig_pv/page/index.html).

Environmental Education, Sustainability, and Outreach

Rice farming, as one of the predominant land uses around Palo Verde National Park, significantly influences the hydrology and biota of the region. In the last year we completed the collaborative project with Conarroz (National Ricegrowers Corporation) and INA (National Institute of Learning) on mechanically transplanted rice. During this period we held field days and workshops for farmers and technicians on this new technique and, in addition, established demonstration farms. Currently this new and friendlier rice cultivation practice is being used intensively by local small rice farmers. More than 15 farmers have adopted this system, for some 250 ha cultivated with this new technique.



To continue wetland ecosystem restoration at Palo Verde, once again we did partial crushing of cattails in the marsh during the dry season of 2006. As reported previous years, the response of wading birds has been astonishing: thousands of birds of some 30 species are once again back to the wetlands. In terms of cattail control, out the 400 ha of dense cattails reported four years ago, just 40 ha still remain in the marsh. Habitat use by wading birds is being monitored by Museo Nacional de Costa Rica and wetland macroinvertebrates by M. Springer of the University of Costa Rica.

To complement the wetland restoration activities that have been ongoing for the past several years at Palo Verde, in February 2006 OTS launched its first professional training course for Central American wetland managers. Over 22 participants took this course taught by an interdisciplinary research team from Florida International University, Universidad de Costa Rica, Instituto Tecnológico de Costa Rica, and OTS. The course is co-sponsored by the US-Fish and Wildlife Service, the US-AID Global Water for Sustainability and SUCCESS (Sustainable Coastal Communities and Ecosystems). The course was received extremely well by both participants and sponsors. The second edition of the course is currently underway, having begun in February 2007.

Beginning in 2007, OTS and UCR embarked on an IUCN-funded two year project to promote the integrated management of the Arenal-Tempisque basins, through the formulation and implementation of a strategic management plan with participation of government agencies, local governments, communities, corporations and non-government organizations of the region. Also in 2007, the Costa Rica-USA Foundation (CRUSA) funded a collaborative project between OTS and ACEM (Asociación Costarricense para la Ética y la Moral) that seeks the training and empowering of local community leaders around Palo Verde.

	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06
Researchers	556	506	645	663	553	1,328	446	399
Education & Workshop	3,153	3,681	3,815	3,919	3,706	4,314	3,248	3,992
Natural History	429	439	356	364	451	1,107	1,142	1,114
Staff & Guest	145	331	219	330	535	252	349	207
Other	83	228	5	20	36	32	9	13
Total	4,366	5,185	5,040	5,296	5,281	7,033	5,194	5,725

Development And Fundraising

Foundations and Government Agencies

The following grants and contracts were awarded in fiscal year 2006:

U.S. National Science Foundation, OSIE
\$150,000 International Research Experience
U.S. National Science Foundation, LSAMP
\$836,472 REU: NAPIRE Program
U.S. National Science Foundation, LSAMP
\$49,991 Best Practices Manual
U.S. Fish and Wildlife Service
\$30,000 ESP: LA Wildlands Mgmt Course
U.S. Fish and Wildlife Service
\$7,000 ESP: US Decisionmakers Course
U.S. Fish and Wildlife Service
\$25,000 ESP: LA Decisionmakers Course
Costa Rica – USA Foundation
\$9,500 Research at Palo Verde
AVINA
\$12,000 Research at Palo Verde
Duke Energy Corporation
\$15,000 Undergraduate Scholarships
John D. and Catherine T. MacArthur Foundation
\$200,000 ESP & Graduate Courses in Peru
Gordon and Betty Moore Foundation
\$35,000 OTS Strategic Plan
Punta Dominical, S.A.
\$15,630 Wetlands Research in Dominical
Oak Foundation
\$99,121 Coastal Ecology Course in Mexico
Rowe Family Foundation
\$25,000 Graduate Fellowships
Stanley Smith Horticultural Trust
\$20,000 Building the Las Cruces Bodega
G. Unger Vetlesen Foundation
\$25,000 General Operations
El Viejo
\$8,400 Research at Palo Verde
Wallace Genetic Foundation
\$50,000 General Operations

In FY06, OTS received both restricted and unrestricted gifts. We thank the following individuals, corporations, governmental agencies, and foundations for their restricted and unrestricted support.

Canopy Club – Passion Flower (\$20,000+)

Christopher Davidson and Sharon Christoph
U.S. Fish and Wildlife Service
Benjamin and Ruth Hammett
John D. and Catherine T. MacArthur Foundation
Gordon and Betty Moore Foundation
U.S. National Science Foundation
Oak Foundation
Dr. Rebecca Rowe and the Rowe Family Foundation
John and Ginger Sall
Stanley Smith Horticultural Trust
G. Unger Vetlesen Foundation
Wallace Genetic Foundation

Canopy Club – Orchid (\$10,000+)

AVINA
Duke Energy Corporation
Mr. and Mrs. Livingston B. Hoyt
INTEL Components of Costa Rica
Intel Foundation
Pharmacia Incorporated
Punta Dominical, S.A.
Jay Savage and Rebecca Papendick
Jarid Simons

Canopy Club – Bougainvillea (\$5,000+)

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David and Dotty
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Judith and Stuart Richardson
El Viejo

Canopy Club – Bromeliad (\$2,500+)

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Temple-Inland Forest Prod Corp
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Canopy Club – Heliconia (\$1,000+)

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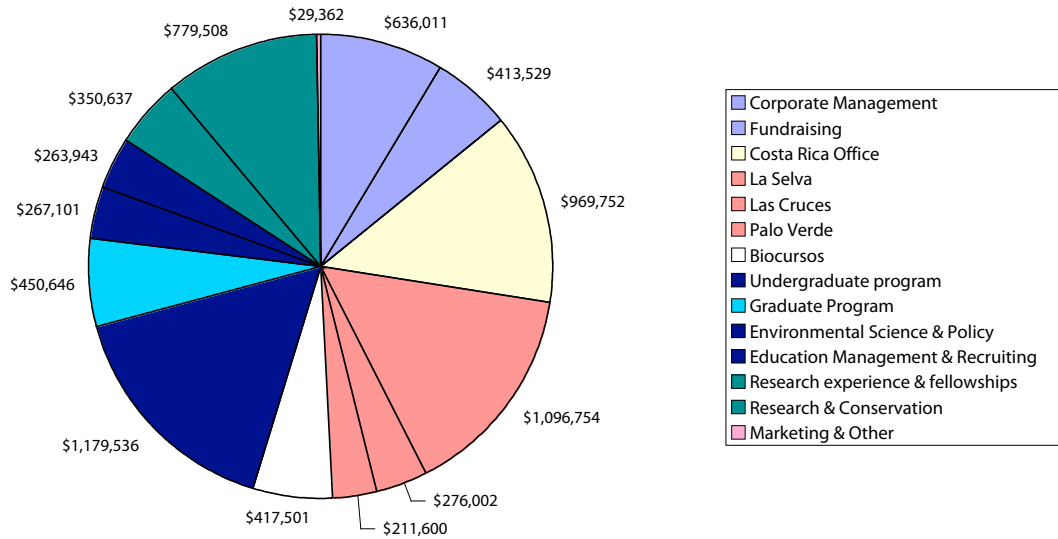
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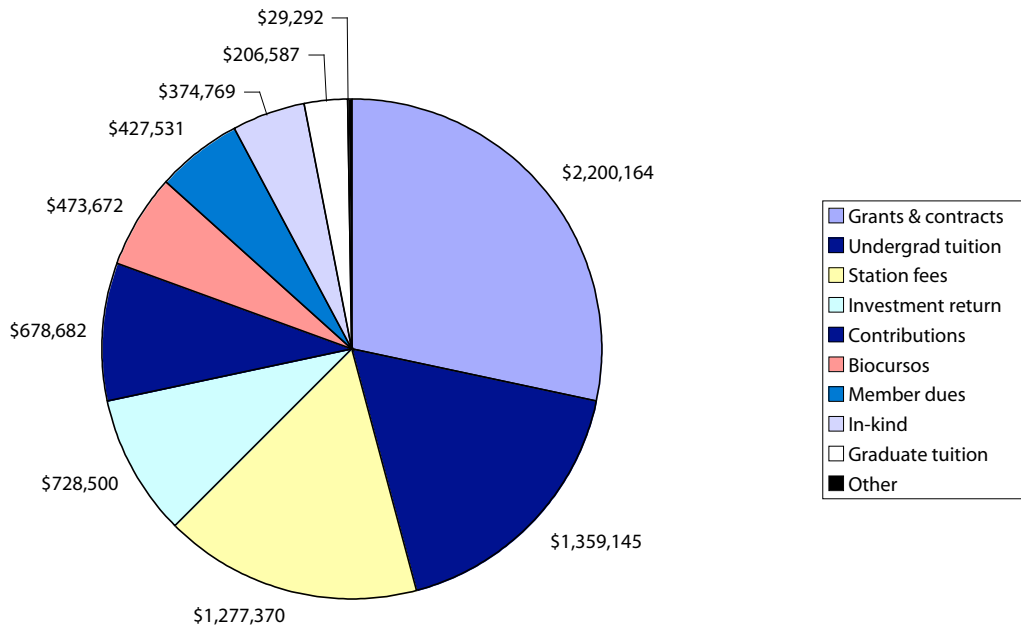
FINANCIAL REPORT

The *multi-year consolidated statements of financial position and changes in net assets* show that OTS was financially healthy on June 30, 2006, the end of fiscal year 2006 (FY06). Unrestricted net assets stood at the highest level of the nine-year period covered by that statement, and the same is true of unrestricted net assets not invested in buildings and equipment, that is, unrestricted resources available to spend. However, temporarily restricted net assets last June 30 reached their lowest year-end level of the nine-year period. The FY06 audit report can be found on the OTS website at www.ots.duke.edu/en/library/newsletters.shtml

Chart 5. FY06 Consolidated Expenses, OTS and subsidiary
Station fees charged to OTS programs show as reduced costs of stations



FY06 Consolidated Revenue, OTS and subsidiary



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