



# Organization for Tropical Studies

## Annual Report

Fiscal Year 2002

July 1, 2001 – June 30, 2002

*where science and nature converge*

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## Message from the President and CEO

During Fiscal Year 2002 (1 July 2001 - 30 June 2002), we conducted hands-on field courses in tropical biology in Costa Rica, Peru and Brazil. We provided invaluable assistance to tropical researchers and maintained three important biological stations in the New World tropics.

We trained 170 graduate students, 75 undergraduate students and 90 professionals in our one-of-a-kind intensive field courses in the biological sciences. Our training program ensures that the world has the human infrastructure in place to address global environmental issues.



We assisted researchers pursuing 178 research projects at our three biological stations in Costa Rica. We awarded \$102,000 in research fellowships to 53 researchers in the early stages of their careers. More than 155 scientific publications were published during the year based on research conducted at our stations. These research activities, combined with our efforts to help researchers identify collaborators, secure funding and process required permits, are vital to increasing the world's knowledge of tropical ecosystems.

Together with the Costa Rican government we conserved and protected more than 100,000 hectares of tropically-diverse ecosystems (lowland rain forest, dry forest, and mid-elevational cloud forest) that surround our stations.

We worked with local communities to provide hands-on educational opportunities for school children and adults. People from all over the world experienced and studied tropical biodiversity at our biological stations.

Our progress is made possible with the dedicated support of our staff, volunteers, and donors. More than 150 volunteers donated thousands of person-hours to our operations. In addition, nearly 2,000 donors contributed to the financial health of the organization.

The University of Connecticut became our first "Century Partner" this year, joining the consortium for the next 100 years. This commitment, along with the outstanding faculty and students, will allow the university to continue as one of the leading U.S. institutions for tropical ecology.

This report will give you an overview of our fiscal year 2002 activities as we continue to provide leadership in education, research and the responsible use of natural resources in the tropics.

*Gary Hartshorn*

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Smithsonian Institution

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OTS

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Environmentalist

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Environmentalist

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Duke University

## Offices

### North American Office

Box 90630  
Durham, NC 27708-0630  
Phone: (919) 684-5774  
Fax: (919) 684-5661  
E-mail: nao@duke.edu  
www.ots.duke.edu

### Costa Rican Office

Apartado 676  
2050 San Pedro de Montes de Oca  
Costa Rica  
Phone: (506) 240-6696  
Fax: (506) 240-6783  
E-mail: oet@ots.ac.cr  
www.ots.ac.cr

### Las Cruces Biological Station and Wilson Botanical Garden

Apartado 73-8257 San Vito  
Coto Brus, Costa Rica  
Phone: (506) 773-4004  
Fax: (506) 773-3665  
E-mail: lcruces@hortus.ots.ac.cr

### La Selva Biological Station

Puerto Viejo de Sarapiquí  
Heredia, Costa Rica  
Phone: (506) 766-6565  
Fax: (506) 766-6535  
E-mail: laselva@sloth.ots.ac.cr

### Palo Verde Biological Station

Palo Verde National Park  
Guanacaste, Costa Rica  
Phone: (506) 661-4714  
Fax: (506) 661-4712  
E-mail: pverde@ots.ac.cr

## Consortium Member Institutions and Assembly of Delegates

### University of Alberta, Canada

Colleen Cassady St. Clair  
Arturo Sánchez-Azofeifa

### University of Arizona

Judith Bronstein  
Brian Enquist

### Arizona State University

Leslie Landrum  
David Pearson

### University of Arkansas

Cindy Sagers  
Kimberly Smith

### Auburn University

Wayne Brewer  
Craig Guyer

### University of California-Berkeley

Michael Watts  
Whendee Silver

### University of California-Davis

Charles Goldman  
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### University of California- Los Angeles

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### University of California-Santa Cruz

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### University of Cape Town, South Africa

Ed February  
Jeremy Midgley

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Timothy Wootton

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Yan Linhart

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Daniel Briceño Lobo

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Paul Moorcroft

### University of Illinois

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David Philipp

### Indiana University

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Craig Nelson

### Instituto de Ecología, A.C., Xalapa, México

Sergio Guevara  
Patricia Moreno

### Instituto Tecnológico de Costa Rica

Julio Calvo  
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Carol Horvitz

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Peter Murphy

### University of Minnesota

Franklin Barnwell

### University of Missouri-Columbia

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Rose-Marie Muzika

### University of Missouri-St. Louis

Jim Hunt  
Bette Loiselle

### Museo Nacional de Costa Rica

Silvia Lobo Cabezas

### Universidad Nacional

Victor Cartín Leiva  
Claudia Charpentier

### Universidad Nacional de la Amazonía Peruana

José Torres Vásquez  
Lorgio Verdi

### University of North Carolina

David Pfennig  
Seth Reice

### North Carolina State University

Paul Mueller  
Ted Shear

### Ohio University

Harvey Ballard  
Don Miles

### Oregon State University

Darlene Judd  
Barbara Gartner

### University of Pittsburgh

Walter Carson  
Bill DeWalt

### University of Puerto Rico

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### Purdue University

Andrew DeWoody  
Kerry Rabenold

### Rice University

David Brown  
Joan Strassman

### Rutgers University

Jean Hartman

### University of San Antonio Abad, Cusco, Perú

Grace Servat

### Smithsonian Institution

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### University of Texas-Austin

Lawrence Gilbert  
Ulrich Mueller

### Tulane University

Thomas Sherry

### U.S. Forest Service

Susan Cordell  
Jack Waide

### University of Utah

Lynn Bohs  
Dinah Davidson

### University of Washington

Shahid Naeem

### Washington University

Jonathan Losos  
Mick Richardson

### University of Wisconsin-Madison

Tom Givnish  
Stanley Temple

### University of Witwatersrand

Kevin Rogers  
Mary Scholes

### Yale University

Kimberley Awbrey  
Anne Yoder

### Honorary Delegate

Jay Savage

## Education

During fiscal year 2002, the organization offered nine graduate courses, two undergraduate semester abroad programs, two undergraduate summer courses, five environmental science and policy workshops and 53 research fellowships.

### Graduate Program

#### Tropical Biology: An Ecological Approach 01-3

In this course students received 8-weeks of rigorous training in research methods in tropical ecology. The students, selected from eight different countries, visited nine field sites in Costa Rica. They participated in a variety of independent and faculty-led field projects, allowing them to explore the vast potential that the tropics hold for future research.

##### Coordinators:

Deedra McClearn, OTS

César Nufio, OTS

Jennifer Koslow, Indiana University

Matjae Kuntner, George Washington University

Hugo Mantilla, Colombia

##### Students:

Jessica Adkins, Oregon State University

Kasey Barton, University of Colorado

Melanie Bateman, North Carolina State University

Joseph Bischoff, Rutgers University

Marina Blanco, University of Massachusetts

Danielle Busch, University of Washington

Andrew Cline, Louisiana State University

Delphine Farmer, University of California-Berkeley

Bernd Freymann, Louisiana State University

Nathan Muchhala, University of Miami

Iris Rodden, Tulane University

Rebecca Rowe, University of Chicago

Charlotte Skov, University of Florida

Scott Solomon, University of Texas

Andrea Sweigart, Duke University

Mario Vallejo-Marin, Duke University

Kevin Whelan, Florida International University

Elliot Wilkinson, University of Utah

Roman Yukilevich, State University of New York-Stony Brook



The Tropical Biology course allowed students to hone their experimental design, interpretation and presentation skills.

#### Agroecología Tropical 01-7

The 14th offering of this Spanish-language course provided a framework of ecological processes, practical methods for management and scientific studies in agricultural systems. Students from nine countries spent six weeks in Costa Rica analyzing agricultural systems from an ecological perspective. Independent research projects were an important component of this course.

##### Coordinators:

José Manuel Mora, Universidad de Costa Rica

Mickie Swisher, University of Florida

##### Teaching Assistant:

Lucía López Umaña, OTS

##### Students:

Raúl Altamirano, Instituto de Ecología, Bolivia

Stephen Black, California State University

Mariana Nai Bregaglio, Universidad Nacional de Córdoba, Argentina

Johanna Delgado, Universidad de Puerto Rico

Martha Enriquez, Centro para la Investigación en Sistemas Sostenibles de Producción Pecuaria, Colombia

William Goitía, Universidad Nacional Experimental Simón Rodríguez, Venezuela

Beatriz González, Spain

Víctor Luque, Asociación de Promoción y Desarrollo, Perú

Miguel Marchamalo, Universidad de Costa Rica

Félix Moreno, Universidad Nacional Experimental del Táchira, Venezuela

Mónica Ramírez, Centro para la Investigación en Sistemas Sostenibles de Producción Pecuaria, Colombia

Alvaro Salmerón, Universidad Capitán General Gerardo Barrios, El Salvador

### Ecología da Floresta Amazônica 01-12

This course was offered in collaboration with the Instituto Nacional de Pesquisas da Amazonia (INPA), the Smithsonian Institution and the Universidade Estadual de Campinas (UNICAMP). Emphasis was placed on the ecology of flooded and terra firme forests in the region around Manaus, Brazil.

#### Coordinators:

Eduardo Martins, INPA  
Jensen Zuanon, INPA

Christiana Dee McCain, University of Miami

Cristiane Follmann Jurinitz, UFRGS

Daniel Luis Macia Vieira, UnB

#### Students:

Alexander Vicente Christianini,  
Universidade Estadual Paulista do Brasil

Edgar Prieto Piraquive, Universidad Nacional de Colombia

Felipe Bandoni de Oliveira, Universidade de Sao Paulo

Katiane Mara Ferreira, Universidade de Sao Paulo

Andrea von der Heyde Lamberts,  
Universidade Estadual de Campinas

Leandro Moraes Scoss, UFV

Maria Rosa Darrigo, Universidade de Sao Paulo

Angela Midori Furuya Pacheco, UnB

Maurício Camargo-Zorro, UFPA

Antônio José Camilo de Aguiar, UFP

Natalie Olifiers, UFRJ

Betsabé Ruiz Guerra,  
Universidad Nacional Autónoma de México

Paula Cavalcante Coeotto, UFRJ

Paula Soares Pinheiro, UERJ

Carlos Eduardo Marinelli,  
Universidade de Sao Paulo-Sao Carlos

Rodrigo Cogni, Universidade Estadual de Campinas



The first Spanish-language plant systematics course stressed theory and practice in equal measure.

### Sistemática de Plantas Tropicales 01-18

In a four-week botanical blitz through the major plant communities of Costa Rica, students from Mexico to Argentina developed the skills needed for systematic, monographic and floristic research on tropical plants. Plant identification walks and quizzes followed overviews of plant morphology and the major groups of ferns and flowering plants; lectures on phylogenetic theory alternated with workshops on botanical illustration and specimen preparation. Many course participants produced the keys, floras, monographs, and phylogenies upon which the rest of the scientific and conservation communities depend.

#### Coordinators:

Brad Boyle, OTS

Robbin Moran, New York Botanical Garden

Nelson Zamora, Instituto Nacional de Biodiversidad,  
Costa Rica

Luis Fdo. Giraldo, Universidad de Antioquia, Colombia

Jasivia Gonzáles, Universitat Gottingen, Germany

Lilian Florencia Ferrufino, Universidad de Costa Rica

Paulo Labiak, Universidade de Sao Paulo, Brazil

Wilfredo Mendoza, Universidad Nal Sn. Antonio Abad  
del Cusco, Perú

#### Students:

Yaayé Arellanes, Universidad Autónoma de México

Edwin Segundo Narváez, Herbario Nacional del Ecuador

Fernando Alzate, Universidad de Antioquia, Colombia

Alcides Mondragón, Universidad Central de Venezuela

José Mauricio Bonifacio, Universidad Rep.  
Oriental del Uruguay

Diego Osorno, Nicaragua

María Teresa Pulido, Universidad Nal. Autónoma de México

Berónica del Carmen Camaripano,  
Universidad Central de Venezuela

Federico Rizo-Patrón, UNA, Perú

Lucía del Cortez, Universidad Central de Venezuela

Dino Jesús Tuberquia, Herbario, Jardín Bot. Joaquín Ant.  
Uribe, Colombia

Felipe Cardona, Universidad de Antioquia, Colombia

Alejandra Vasco, Universidad de Antioquia, Colombia

Sandra Correa, STRI-BCI, Panamá

Jorge Vargas, Universidad de San Carlos, Guatemala

Roosevelt García, Universidad Nacional de la  
Amazonía Peruana

Elisabet Wehncke, UNAM, México



*Advanced Comparative Neotropical Ecology, also known as the Four Forests course, encouraged students to conduct comparative and collaborative research.*

### Advanced Comparative Neotropical Ecology 01-25

This course trained a talented group of post-doctoral investigators at La Selva Biological Station, Costa Rica; Barro Colorado Island, Panama; Cocha Cashu Biological Station in Manu National Park, Peru; and the Biological Dynamics of Forest Fragments Project near Manaus, Brazil. Participants in the course conducted comparative research in an array of tropical ecosystems. As a result, participants developed a pan-tropical, multi-collaborator proposal dealing with the joint influences of climate, litter quality, and soil fauna in regulating the decomposition of leaf and root litter.

#### Coordinators:

Gordon Orians, University of Washington (emeritus)  
Erika Deinert, OTS

Kyle Harms, Cornell University

Rebecca Montgomery, University of Wisconsin

Helene Muller-Landau, Princeton University

Alexandre Oliveira, Universidad Paulista, Brazil

Horacio Paz, University of California-Santa Barbara

Lourens Poorter, Wageningen University, Netherlands

Jennifer Powers, Duke University

George Weiblen, Michigan State University

#### Students:

Douglas Altshuler, University of Texas

Jerome Chave, Princeton University

Saara DeWalt, Louisiana State University

Hector Grau, Universidad Nacional de Tucumán, Argentina

Marco Gutiérrez, Universidad de Costa Rica

### Multi-Site, Multi-Investigator, Multi-Disciplinary Initiative

The “3M” program disseminated the work of Mellon-funded scientists to a new generation of young researchers focused on tropical and subtropical plant ecology research. The unique value of the program was in establishing training modules at intensively studied sites in tropical and subtropical ecosystems. The first three modules (2001) took place in Hawai’i, Costa Rica (La Selva) and Brazil (Forest Fragments Project).

#### Coordinators:

Peter Vitousek, Stanford University

Robin Chazdon, University of Connecticut

Heraldo Vasconcelos, INPA, Brazil

Tamara Heartsill Scalley, Utah State University

Scott Mangan, Indiana University

Gabi Nuñez Iturri, University of Illinois-Chicago

Anton Pauw, University of Cape Town, South Africa

Halton Peters, Stanford University

Elsie Rivera Ocasio, University of Puerto Rico

Mark Rountree, University of Witwatersrand, South Africa

Sunshine Van Bael, University of Illinois

Susi Vette, University of Cape Town, South Africa

Carolina Volkmer Castilho, INPA, Brazil

#### Students:

Steve Allison, Stanford University

José Camargo, INPA, Brazil

Miguel Cifuentes, Oregon State University

Auristela Conserva, INPA, Brazil

Teresa Garcia Restom, University of Hawai’i

ANTON PAUW



*A select group of outstanding young plant ecologists were trained in multi-site and multi-disciplinary research.*



### Tropical Biology 02-1

Students in this course traveled to contrasting ecosystems throughout Costa Rica and focused on research methods in tropical ecology. Visiting instructors were instrumental to the success of this course, as they provided expertise on a wide range of issues.

#### Coordinators:

César Nufio, OTS

Derek Johnson, University of Miami

#### Teaching Assistant:

Laura May, Universidad de Costa Rica

#### Students:

Fernando Alvarez Padilla, Smithsonian Institution

Lindsay Amsberry, University of Washington

Jessica Cable, University of Arizona

Gerardo Carfagno, University of Illinois

Juanita Choo, Rutgers University

Amy Freestone, University of California-Davis

Alex Gilman, University of California-Los Angeles

Coleman Kennedy, University of California-Berkeley

Barrett Klein, University of Arizona

Chad Montgomery, University of Arkansas

Monica Papes, University of Kansas

Liba Pejchar, University of California-Santa Cruz

Janice Pereira, University of Arizona

Ana Planavsky, University of Arizona

Claudia Polo-Urrea, University of Massachusetts-Amherst

Laura Schoessler, University of Minnesota

Katharine Semsar, North Carolina State University

Candan Soykan, Arizona State University

John Steffen, Auburn University

Yung-Ho Wang, University of Illinois

Jennifer White, University of Minnesota

Heather York, University of Kansas

CESAR NUFIO



Students in the eight-week tropical biology field course were from nine different countries.

### Ecología Tropical y Conservación 02-2

Twenty-two Latin American students from 14 countries participated in this course, which started with statistics-oriented field problems in palm plantations at Parrita, moved on to Atlantic mid-elevation forests at Pocosol, and ended January in the páramo and oak forests of Cuericí. Students developed group projects with guidance of course coordinators and resource faculty.

#### Coordinators:

Alejandro Farji Brenner, Universidad del Comahue, Argentina

Gilbert Barrantes, Universidad de Costa Rica

#### Teaching Assistant:

Katja Poveda, Goerge-August-Universität, Germany

#### Students:

María Cecilia Baldovino, Lab. Investigaciones Ecológicas de las Yungas, Argentina

Mariano Santos Morales, Centro Regional de Investigaciones Científicas y Tecnológicas, Argentina

Catalina Rivadeneira, Instituto de Ecología, Bolivia

Fabiana de Gois Aquino, Universidade de Brasilia, Brazil

Marcela Bernal, Universidad de Antioquia, Colombia

Alberto Galindo, Universidad de Puerto Rico

María Carolina Gómez, Universidad del Valle, Colombia

Oscar Laverde, Universidad Nacional de Colombia

Pablo Esteban Allen, Universidad de Costa Rica

Oscar Chavez, Universidad de Costa Rica

Daimy Godínez, Centro de Investigaciones de Medio Ambiente, Cuba

José Francisco Fabara, Fundación Ecuatoriana de Estudios Ecológicos, Ecuador

María Paulina Viteri, Fundación Ecuatoriana de Estudios Ecológicos, Ecuador

Juan Manuel Lobato, Centro de Investigaciones Biológicas de Noroeste, México

Arceli Samaniego, Instituto de Ecología, México

Emelina Tapia, Universidad Nacional Agraria, Nicaragua

Joel Angel Sands, Universidad de Panamá

Carlos Willy Palomino, Universidad Nal. San Antonio Abad del Cusco, Perú

Claudia Véliz, Perú

José Javier Fumero, Universidad de Puerto Rico

Alvaro Soutullo, Sociedad Uruguaya para la Conservación de la Naturaleza, Vida Silvestre, Uruguay

Claudia Peñaloza, Universidad Simón Bolívar, Venezuela

### Ecología de Ecosistemas Amazónicos 02-13

The fourth offering of this Spanish language course in the Peruvian Amazon included 22 students selected from 65 applicants. The course visited Madreselva (Loreto) where emphasis was on the ecology of the flooded forests and aquatic habitats. The second part of the course took place at Los Amigos (Madre de Diós) where the focus was on tierra firme forest ecosystems and biodiversity.

**Coordinator:**

Grace Servat, University of Missouri-St. Louis

Lincoln Nolivos Duque,

Universidad Cristiana Latinoamericana, Ecuador

**Students:**

Ana Margarita Horta, Laboratorio de Investigaciones  
Ecológicas de las Yungas, Argentina

Claudia Fabiola Cortéz Fernández,  
Colección Boliviana de Fauna, Bolivia

Marolyn Vidaurre de la Riva,  
Universidad Mayor de San Andrés, Bolivia

Robinson Botero Arias,  
Universidad de Antioquia, Colombia

Diana Catalina Ramos Báez, Colombia

Silvia Vejarano Rivadeneira, Colombia

Vivian Vanesa Méndez Alvarez, Costa Rica

Julissa Rojas Sandoval, Universidad de Costa Rica

Luis Daniel Avila Cabadilla, Centro de Servicios  
Ambientales de Matanzas, Cuba

Sandra Enríquez Morillo,  
Escuela Politécnica Nacional, Ecuador

Claudia Lorena Quan Rodas,  
Universidad Nacional de Costa Rica

Mariana Alvarez Añorve,  
Universidad Nacional Autónoma de México

Teresa Patricia Fera Arroyo,  
University of Missouri-St. Louis

Clementina González, Instituto de Ecología A.C., México

Katya Balta Abadía, Museo de Historia Natural, Perú

Lilia Aurora Campos Zumaeta, Perú

María Ysabel Cazorla Palomino,  
Instituto Andino de Ecología y Desarrollo, Perú

Clara Rosa Del Aguila Morante, Perú

Freddy Ferreyra Vela,  
Universidad Nacional de la Amazonía Peruana

Oscar González Medina, Asociación Peruana para la  
Conservación de la Naturaleza, Perú

José Flores Martínez, Michigan State University

## Undergraduate Program

### Undergraduate Semester Abroad

The students spent their semesters learning the fundamentals of tropical biology, doing field research and studying environmental policy, Spanish and Latin American culture. During each semester, students spent 3 weeks in the cultural immersion component of the program, including home stays with Costa Ricans and intensive Spanish classes. They then received an intensive introduction to plant and insect taxonomy, the complexity of park management issues and community relations and ethnobiology, among other topics. Students established close and lasting friendships and experienced the trials and triumphs of tropical biology first-hand.

#### Fall 2001

Emily AlMBERG, Swarthmore College  
 Maria Biaggio, Bryn Mawr College  
 Philip Blumenshine, Swarthmore College  
 Daniel DeMoss, Williams College  
 Sonja Dorrance, Willamette University  
 James Douglass, Rice University  
 Laura Dunn-Mark, Reed College  
 Shelley Edmundson, Wheaton College  
 Jessica End, Brown University  
 Jessica Feingold, Dartmouth College  
 Nicole M. Gerlach, Cornell University  
 Christa Jen, Michigan State University  
 Sarah Klain, Reed College  
 Jennifer Lunstead, Swarthmore College  
 Sarah Mann, DePaul University  
 Sarah Mazur, Carleton College  
 Callan Ordoyne, Mount Holyoke College  
 Margarita Ramos, Tulane University  
 Megan Storey, Carleton College  
 Catherine Taylor, Swarthmore College  
 Jenny Tung, Duke University  
 Mercedes Ward, University of the South-Sewanee  
 Danli Xing, Northwestern University

#### Spring 2002

Jessica Albietz, Georgetown University  
 Jordan Baker, University of Pittsburgh  
 Stacy Barron, Bowdoin College  
 Talia Bigelow, Smith College  
 Rachel Brummel, Grinnell College  
 Andrew Cowan, Davidson College  
 Jillian De Gezelle, Reed College  
 Merrit Hickman, Wesleyan University  
 Meghan Martin, Reed College  
 Alexandra Morel, Washington University  
 Catherine Otis, Cornell University  
 Rebecca Owens, Wellesley College  
 Sylvia Scharf, Smith College  
 Melissa Smith, Willamette University  
 Shannon Tyman, Bryn Mawr College  
 Rita Vincello, Middlebury College  
 Meredith Wehrman, Sarah Lawrence College  
 Susanne Wimberley, Rhodes College



Group and independent field projects were an important aspect of the undergraduate semester program, allowing students to learn about science by doing science.

### Tropical Ecology Summer 2002

Students studied the natural history of important plant and animal taxa in tropical habitats within the context of basic ecological and evolutionary principles. They spent time in the field and in the classroom studying topics ranging from the behavior and physiology of individual organisms to the processes and patterns of communities and ecosystems. The course emphasized intensive fieldwork. Four students received scholarships from the OTS Minority Scholars Program.

ETHEL VILLALOBOS



Students designed, conducted and interpreted independent research projects as part of *Tropical Ecology*.

#### Coordinators:

Ethel Villalobos, University of Hawai'i  
Don Brightsmith, Duke University

#### Teaching Assistant:

Alexander Pries, Wooster College

#### Students:

Carrie Cooper-Fenske, Swarthmore College  
Teresa Edwards, Washington University  
Alicia Evans-Imbert, Howard University  
Andrew Filipczak, University of Richmond  
Whitney Florin, Duke University  
Andrea Garcia, University of Florida  
Andrea Gilbert, Millsaps College  
Scott Goldberg, Yale University

Jonathan Katz, Yale University

Allegra Lee, Duke University

Erik Lu, University of Pennsylvania

Lanakila McMahan, Duke University

David Merin, Lewis & Clark College

Lauren Pincus, Brandeis University

Heather Rogers, University of Arizona

Leticia Sanchez, San Diego State University

Hannah Schrum, University of Arkansas

Anne Starling, Duke University

Evan Twomey, University of Maine

Evelyn Ware, University of North Carolina

Jenny Yoo, University of Pennsylvania

### Introduction to Field Ethnobiology Summer 2002

Students experienced the medicinal, ceremonial, esthetic and subsistence use of plants and animals by human communities in Central America. They visited indigenous communities to conduct ethnobiological assessments through interviews with local people. In addition, students presented an original research paper on an ethnobiology topic of their interest. Nine students received scholarships from the OTS Minority Scholars Program.

#### Coordinator:

Luis Diego Gómez, OTS

#### Students:

Ayanna Adams, University of Illinois, Urbana-Champaign  
Brandy Alexander, Tuskegee University  
Abby Captain, University of Illinois, Urbana-Champaign  
Stephanie Cohan, Florida International University  
Patricia Gillespie, Johnson C. Smith University

Lourí Gorman, Haskell Indian Nations University

Dana Graef, Princeton University

Angel Hsu, Wake Forest University

Rishi Parikh, Duke University

Monica Peña, Texas A & M University

Meghan Romano, Southern Illinois University

Jacqueline Skrutvold, University of Arizona

Sherry Tsai, University of California-Los Angeles

### Research Experience for Teachers

With funding from the National Science Foundation, OTS implemented a pilot Research Experience for Teachers (RET) program in Costa Rica. Three teachers from the U.S. spent 6 weeks at one of the OTS biological stations where they worked with a researcher to design and conduct tropical biology research.

#### Participants:

Curtis Varnal, Paris High School, Paris, Arkansas  
(Palo Verde)

Miles Robinson, Kingswood Girls Middle School,  
Bloomfield, Michigan (La Selva)

Roy Arezzo, City as the School, New York, New York (La Selva)

## Environmental Science and Policy Program

### Program Expansion Underway in Peru

During the fiscal year, the Environmental Science and Policy program began a geographic expansion to offer new decision-maker courses in Peru. With funding from the William and Flora Hewlett Foundation, these in-country courses will be of heightened relevance to local decision-makers while reduced travel time and costs to attend will allow for a broader range of participants. Activities in Peru during the year included building a network of in-country partners who will help to guide decision-maker training by contributing to recruiting, logistical, teaching, and follow-up efforts. OTS will provide impetus to a program for which partners will eventually assume primary responsibility. Workshops were conducted to stimulate interest in decision-maker training.

### Meso-American Biological Corridor Seminars

These joint seminars of OTS and WWF-Central America trained mid- to high-level decision-makers on the objectives, mission, vision, challenges and opportunities to consolidate the Meso-American Biological Corridor (MBC). The fourth *MBC Seminar* included 14 Central American and two Mexican representatives from the tourism sector. These highly motivated professionals actively worked as a single unit to identify 15 concrete mechanisms by which their sector could help to further the MBC. The fifth edition engaged directors, editorialists and editors of printed and broadcast media in Central America and Mexico. The seminar addressed the role that journalists and other communication experts should play in efforts to consolidate the MBC.



Communications professionals from Central America and Mexico learned about ecological principles during a guided walk in La Selva.

#### Coordinators:

Javier Mateo-Vega, OTS

Leandro Castaño, OTS

#### Participants:

María Vega, Belize Tourism Industry Association

Godsman Ellis, Belize Eco-tourism Association

Rafael Robles González, Horizontes Tours, Costa Rica

Hannia Cordero, Cámara Nacional de Turismo, Costa Rica

Alba Marisol Galindo, Asociación Pro-desarrollo Turístico de Perkín, El Salvador

Elena Larreynaga de Rivera, Corporación Salvadoreña de Turismo, El Salvador

Saúl Blanco Sosa, Asociación Ecoturística Alianza Verde, Guatemala

Salvador Echigoyen, Instituto Hondureño de Turismo, Honduras

Jorge E. Salaverri, La Moskitia Ecoaventuras, Honduras

Basilio Velázquez Chi, Amigos de Sian Ka'an A.C., México

Verónica Juárez, Amigos de Isla Contoy A.C., México

Sergio Escobar, Cámara Nicaraguense de Turismo, Nicaragua

Raquel Quesada, Instituto Nicaraguense de Turismo, Nicaragua

Hugo José Navas Mora, Cámara de Turismo Ometepe, Nicaragua

Lanay Valderrama, Asociación Nacional para la Conservación de la Naturaleza, Panamá

Evans Canto, Sostenible Instituto Panameño de Turismo, Panamá

Luis García, Radio Ritmo Radio Station, Belize

Katiana Murillo, Rainforest Alliance, Costa Rica

Ricardo Zamora, Eco News, Costa Rica

Jorge Vargas Méndez, Asociación Salvadoreña de Radiodifusores, El Salvador

Gerardo Hurtado, Noticiero Teledos, El Salvador

Myriam Larra Bujalance, Diario Prensa Libre, Guatemala

Jorge Talavera Sosa, Diario La Tribuna, Honduras

Héctor Amador, Tele Noticiero Abriendo Brecha, Honduras

Mario Eduardo Camacho Rivera, Diario Novedades de Quintana Roo, México

José Solís Juárez, Comisión Nacional de Areas Naturales Protegidas, México

Soraya Quintero, Canal 13, Panamá

Víctor Dagoberto Torres Melgar, Diario La Prensa, Panamá

### Principios Ecológicos para el Desarrollo Sostenible en América Latina 02-6

This course included Latin American decision-makers, such as corporate executives, politicians and non-governmental leaders. Professionals traveled to reserves in Costa Rica and crossed the border into Panama to discuss trans-boundary environmental problems and their proposed solutions.

#### Coordinators:

Raúl Solórzano, MINAE

Javier Mateo-Vega, OTS

Andrew Chek, OTS

Leandro Castaño, OTS

#### Participants:

Fernando Martín Gagliardi, Asociación Conservación Argentina

María del Pilar Barrera Rey, The Nature Conservancy - Colombia Program

Rosamira Guillén Monroy, Fundación Botánica y Zoológica de Barranquilla, Colombia

José Andrés Díaz, Instituto de Investigaciones Biológicas Alexander von Humboldt, Colombia

Alvaro Hernán Roldán Maya, Centro Recreacional Santa Rosa de Quilitén, Colombia

Rubén Darío Escamilla Hernández, Red de Reservas Naturales de la Sociedad Civil, Colombia

Alexandra Alvarado Paniagua, Jueza Tribunal Superior Agrario, Poder Judicial, Costa Rica

Edely Bravo Amarante, Ministerio de Ciencia, Tecnología y Medio Ambiente, Cuba

Gustavo Eduardo Novillo Riofrío, Fundación Ecológica Arcoiris, Ecuador

Francisco Khalil De León Barrios, Consejo Nacional de Areas Protegidas, Guatemala

Arturo Can Moo, Programa de Manejo Integrado de Recursos Costeros, México

Rogelio Erick Manríquez Martínez, Programa Nacional Conservación de Tierras, México

Nilva Góngora Meneses, Universidad de Panamá, Programa de Desarrollo Comunitario

Manuel Leonardo Cabrera Sandoval, Instituto Nacional de Recursos Naturales, Perú

Isabel Calle Valladares, Sociedad Peruana de Derecho Ambiental, Perú



Policy makers from the U.S. learned about natural forest management at a project in San Carlos.

### Interdependence: Economic Development and Environmental Concerns in Developing Countries 02-8

Senior staff members from Capitol Hill, other branches of government, NGOs and the private sector participated in this weeklong, policy-oriented, field course. They were exposed to the lowland rain forest, dry forest, wetlands, cloud forest, as well as several contrasting agricultural, secondary growth and degraded landscapes, all serving to illustrate key issues addressed during the course.

#### Coordinators:

Katrina Brandon, Conservation International

Andrew Chek, OTS

Javier Mateo-Vega, OTS

#### Participants:

David Alarid, U.S. Embassy, Costa Rica, Environmental Hub for Central America and Caribbean

José Pablo González, Adjunct Attorney General, Chief Environmental Prosecutor, Costa Rica

Jennifer Barrett, U.S. House of Representatives, Office of Rep. Mark Udall

Charles Cooke, U.S. House of Representatives, Committee on Science

Brian Hannegan, U.S. Senate, Committee on Energy and Natural Resources

Doug Hobbs, U.S. Fish and Wildlife Service, Division of Congressional and Legislative Affairs

Chris Iverson, U.S.D.A. Forest Service, International Programs

Amelia Jenkins, U.S. House of Representatives, Office of Rep. George Miller

Gregory Maggio, Overseas Private Investment Corporation

Kimberly McClurg, U.S. Fish and Wildlife Service, Division of International Conservation

Abbie Meador, U.S. House of Representatives, Office of Rep. John Olver

Brian Muehling, U.S. Environmental Protection Agency, Office of International Activities

Martha Scott Poindexter, Monsanto Company

Eileen Robinson, Duke Energy Corporation, Global Issues Strategy

Gene Smith, U.S. House of Representatives, Office of Rep. Howard Berman

Reilly Starr, Mitsubishi International Corporation

Wendy Tan, Conservation International

Pam Teel, U.S. Environmental Protection Agency, Office of International Activities

Andrew Velthaus, U.S. Treasury Department, Office of Specialized Development Institutions

David Watkins, U.S. House of Representatives, Committee on Resources

### Manejo de Areas Silvestres Tropicales 01-16

Park directors and rangers from nine Latin American countries spent seven weeks at 12 parks and reserves in Costa Rica. The managers were trained on a wide range of issues pertinent to their everyday work, including ecological principles, conservation biology, wildlife management and monitoring, ecological restoration, protected areas planning, management plan evaluation, community relations, environmental dispute resolution and environmental education.

#### Coordinators:

José María Rodríguez, OTS

Leandro Castaño, OTS

#### Participants:

Gerardo Félix Elst, Parque Nacional Nahuel Huapi, Argentina

Pedro Prieto Alonso, Parque Nacional Los Alerces, Argentina

Lucio Rhu Espinosa, Parque Nacional Kaa Iya del Gran Chaco, Bolivia

Walter Ayala Esteban, Fundación Ivi Iyamabe, Bolivia

Lelivnova Londoño Díaz, Fundación El Pilar Verde, Colombia

Rubén Dario Escamilla, Asociación Red de Reservas Naturales de la Sociedad Civil, Colombia

Gilberto Chaves Matamoros, Parque Nacional Volcán Arenal, Costa Rica

Jorge Rodríguez Gómez, Parque Nacional Volcán Irazú, Costa Rica

Vilma Margarita Brown Colley, Parque Nacional Cahuita, Costa Rica

José Martí Jamorrón Garrido, Ministerio de Ciencia y Tecnología, Cuba

Lázaro Viñola Valdes, Unidad de Areas Protegidas Ciénega de Zapata, Cuba

Manuel Alda Sierra, Estación Ecológica y Refugio de Fauna Internacional Las Salinas, Cuba

Antonia Castañeira, Centro Nacional de Areas Protegidas, Cuba

Tania Piñero Cordero, Centro de Gestión Ambiental y Estación Ecológica, Cuba

Alonso Jaramillo Jaramillo, Parque Nacional Yasuní, Ecuador

Hermes Cuasaluzán, Federación de Centros Awa, Ecuador

Juan Vicente Colcha, Fundación Ecológica Rumicuema, Ecuador

Miguel Chapiro Añapa, Fundación Ecociencia, Ecuador

Washington Tapia Aguilera, Parque Nacional Galápagos, Ecuador

Saúl Alfonso Robalino, Parque Nacional Galápagos, Ecuador

Francisco de León Barrios, Consejo Nacional de Areas Protegidas, Guatemala

Gerardo Ríos Sais, Comisión Nacional de Areas Naturales Protegidas, México

Juan Carlos Flores Del Castillo, Parque Nacional y Zona Reservada del Manu, Perú

Delsi de los Santos Tapia, Dirección General de Vida Silvestre y de Biodiversidad, República Dominicana

Omar de Jesús Zerpa, Instituto Nacional de Parques, Venezuela

## Environmental Education

OTS works to educate a broad audience to promote sustainable development activities. Programs are geared toward people living in the communities surrounding the biological stations, as well as Costa Rican citizens in general.

### BioCursos

More than 1,800 Costa Ricans of all ages and from all walks of life participated in 60 weekend programs that communicated the importance of protecting Costa Rica's biodiversity.

### Nature Walks, Open Houses and Special Events

Hundreds of school children and local residents visited the OTS biological stations to learn about biodiversity and the significance of science in protecting tropical ecosystems. Environmental outreach activities were conducted throughout the year in conjunction with special events, festivals, science fairs and open houses.

### Science Education in Local Communities

La Selva's environmental education program reached more than 400 4th graders in ten local schools. The curriculum focused on natural history, ecological processes and the interactions between human populations and the environment. Students visited La Selva for classroom, field and laboratory activities.

Las Cruces hosted more than 700 local students during the year through "The Garden as a School" program. In this program, elementary school children, high school students and university students participated in guided walks, classroom instruction and additional hands-on projects in the Wilson Garden and forest reserve. Students learned about the scientific method, ecosystems, biodiversity, forest dynamics and relationships between organisms, pollination and plant dispersal.

RODOLFO QUIRÓS



**Students from a local elementary school planted more than 100 native tree seedlings in the Las Cruces Wilson Botanical Garden as part of Tree Day.**



## Fellowships

In fiscal year 2002, OTS awarded fellowships totaling \$102,047 to 53 individuals. The award recipients were either enrolled in degree programs at OTS member institutions or were course alumni. Fellowships awarded included 25 post-course research awards, 4 pilot research awards, 13 research fellowships, and 11 OTS-STRI research fellowships.

### Andrew W. Mellon Graduate Fellowships

- Barton, Kasey (Colorado). Secondary chemistry and seedling mortality patterns in *Pentaclethra maculosa* in two Costa Rican wet forests.
- Baumert, Anthony (University of Pittsburgh). Consequences of excluding herbivores in tropical forests: On the potential for important indirect effects.
- Baumert, Anthony (University of Pittsburgh). The effects of seed predator exclusion on seedling abundance, distribution and composition: An assessment of the Connell-Janzen hypothesis.
- Bischoff, Joseph (Rutgers University). A survey of clavicipitalean fungal pathogens and their impact on ant colony populations in four wet forests in southern Central America.
- Camelo de Castro, Ernesto (University of Arizona). Variables affecting the dynamics of tree fall events at La Selva.
- Carson, Walter (University of Pittsburgh). Do herbivores and seed and seedling predators maintain tropical diversity: Testing Janzen-Connell at the community level at La Selva and BCI, OTS-STRI.
- Choo, Juanita (Rutgers University). Ethnobotany of the Afro-Caribbean community in Limón, Costa Rica.
- Cline, Andrew (Louisiana State University). The fungus beetles of southern Central America: A structured inventory of the Nitidulidae, Erotylidae and Endomychidae.
- Cortez, Lucía (University of Venezuela). Análisis filogenético del conjunto de especies de *Cyathea* (Cyatheaceae) con indusio escamoso, Costa Rica.
- Cramer, Jennifer (Louisiana State University). The effects of forest fragmentation on bat and specialist bird mediated seed dispersal in the central Amazon.
- Freyman, Bernd (Germany). Physical properties and relative abundance of fungal rhizomorphs used as nesting material by birds.
- González, María (Göteborg-Universität, Germany). Elaboración de una clave de campo y análisis filogenético de las especies endémicas del género *Sticherus* (Pteridophyta Gleicheniaceae) en Costa Rica.
- Grose, Susan (University of Washington). Phylogeny and fruit evolution in Mesoamerican Bignoniaceae.
- Himler, Anna (University of Texas-Austin). Speciation as a function of cultivar switching in fungus-growing ants: Biogeographic patterns.
- Holbrook, Kimberly (University of Missouri-St. Louis). Seed dispersal in *Virola*: From toucans to microsatellites.
- Klein, Barrett (University of Arizona). Spatial and temporal comparative analyses of *Atta cephalotes* leaf-cutter ant hitchhiker density.
- Kuntner, Matjaz (Smithsonian Institution). A comparative study of biology and orb-web plasticity of *Nephila clavipes* and related spiders at Isla de Barro Colorado and La Selva Biological Station with implications for the phylogeny of nephilite spiders, OTS-STRI.
- Labiak, Paulo (Brazil). Monografía del género *Terpsichore* A.R. Sm (Grammitidaceae).
- Mantilla Meluk, Hugo (Colombia). Estudio comparativo sobre distribución vertical de la comunidad de quirópteros en la Estación Biológica La Selva, Costa Rica, la Isla Barro Colorado, Panamá y su relación con variables ambientales.
- McCarthy, Sarah (Michigan State University). Soil pathogen mediated tree species coexistence: A mechanistic approach to Janzen-Connell processes.
- McKenzie, Valerie (University of California-Santa Barbara). Amphibian parasite communities in tropical forests: Potential indicators of ecosystem complexity.
- Nai, Mariana (Universidad Nacional Córdoba). Crecimiento de especies nativas maderables plantadas en pastizales abandonados, Coto Brus, Costa Rica.
- Notman, Evan (Organization for Tropical Studies). A comparison of *Socratea exorrhiza* fruiting phenology on BCI and La Selva and its effect on seed production, secondary dispersal, and survival.
- Powers, Jennifer and Rebecca Montgomery (SUNY-Stony Brook and University of Wisconsin). The joint influences of climate, litter quality, and soil fauna in regulating the decomposition of leaf and root litter: A pantropical study.
- Reich, Alexandra (Organization for Tropical Studies). The ecophysiological importance of photosynthetic bract extensions in Heliconiaceae.

**Andrew W. Mellon Graduate Fellowships – continued**

- Rizo-Patrón, Federico (University of Costa Rica). Inventario digital de plantas de Palo Verde.
- Rodden, Iris (Tulane University). Does the presence of ant-mutualist affect pollination in *Piper*?
- Saborío, Guido (University of Costa Rica). Efecto del parasitismo vegetal de *Phoradendron quadreangulare* sobre la producción de flores, frutos, semillas de *Guazuma ulmifolia* en el Parque Nacional Palo Verde.
- Scofield, Douglas (University of Miami). Mitotic mutations and reproductive fitness in *Ceiba pentandra*.
- Solomon, Scott (University of Texas-Austin). Biogeography of *Atta cephalotes*: Genetic analysis at two scales.
- Wang, Yung-Ho (University of Illinois-Urbana-Champaign). Effects of palms on recruitment limitation and community structure: A comparison between BCI and La Selva.
- Woodward, Catherine (University of Wisconsin). Can tropical trees persist in small forest fragments? An analysis of paternity, reproductive success, and inbreeding in small, isolated tree populations.

**Peace Frogs Fellowships**

- Toral, Eduardo (University of Costa Rica). Efectos de borde en las poblaciones de anuros y lagartijas en la Estación La Selva, Costa Rica.
- Whelan, Kevin (Florida International University). Double observer abundance estimates of the anurants at the Palo Verde marsh.
- Williams, Matthew (Auburn University). The ecology of arboreal herpetofauna and relationship to tropical forest dynamics.

**Donald and Beverly Stone Endowment for Graduate Research Fellowships****Donald and Beverly Stone Fellowships**

- Catenazzi, Alessandro (Florida International University). The importance of marine allochthonous resources for terrestrial consumers in coastal Peru.
- Kronforst, Marcus (University of Texas-Austin). Speciation from start to finish: The role of hybridization in the evolution and diversification of *Heliconius* butterflies.
- Muchhala, Nathan (University of Miami). Generalization vs. specialization in pollination syndromes: Bats and hummingbirds as pollinators of *Burmeistera* spp.

**Glaxo Wellcome Fellowships**

- Carmona, Victor (University of Arkansas). Ayúdame que yo te ayude: Evidencia de un mutualismo condicional en la interacción *Acacia-Pseudomyrmex*.
- Cuervo, Andrés (University of Antioquia). Efecto de la fragmentación de hábitat sobre aves andinas: Tamaño corporal e inestabilidad del desarrollo.
- Lozano, Sacha (Universidad del Valle, Colombia). Influencia de la dinámica mareal en el reabastecimiento de las poblaciones de peces arrecifales en una localidad de Pacífico Panameño.
- Lugo, Javier (University of Puerto Rico). Comportamiento de remoción de plantas por *Pseudomyrmex spinicola* y la relación hormiga-acacia: Un costo bien invertido?
- Soutullo, Alvaro. Criterios para la valoración biológica de áreas de potencial interés para la conservación.

**Thompson Fellowship**

- York, Heather (University of Kansas). A comparison of wet- and dry-season diets of Neotropical frugivorous bats.

**Emily P. Foster Fellowships**

- Bertsch, Alicia (University of Simón Bolívar, Venezuela). Uso de habitat y ecología alimentaria del Paujil Copete de plumas, *Crax daubentoni*, en los Llanos Centrales de Venezuela.
- Busch, Danielle (University of Washington). Investigating the trade-off between individual success in the rufous-collared sparrow (*Zonotrichia capensis costaricensis*).
- Skov, Charlotte (University of Florida). Aggressive behavior of male orchid bees on chemical baits.

**Deborah and David Clark Fellowships**

- Guthrie, Carla (University of Texas - Austin). Dispersal in a neotropical hispine beetle population: Implications for species diversity and community organization.
- Quan, Claudia (Universidad Nacional de Costa Rica). Efectos de la fragmentación sobre la variabilidad genética de poblaciones de mono congo (*Aloutta pallaita*) en el Área de Conservación de Tempisque, Costa Rica.
- Toth, Amy and David Kabelik (University of Illinois - Urbana-Champaign). Passalid beetle communities' communication and commercial organisms.

**Dole Foods Fellowship**

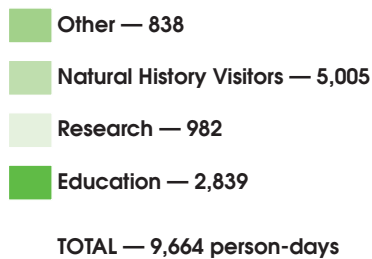
- Koslow, Jennifer (Indiana University). Soil pathogens of understory seedlings.

## Las Cruces Biological Station

Las Cruces is located on Costa Rica's southern Pacific slope and is OTS' 266-hectare reserve of mid-elevation rain and cloud forest. Las Cruces is home to the Robert and Catherine Wilson Botanical Garden, a 10-hectare managed area consisting of one of the most important living botanical collections in Central America.

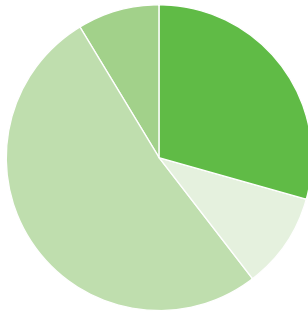
### Publications

Twenty-six publications were added to the Las Cruces bibliography during the year.



### Visitation

During fiscal year 2002, 6,589 people visited Las Cruces, including 1,545 students, 210 researchers, and 5,115 natural history visitors.



### Facilities and Resources

One 200-square-foot greenhouse was constructed with support from the Stanley Smith Horticultural Trust. In addition, the greenhouse, shade house and potting shed were renovated with galvanized steel framing, steel benches and an updated electrical system and watering system.

### Research

A closer look at amphibian declines: Population density and distribution of neotropical salamanders at three biological sites in Costa Rica / Aurora Marín (Indiana University) / Roy Arezzo, John Cozza (University of Miami)

A survey of clavicipetalean fungal pathogens and their impact on ant colony populations in four wet forests in southern Central America / Joseph Bischoff (Rutgers University)

Abundance, diversity and habitat relationships of the herpetological communities at Las Cruces forest, southwestern Costa Rica / Georgina Santos Barrera (UNAM), Fernando Mendoza (UNAM), Jesús Pacheco (UNAM), Gerardo Ceballos (UNAM), Gretchen Daily (Stanford University), Paul Ehrlich (Stanford University) / Randi Figueroa, Jesús Ilima, Sofía Rodríguez, Alberto Mendoza, María Sagot

Amphibian population decline in southern Costa Rica / Karen Lips (Southern Illinois University), Robert Brooks (Southern Illinois University), Keith Willcock (Southern Illinois University)

Arácnidos de Costa Rica / Carlos Viquez (INBio) / Gina Chaves

Avian seed dispersal in abandoned pastures / Frederick Werner (Cornell University) / Audrey Sandí, Jeisson Figueroa / Chemical defenses in Costa Rican birds / Todd Capson (Smithsonian Tropical Research Institute), Luis Diego Gómez (OTS)

Comparison of the frugivorous beetle fauna at Las Cruces and Las Alturas / Andrew Cline (Louisiana State University) / Coleoptera and pollination of Cyclanthaceae / Luis Diego Gómez (OTS)

Countryside biogeography of Costa Rican birds / Gretchen Daily (Stanford University), Paul Ehrlich (Stanford University) / James Zook (freelance)

Crecimiento de especies nativas maderables plantadas en patizales abandonados, Coto Brus, Costa Rica / Mariana Nai Bregaglio (Universidad Nacional de Córdoba, Argentina)

Cycad toxins and *Aulacoscelis costaricensis* (Coleoptera) / Luis Diego Gómez (OTS)

LUIS DIEGO GÓMEZ



Greenhouse facilities were updated to support research, education and conservation efforts.

- Distribución geográfica y selección sexual en dos especies de saltarines (Aves: Pipridae) de Costa Rica / Marina Ancaes (University of Kansas)
- Distribution of birds in the fragments and forest near Las Cruces Biological Station / Jai Ranganathan (Stanford University) / Emily Freed, Kim Carlson, Jim Zook, Ian Carrol
- Diversity of herbaceous plants in countryside habitats / Margaret Mayfield (Stanford University) / Andres Vega (University of Texas-Austin), Martha Roberts, Shasta Daisy Pistey-Lyhne (Stanford University)
- Factors affecting sex ratios in Begonias / John Cozza (University of Miami)
- Flora Costaricensis: Droseraceae / Luis Diego Gómez (OTS)
- Genetics of a subdivided Opilionid population / Joshua Mutic (University of Vermont)
- Geographic variation in bird songs / Daniel Leger (University of Nebraska), Arenz Cody (University of Nebraska)
- Hydnoraceae, Flora Neotropica / Luis Diego Gómez (OTS)
- Investigación arqueológica en Las Cruces / Mauren Sánchez (Universidad de Costa Rica), Sergio Chaves (Universidad de Costa Rica), Julio Delgado (Universidad de Costa Rica), Marta Chaves (Universidad de Costa Rica)
- Microscopic wood fungi / Liuba Kisimova-Horovitz (Universität Tübingen, Germany)
- Mycorrhizae in epiphytic and other Costa Rican ferns / Luis Diego Gómez (OTS)
- Mycota of Costa Rica / Luis Diego Gómez (OTS)
- Nematode-destroying fungi of Costa Rica / Greg Thorn (University of Western Ontario), Hans-Borje Jansson (University of Western Ontario) / Nina Zitani, María Clarita Tuason (University of Western Ontario)
- Neotropical hybrid zone stability and formation in butterflies / Michael Blum (Duke University)
- Ontogeny of *Septobasidium* / Liuba Kisimova-Horovitz (Universität Tübingen, Germany), Luis Diego Gómez (OTS)
- Paleoecology of the Las Cruces area / Sally Horn (University of Tennessee) / Kevin Anchukaitis (University of Tennessee), Ken Orvis (University of Tennessee)
- Proyecto charral / Christopher Peterson (University of Georgia), Bruce Haines (University of Georgia) / Ivelisse Ruiz, Gordon Ward, Kelly Todd
- Russula* of Costa Rica and Colombia / Ruth Aldana Gómez (Field Museum)
- Resupinate basidiomycetes of Costa Rica / Luis Diego Gómez (OTS), Liuba Kisimova-Horovitz (Universität Tübingen, Germany)
- The effects of forest fragmentation on forest insectivorous birds / Cagan Sekercioglu (Stanford University) / Viviana Ruiz, Mauricio Paniagua, Randy Figueroa, Audrey Sandí, Jeisson Figueroa, Greivin Vargas Prendas, Scott Robbins, Kerem Boyla

# Palo Verde Biological Station

Unique in its landscape richness and wildlife, Palo Verde National Park contains one of the most extensive marshes and some of the oldest patches of dry forest remaining in Central America. The OTS facilities are in the heart of the Palo Verde National Park, located in the northwest lowland of Guanacaste Province.

## Conservation

With support from the CR-USA Foundation, the integrated management of the Tempisque River Basin project continues to conserve the ecological integrity of the region. Workshops were conducted for community members, strategies developed for conservation efforts, baseline information gathered, geographic information needs were addressed and monitoring began.

As part of a three-year project funded by the AVINA Foundation, farmers were trained on management of water, soils, pesticides and fertilizers. All project activities were closely coordinated with local agencies and carried out by the National Center for Irrigated Agriculture and supported by professors, researchers and technicians from local academic and research institutions. The training activities were followed by monitoring the flow and quality of water, using the discharge water as an efficiency indicator of the practices implemented by farmers.

In close coordination with the National Program for Wetlands of MINAE and the Department of Ornithology of the National Museum of Costa Rica and with funding from Ducks Unlimited, Palo Verde facilitated floodplain conservation of the Tempisque River. The La Jacinta wetland was restored and duck surveys were conducted at the Tempisque and Caño Negro wetlands. A 50-hectare section of the Palo Verde wetland was surveyed and restored.

## Facilities and Resources

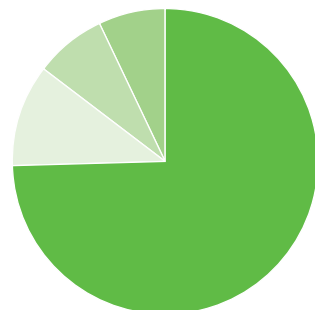
In addition to the on-going maintenance of the station, funding was secured from the National Science Foundation for construction of four researcher cabins, a director and staff dormitory, a boardwalk into the marsh and shade houses.

## Publications

Twenty-one publications were published during the year based on work conducted at Palo Verde.

## Station Use

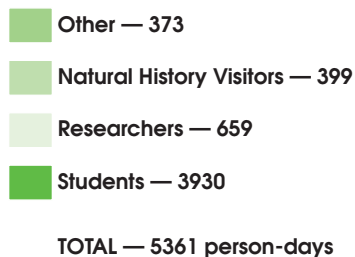
During fiscal year 2002, 2,303 people visited Palo Verde. This included 1,663 students, 107 researchers and 271 natural history visitors.



CHRIS HILDRETH



Undergraduate students take a break to enjoy the view of the Palo Verde marsh.



## Research

- Almacenamiento de proteínas en las avispas *Poliste* / Jim Hunt (University of Missouri-St Louis)
- Aves acuáticas migratorias: Evaluación del uso del hábitat en pantanos del Parque Nacional Palo Verde y arrozales con riego: Su impacto por actividades agrícolas / Johanna Hurtado (Universidad Nacional)
- Comportamiento de las ranas arborícolas y selección de microhábitat durante la estación seca en Palo Verde, Costa Rica / Jennifer Brouder (University of Florida)
- Comportamiento de remoción de plantas por *Pseudomyrmex spinicola* y la relación hormiga - *Acacia*: Un costo bien invertido? / Javier Lugo (Universidad de Puerto Rico)
- Countryside biogeography of Costa Rica birds / Jim Zook (freelance)
- Efecto del parasitismo vegetal de *Phoradendron quadrangulare* sobre la producción de flores, frutos y semillas de *Guazuma ulmifolia* en el Parque Nacional Palo Verde / Guido Saborío (Universidad de Costa Rica)
- Factores que determinan el establecimiento y distribución de *Laguncularia racemosa* en ambientes de alta sedimentación en la Costa Pacífica de Costa Rica / Philippe Hensel (Louisiana State University), Don Cahoon (U.S. Geological Survey)
- Filogenia y evolución de los frutos en *Tabebuia* s.l. y Crecentieae (Bignoniaceae) / Susan Grose (University of Washington)
- Fine-scale genetic structure of populations of *Acacia collinsii* (Fabaceae) / E. Pardini (University of Georgia)
- Gene flow into tropical forest fragments / Jim Hamrick (University of Georgia), Victoria Apsit (University of Georgia), Dorset Trapnell (University of Georgia)
- Inventario digital de plantas de Palo Verde / Federico Rizo-Patron (Universidad Nacional, Costa Rica)
- Monitoreo de la efectividad de la restauración del humedal de Palo Verde / Florencia Trama (Universidad Nacional, Costa Rica)
- Paleoecology of Palo Verde wetlands / Sally Horn (University of Tennessee) / Cynthia Styles (University of Tennessee), C. Voigt (University of Tennessee), Claudia Mora (University of Tennessee), Steven Driese (University of Tennessee).
- The effects of spatial and temporal heterogeneity in light and soil resources on seedling survival and growth in a tropical dry forest / Merril Iyer (Michigan State University)
- When the cupboards are bare: The effect of seasonality on an ant-plant mutualism in a tropical dry forest / Victor Daniel Carmona (University of Arkansas)

## La Selva Biological Station

With its state-of-the-art laboratories, on-line geographic information system, extensive trails and large forest reserve bordering Braulio Carrillo National Park, La Selva is one of the world's most important sites for tropical forest research. La Selva is located in the Caribbean lowlands of Costa Rica and comprises 1,516 hectares of old and secondary growth forests, plus experimental habitats.

### Conservation

During the year, La Selva staff worked with other organizations to implement the 246,000 hectare San Juan-La Selva Biological Corridor, part of the Mesoamerican Biological Corridor, an international initiative to maintain ecological connectivity between North and South America. The primary goal of this initiative is to maintain wildlife movement pathways in order to prevent the isolation or loss of species and to preserve ecosystem function. Activities included conducting GIS coverages and developing a plan for land acquisition. The Corridor will not only contribute to the long-term security of Braulio Carrillo National Park and La Selva, but will also open opportunities for research and education.

In conjunction with the involvement of the Costa Rican government and local people, a management plan was developed for the Sarapiquí River to address environmental impacts of nine planned hydroelectric projects.

In addition, La Selva worked with local government organizations to reforest the banks of the Sarapiquí River to offset current impacts of sedimentation caused by deforestation-related erosion.

### Facilities and Resources

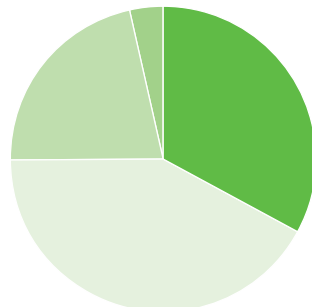
A new laboratory was constructed for the Arthropods of La Selva (ALAS) project. Funding for the lab and trail improvements was provided by the National Science Foundation. The former library was remodeled for researcher office space, providing 18 researcher cubicles and two larger offices. The former ALAS laboratory was remodeled to house scientific services, including the GIS laboratory, IT support and the station naturalist, opening up space for seven new researcher offices in the ecology lab. Internet bandwidth was increased and three new public computers were installed. The electronic Florula now contains approximately 3,500 images of more than 600 species. The Geographical Information System website was created and includes all La Selva local and regional coverages plus metadata for remote access.

### Publications

La Selva's 2001-2002 publication count stands at 108.

### Station Use

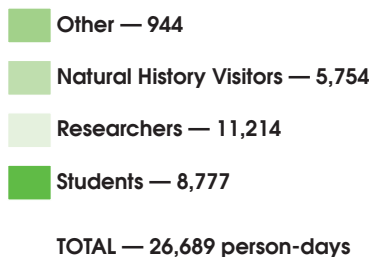
During fiscal year 2002, 8,798 people visited La Selva. This included 2,632 students, 285 researchers and 5,358 natural history visitors (mostly day visitors).



ROBERT MATLOCK



A new lab was built to house the Arthropods of La Selva research project.



## Research

- A sampling of the Hylidae of the researchers swamp / James Watling (Florida International U.) / Rosalyn Leonard (Florida International U.)
- A survey of clavicipitalean fungal pathogens and their impact on ant colony populations in four wet forests in southern Central America / Joseph Bischoff (Rutgers U.)
- A test of metapopulation incidence function parameters: Comparison of predictions from census data and experimental data / Derek Johnson (U. Miami)
- ALAS IV - Arthropod diversity in a lowland tropical rain forest / Robert Colwell (U. Connecticut), Jack Longino (Evergreen State College) / Paul Berg (U. Bergen, Norway), Danilo Brenes (INBio), Brian Brown (Los Angeles County Museum of Natural History), Donald Chandler (U. New Hampshire), Donald Davis (Smithsonian Institution), Mignon Davis (Smithsonian Institution), Marc Epstein (Smithsonian Institution), Allan González (Museo de Insectos, UCR), Paul Hanson (UCR), Carlos Hernández (INBio), Frank Hovore (OTS/CSUN/INBio), Kevin Jordan (U. Victoria, Canada), Ethan Kane (U. Maryland), Akito Kawahara (Cornell U.), Lawrence Kirkendall (U. Bergen, Norway), Piotr Naskrecki (U. Connecticut), Kenji Nishida (UCR), Jadranka Rota (U. Connecticut), Ainsley Seago (Cornell U.), Angel Solís (INBio), Charles Staines (Smithsonian Institution), Susan Staines (Smithsonian Institution), Lisa Taylor (U. Kentucky), David Wagner (U. Connecticut), Neville Winchester (U. Victoria, Canada), Willow Zuchowski (Monteverde), Ronald Zúñiga (INBio)
- Alternatives for reforestation with native trees in Sarapiquí / Jeremy Hagggar (CATIE)
- Altitudinal migration of butterflies in Costa Rica / William Haber (Missouri Botanical Garden)
- Amphibian parasite communities in tropical forests: Potential indicators of ecosystem complexity / Valerie McKenzie (U. California, Santa Barbara)
- An investigation of existing and proposed hydropower projects in Sarapiquí, Costa Rica / Elizabeth Anderson (U. Georgia) / Paulo Olivas (UCR)
- Anti-tumor and anti-viral properties of toxic secondary compounds / Karla Malloy (Duke U.)
- Antibacterial compounds from amphibian skin / Rick Austin (Piedmont College)
- Antiparasitoid defense mechanisms in tropical Lepidopteran larvae / Lee Dyer (Tulane U.) / Kirsten Becklund (Earthwatch), Catrina Huynh (Earthwatch)
- Ants in barbechas / Robert Dunn (U. Connecticut)
- Army ants and forest fragments / Joe Meisel (U. Wisconsin)
- Arthropods in banana and other tropical monocultures under different pesticide regimes / Robert Matlock (La Selva Biological Station, OTS) / Mariana Jausoro (U. Nacional de Córdoba, Argentina)
- Avifaunal community changes / Fritz Hertel (California State U., Northridge)
- Beetle seed predation in two different palms species (REU 02) / Evan Notman (OTS), Esther Zeledón (Swarthmore College)
- Behavioral ecology of *Aphaenogaster araneoides* / Terrence McGlynn (U. San Diego) / Jonathan Buma (U. San Diego), Ryan Carr (U. San Diego), John Carson (U. San Diego)
- Behavioral endocrinology of tropical house wrens / Rachel Levin (Pomona College)
- Behavioral sensitivity of *Dendrobates pumilo* to UV-B radiation / Lee Kats (Pepperdine University)
- Biogeography of *Atta cephalotes* / Scott Solomon (U. Texas)
- Brood parasitism by Cowbirds (Icteridae) on *Montezuma oropendola* / Emma Cunningham (Cambridge U., UK)
- Changes in resource acquisition by plants of different life forms as a function of their age and stature / John J. Ewel (USDA Forest Service, Institute of Pacific Islands Forestry, Honolulu, HI), Nalini Nadkarni (Evergreen State College) / Alexandra Reich (La Selva Biological Station, OTS)
- Comparative ecology of pioneers: Evidence for local variation in life history characteristics / James Dalling (U. Illinois, Urbana-Champaign) / Rachel Gallery (U. Illinois, Urbana-Champaign)
- Current and future carbon budgets for tropical rain forests: A cross-scale analysis / David Clark (U. Missouri, St. Louis), Deborah Clark (U. Missouri, St. Louis), Steven Oberbauer (Florida International U.) / Luitgard Schwendenmann (U. Goettingen, Germany), Ana Murillo (UNA)
- Demography and ecophysiology of regeneration of tropical rain forest trees / David Clark (U. Missouri, St. Louis), Deborah Clark (U. Missouri, St. Louis)
- Differential seedling survivorship: A search for community level patterns / Corine Vriesendorp (Michigan State U.)
- Dispersal of seeds of three commercial arboreal species, disseminated by vertebrates in fragmented forests in Sarapiquí / Harold Arias (CATIE), Gabriela Jones (CATIE)
- Dissimilatory nitrate reduction in tropical soils / Whendee Silver (U. California, Berkeley), Mary Firestone (U. California, Berkeley), John J. Ewel (USDA Forest Service, Institute of Pacific Islands Forestry, Honolulu, HI) / Alexandra Reich (La Selva Biological Station, OTS), Egbert Schwartz (U. Denver)



## La Selva Research – continued

- Distribution and abundance of vascular epiphytes in tropical wet forests: A multiscale approach / Catherine Cardelús (U. Connecticut) / Kathleen Engelmann (U. Connecticut), James Edward Watkins (U. Florida)
- Distribution of tropical plants in relation to edaphic heterogeneity: Use of indicator species in biodiversity inventories and land use planning / David Clark (U. Missouri, St. Louis), Hanna Tuomisto (U. Turku, Finland) / Mirkka Jones (U. Turku, Finland), Hugo Mantilla (OTS), Paulo Olivas (UCR)
- Diversity, abundance and mortality of lianas in a tropical wet forest / Walter Carson (U. Pittsburgh), Joseph Mascaro (U. Michigan)
- Do soil nutrients affect seedling shade tolerance? / Danielle Palow (Florida International U.)
- Duetting in tropical *Thryothorus* wrens / Daniel Mennill (Queen's U.) / Stéphanie Doucet (Queen's U.)
- Dynamics of regeneration in wet tropical forests: Establishing a baseline for long-term monitoring / Robin Chazdon (U. Connecticut), Deborah Lawrence (U. Virginia), Braulio Vilchez (ITCR) / Keya Chatterjee (U. Virginia), Jorge Armando Leiva (ITCR), Alvaro Redondo (ITCR), Tatiana Robles (UCR), Marlon Salazar (ITCR), Uzay Sezen (U. Connecticut), Tana Wood (U. Virginia)
- Ecological basis of sustainability in restructured tropical ecosystems / John J. Ewel (USDA Forest Service, Institute of Pacific Islands Forestry, Honolulu, HI) / Ricardo Bedoya Arrieta (ITCR), Karen Carney (Stanford U.), Angela Mata (ITCR), Jenny Pérez (La Selva Biological Station, OTS)
- Ecology and neurobiology of spatial memory in nectar feeding bats / York Winter (Erlangen U.) / Tobias Dittmann (Freelance), Jennifer Holzhaider (U. Munich, Germany), Andres Lebeftan (Freelance), Vladislav Natchev (Hartwick College), Thomas Pufe (U. Kiel, Germany), Katja Rex (U. Munich, Germany), Johannes Thiele (U. Munich, Germany)
- Ecology of arboreal herpetofauna and relationship to tropical forest organics / Matthew Williams (Auburn U.)
- Ecology of exclusive male parental care and polygyny in Tinamous / Patricia Brennan (Cornell U.) / Eva María Salas (UCR), Sergio Vargas (UCR), Federico Villalobos (UCR), Natalie Villalobos (UCR)
- Ecology of nectar-feeding bats / Otto von Helversen (Erlangen U.) / Katja Rex (U. Munich, Germany), Monika Schirutsche (U. Ulm, Germany), Marco Tschapka (U. Ulm, Germany)
- Ecophysiological leaf monitoring: Understory, natural disturbance and openings / Philip Rundel (UCLA), Arthur Gibson (UCLA) / Arielle Cooley (UCLA), Judy King (UCLA), Rasoul Sharifi (UCLA)
- Edge effect on lizards and amphibians / Eduardo Toral (UCR)
- Effects of deforestation and forest regeneration in hypocrean fungal diversity / Priscila Chaverri (Pennsylvania State University)
- Effects of herbivores on tropical tree diversity / Walter Carson (U. Pittsburgh)
- Effects of land use change on soil trace gas emissions / Michael Keller (USDA Forest Service)
- Effects of volcanic processes on tropical streams / Catherine Pringle (U. Georgia) / Marcelo Luis Ardón (U. Georgia), Paul Chmura (U. Georgia), Minor Hidalgo (La Selva Biological Station, OTS), Alonso Ramírez (U. Puerto Rico), Lindsay Stallcup (U. Georgia)
- Encyrtidae (Hymenoptera: Chalcidoidea) of Costa Rica / John Stuart Noyes (The Natural History Museum, London, UK.)
- Evolution of fish egg size in the Cichlidae / Ronald Coleman (California State U., Sacramento)
- Experimental forestry with native and exotic tree species / Eugenio González (OTS)
- Exploratory / Karen Garrett (Kansas State U.), Gregorio Osland (Butler U.)
- Factors affecting sex ratio in *Begonia* / John Cozza (U. Miami) /
- Fern gametophyte morphology / Chanda Riedel (Iowa State U.)
- Follicular lichens on real and plastic plant leaves: Investigating the mechanisms maintaining diversity in tropical rain forests / Robert Lücking (Field Museum of Chicago)
- Geographic patterns in rainforest tree architecture related to the environment / David King (U. Virginia)
- Habitat comparisons of mainland and island species of the frog genus *Eleutherodactylus*: A pilot study at La Selva Biological Field Station in Costa Rica / Shawn Vincent (Tulane U.)
- Herbivory of *Pentaclethra macroleoba* / Kasey Barton (U. Colorado)
- Herpetofauna monitoring on cacao plots / Andres Vega (UCR)
- Hitchhiker dynamics in *Atta* ants / Barret Klein (U. Arizona)
- Host and environmental controls on the arbuscular mycorrhizae symbiosis in tropical forests / Catherine Lovelock (Smithsonian Environmental Research Center), Deborah Clark, (U. Missouri, St. Louis), Sara Wright, (USDA, ARS) / Micah Lightfoot (U. Missouri, St. Louis)
- Host plant detection: Shifting sensory modalities / Janice Pereira (U. Arizona)
- Human impacts on the bird community of a lowland tropical rainforest: Long-term changes at Finca La Selva, Costa Rica / Bryan Sigel (Tulane U.)

## La Selva Research – continued

- Identifying the barriers to forest recovery in an abandoned pasture in Costa Rica / Genesis Humphrey (Duke U.)
- Impact of native trees on soil properties in the Atlantic lowlands / Ileana Moreira (ITCR), Elizabeth Arnaez (ITCR)
- Improved nursery production techniques for five native tree species / Kewyn Wightman (CATIE)
- Insect herbivory, community structure and diversity on the Cecropiaceae / Louis LaPierre (UCLA)
- Interpretation of the soil charcoal record, generation of phosphorus toposequence map and the investigation of microbial community patterns along the transect in Braulio Carrillo National Park / Robert Sanford (U. Denver) / Sneena Anderson (U. Denver), Melissa Hailey (U. Denver), William Longbrake (U. Denver), Ryan King (U. Denver), Thomas McGinnis (U. Denver), Beyhan Titiz (U. Denver), Natalie Villalobos (UCR), Cynthia Withington (U. Denver)
- Invasibility of model tropical ecosystems / Hina Kneubuhl
- Key to reptiles and amphibians of La Selva / Maureen Donnelly (Florida International U.), Craig Guyer (Auburn U.)
- La Selva digital florula database / David Morello (Freelance), Erik Nises (Freelance)
- Leaf litter decomposition and retention rates in two species of bromeliads (REU 02) / Alexandra Reich (La Selva Biological Station, OTS), Hector Maldonado (U. North Carolina)
- Leaf reflectance of tropical tree species / Benoit Rivard (U. Alberta, Canada) / Sheri Elizabeth Foley (U. Alberta, Canada)
- Local adaptation in the scale insect *Saissetia coffeae* (Homoptera: Coccidae) / Brian Spitzer (U. California, Davis) / Nathan Kurz
- Maintenance of bird populations in forest fragments associated with banana plantations / Robert Matlock (La Selva Biological Station, OTS) / Angela Mata (ITCR), Ana Margarita Horta (U. Nacional de Tucumán)
- Mathematical modeling of the *Piper cenocladium* system (REU 02) / Robert Matlock (La Selva Biological Station, OTS), Toby Gershon (University of Maryland at College Park), Sari Hopson (U. North Carolina)
- Mating behavior and ponds selection of Costa Rican tree frogs / Erik Melchiorre (De Pauw U.), Becky Talyn (Denison U.)
- Mechanical defense and locomotor tradeoffs in beetles / Brendan Borrell (U. Texas) / Allison Borrell (U. California, Santa Barbara), Yuval Avnur (Freelance)
- Microbial ecology research / Karen Adair (U. Denver)
- Mixed plantations of native trees for the rehabilitation of disturbed habitats / Florencia Montagnini (CATIE)
- Modeling the consequences of heterogeneous light environments for seedling performance in tropical wet forest / Rebecca Montgomery (U. Connecticut)
- Monitoring amphibian populations in the La Selva - Braulio Carrillo biological corridor / Mahmood Sasa (UCR) / Marco Barquero (UCR), Randall Valverde (UCR)
- Monitoring countryside biogeography of Costa Rica birds / Gretcher Daily (Stanford U.), Paul Ehrlich (Stanford, U.) / James Zook (Freelance)
- Morphology & physiology of terrestrial and hemi-epiphytic plants (REU 02) / Philip Rundel (UCLA), Chadette Pfaff (U. New Mexico)
- Natural history of Odonata (ALAS) / Lisa Swihart (Evergreen State College)
- Naturally occurring parasitoid levels in tropical banana agroecosystems / Darya Chehrezad (San Jose State University, California), Robert Matlock (La Selva Biological Station, OTS) / Amanda Johnson (U. California, Davis)
- Nematode-destroying fungi of Costa Rica / R. Greg Thorn (U. Western Ontario, Canada), Hans-Borje Jansson (Lund U., Sweden)
- Neotropical hybrid zone stability & formation / Michael Blum (Duke U.)
- Neurophysiological investigations of olfaction in Euglossine bees / Charlotte Skov (U. Florida)
- Paleoecology and land use history of La Selva / Robert Sanford (U. Denver)
- Patterns of seed survival and seedling recruitment of three palm species (REU 02) / Ana Cristina Villegas (U. Missouri, St. Louis), Laura Young (U. Texas)
- Piper* ant plants and trophic cascades / Lee Dyer (Tulane U.), Deborah Letourneau (U. California, Santa Cruz) / Russell Terrance Fong (U. California, Santa Cruz), Jennifer Redfean (Wellesley College), Angela Smilanich (Mesa State College)
- Population response of insect herbivores and pathogens to native tree plantations / Elizabeth Braker (Occidental College) / Marcela Arguedas (ITCR)
- Recruitment limitation, resource-based niches and the maintenance of tropical tree diversity / Richard Kobe (Michigan State U.) / Meera Iyer (Michigan State U.)
- Reproductive cycle of *Phrynus parvulus* (Arachnidos Amblypygida) / Barthold Bouricius (Selby Botanical Garden)
- Reproductive division of labor in ponerine ants / Bruno Gobin (Katholieke Universiteit Leuven, Belgium), Johan Billen (Katholieke Universiteit Leuven, Belgium) / Christine Johnson (Katholieke Universiteit Leuven, Belgium), Els Lommelen (Katholieke Universiteit Leuven, Belgium),

## La Selva Research – continued

- Reproductive success in the bat *Saccopteryx bilineata* / Christian Voigt (Institute for Zoo and Wildlife Research, Germany) / Sonja Meister (Erlangen U., Germany), Annegret Brunner (Erlangen U., Germany)
- Reproductive success of tropical trees in small forest fragments: Analysis of gene flow, fruit set and inbreeding depression / Catherine Woodward (U. Wisconsin)
- Rolled leaf hispine beetle ecology / Duane D. McKenna (Harvard U.)
- Roosting ecology of bats / Detlev Kelm (Erlangen U., Germany) / Kirsten Jung (Erlangen U., Germany), Volker Kelm (Erlangen U., Germany)
- Seedling ecology of rare tree species / Carol Augspurger (U. Illinois, Urbana Champaign) / Yung-Ho (Ophelia) Wang (U. Illinois, Urbana Champaign)
- Self-organization of raid behavior in the army ant *Eciton burchelli* / Tim Brown (U. Utah)
- Silica formation in trees / Bianca Mollendorf (U. Hamburg, Germany), Schmitt Uwe (U. Hamburg, Germany)/
- Soil pathogens of understory seedlings / Jennifer Koslow (U. Indiana)
- Spider influence on levels of the *Piper urostachym* (REU 02) / Elizabeth Ahlstrom (Brigham Young University), Karin Gastreich (OTS)
- Statistical properties of large manual monitoring protocols / John P. Hayes (Oregon State U.)
- Storage proteins in wasps of *Polistes* genus / James Hunt (U. Missouri, St. Louis)
- Streamflow measurements in two tropical rainforest watersheds / David Genereux (North Carolina State U.) / David Carbonell (North Carolina State U.)
- Study on the flight-height of insectivorous bats / Ulrich Marckmann (Erlangen U., Germany)
- Study of phorid flies parasitoids of *Paraponera clavata* ants / Michelle Lefebvre (U. Utah)
- Systematics and ecology of tropical bryophytes and lichens / Andrea Lücking (UCR)
- Systematics of *Piper* and *Peperomia* / Chris Davidson (Botanical Research Foundation of Idaho)
- Taxonomy and morphology of the tribe Prockieae (Flacourtiaceae) / Mac Alford (Cornell U.)
- Testing the green-desert hypothesis: Bottom-up herbivore regulation of *Piper cenocladum* amides (REU 02) / Lee Dyer (Tulane U.), Angel Hsu (Wake Forest University)
- Testing the intermediate disturbance hypothesis / Chris Hauser (U. Illinois) / Jennifer Hauser (U. Illinois)
- The behavior and ecology of *Azteca pittieri* (Hymenoptera: Formicidae) on *Cordia alliodora* (Boraginaceae) / Chadwick Tillberg (U. Colorado) / Steven Cooper (U. Colorado), Kimberly Goetz (U. Colorado), Shilo White (U. Colorado), Morgan Smith (U. Colorado)
- The effects of leaf chemistry on consumer preferences / Catherine Pringle (U. Georgia), Kelly Maynard (Yale U.)
- The effects of pesticides on Costa Rican stream ecology / Kerstin Gustafsson (Stockholm U., Sweden), Peter Plantman (Stockholm U., Sweden), Gunnar Swahn (Stockholm U., Sweden), Lina Wendt (Lund U., Sweden)
- The effects of seasonality on secondary seed dispersal, germination and recruitment of three species of palms at La Selva / Evan Notman (OTS), Ana Cristina Villegas (U. Missouri, St. Louis) / Lisa Patrick (Barnard College)
- The effects of seed predator exclusion on seedling abundance, distribution, and composition: An assessment of the Connell-Janzen hypothesis / Anthony Baumert (U. Pittsburgh)
- The evolution of reproductive isolation in hummingbird-pollinated *Costus* / Kathleen Kay (Michigan State U.)
- The joint influences of climate, litter quality and soil fauna in regulating above- and below-ground position processes: A pan-tropical study / Rebecca Montgomery (U. Connecticut), Jennifer Powers (SUNY, Stony Brook)
- The role of secondary chemistry in seedling mortality / Kasey Barton (U. Colorado)
- Tree fall direction in La Selva / Ernesto Camelo de Castro (Arizona State U.)
- Dipteryx panamensis* tree seedlings / Deedra McClearn (OTS)
- Tree seedling dynamics in primary lowland rain forest / Diana Lieberman (U. North Dakota), Milton Lieberman (U. North Dakota) / Johnny Serrano (UNA)
- Tree species effects on soil microbial communities and soil properties / Deborah Lawrence (U. Virginia), Keya Chatterjee (U. Virginia)
- Variability of solar irradiation / Arturo Sánchez (U. Alberta, Canada) / Patrick Van Laake (U. Alberta, Canada)
- Vertical distribution of Genópteros and its relation to environmental variables in the forest / Hugo Mantilla (OTS)
- Vocalizations in *Dendrobates pumilio* / Maureen Donnelly (Florida International U.), Kirsten Hines (Florida International U.) / Ralph Saporito (Erlangen U.)
- Wellesley internship program / Lois Wasserspring (Wellesley College), Amy Capman (Wellesley College)

# Development

## Annual Fund

The Annual Fund totaled \$268,000 in unrestricted revenues in fiscal year 2002.

Gifts to the Annual Fund are especially important to the overall health of the organization, as they support on-going operations.

## Restricted Grants and Contracts

The following grants and contracts were awarded to OTS in fiscal year 2002:

<b>Funding Source</b>	<b>Purpose</b>	<b>Amount</b>
Andrew W. Mellon Foundation	Matching Endowment	\$250,000
Andrew W. Mellon Foundation	Graduate Education	\$900,000
Andrew W. Mellon Foundation	Planning Grant for South Africa Undergraduate Program	\$295,000
Andrew W. Mellon Foundation	Matching Endowment	\$506,965
Andrew W. Mellon Foundation	Operating Reserve Fund	\$300,000
AVINA Foundation	Tempisque River Watershed Project	\$308,531
Christensen Fund	Endowment	\$506,965
CR-USA Foundation	Integrated Management of Tempisque River Basin Project	\$220,821
John D. & Catherine T. MacArthur Foundation	Capital Campaign Expenses	\$50,000
National Science Foundation	Minority Scholars Program	\$57,526
National Science Foundation	La Selva General Operations	\$2,450,000
National Science Foundation	Research Experience for Undergraduates	\$252,000
National Science Foundation	Research Experience for Undergraduates Supplement	\$6,480
Oak Foundation	Coastal Ecosystems Course in Mexico	\$180,543
Stanley Smith Horticultural Trust	Greenhouse Improvements at Wilson Botanical Garden	\$20,000
Tinker Foundation	Wildlands Management Manual	\$50,000
Tinker Foundation	Capital Campaign Expenses	\$50,000
U.S. Fish and Wildlife Service	Wildlands Management Manual	\$5,000
U.S. Fish and Wildlife Service	Environmental Science and Policy Courses	\$52,000
World Wildlife Fund U.S.	Meso-American Biological Corridor Seminars	\$87,530
Cleveland Zoological Society	Cordillera Azul Buffer Zone, Peru	\$10,000
		<b>\$6,559,362</b>

## Donors

A special thank you to the following individuals, foundations, corporations and government agencies for their support in fiscal year 2002. It is only through this support that OTS can continue to provide leadership in education, research and the responsible use of natural resources in the tropics.

In addition, many thanks to our friends for the various forms of in-kind support given to the organization. These gifts included equipment, books, periodicals, research equipment and services. A special thank you to members of our Board of Directors, Assembly of Delegates and Board of Visitors for their generous gifts of time and expertise and for absorbing many costs associated with their involvement in OTS.

**GRAND SPONSORS (\$100,000+)**

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 George and Veneva Alcock  
 Robert and Taimi Anderson  
 BBC  
 Edward W. Beals  
 George and Susan Beischer  
 Christine R. Boake  
 Michael Breed and Cheryl Ristig  
 C. Ronald Carroll  
 Joel E. Cohen  
 Thomas R. Davis and Elyn Bush  
 Marion M. Eggertsen  
 Richard F. Fisher  
 Barker and Cavett French  
 Albert S. Gates  
 Jonathan Giles and Karen Steinour  
 S. Malcolm and Elizabeth Gillis  
 Robert M. Goodman  
 Alice S. Graefe  
 Devon L. Graham  
 David E. Grambort and  
 Julia Grambort  
 James and Karen Hamrick  
 Hopkins Design Group  
 Samuel C. Jones  
 Dale and Davida Kalina  
 William E. Kemp  
 Kids for Saving Earth  
 Julie Lindholm  
 Bert and Margaret McIntosh  
 Katharine McLeod and  
 Bryan Chappell  
 Mobil Matching Gifts  
 Peter K. Nelson  
 Dan and Alice Nicolson  
 Heidi Nitze  
 Gordon and Elizabeth Orians  
 Ronald H. Petersen  
 Thomas C. Peterson  
 Laurence and Janet Phelps  
 Tamra E. Raven  
 Marilyn and Robert Reeves  
 James E. Rodman  
 Norman and Alice Rubash  
 Ann C. Stephens

**PATRON (\$500+) – continued**

Peter F. Stevens  
 A. Richard Stoltenberg  
 Donald and Beverly Stone  
 Virginia and Riley Willcox  
 Edward O. Wilson  
 Robert W. Winters  
 Frank G. Witebsky  
 Alvin Y. Yoshinaga  
 Christian and Verna Young  
 Peggy Young

**SUSTAINERS (\$250+)**

James Ackerman and  
 Elvia Melendez-Ackerman  
 Richard and Diana Allan  
 Marilyn Anderson  
 Robin M. Andrews  
 Robert and Karen Arras  
 ARTE French German TV  
 Carol K. Augspurger  
 Michael S. Beamer  
 Jean-Louise Beard  
 Barbara L. Bentley  
 Shirley M. Billings  
 Bob Bledsoe  
 Blue Heron Films  
 Gary Bricker  
 Janalee P. Caldwell and  
 Laurie J. Vitt  
 Paul J. Campanella, II  
 John H. Carothers  
 Mary E. Case  
 Peter C. Chabora and  
 H. Roberta Koepfer  
 Kelly Chapman  
 Christina Cheatham and  
 Matt Alfermann  
 David and Deborah Clark  
 Roland C. Clement  
 Charlotte M. Cogswell  
 Martha A. Condon  
 Ida Cortés de Gamboa and  
 Luis Gamboa  
 Joel L. Cracraft  
 Peter S. Curtis and  
 Allison A Snow  
 Lorraine J. D'Angelo

Bill and Kathleen DeWalt  
 Carol A. Dolinskas  
 Eli Lilly & Company Matching Gifts  
 W. Hardy and Barbara Eshbaugh  
 John and Katherine Ewel  
 James Eyster  
 John E. Fauth  
 Jonathan Fink  
 Benjamin A. Foote  
 Daniel and Gretchen Funk  
 Phyllis R. Gertis  
 Richard H. Goodwin  
 Alan Graham  
 Nancy Greig  
 Lisa H. Hammer  
 Kent G. Harbison  
 Willard and Mary Hartman  
 C. Thomas and Jill Hendrickson  
 John Hinde  
 Walter and Barbara Hodge  
 Hornocker Wildlife Institute  
 Frank T. Hovore  
 Anne Hubbard  
 James H. Hunt  
 IBM Matching Gifts  
 David P. Janos  
 Elysaebeth Kleinhans  
 Lyla and Clark Lampson  
 Gertrude Lange  
 Ann Langford  
 Richard and Carol Laursen  
 Jim Lee  
 Egbert and Elizabeth Leigh  
 Alan Levine  
 Joseph Levine  
 Susan and Lawrence Libsch  
 Bette Loiselle and John Blake  
 Mark and Rebecca Lystig  
 Oscar Madrigal  
 Ann Marie Langford  
 Robert B. Matlock  
 Meredith McBurney  
 Rogers McVaugh  
 Gary K. Meffe  
 Elizabeth Mills and Rusty Kuntze  
 Peter and Alice Murphy

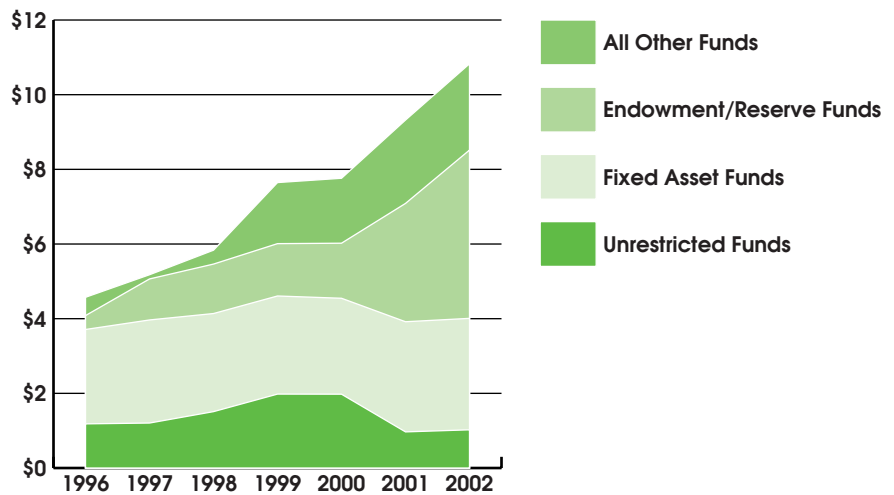
Margaret Murray and Jim Genis  
 Hashida Nanako  
 David and Tamar Nicolson  
 Alan Nunns and Alice Rogan  
 Steve Oberbauer and  
 Maureen Donnelly  
 John W. Pankhurst  
 Louis and Sandra Pitelka  
 Popular Arts Entertainment  
 F. Harvey Pough  
 Anne Pratt  
 Laurel R. Prevetti  
 Vincent A. Puglisi  
 Quatre Vents Foundation  
 Ann and Anis Racy  
 Marina Ramírez de Steinorth  
 David and Ellen Rich  
 Robert E. Ricklefs and  
 Susanne S. Renner  
 Rudy L. Ruggles, Jr.  
 John R. Sauer  
 David Schubert  
 Maggie R. Shane  
 Theodore H. Shear and  
 Francine Durso  
 Lester L. Short  
 Constantine and  
 Anne Sidamon-Eristoff  
 Rodolfo and Margaret Silva  
 Harriet J. Smith  
 Robert and Florence Spurney  
 Charles D. Stanberry and  
 Helene J. Dublisky  
 David Stebbing  
 Marc Tatar  
 Louise Thomas  
 Russell E. Train  
 E. Douglas and Elizabeth L. Waits  
 Peter J. Watkins  
 Jeff and Missy Wert  
 Nathaniel T. Wheelwright  
 Keith Willcock  
 Richard and Catherine Williams  
 G. Bruce Williamson  
 Don and Kathleen Wilson  
 David and Phyllis Wise  
 Donald E. Wiseman

## Finances

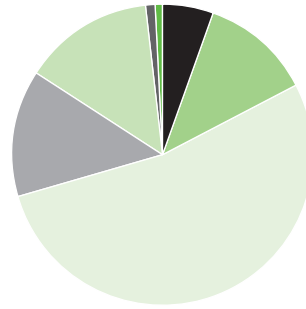
The accompanying chart summarizes the financial condition of OTS for Fiscal Years 1996-2002. (ESINTRO, our for-profit subsidiary in Costa Rica created to handle sales and related taxable items, is not included in the graph, but its inclusion would not make a material difference.) This graph shows changes in net assets, which means assets minus liabilities, or net worth.

The most obvious change over these years is the increase in total net assets, from four and a half million dollars to nearly eleven million. The top band in the chart, *all other funds*, reflects an increase in grants received for OTS programs. The next band, *endowment/reserve funds*, increased more than 10-fold in this period. Our growing endowment provides financial stability for the years ahead. The third band, *fixed asset funds*, shows OTS resources in buildings, vehicles, and equipment. The bottom band, *other unrestricted funds*, indicates resources available for operating costs, other than depreciation expense, that are not covered by restricted funds. The largest financial challenge now facing OTS is to strengthen our unrestricted operating funds by holding down expenses, increasing earned revenues, and seeking additional unrestricted contributions.

### Net Assets by Fund (in millions)

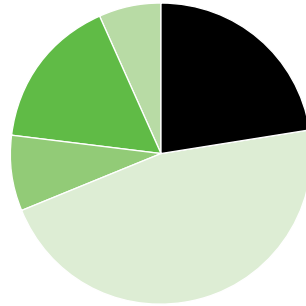


### Support and Revenue



- Other — 68,754
- Investment Return — 89,155
- Tuition and Fees — 1,222,189
- Facilities Fees — 1,185,974
- Contributions — 4,625,917
- Grants, contracts and similar agreements — 1,034,676
- Membership Dues — 475,114

### Expenses



- Fundraising — 431,801
- Management and General — 1,056,812
- Facilitated Research — 523,905
- Educational Programs — 2,992,299
- Field Stations — 1,452,010



**ORGANIZATION FOR TROPICAL STUDIES, INC. AND SUBSIDIARY**

Consolidated Financial Statements

June 30, 2002

(With Independent Auditors' Report Thereon)

## Independent Auditors' Report

The Board of Directors  
Organization for Tropical Studies, Inc.:

We have audited the accompanying consolidated statement of financial position of the Organization for Tropical Studies, Inc. and subsidiary (the Organization) as of June 30, 2002, and the related consolidated statements of activities and cash flows for the year then ended. These consolidated financial statements are the responsibility of the Organization's management. Our responsibility is to express an opinion on these consolidated financial statements based on our audit. The prior year summarized comparative information has been derived from the Organization's 2001 consolidated financial statements and, in our report dated December 14, 2001, we expressed an unqualified opinion on those financial statements.

We conducted our audit in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audit provides a reasonable basis for our opinion.

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Organization for Tropical Studies, Inc. and subsidiary as of June 30, 2002 and the changes in its net assets and its cash flows for the year then ended in conformity with accounting principles generally accepted in the United States of America.

A rectangular box containing the handwritten text "KPMG LLP" in black ink.

October 11, 2002

**ORGANIZATION FOR TROPICAL STUDIES, INC. AND SUBSIDIARY**

Consolidated Statement of Financial Position

June 30, 2002

(with comparative financial information as of June 30, 2001)

<b>Assets</b>	<b>Supplementary Information</b>			
	<b>Organization for Tropical Studies, Inc.</b>	<b>ESINTRO</b>	<b>2002 Total</b>	<b>2001 Total</b>
Cash and cash equivalents (note 3)	\$ 1,832,925	78,451	1,911,376	591,437
Accounts receivable, less allowance for doubtful accounts of \$29,245 in 2002 and \$149,236 in 2001 (note 6)	195,176	22,565	217,741	522,684
Grants and contributions receivable, net (notes 9 and 10)	1,048,408	—	1,048,408	279,731
Investments (note 3)	5,557,453	—	5,557,453	5,468,183
Land, buildings and equipment, net (note 4)	2,985,017	14,822	2,999,839	2,948,912
Other assets	180,414	35,050	215,464	186,956
<b>Total assets</b>	<b>\$ 11,799,393</b>	<b>150,888</b>	<b>11,950,281</b>	<b>9,997,903</b>
<b>Liabilities and Net Assets</b>				
Liabilities:				
Accounts payable	85,046	6,105	91,151	126,152
Other liabilities	397,312	26,147	423,459	517,696
Accumulated postretirement benefit liability (note 8)	158,721	—	158,721	143,747
<b>Total liabilities</b>	<b>641,079</b>	<b>32,252</b>	<b>673,331</b>	<b>787,595</b>
Net assets:				
Unrestricted (notes 5 and 7)	4,153,869	118,636	4,272,505	4,552,233
Temporarily restricted (note 5)	3,139,508	—	3,139,508	2,355,458
Permanently restricted (note 5)	3,864,937	—	3,864,937	2,302,617
<b>Total net assets</b>	<b>11,158,314</b>	<b>118,636</b>	<b>11,276,950</b>	<b>9,210,308</b>
Contingencies (note 7)				
<b>Total liabilities and net assets</b>	<b>\$ 11,799,393</b>	<b>150,888</b>	<b>11,950,281</b>	<b>9,997,903</b>

See accompanying notes to consolidated financial statements.

**ORGANIZATION FOR TROPICAL STUDIES, INC. AND SUBSIDIARY**

Consolidated Statement of Activities

Year ended June 30, 2002

(with summarized financial information for the year ended June 30, 2001)

	<u>Supplementary Information</u>					
	<u>Organization for Tropical Studies, Inc. Unrestricted</u>	<u>ESINTRO Unrestricted</u>	<u>Total Unrestricted</u>	<u>Temporarily Restricted</u>	<u>Permanently Restricted</u>	<u>2001 Total</u>
Revenues and other support:						
Operating revenues:						
Memberships dues	\$ 475,114	—	475,114	—	—	454,114
Grants, contracts and similar agreements (note 6)	1,034,676	—	1,034,676	—	—	994,608
Contributions	571,845	—	571,845	2,491,752	1,562,320	3,279,828
Facilities fees	723,605	462,369	1,185,974	—	—	1,255,734
Tuition and fees	1,222,189	—	1,222,189	—	—	1,171,184
Investment income	33,990	—	33,990	236,847	—	377,001
Unrealized loss on investments	(32,064)	—	(32,064)	(327,928)	—	(170,547)
Contributed services and facilities (note 6)	46,700	—	46,700	—	—	47,000
Other	22,054	—	22,054	—	—	117,218
Total operating revenues	4,098,109	462,369	4,560,478	2,400,671	1,562,320	7,526,140
Net assets released from restrictions (note 5)	1,616,621	—	1,616,621	(1,616,621)	—	—
Total revenues and other support	5,714,730	462,369	6,177,099	784,050	1,562,320	7,526,140
Expenses (note 6):						
Program expenses:						
Field stations	963,403	488,607	1,452,010	—	—	1,747,371
Educational programs	2,992,299	—	2,992,299	—	—	1,950,375
Facilitated research	523,905	—	523,905	—	—	562,594
Total program expenses	4,479,607	488,607	4,968,214	—	—	4,260,340
Management and general Fundraising	1,056,812	—	1,056,812	—	—	1,236,991
	431,801	—	431,801	—	—	459,856
Total management, general and fundraising expenses	1,488,613	—	1,488,613	—	—	1,696,847
Total expenses	5,968,220	488,607	6,456,827	—	—	5,957,187
Change in net assets	(253,490)	(26,238)	(279,728)	784,050	1,562,320	1,568,953
Net assets at beginning of year	4,407,359	144,874	4,552,233	2,355,458	2,302,617	7,641,355
Net assets at end of year	\$ 4,153,869	118,636	4,272,505	3,139,508	3,864,937	9,210,308

See accompanying notes to consolidated financial statements.

**ORGANIZATION FOR TROPICAL STUDIES, INC. AND SUBSIDIARY**

Consolidated Statement of Cash Flows

Year ended June 30, 2002

(with comparative financial information for the year ended June 30, 2001)

	<u>Supplementary Information</u>			
	<b>Organization</b>			
	<b>for Tropical</b>			
	<b>Studies, Inc.</b>			
	<b>ESINTRO</b>	<b>2002 Total</b>	<b>2001 Total</b>	
Cash flows from operating activities:				
Change in net assets	\$ 2,092,880	(26,238)	2,066,642	1,568,953
Adjustments to reconcile change in net assets to net cash provided by operating activities:				
Depreciation on property and equipment	311,809	1,112	312,921	287,502
Gain on sale of property and equipment	(19,361)	—	(19,361)	(65,400)
Decrease in accounts receivable	289,716	15,227	304,943	(223,939)
Increase in grants and contributions receivable	(768,677)	—	(768,677)	(134,824)
(Increase) decrease in other assets	(75,771)	47,263	(28,508)	(102,535)
(Decrease) increase in accounts payable and other liabilities	(134,223)	4,985	(129,238)	61,139
(Increase) decrease in accumulated postretirement benefit liability	14,974	—	14,974	13,761
Contributions restricted for permanent endowments	(1,412,320)	—	(1,412,320)	(1,353,430)
Unrealized loss on investments	359,992	—	359,992	170,547
Net cash provided by operating activities	<u>659,019</u>	<u>42,349</u>	<u>701,368</u>	<u>221,774</u>
Cash flows from investing activities:				
Purchases of property and equipment	(361,620)	(3,678)	(365,298)	(687,944)
Proceeds from sales of property and equipment	20,811	—	20,811	93,306
Purchases of investments	(2,313,178)	—	(2,313,178)	(2,379,100)
Net proceeds from sales of investments	1,863,916	—	1,863,916	466,224
Net cash used by investing activities	<u>(790,071)</u>	<u>(3,678)</u>	<u>(793,749)</u>	<u>(2,507,514)</u>
Cash flows from financing activities:				
Contributions restricted for permanent endowments	1,412,320	—	1,412,320	1,353,430
Net cash provided by financing activities	<u>1,412,320</u>	<u>—</u>	<u>1,412,320</u>	<u>1,353,430</u>
Increase (decrease) in cash and cash equivalents	1,281,268	38,671	1,319,939	(932,310)
Cash and cash equivalents at beginning of year	551,657	39,780	591,437	1,523,747
Cash and cash equivalents at end of year	\$ <u>1,832,925</u>	<u>78,451</u>	<u>1,911,376</u>	<u>591,437</u>

Supplemental schedule of noncash operating activities:

The Organization receives certain services such as general administrative support and the use of facilities as a contribution. The market value associated with this contribution is estimated at \$46,700 and \$47,000 for the years ended June 30, 2002 and 2001, respectively.

See accompanying notes to consolidated financial statements.

# ORGANIZATION FOR TROPICAL STUDIES, INC. AND SUBSIDIARY

## Notes to Consolidated Financial Statements

June 30, 2002

(with comparative financial information for the year ended June 30, 2001)

### (1) Organization

The Organization for Tropical Studies, Inc. (the Organization) is chartered as a nonprofit corporation under the laws of the State of North Carolina for the purpose of furthering education and research in tropical sciences, and is supported by a consortium of institutions of higher education located in North, Central and South America, Australia and South Africa. The Organization maintains its general office in Durham, North Carolina on the campus of Duke University, an administrative office in San Jose, Costa Rica, and three field stations in Costa Rica (La Selva, Las Cruces and Palo Verde) for instructional and research purposes.

Funding of the Organization is provided principally by dues from the member institutions, field stations and vehicle rental charges, tuition and fee charges for courses offered by the Organization, grants from the National Science Foundation and various private foundations, and private gifts. The Organization is dependent on the grants and private gifts to continue operating.

Included in the consolidated financial statements of the Organization is *Estudios E Investigaciones Tropicales S.A.* (ESINTRO), a for-profit subsidiary of the Organization. ESINTRO was incorporated for sales made to field station visitors of food, lodging, clothing, beverages, and other miscellaneous items. The Organization is the sole stockholder of ESINTRO.

The Organization is exempt from Federal income taxes under Section 501(c)(3) of the Internal Revenue Code. ESINTRO is subject to income tax in Costa Rica. The ESINTRO operations for the current year indicate a net loss. Accordingly, there was no provision for income tax.

A summary of the financial data applicable to the operations in Costa Rica compared to total operations as included in the consolidated financial statements as of and for the years ended June 30, 2002 and 2001 is as follows:

	2002		2001	
	Costa Rican Operations	Total Operations	Costa Rican Operations	Total Operations
Total assets	\$ 3,547,900	11,950,281	3,300,783	9,997,903
Total liabilities	199,309	673,331	183,677	787,595
Total revenue and other support	2,961,161	8,523,469	2,592,334	7,526,140
Total expenses	5,390,664	6,456,827	4,645,865	5,957,187

## ORGANIZATION FOR TROPICAL STUDIES, INC. AND SUBSIDIARY

### Notes to Consolidated Financial Statements

June 30, 2002

(with comparative financial information for the year ended June 30, 2001)

#### (2) Summary of Significant Accounting Policies

The consolidated financial statements of the Organization have been prepared on the accrual basis of accounting. The significant accounting policies followed are described below to enhance the usefulness of the consolidated financial statements to the reader.

(a) *Principles of Consolidation*

All significant intercompany balances and transactions have been eliminated in consolidation.

(b) *Cash and Cash Equivalents*

The Organization considers all investments with original maturities of less than 90 days to be cash equivalents.

(c) *Allowance for Doubtful Accounts*

The allowance for doubtful accounts represents management's estimate of potentially uncollectible accounts receivable.

(d) *Investments*

Investments in equity securities and debt securities are reported at fair value with unrealized gains and losses reported in the statement of activities. Investment income includes realized gains and losses on investments, interest and dividends.

(e) *Land, Buildings and Equipment*

Land, buildings and equipment are stated at cost at date of acquisition or fair value at date of donation in the case of gifts. Depreciation of buildings and equipment is provided over the estimated useful lives of the respective assets on the straight-line basis.

(f) *Net Assets and Contributions*

Net assets and revenues, expenses, gains and losses are classified based on the existence or absence of donor-imposed restrictions. Accordingly, net assets of the Organization are classified and reported as follows:

**Permanently restricted** – Net assets subject to donor-imposed stipulations that they be maintained permanently by the Organization. Generally, the donors of these assets permit the Organization to use all or part of the income earned on related investments for general or specific purposes.

**Temporarily restricted** – Net assets subject to donor-imposed stipulations that may or will be met either by actions of the Organization and/or the passage of time.

**Unrestricted** – Net assets that are not subject to donor-imposed stipulations.

## **ORGANIZATION FOR TROPICAL STUDIES, INC. AND SUBSIDIARY**

### Notes to Consolidated Financial Statements

June 30, 2002

(with comparative financial information for the year ended June 30, 2001)

Revenues are reported as increases in unrestricted net assets unless use of the related asset is limited by donor-imposed restrictions. Expenses are reported as decreases in unrestricted net assets. Gains and losses on investments are reported as increases or decreases in unrestricted net assets unless their use is restricted by explicit donor stipulations or by law. Expirations of temporary restrictions on net assets (i.e., the donor-stipulated purpose has been fulfilled and/or the stipulated time period has elapsed) are reported as reclassifications from temporarily restricted net assets to unrestricted net assets.

Contributions, including unconditional promises to give, are recognized as revenues in the period received. Conditional promises to give are not recognized until the conditions on which they depend are substantially met. Contributions of assets other than cash are recorded at their estimated fair value at the date of gift. Contributions to be received after one year are discounted at a rate commensurate with the risk involved. Amortization of the discount is recorded as additional contribution revenue in accordance with donor-imposed restrictions, if any, on the contributions. Allowance is made for uncollectible contributions based upon management's judgment and analysis of the creditworthiness of the donors, past collection experience and other relevant factors.

**(g) *Translation of Foreign Currencies***

Assets and liabilities denominated in Costa Rican colones (all monetary items) are translated into U.S. dollars at the rate prevailing at the balance sheet date of 346.68 and 329.07 colones as of June 30, 2002 and 2001, respectively, to the U.S. dollar. Transactions in colones have been translated into U.S. dollars at rates prevailing at the transaction dates. Such rates ranged from 320.51 to 371.75 and 305.00 to 329.07 colones to the U.S. dollar during fiscal years 2002 and 2001, respectively. The translation of foreign currencies resulted in a gain of \$4,322 and \$209 for fiscal years 2002 and 2001, respectively, which are included in the accompanying consolidated statement of activities.

**(h) *Functional Allocation of Expenses***

The costs of providing the various programs and other activities of the Organization have been summarized on a functional basis in the statement of activities. Accordingly, certain costs have been allocated among the programs and supporting services benefited.

**(i) *Use of Estimates***

The preparation of consolidated financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and judgments that affect the reported amounts of assets and liabilities and disclosures of contingencies at the date of the consolidated financial statements and revenues and expenses recognized during the reporting period. Actual results could differ from those estimates.



**ORGANIZATION FOR TROPICAL STUDIES, INC. AND SUBSIDIARY**

Notes to Consolidated Financial Statements

June 30, 2002

(with comparative financial information for the year ended June 30, 2001)

**(j) Comparative Amounts**

The consolidated financial statements include certain prior-year summarized comparative information in total but not by net asset class. Such information does not include sufficient detail to constitute a presentation in conformity with accounting principles generally accepted in the United States of America. Accordingly, such information should be read in conjunction with the Organization's consolidated financial statements for the year ended June 30, 2001, from which the comparative information was derived.

**(k) Reclassifications**

Certain reclassifications have been made to the 2001 summarized comparative information to conform with the 2002 presentation. These reclassifications had no effect on the change in net assets or total net assets as previously reported.

**(3) Investments**

Temporary investments of \$1,282,848 and \$37,429 which are included in cash and cash equivalents at June 30, 2002 and 2001, respectively, were invested in money market accounts, earning interest at 1.75% and 4.12% at June 30, 2002 and 2001, respectively.

Investments at June 30, 2002 and 2001 consist of the following:

	<u>2002</u>	<u>2001</u>
Stocks	\$ —	5,333
Bonds	—	1,514,767
Mutual funds:		
Common stocks	3,134,833	2,462,278
Corporate bonds	2,422,620	1,485,805
	<u>\$ 5,557,453</u>	<u>5,468,183</u>

**ORGANIZATION FOR TROPICAL STUDIES, INC. AND SUBSIDIARY**

Notes to Consolidated Financial Statements

June 30, 2002

(with comparative financial information for the year ended June 30, 2001)

**(4) Land, Buildings and Equipment**

Land, buildings and equipment are summarized at June 30, 2002 and 2001 as follows:

	<u>2002</u>	<u>2001</u>
Land	\$ 786,028	786,028
Land improvements	450,911	448,528
Buildings and improvements	2,904,818	2,689,306
Motor vehicles	437,112	486,112
Equipment	1,587,935	1,499,088
Furniture and furnishings	38,575	14,398
Construction-in-progress	13,237	64,272
	<u>6,218,616</u>	<u>5,987,732</u>
Less accumulated depreciation	<u>(3,218,777)</u>	<u>(3,038,820)</u>
	<u>\$ 2,999,839</u>	<u>2,948,912</u>

**(5) Net Assets**

The Organization has designated certain net assets classified as unrestricted for specific purposes or uses. As a result, substantially all of the net assets classified on the consolidated statement of financial position as unrestricted net assets at June 30, 2002 and 2001 have been invested in property and equipment or are designated for specific uses.

Unrestricted net assets consist of the following at June 30, 2002 and 2001:

	<u>2002</u>	<u>2001</u>
Net investment in property and equipment	\$ 2,999,839	2,948,912
Funds designated by governing board:		
Estimated severance pay	195,038	206,062
Asset renewal	307,949	610,824
Organizational support	675,201	543,451
Unrestricted and undesignated	94,478	242,984
	<u>\$ 4,272,505</u>	<u>4,552,233</u>

## ORGANIZATION FOR TROPICAL STUDIES, INC. AND SUBSIDIARY

### Notes to Consolidated Financial Statements

June 30, 2002

(with comparative financial information for the year ended June 30, 2001)

Temporarily restricted net assets consist of the following at June 30, 2002 and 2001:

	<u>2002</u>	<u>2001</u>
Term endowment funds to be used for fellowships	\$ 13,632	97,598
Contributions for station improvements and land acquisition	280,919	273,947
Educational programs	<u>2,844,957</u>	<u>1,983,913</u>
	<u>\$ 3,139,508</u>	<u>2,355,458</u>

Net assets were released from donor restrictions by incurring expenses satisfying the restricted purposes or by the passage of time. Purpose restrictions were accomplished by incurring \$1,616,621 in expenses for fellowships, station improvements, land acquisition and educational programs in 2002.

Permanently restricted net assets at June 30, 2002 and 2001 consist of perpetual endowment funds. The income from these investments in perpetuity is spendable for instruction, scholarships and operations.

#### (6) Relationship with Duke University

The Organization has an agreement with Duke University whereby the University acts as fiscal agent for the Organization. As a result of this agreement, certain federal and state grants and contracts are made to the University on the Organization's behalf. Total amounts received by the University and reported as revenues under grants and contracts amounted to \$951,744 in fiscal year 2002 and \$704,453 in fiscal year 2001. Accounts receivable at June 30, 2002 and 2001 include \$63,923 and \$90,566, respectively, due from Duke University for amounts expended for grant purposes but not yet reimbursed.

During 2002 and 2001, the University assigned employees to work at the Organization. The Organization reimbursed the University for the salary expenses and fringe benefits of these employees, which totaled \$922,197 and \$983,746 for the years ended June 30, 2002 and 2001, respectively.

The University provides certain services such as general administrative support and the use of facilities for the benefit of the Organization. These contributed services and facilities have been recognized in the accompanying statement of activities as contributions and expenses at their estimated fair value. The amount of these contributed services and facilities was \$46,700 and \$47,000 in 2002 and 2001, respectively.

#### (7) Contingencies

Under Costa Rican law, an employee can receive as severance pay the equivalent of one month's salary for every year of employment, up to a maximum of eight years, if it is determined by the courts that his employment was terminated without just cause, plus one additional month's salary. If all employees of the Organization were terminated at June 30, 2002 and 2001 without just cause, the liability for severance pay would be \$235,752 and \$181,995, respectively. The Board of Directors has designated funds to make payments under the law, if necessary. Severance payments would be made from the unrestricted designated net assets. Payment of such contingent liability is not probable at June 30, 2002 and, accordingly, such amount is not recorded as a liability in the accompanying consolidated statement of financial position.

# ORGANIZATION FOR TROPICAL STUDIES, INC. AND SUBSIDIARY

## Notes to Consolidated Financial Statements

June 30, 2002

(with comparative financial information for the year ended June 30, 2001)

The Organization is involved in claims and legal actions arising in the ordinary course of business. In the opinion of management, the ultimate disposition of these matters will not have a material adverse effect on the Organization's financial position, results of operations or liquidity.

### (8) Benefit Plans

Duke University employees assigned to the Organization participate in either the University's contributory defined contribution pension plan or the University's noncontributory defined benefit pension plan. The salary and fringe benefit expenses disclosed in note 6 to the consolidated financial statements include the net pension expenses associated with these plans.

These employees are also participants in the University's unfunded defined benefit postretirement medical plan. The net periodic postretirement benefit cost amounted to \$14,974 and \$13,761 for the years ended June 30, 2002 and 2001, respectively, and the associated liability was \$158,721 and \$143,747 as of June 30, 2002 and 2001, respectively.

It is not possible to present separately the actuarial present value of benefit obligations or the net assets available for benefits under either the contributory defined contribution or the noncontributory defined benefit pension plans because no determination has been made of the allocation of such amounts between Duke University and the Organization. Furthermore, it is not possible to present separately the actuarially determined accumulated postretirement benefit obligation for the Organization for the postretirement benefit plan because no determination has been made of the allocation of such amounts between Duke University and the Organization.

### (9) Grants and Contributions Receivable

Grants and contributions receivable are summarized at June 30, 2002 and 2001 as follows:

	<u>2002</u>	<u>2001</u>
Unconditional promises expected to be collected in:		
Less than one year	\$ 795,408	279,731
One year to five years	<u>253,000</u>	<u>—</u>
	<u>\$ 1,048,408</u>	<u>279,731</u>

**ORGANIZATION FOR TROPICAL STUDIES, INC. AND SUBSIDIARY**

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**(10) Conditional Promises To Give**

The Organization has received a \$1,500,000 challenge grant from a private foundation, which is conditional on a 1-for-1 match from other sources. Through June 30, 2002, the Organization has raised matching funds under this grant totaling \$1,158,000 from other sources and received \$1,008,000 in contributions from the private foundation. As of June 30, 2002, the Organization has recorded a receivable of \$150,000 from the private foundation which is included in grants and contributions receivable on the consolidated statement of financial position at year-end. The challenge grant expires in fiscal year 2003.

**(11) Subsequent Event (Unaudited)**

Due to the continued volatility of the capital markets, the investments declined in value by approximately \$559,000 subsequent to year-end.





