

Annual Report Fiscal Year 2001

July 1, 2000 - June 30, 2001

*Dedicated to providing leadership in education, research and
the responsible use of natural resources in the tropics.*

The Organization for Tropical Studies is a nonprofit consortium of 64 universities and research institutions from the U.S., Costa Rica, Peru, Mexico, South Africa, Canada and Australia. OTS was established in 1963 to provide leadership in education, research and the responsible use of natural resources in the tropics. To address this mission, OTS provides graduate, undergraduate and professional training, facilitates research, participates in tropical forest conservation, maintains three biological stations in Costa Rica and conducts environmental education programs.

Table of Contents

3	Message from the President and CEO
4	Board of Visitors
4	Offices
5	Board of Directors
5	Consortium Member Institutions and Assembly of Delegates
6	Education
19	Biological Stations and Research
29	Development
31	Finances

Message from the President and CEO

During fiscal year 2001 (1 July 2000 – 30 June 2001), we continued our 38-year tradition of providing the best field courses in tropical biology, providing invaluable assistance to tropical researchers and operating three of the most important biological stations in the New World tropics.

We trained more than 180 graduate students, 80 undergraduate students and 75 professionals in our one-of-a-kind intensive field courses in the biological sciences. Our training program ensures that the world has trained leaders in universities, research institutions, government and non-profit organizations to address global environmental issues.



We assisted researchers pursuing 168 research projects at our biological stations in Costa Rica. We awarded \$68,000 in research fellowships to 69 researchers in the early stages of their careers. More than 100 scientific publications were published during the year based on work conducted at the our stations. Our efforts in helping researchers, identifying collaborators, securing funding and processing required permits, are vital to increasing the world's knowledge of tropical ecosystems.

We conserved and the protected the more than 100,000 hectares of tropically diverse ecosystems (lowland rainforest, dry forest, and mid-elevational forest) that surround our biological stations. We worked with local communities to provide hands-on educational opportunities for school children and adults. Our stations hosted more than 17,000 visitors last year, including students, researchers and natural history visitors from all over the world.

Our progress is made possible with the dedicated support of our volunteers and donors. More than 150 volunteers, mostly from our member institutions and Board of Visitors, donated thousands of man-hours to our operations. In addition, nearly 2,000 donors contributed to the financial health of the organization, representing 44% of our revenue.

Whether you are an old friend or a new acquaintance, we thank you for your interest in OTS. We hope that this report gives you a glimpse of our activities as we continue to provide leadership in education, research and the responsible use of resources in the tropics.

A handwritten signature in cursive script that reads "Gary Hartshorn". The ink is dark and the signature is fluid and legible.

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Environmentalist

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Former Costa Rican
Ambassador to the U.S.
Don Stone
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Christiane Tyson
Environmentalist
Richard White
Duke University

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Las Cruces Biological Station and Wilson Botanical Garden

San Vito, Coto Brus, Costa Rica
Phone: (506) 773-4004
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La Selva Biological Station

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

Palo Verde Biological Station

Palo Verde National Park, Guanacaste, Costa Rica
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Fax: (506) 661-4712
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Board of Directors

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Pedro León (U. Costa Rica)

President and CEO:

Gary Hartshorn (OTS)

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Claudia Charpentier (UNA, Costa Rica)

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Jay Taft (Harvard U.)

James Hamrick (U. Georgia)

Carol Horvitz (U. Miami)

Consortium Member Institutions and Assembly of Delegates

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Colleen Cassady St. Clair
Arturo Sanchez-Azofeifa

University of Arizona

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Manuel Zeledón

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Lauren Chapman
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Florida International University

Maureen Donnelly
Steven Oberbauer

University of Georgia

James Hamrick
Catherine Pringle

Harvard University

Noel Michele Holbrook
Jay Taft

University of Illinois-Urbana-Champaign

Carol Augspurger
David Philipp

Indiana University

Edmund Brodie
Craig Nelson

Instituto de Ecología, Xalapa, Mexico

Instituto Tecnológico de Costa Rica

Juvenal Valerio
Braulio Vílchez A.

Iowa State University

Fred Janzen
James Raich

James Cook University-Queensland, Australia

Nigel Stork
Richard Pearson

University of Kansas

Paul Rich
Robert Timm

University of Kentucky

Scott Gleeson
David Wise

Louisiana State University

Christopher Carlton
G. Bruce Williamson

University of Maryland

Douglas Gill
Barbara Thorne

University of Massachusetts-Amherst

Peter Alpert
Curtice Griffin

University of Miami

Carol C. Horvitz
Michael Gaines

University of Michigan

John Vandermeer

Michigan State University

Tom Burton
Peter Murphy

University of Minnesota

Franklin Barnwell

University of Missouri-Columbia

Tim Holtsford
Rose-Marie Muzika

University of Missouri-St. Louis

Bette Loiselle
Jim Hunt

Museo Nacional de Costa Rica

Silvia Lobo Cabezas
Melania Ortíz V.

Universidad Nacional de la Amazonía Peruana

José Torres Vásquez
Lorgio Verdi

Universidad Nacional de Costa Rica

Claudia Charpentier E.
Víctor Cartín

University of North Carolina

David Pfennig
Seth Reice

North Carolina State University

Paul Mueller
Ted Shear

Ohio University

Don Miles
Harvey Ballard

Oregon State University

Darlene Judd
Phillip Sollins

University of Pittsburgh

Walter Carson
Billie DeWalt

University of Puerto Rico

James Ackerman
Dennis LeMaster

Purdue University

Kerry Rabenold

Rice University

David Brown
Joan Strassman

Rutgers University

Jean Marie Hartman

University of San Antonio Abad, Cusco, Peru

Smithsonian Institution

David Roubik
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Southern Illinois University

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Beth Middleton

State University of New York-Stony Brook

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University of Tennessee

Christine Boake
Gary McCracken

University of Texas-Austin

Lawrence Gilbert
Ulrich Mueller

Tulane University

Thomas Sherry

Universidad Estatal a Distancia de Costa Rica

Héctor Brenes
Oscar Bonilla

U.S. Forest Service-Research

John Ewel
Jack Waide

University of Utah

Dinah Davidson
Lynn Bohs

University of Washington

Shahid Naeem

Washington University

P. Mick Richardson
Jonathan Losos

University of Wisconsin-Madison

Tom Givnish
Stanley Temple

Yale University

James Bryan
Junhyong Kim

Honorary Delegate

Jay Savage

Education

During fiscal year 2001, the Consortium offered seven graduate courses, two undergraduate semesters abroad, two undergraduate summer programs, four environmental policy courses and seminars, a course for secondary school science teachers, a field course opportunity in East Africa and an increased number of research fellowships for graduate students.

Graduate Program

Tropical Biology: An Ecological Approach (00-3)

Geared toward students in the early stage of graduate study, this course included the unique expertise of long-term resource people and station researchers. A wealth of topics were covered including forest dynamics, biodiversity, plant-animal interactions and conservation biology. The course visited six sites in Costa Rica, representative of most of the major ecosystem types in the country, and participated in orientation walks, faculty-led group projects and independent research.

Coordinators:

Deedra McClearn, OTS
Laura Brown, Cornell University
Derek Johnson, University of Miami

Teaching Assistant:

Jorge Mena, Universidad de Costa Rica

Students:

Jennifer A. Brisson, Washington University
Timothy B. Brown, University of Utah
Ernesto Camelo de Castro, Arizona State University
Jennifer M. Cramer, Louisiana State University
Bradley L. Demarest, University of Utah
Jon E. Hess, Washington University
Mirkka M. Jones, Helsinki

Esther M. Langan, University of Florida
Michele L. Lefebvre, University of Utah
Erika Marin-Spiotta, University of California-Berkeley
Enrique Martinez-Meyer, University of Kansas
Douglas A. Nutter, University of Chicago
Mariana C. Panuncio, University of Maryland
Heather A. Passmore, Louisiana State University
Thomas M. Pucci, University of Kentucky
Jai V. Ranganathan, University of Minnesota
Jed R. Redwine, Florida International University
Matthew V. Rockman, Duke University
Julissa Roncal, Florida International University
James A. Spurney, University of Miami
Margo A. Stoddard, Oregon State University
Gretchen M. Walters, Arizona State University

Agroecología (00-7)

This course focused on the ecology of agricultural ecosystems - understanding how these systems work and how they interact with natural ecosystems. Students learned field research methods that are useful for understanding agroecosystems and examined relationships between biological and physical factors at the level of the individual field. Students also looked at impacts of agroecosystems on components of natural systems.

Coordinators:

Mickie Swisher, University of Florida
José Manuel Mora, Universidad de Costa Rica

Teaching Assistant:

Lucía López Umaña, OTS

Students:

Andrea Albertin, University of Florida
Kristen Bowers, University of Florida
José Camilo Bedano, Universidad Nacional de Río Cuarto, Argentina
Martha Isabel Calderón, Fundación CENIPACIFICO, Colombia
María Inés Cavallero, Instituto de Cultura Popular, Argentina
Sylvia B. Lang, Universidad Nacional de Costa Rica/Colorado State University
David López, Fundación Trópico, Colombia
Iguaigdigili López, Smithsonian Tropical Research Institute, Panama
Miguel Angel Morán, Universidad Autónoma Chapingo, Mexico
María del Carmen Ruiz, Smithsonian Tropical Research Institute, Panama
Juan Francisco Santos, Ministerio de Ciencia, Tecnología y Medio Ambiente, Cuba
Edson Luiz Souchie, Universidade Federal Rural do Rio de Janeiro, Brazil
Randall Varela, Universidad de Costa Rica
Julia Angélica Zavala, El Colegio de la Frontera Sur (ECOSUR), Mexico

Tropical Plant Systematics (00-9)

This course emphasized identification of vascular plants as well as phylogenetic theory and practice. Students were taught how to identify families and genera of seed plants, lycopods and ferns, with emphasis on the use of vegetative characteristics. Practical and theoretical aspects of the course were brought together in the main course project - a taxonomic monograph of a small group of species for which the students wrote keys and descriptions, cited specimens and performed a cladistic analysis.

Coordinators:

Brad Boyle, OTS

Robbin Moran, New York Botanical Garden

Teaching Assistant:

Mario Blanco, Universidad de Costa Rica

Students:

Ana L. Caicedo, Washington University

Monica Carlsen, University of Missouri-St. Louis

Victor D. Carmona, University of Arkansas

Saharah Moon Chapotin, Harvard University

Jonathan D. Coop, University of Wisconsin-Madison

Hilary M. Davis, University of Missouri-St. Louis

Norman A. Douglas, Duke University

Matthew W. Hahn, Duke University

Mark A. Higgins, University of Georgia

Linda K. Hirst, University of Missouri-St. Louis

Kenneth M. Hiser, University of Missouri-St. Louis

Susan T. Klimas, University of Wisconsin-Madison

Miriam S. Kritzer Van Zant, Southern Illinois University

Allison J. Miller, Washington University

Robin A. Smith, Duke University

Rachel Spicer, Harvard University

Sasa Stefanovic, University of Washington

Feng-Jie Sun, University of Illinois

Marie T. Trest, University of Wisconsin-Madison

Steven T. Trimble, University of Arkansas

Aimee L. Trojnar, Southern Illinois University

Jennifer L. Trusty, Florida International University

Tropical Biodiversity (00-10)

Four primary questions were addressed in this course: 1) What is biodiversity, and how is it defined and quantified? 2) What are the origins of biodiversity, and what are the prevailing hypotheses explaining high tropical diversity? 3) What are the threats to biodiversity in Costa Rica, and how do problems here relate to global patterns? 4) How can ecosystems be managed to preserve and restore biodiversity? This holistic approach allowed students to experience the diversity of flora and fauna of Costa Rica, and to integrate these facts into a conceptual framework.

Coordinators:

Ethel Villalobos, OTS

Don Brightsmith, Duke University

Students:

Christina M. Bentz, University of Chicago

Elisabeth K. Brennan, Southern Illinois University

Jennifer L. Brodeur, University of Florida

Jennifer A. Drummond, Rice University

Myla F. Johnson, Rutgers University

Jennifer L. Momsen, Rutgers University

Margaret B. Murphy, Michigan State University

Carla M. Norwood, Duke University

Elizabeth Scherrer, North Carolina State University

Deborah J. Zieger, University of Pittsburgh

OTS trains the next generation of tropical biologists in research methods by providing intense field experience in diverse ecosystems.



Tropical Biology: An Ecological Approach (01-1)

Students' concepts of what constitutes a forest's "natural balance" were challenged as they examined an archeological site that contained artifacts and other evidence left behind by ancient communities. Students examined nutrient cycling in epiphytic bromeliads, how orchid bee species might be stratified from the forest floor to the sub-canopy and canopy, and the differences in species diversity of spiders and herpetofauna of the ground versus the canopy.

Coordinators:

César Nufio, OTS
Derek Johnson, University of Miami

Teaching Assistant:

Laura May, Universidad de Costa Rica

Students:

Ingi Agnarsson, Smithsonian Institution
Anthony J. Baumert, University of Pittsburgh
Robert J. Brinkerhoff, North Carolina State University
Jesse L. Brunner, Arizona State University
Robert S. Capers, University of Connecticut
John F. Cozza, University of Miami
Christopher E. Hauser, University of Illinois

Shanie L. Holman, Oregon State University
Edward M. Jhee, Auburn University
Andrew W. Jones, University of Minnesota
David Kabelik, Arizona State University
Monica Landi, Rice University
Aurora Marin, Indiana University
Shannon M. Murphy, Cornell University
Catherine A. Nishida, University of Arizona
Adriana Pacheco, Universidad de Costa Rica
Marina L. Ramon, University of California-Santa Cruz
Nancy M. Schoeppner, University of Pittsburgh
Tanya M. Smutka, University of Minnesota
Amy L. Toth, University of Illinois
Eva Toth, Rice University
Matthew I. Williams, Auburn University



The Spanish-language tropical biology course provides graduate students with rigorous training in research methods and conservation biology.

Ecología Tropical y Conservación (01-2)

This course focused on research methods in tropical ecology. Students visited contrasting environments such as oil palm plantations, tropical wet forest, oak forest, páramo and tropical dry forest. Visiting resource people provided expertise on a wide range of issues. Including faculty-led and independent projects, the course generated 110 projects!

Coordinators:

Alejandro Farji, Universidad de Comahue, Argentina
Gilbert Barrantes, University of Missouri-St. Louis/Universidad de Costa Rica

Teaching Assistant:

Caty Frenkel, Universidad de Costa Rica

Students:

Ximena Bernal, Universidad de los Andes, Colombia
Alicia Bertsch, Universidad Simón Bolívar, Venezuela
María Azucena Canto, Instituto de Ecología AC, Mexico
Victor Carmona, University of Arkansas
Paloma Cartón de Grammont, Universidad Nacional Autónoma de México
Juan Carlos Chaparro, Universidad Nacional de San Antonio Abad del Cusco, Peru
Andrés Cuervo, Universidad de Antioquia, Colombia
Carlos García, Universidad de los Andes, Colombia
Lainet García, Instituto de Ecología y Sistemática, Cuba
María Genoveva Gatti, Universidad de Buenos Aires, Argentina
Marcos Joaquín Justiniano, Proyecto BOLFOR, Bolivia
Javier Lugo, Universidad de Puerto Rico
Agustina Malizia, Laboratorio de Investigaciones Ecológicas de las Yungas, Argentina
Floria Mora, Universidad de Costa Rica
Manuel Antonio Morales, Fundación Ecuatoriana de Estudios Ecológicos, Ecuador
Aida Ortiz, Fundación Ecuatoriana de Estudios Ecológicos, Ecuador
Claudia Moreno Paro, Universidade Federal de Uberlândia, Brasil
Katja Poveda, Universidad Nacional de Colombia
Guido Saborío, Universidad de Costa Rica
Lila Sainz, Museo de Historia Natural Noel Kempff, Bolivia
Yaniria Sánchez, Universidad de Puerto Rico
Adriana Zegarra, Universidad Nacional de San Antonio Abad del Cusco, Peru

Students in the Amazon course focused on the unique characteristics of flooded and upland forests of the western Amazon region of Peru.



Ecología de Ecosistemas Amazónicos (01-13)

The course orientation walks, group projects, independent projects and seminars were conducted in two locations in the Peruvian Amazon. The first was ExplorNapó Camp, a lodge located on the Napó River, where emphasis was on aquatic systems to take advantage of the rivers and the area's oxbow lakes or "cochas." The second site utilized the installations of ACEER (Amazon Center for Environmental Education and Research) on the Sucusari River, including a 500-meter long canopy walkway.

Coordinators:

Alejandro Farji, Universidad de Comahue, Argentina
Grace Servat, University of Missouri-St. Louis

Teaching Assistants:

Sandra Correa, OTS
Wendy Tori, OTS

Students:

Paola Lucía Aibar, Rainforest Expeditions, Peru
Pablo Emilio Araujo, Escuela Politécnica Nacional, Ecuador
Illich Arista, Universidad Nacional de la Amazonía Peruana, Peru
María Clara Arteaga, Universidad de Antioquia, Colombia
Edwin Fabián Bersosa, Fundación Ecuatoriana de Estudios Ecológicos, Ecuador
Mario Castañeda, Universidad Nacional Autónoma de México
María Clara Castellanos, University of Toronto, Canada
Sandra Milena Durán, Universidad del Valle, Colombia
Patricia Carina Fernández, Universidad de Buenos Aires, Argentina
Manuel Flores, Universidad Nacional de la Amazonía Peruana, Peru
René Marcelo Fonseca, Pontificia Universidad Católica del Ecuador
Estela Herbas, Universidad Mayor de San Simón, Bolivia
Priscilla Hurtado, Instituto Nacional de Biodiversidad, Costa Rica
Paula Meli, Universidad de Buenos Aires, Argentina
Daniel R. Neira, Universidad Nacional de San Agustín, Peru
José A. Ochoa, Universidad Nacional de Córdoba, Argentina
Camilo A. Peraza, Pontificia Universidad Javeriana, Colombia
Kristina Renate Pfannes, Duke University
María Cleopatra Pimienta, Universidad del Valle, Colombia
Erit Manuel Salas, Universidad Nacional de la Amazonía Peruana
Alejandro Valerio, University of Arkansas
Luciana Andrade Zago, Universidade de Brasília, Brazil

Comprehensive Review of OTS Graduate Education Program

The Graduate Education Review Committee, funded by the Andrew W. Mellon Foundation, first met in spring 2000 with the charge of conducting a comprehensive external review of the OTS graduate program. Four principal activities during the year included course visits and surveys to the Assembly of Delegates and graduate alumni. The third and final meeting of the committee took place in December 2001 to discuss the final report and recommendations.

Undergraduate Program

Minority Scholars Program Established

Historically, African Americans, Hispanics, and Native Americans have been underrepresented in the sciences in the United States, particularly in ecology and tropical biology. OTS initiated the Minority Scholars Program to address this deficiency, receiving funding from the Andrew W. Mellon Foundation, the Coca-Cola Foundation and the National Science Foundation. The funds provide fellowships for the undergraduate summer courses as well as for the semester abroad program. Funds from the Mellon grant were also used to establish the National Fellowship Advisory Committee, which consists of professors and senior administrators from Spelman College, Howard University, North Carolina A&T, Haskell Indian Nations University, University of Kansas, Tuskegee University, Morehouse College, Florida International University, Duke University, Universidad de Costa Rica and the University of Puerto Rico. During the inaugural meeting, strategies were developed for recruiting and marketing, mentoring participants and evaluating the program.

Undergraduate Study Abroad Program

The Undergraduate Study Abroad Program (USAP), offered in conjunction with Duke University, included two semester programs and two summer programs. All courses focused on the OTS method of field-based, experiential learning in Costa Rica.

Undergraduate Semester Abroad - Fall 2000 and Spring 2001

The semester program consisted of four courses, *Fundamentals of Tropical Biology*, *Field Research in Tropical Biology*, *Environmental Science and Policy of the Tropics* and *Spanish Language and Latin American Culture*. These programs began with intensive Spanish training, where students worked in small groups studying Spanish, Costa Rican history, literature, and environmental issues. In addition, they participated in a variety of field trips. The course then traveled throughout Costa Rica and students were introduced to tropical plant taxonomy, learned first-hand about the rice, banana, forestry and ecotourism industries, and gained experience in how to conduct research through group and independent projects. Faculty included Karin Gastreich (USAP Director), Erika Deinert, Mahmood Sasa, Ana Villegas and Evan Notman.

Fall 2000 Students:

Claire C. Agre, Duke University
Kara J. Bidden, Ursinus College
Todd P. Brilliant, University of Michigan
Lisa A. Bucci, Denison University
Idelle A. Cooper, Grinnell College
Andrea L. Crino, Lewis & Clark College
Sierra K. Curtis-McLane, Swarthmore College
Christine L. Dolph, Grinnell College
Brian H. Eichner, Duke University
Jeffrey A. Firman, Yale University
Suzanne E. Glover, Rhodes College
Rachel C. Kaplan, Tufts University
Miles H. Kiger, University of Massachusetts-Amherst
Sara B. LaBoskey, Duke University
Shannon S. Magaw, Duke University
Mary M. Miner, Bowdoin College
Thomas A. Morrison, Duke University
Trevor S. Peterson, Bowdoin College
Sean Rovito, Washington University
Rebecca E. Rush, Grinnell College
Scott C. Stark, University of Pittsburgh
Shannon M. Tanner, Tulane University
Tamra M. Thayer, Carleton College
Kristin R. Wilson, Middlebury College

Spring 2001 Students:

Robin M. Braff, Skidmore College
Michael B. Butts, Duke University
Lauren A. Byerley, Reed College
Justin M. Cohen, Yale University
Laurel E. Converse, Reed College
Genevieve K. Croft, Georgetown University
Elizabeth Duffy, Brown University
Kevin J. Emerson, Clarkson University
Eric B. Jacobson, University of Pennsylvania
Rakesh P. Jotwani, Duke University
Jonathan E. Katz, Middlebury College
Ashley K. Langworthy, Tufts University
Noah M. Levin, Harvey Mudd College
Ryan M. Meyer, Bowdoin College
Cameron E. Naficy, Rice University
Aura M. Obando, Duke University
Lisa D. Patrick, Barnard College
Jessica L. Purcell, Williams College
Daniel S. Roh, Duke University
Michelle S. Rome, Brown University
Elon B. Slutsky, Amherst College
Carla C. Stefanescu, University of the South-Sewanee
Prescott L. Vandervoet, University of Arizona
Drew G. Weymouth, Bates College
Jessica S. Williams, Swarthmore College



In *Ethnobiology*, students studied varied uses of plants and animals by human communities in Costa Rica.

***Ethnobiology* – Summer 2000**

Six students received scholarships to participate in this four-week scientific study of the medicinal, ceremonial, aesthetic and subsistence uses of plants and animals by human communities in Costa Rica. Emphasis was placed on the preservation of natural and cultural resources. Because mythology and religious beliefs underlie attitudes toward nature in all cultures, students were exposed to a series of lectures on mythology of Amerindian groups and syncretisms between those and European religious influences on native peoples.

Coordinators:

Luis Diego Gómez, OTS
Todd Capson, STRI, Panama

Students:

Paola Grasso, Duke University
Gail M. Gutierrez, University of Southern California
Christa Jen, Michigan State University
Megan K. Kupko, Cornell College
Beth S. Landes, Brandeis University
Julie M. Linton, Duke University
Rebecca M. Lutz, Brown University
Aura M. Obando, Duke University
Mariangie Ramos-Rodriguez, University of Puerto Rico
Allison A. Williams, Duke University

***Field Tropical Ecology* – Summer 2001**

Six students received funding from the OTS Minority Scholars Program. The emphasis of the course was on ecology and field biology. However, by virtue of the extensive travel that was part of this course, the students also gained an understanding of the social and economic realities that shape the country. The curriculum included a variety of teaching modalities, such as formal lectures by faculty and guest speakers, orientation walks, field trips and research projects.

Coordinators:

Ethel Villalobos, OTS
Don Brightsmith, Duke University

Students:

Orimichael J. Benhamou, Duke University
Katherine H. Betzer, Mount Holyoke College
Meaghan E. Daly, Barnard College
Brittany L. Enzmann, Scripps College
Neal E. Goldenberg, Duke University
Kristin I. Hunter-Thomson, Williams College
Courtney R. Jones, Spelman College
Lincoln R. Larson, Duke University

Yuen Yu A. Lau, University of Maryland

Nzinga Mack, Howard University
Kevin C. McElroy, University of Arkansas
Devin A. McGaughey, Duke University
Beatrice E. Meizoso, University of Utah
Omosalewa R. Oyelaran, University of North Carolina-Asheville
Luanna B. Prevost, Tuskegee University
Alexander J. Pries, College of Wooster
Timothy D. Schmalz, George Washington University
Morgan M. Smith, University of Colorado
Diana R. Swilling, Duke University
Lauren A. Terwilliger, Skidmore College
Timothy T. Weil, Washington University
Luke E. Wood, Duke University

Environmental Science and Policy Program

The Environmental Science and Policy Program offered three short courses for policy-makers and one workshop for park managers. These programs reached professionals who devise and implement policies that affect tropical resources but who often have minimal training in environmental sciences. It also provided continuing education for professionals in the conservation and environmental fields.

The Wildlands Management course significantly improved the capacity of wildlands managers to conserve and manage protected areas .



Manejo de Areas Silvestres Tropicales (00-16)

The U.S. Fish and Wildlife Service provided funds and technical assistance for the second edition of the Wildlands Management course. The participants (professionals involved in park management) visited public and private protected areas throughout Costa Rica, where they learned first-hand the necessary skills to manage and conserve important ecosystems and to deal with typical population and resource extraction pressures. A wide array of topics was addressed including conservation, community relations, fund-raising, development and conservation, participatory decision-making, environmental conflict resolution and environmental interpretation.

Coordinators:

José María Rodríguez, OTS
Alberto Vásquez, UNED

Participants:

Alfredo Wüthrich, National Parks Administration, Argentina
Florencia Trama, National Parks Administration, Argentina
Mario Luis Malajovich, Commission for the Yabotí Biosphere Reserve, Argentina
Simón Cuminetti, National Parks Administration, Argentina
Mario Diego Lilienfeld, Cotapata National Park, Bolivia
Carlos Arturo Poveda, Vicente Pérez Rosales National Park, Chile
Eduardo Mora, Puyehue National Park, Chile
José Antonio Gayozo, Puyehue National Park, Chile
Andrés Rivera, Otún Quimbaya Fauna and Flora Sanctuary, Colombia
Edgar Castro, Cahuinarí National Park, Colombia
Luz Mery Martínez, Septiembre Station, Colombia
Natalia Gómez, Valle del Cauca Autonomous Regional Corporation, Colombia
Sergio Márquez, Darién Special Management Area, Colombia

Freddy Salazar, Cocos Island Marine Conservation Area, Costa Rica
Marcos Madrigal, Manuel Antonio National Park, Costa Rica
Mario Gutiérrez, Matanzas, Cuba
Kleber Aguilar, Galápagos National Park, Ecuador
María Eugenia Proaño, Charles Darwin Scientific Foundation, Ecuador
Sixto Naranjo, Galápagos National Park, Ecuador
Javier Márquez, Sierra del Lacandón National Park, Guatemala
Miguel Pereira, Laguna del Tigre National Park, Guatemala
Cristóbal Díaz, Durango, Mexico
Daniel Ceballos, Banco Chinchorro Biosphere Reserve, Mexico
Deidad Partida, Sierra del Manantlán Biosphere Reserve, Mexico
Delfina Rodríguez, National Institute of Ecology, SEMARNAP, Mexico

Principios Ecológicos para el Desarrollo Sostenible en América Latina (01-6)

During the thirteenth edition of the Latin American Decision-Makers course, participants interacted with a highly qualified group of 28 instructors. Lectures and discussions centered on forest management, environmental economics and valuation, biological and ecological principles, biodiversity conservation and use, environmental impacts and assessment, ecotourism, environmental law and payment for environmental services. The syllabus was designed to provide participants with a solid introduction to the topics and link them directly to the pursuit of the goals of sustainable development. All topics were explored from conceptual and practical angles, with particular reference to their inclusion in decision-making processes.

Coordinators:

Raúl Solórzano, Tropical Science Center
José María Rodríguez, OTS
Javier Mateo-Vega, OTS

Participants:

Alejandra Monge Jiménez, Cámara de Comercio, Industria y Turismo de Aguirre, Costa Rica
Ana Cristina Miranda Calderón, Asamblea Legislativa de Costa Rica
Antonio Damián Franyutti León, Corporación Mexicana de Investigación en Materiales, Mexico
Ariadna Laura Guaglianone, Facultad Latinoamericana de Ciencias Sociales, Argentina
Arnoldo José Uribe Patiño, Ministerio del Ambiente y los Recursos Naturales, Venezuela
Carlos Alberto Méndez García, Ministerio de Ciencia, Tecnología y Medio Ambiente, Cuba
Cristina Víquez Cerdas, Poder Judicial, Costa Rica
Emilio José Aponte Sierra, Fundación Pro-Sierra Nevada de Santa Marta, Colombia

Enid Gamboa Robles, Ministerio del Ambiente y Energía, Costa Rica
Everardo Rojas Díaz, Asamblea Legislativa, Costa Rica
José Guadalupe Martínez Ávalos, Universidad Autónoma de Tamaulipas, Mexico
José Salomón Alvarenga Vásquez, Tribunal Primero de Sentencia, El Salvador
Juan Antonio Juárez Rubio, Ministerio de Agricultura y Ganadería, El Salvador
Leonardo Cruz Cabrera, Ministerio de Ciencia, Tecnología y Medio Ambiente, Cuba
Manuel De La O Cabrera, Fiscalía General de la República, El Salvador
Ricardo Lara Melo, AEC Colombia Ltda., Colombia
Roberto Valladares Ortega, Agencia para el Desarrollo de la Mosquitia (MOPAWI), Honduras
Róger Salvador Alfaro Cortés, Comisión de Ambiente de la Municipalidad de León, Nicaragua
Sergio Domber, Administración de Parques Nacionales, Argentina



Professional policy makers from the U.S. were exposed to tropical ecosystems, biodiversity and saw first-hand how issues in the tropics affect the global environment.

Interdependence: Economic Development and Environmental Concerns (01-8)

In this course, also known as the U.S. Decision-Makers Course, participants were introduced to Costa Rica's economy, environmental policy history, forestry sector and hydroelectric energy policies. The group learned about tropical ecology, environmental management systems in banana plantations, land-use changes in Sarapiquí, biodiversity use, carbon sequestration in tropical forests and its implications on global climate change research. The topic of payment for environmental services was also discussed followed by a visit to a forest management project.

Coordinators:

Katrina Brandon, OTS
José María Rodríguez, OTS
Nigel Asquith, Conservation International

Participants:

Nicole Alt, Legislative Specialist, U.S. Fish and Wildlife Service
DeAndra Beck, Assistant Director for Policy, USDA Forest Service
Deborah Ben-David, Attorney, NOAA, General Council for Fisheries
Jo-Ellen Darcy, Deputy Staff Director, U.S. Senate, Committee on Environment and Public Works
Deborah Fiddelke, Press Director, U.S. Senate
Eliecer Feinzaig, Vice Minister of Transportation, Ministry of Public Works & Transportation, Costa Rica
Ken Flanz, Deputy Legislative Director, U.S. Senate
Monique Frazier, Legislative Director, U.S. House
Mark Harkins, Democratic Legislative Director, U.S. House Committee on Science
Eileen Henniger, Environmental Scientist, U.S. Environmental Protection Agency
Jennifer Johnson, Press Secretary, Communications Director, U.S. House
Chris Knauer, Professional Staff Member, U.S. House
Kimberly McClurg, International Affairs Specialist, U.S. Fish and Wildlife Service
Sally McGee, Legislative Assistant, NOAA Sea Grant Fellow, U.S. House
Susan Mers, Legislative Assistant, U.S. House
Pat O'Brien, Ecological Services Team Leader, Chevron Research and Technology
Marcela Ramirez, Environmental Specialist, U.S. Embassy, Costa Rica
Andrea Tebbe, Legislative Assistant, U.S. House
Franz Wuerfmannsdobler, Legislative Assistant, U.S. Senate

Mesoamerican Biological Corridor (MABC) Seminar

These seminars are joint ventures of OTS and World Wildlife Fund-Central America, designed to contribute to the formation of a critical mass of Central American decision-makers committed to the MABC. The second edition of the seminar included legislators and legislative advisors. The legislators each signed a personal declaration entitled "Our Commitment to the MABC" in which they stipulate 20 activities they will carry out to help consolidate the MABC.

Coordinators:

José María Rodríguez, OTS

Javier Mateo-Vega, OTS

Participants:

Norman Noel Quijano González, Asamblea Legislativa, El Salvador

Juan Angel Alvarado Alvarez, Asamblea Legislativa, El Salvador

Armando López Prado, Asamblea Nacional, Nicaragua

Horacio Alvarado Bogantes, Asamblea Legislativa, Costa Rica

Rolando Streber Pineda, Congreso Nacional, Honduras

Rodimiro Díaz Zelaya, Congreso Nacional, Honduras

José Antonio Fuentes Posas, Congreso Nacional, Honduras

Carlos Walter Guzmán Coto, Asamblea Legislativa, El Salvador

José Luis Salas Zuñiga, Asamblea Legislativa, Costa Rica

Carlos García Bonilla, Asamblea Nacional, Nicaragua

David Burgos, Asamblea Nacional, Belize

Gaston Vargas, Asamblea Legislativa, Costa Rica

Rogelio Alba Filós, Asamblea Legislativa, Panama

Salustiano Lizama, Asamblea Nacional, Belize

Wildlands Management Resource Manual

A training manual is critically needed to support and complement the lectures and activities of the Wildlands Management Course. The manual, sponsored by the Tinker Foundation with additional assistance from the U.S. Fish and Wildlife Service, is currently under development and will be the first of its kind in the region and will serve as a comprehensive guide on wildlands conservation and management.

Colombian Courses

The William and Flora Hewlett Foundation supported the expansion of the Environmental Science and Policy Program in fiscal year 2001. This expansion will include a range of activities that will both train more decision-makers in the near term but will also lay the groundwork to realize the vision of a more extensive training *network*. The first such activities took place in May 2001. Two courses were offered in Colombia in conjunction with the Andean Center for Economics and Environment (CAEMA). *Clean Development Mechanism (CDM) and Conservation Corridors* introduced national and local representatives to possibilities for developing countries to receive support for conservation under the CDM. Participants identified potential changes in national legislation and developed plans for four regions where they proposed that payments for environmental services could be implemented. The second course was at the request of Conservation International and the Regional Development Authority for the state of Cundinamarca. The emphasis of this course was on helping the authority develop economically and environmentally sound plans for water protection and distribution in this Colombian department.

Collaborations

Environmental Science Institute for Science Teachers

The 2001 Institute, funded by the National Science Foundation, was administered by OTS and The Woodrow Wilson National Fellowship Foundation Leadership Program for Teachers. The course included middle and high school science teachers and focused on global environmental change and its impact on the tropics. Participants were immersed in environmental science field projects and learned the value of inquiry-based instruction in this intense program.

Tropical Biology Association

Silvia Lomáscolo, University of Florida, participated in the Tropical Biology Association's Uganda field course. The course was based in Kibale National Forest and was an introduction to Old World tropical ecology, field techniques, problem solving and presentation of scientific ideas, projects and results.

Environmental Education

OTS educates 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* educated Costa Ricans on topics such as medicinal plants, natural history of frogs and birds of the cloud forest.**

BioCursos

More than 1,500 Costa Ricans participated in 75 weekend programs designed to communicate the importance of protecting Costa Rica's biodiversity. Specialists in the field taught each course which included participants of all ages and from all walks of life.

Nature Walks, Open Houses and Special Events

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 and open houses.

Science Education in Local Communities

La Selva's environmental education program reached 4th-6th graders in ten local schools. The curriculum focused on natural history, ecological processes and interactions between human populations and the environment. Students visited La Selva for field activities as well as received instruction in their classrooms.

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

Las Cruces also coordinated special activities in local communications including:

- Assisting area high school students with the development of projects for the Agua Buena High School Science Fair. Projects included the diversity of aquatic insects in artificial bromeliads, diversity of epiphytic plants on trees under several light conditions, organic garbage and recycling process.
- Conducting a workshop on palms for the Neotrópica Foundation to teach local participants the taxonomy and natural history of this important group of plants.
- Coordinating "Tree Day" celebration for students of the Linda Vista Elementary School, including discussions on the importance of trees and the planting of 100 seedlings.
- Donating school supplies to the Linda Vista Elementary School, including a new collection of textbooks, notebooks, pencils, journals and literature (thanks, in part, to a donation from Horizontes Travel Agency).

OTS Fellowships

In Fiscal Year 2001, OTS awarded fellowships totaling \$68,159 to 69 graduate students. The award recipients were either enrolled in degree programs at OTS member institutions or were OTS course alumni. The total awarded included \$21,567 for 47 post-course awards, \$13,090 for 12 pilot awards and \$33,502 for ten research fellowships.

Andrew W. Mellon Graduate Fellowship Awards

Arnáez, Elizabeth and Ileana Moreira. Instituto Tecnológica de Costa Rica. Preliminary study of root development in the forest almond (*Dipteryx panamensis*) and “botarrama” (*Vochysia ferruginea*) in relation to tree phenology in plantation and protected areas in Sarapiquí, Heredia, Costa Rica.

Boege, Karina. University of Missouri-St. Louis. Ontogenetic variation in plant resistance: Consequences for the balance between bottom-up and top-down forces on herbivore and plants.

Carmona, Victor. University of Arkansas. When the cupboards are bare: The effect of seasonality on an ant-plant mutualism in a tropical dry forest.

Chapotin, Sarah. Harvard University. Water relations and functional anatomy of tropical forest flowers.

Chatterjee, Keya. University of Virginia. The relationship between tree species and microbial communities in a tropical secondary forest.

Chaves, Oscar. Universidad de Costa Rica. The influence of different light and water regimes on the inverse phenology of *Jacquinia pungens* (Theophrastaceae) in Santa Rosa National Park, Costa Rica.

Coop, Jonathan. University of Wisconsin-Madison. Diversity and composition of tropical dry forest understory vegetation.

Cozza, John. University of Miami. Factors affecting sex ratio in *Begonia*.

Douglas, Norman. Duke University. Documentation of floral visitors in *Palicourea* and *Psychotria* subg. *Heteropsychotria* (Rubiaceae).

Hauser, Christopher. University of Illinois-Urbana-Champaign. Testing the intermediate disturbance hypothesis in a riverbank community.

Herbas, Estrella. Universidad Mayor de San Simón, Bolivia. *Ictiocoria* germination and seed viability on the flood plain of Laguna Bufeos (Cochabamba, Bolivia).

Hurtado, Priscilla. Instituto Nacional de Biodiversidad, Costa Rica. Determining factors for germination and seed dispersal of *Erythrochiton gymnanthus* Kallunki (Rutaceae) in a mature secondary forest of the Central Pacific region of Costa Rica.

Jhee, Edward. Auburn University. A preliminary assessment for nickel hyperaccumulating plant species endemic to serpentine soils of the Santa Elena Peninsula, Santa Rosa National Park.

Klimas, Susan. Diversity and abundance of epiphytic pteridophytes on tree ferns and woody angiosperms.

Mantilla, Hugo. Comparative study of the vertical distribution of bats at La Selva Biological Station, Costa Rica, and Barro Colorado Island, Panama, and its relationship with environmental variables.

Mata, Angela. Instituto Tecnológico de Costa Rica. Survey of insect herbivores present in monoculture plantations of three tree species located in experiment plots of the Huertos Project, La Selva Biological Station.

Miller, Allison. University of Washington. Domestication in a tropical fruit tree, jocote (*Spondias purpurea* L., Anacardiaceae).

Miller, Allison. University of Washington. Genetic variation in wild and cultivated populations of *Spondias purpurea*.

Murphy, Shannon. Cornell University. *Lantana camara* pollination by butterflies: Does color matter?

Otero, J. Tupac. University of Puerto Rico. Molecular identification of endophytic fungi of tropical orchids.

Passmore, Heather. Louisiana State University. Long-term dynamics of a seasonally-dry forest in Costa Rica.

Roncal, Julissa. Florida International University. The distribution and abundance of two understory dwarf palms: *Asterogyne martiana* and *Geonoma cuneata*.

Russo, Sabrina. University of Illinois-Urbana-Champaign. Monkey and bird seed dispersal of a neotropical tree species: A simultaneous test of escape, colonization and directed dispersal hypotheses.

Schreeg, Laura. Michigan State University. An investigation of structural forest floor heterogeneity and light availability as mechanisms for maintaining the diversity of tree species at La Selva.

Spicer, Rachel. Harvard University. Parenchyma cell death during the transition from sapwood to heartwood in tropical tree species.

Tillberg, Chadwick. University of Colorado. Is the symbiosis between *Azteca pittieri* (Hymenoptera: Formicidae) and *Cordia alliodora* (Boraginaceae) maintained by reciprocal nutrient exchange?

Trusty, Jennifer. Florida International University. Herbarium survey of the endemic trees of Isla del Coco, Costa Rica.

Zambrano, Ruby. Smithsonian Tropical Research Institute, Panama. Seed dispersal in *Chamaedorea tepejilote*.

Conservation Biology Fellowship Awards

Hale, Amanda. University of Miami. Metapopulation approach to understanding the effects of sociality on population dynamics and persistence.

Moyer, Gregory. Southern Illinois University. A survey of the freshwater ichthyofauna from Brazil's eastern coastal drainages.

Ranganathan, Jai. University of Minnesota. Factors that determine generalist avifaunal distributions along forest-pasture boundaries.

Peace Frogs Awards for Amphibian Research

Arista, Illich. Universidad Nacional de la Amazonía Peruana, Peru. Diversity and abundance of frogs in terrestrial bromeliads on white sand ecosystems.

Beecher, Nancy. Indiana University. The current status of Monteverde's declining anurans, especially the Meadow Treefrog (*Hyla pseudopuma*).

Brisson, Jennifer. University of Washington. An examination of calling behavior in an assemblage of swamp-breeding frogs.

Brodeur, Jennifer. University of Florida. Treefrog behavior and microhabitat selection during the dry season at Palo Verde, Costa Rica.

Hines, Kirsten. Florida International University. Relationship between stamina level and call parameters in male *Dendrobates pumilio* at La Selva, Costa Rica.

Langan, Esther. University of Florida. Reproductive strategy and male body size in *Hyla loquax*.

Marin, Aurora. Indiana University. A closer look at amphibian declines: population density and distribution of neotropical salamanders at three biological sites in Costa Rica.

Schoeppner, Nancy. University of Pittsburgh. The effects of forest structure on the habitat preference of *Dendrobates pumilio*.

Watling, James. Florida International University. A preliminary assessment of mark-recapture techniques for estimating population parameters of the La Selva herpetofauna.

Williams, Mathew. Auburn University. Community structure and natural history of the arboreal herpetofauna at La Selva Biological Station. Glaxo Pharmaceutical Latin American Graduate Fellowship Awards
Araujo, Pablo. Escuela Politécnica Nacional, Ecuador. Beetles of the tropical dry forest in the coastal region of Ecuador.

Bersosa, Pablo. Fundación Ecuatoriana de Estudios Ecológicos, ECOCIENCIA. Influence of seasonality on the aquatic macroinvertebrate community in *Heliconia* inflorescences.

Brennan, Patricia. Cornell University. Ecology of exclusive male parental care and mating system of the great tinamou (*Tinamus major*) in a tropical forest.

Castaneda, Mario. Universidad Nacional Autónoma de México. Relationship between the trophic structure of a community of fishes and its nematode parasite load.

Corella, Osvaldo. Instituto Tecnológico de Costa Rica. Map of historic changes in land use at the La Selva Biological Station over the last 50 years.

Fernández, Patricia. Universidad de Buenos Aires, Argentina. Patterns of nectar collection in the stingless bee *Melipona fasciata*.

Hernández, Alonso. Response to cutting damage in the mangrove species *Laguncularia racemosa* in different wetlands communities of Alvarado, Veracruz, Mexico.

Montero, Jorge. Universidad Nacional de Costa Rica. Differences in the use of ecomorphospace in taxonomic assemblages of bats in different habitats.

Valerio, Alejandro. University of Arkansas. A systematic study of the genus *Hypomicrogaster* (Hymenoptera: Braconidae).

Donald and Beverly Stone Endowment

Donald and Beverly Stone Fellowships

Boyko, Adam. Purdue University. Sexual selection and the evolution of novel warning coloration: A comparison between pupal mating and non-pupal mating Heliconius butterflies.

Demarest, Bradley. University of Utah. Genetic relatedness within flocks of the cooperatively breeding brown joy (*Cyanocorax morio*).

Fonseca, René. Pontificia Universidad Católica, Ecuador. Factors that affect the diversity and abundance of leaf-nosed bat ectoparasites in the Andes and Amazon regions of Ecuador.

Krueger, Terry. University of Miami. The effects of parasitism on song, plumage color and fitness of the male Cherrie's tanager (*Ramphocelus costaricensis*).

Pfannes, Kristina. Duke University. Scents as an alternative method to study tropical mammals in the Amazon.

Stoddard, Margo. Oregon State University. Bat diversity and habitat use at Las Cruces.

Rexford Daubenmire Fellowships

Agnarsson, Ingi. George Washington University. Spiders in the high frontier—assessing the diversity and vertical stratification of spider species in a rainforest.

Boyko, Adam. Purdue University. Color pattern diversity in Heliconius butterflies: strength in numbers?

Dole Foods Fellowships

Brown, Tim. University of Florida. Self-organization of raid behavior in the army ant *Eciton burchelli*.

Emily P. Foster Fellowships

Agreda, Ana. University of Missouri-St. Louis. Effects of the dynamics of the Napo River on habitat use and foraging behavior of terrestrial bird species dependent on riverine habitats in northwestern Ecuador.

Lefebvre, Michelle. University of Utah. Host specificity of the ant parasitoid *Apocephalus paraponerae*: evidence for a cryptic species complex.

Ochoa, José. Universidad Nacional de Córdoba, Argentina. Patterns of daily surface activity in *Brachistosternus ferrugineus* (Thorell) (Scorpions; Bothriuridae), in the Chaco region of Argentina.

Ronhaar, Dirk. Rice University. Queen worker conflict over male production in stingless bees.

Salas, Erit. Universidad Nacional de la Amazonía Peruana. What factors determine the presence of *Anopheles* larva in *Piscicolas* ponds?

Spitzer, Brian. University of California-Davis. Factors affecting local adaptation in the scale insect *Saissetia coffeae*.

Vogel, Erin. SUNY-Stony Brook. The ecological basis of aggression in white-faced capuchin monkeys, *Cebus capucinus*, in a Costa Rican dry forest.

William L. Brown Fellowships

Toth, Eva. Rice University. How do *Centris* males find their sleeping place?

Walters, Gretchen. Arizona State University. Flying in the face of evolution: do nectar-feeding bats prefer nectar concentrations higher than available in chiropterophilous flowers?



Fellowship recipient Adam Boyko researches Heliconius butterflies.

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 also 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.

Conservation

Reforestation efforts continued in Melissa's Meadow. Several hundred seedlings of native tree species were planted during the year. Of the remaining hectares not planted, some will remain in pasture while others will be eventually planted with either a native bamboo (*Guadua* sp.) or 400 seedlings of *Quercus oocarpa*.

Research Highlights

During the year 42 research projects were conducted at Las Cruces.

Publications

In fiscal year 2001, 10 publications based on work conducted at Las Cruces were published. Las Cruces' total publication count is now 453.

Facilities and Resources

Database collections grew during the year. The Biodiversity of Coto Brus database was expanded with observations done by the *Tropical Biology*, *Agroecology*, and *Ethnobiology* courses. The GIS station at Las Cruces has been enriched with the vegetation cover of Central America. Regular maintenance, with a special emphasis on trail upkeep, was also conducted.

Visitation

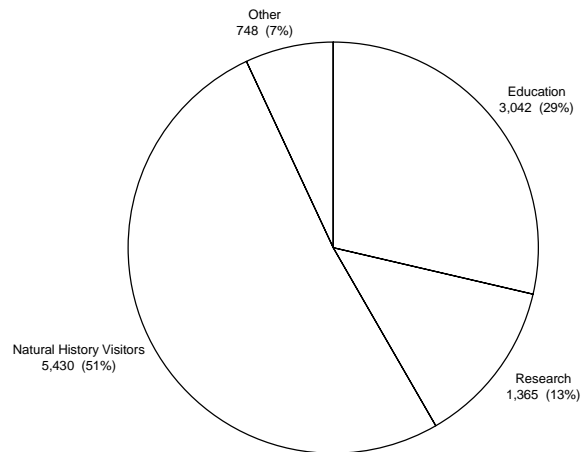
During fiscal year 2001, 6,117 individuals visited Las Cruces. This included 830 students, 162 researchers, and 4,744 natural history visitors.

Research Projects

Abundance, diversity and habitat relationships of the herpetological communities at Las Cruces forest, southwestern Costa Rica / Fernando Mendoza (Instituto de Ecología, UNAM), Georgina Santos (Instituto de Ecología, UNAM), Jesús Pacheco (Instituto de Ecología, UNAM), Gerardo Ceballos (Instituto de Ecología, UNAM), Gretchen Daily (Stanford University), Paul Ehrlich (Stanford University) / Randi Figueroa, Jesus Ilama

Archaeological research at Las Cruces / Mauren Sánchez, Patricia Rojas (Universidad de Costa Rica) / Jesús Ilama

Avian seed dispersal in abandoned pastures / Frederick Werner (Cornell University) / Audrey Sandí, Ronald Murillo



6,117 people visited Las Cruces in fiscal year 2001 and totaled 10,585 person days, as outlined above.

Bat diversity and habitat use at Las Cruces / Margo Stoddard (Oregon State University)

Chemical defenses in Costa Rican birds / Todd Capson (Smithsonian Tropical Research Institute), Luis Diego Gómez (OTS)

Coffee pollination in tropical fragmented landscapes: Conservation of an important ecosystem service / Taylor Ricketts (Stanford University)

Coleoptera and pollination of Cyclanthaceae / Luis Diego Gómez (OTS)

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

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

Distribution of self compatibility in *Witheringia*, Solanaceae / Judy Stone (Colby College)

Diversity of herbaceous plants in countryside habitats / Margaret Mayfield (Stanford University) / Andres Vega (University of Texas-Austin), Martha Roberts (Stanford University), Shasta Daisy Pistey-Lyhne (Stanford University)

Documentation of floral visitors in *Palicourea* and *Psychotria*, subgenus *Heteropsychotria* (Rubiaceae) / Norman Douglas (Duke University)

Eco-maps / José González (Instituto Nacional de Biodiversidad)

Elevational variation in resource exchange in the *Cecropia obtusifolia* (*Azteca* spp) mutualism / Steven Trimble (University of Arkansas)

Epiphytic plants in their natural environments and associated microhabitats / Mike T. Brown (University of Florida)

Evolution of non-photosynthetic plants / Yaxelis Mendoza (Smithsonian Tropical Research Institute)

Flora Costaricensis: Droseraceae / Luis Diego Gómez (OTS)

Fossils of the Fila de Cal hills, Coto Brus / Eduardo A. Pérez (Ministerio de Ambiente y Energía, Costa Rica)

Genetics of a subdivided Opilionid population / Joshua Mutic (University of Vermont)

Geographic distribution and sexual selection in two species of Manakins (Birds: Pipridae) in Costa Rica / Marina Ancaes (University of Kansas)

Hydnoraceae, Flora Neotropica / Luis Diego Gómez (OTS)

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)

Ontogeny of *Septobasidium* / Liuba Kisimova-Horovitz (Universität Tübingen, Germany), Luis Diego Gómez (OTS)

Phosphorus release and conservation in the litter of a modified Costa Rica slash-mulch bean production system (frijol tapado) / Isidor Ruderfer (University of Georgia)

Predicting bird species diversity from landscape characteristics in southern Costa Rica / Catherine Lindell (Michigan State University) / James Zook

Preliminary checklist of Myxomycetes in primary and secondary forests of Las Cruces Biological Station / Steven Stephenson (Fairmont State College), Martin Schnittler (Fairmont State College)

Research toward sustainable land-use and biodiversity in a mosaic of agriculture and tropical forests / Christopher Peterson (University of Georgia), Bruce Haines (University of Georgia) / Gordon Ward, Steve Franks, Andy Jones (University of Georgia), Randy Figueroa, Manrique Abarca, Audrey Sandí

Resupinate basidiomycetes of Costa Rica / Luis Diego Gómez (OTS), Liuba Kisimova-Horovitz (Universität Tübingen, Germany)

Role of micorhizas in pasture recolonization by a tropical tree / Laura Aldrich-Wolfe (Cornell University)

***Russula* of Costa Rica and Colombia** / Ruth Aldana Gómez (Field Museum)

Science-community partnerships in Latin America / Brian Lutz (Arizona State University)

Song as an indicator of blood parasitism and a predictor of male-mating success in the Cherrie's tanager (*Ramphocelus costaricensis*) / Terry Krueger (University of Miami) / Oscar Amador, Lisa Bakanskas

Spittlebugs of Las Cruces and surrounding area / Vinton Thompson (Roosevelt University) / Ruta Moskovitch

Structural characteristics of coffee plantations and their relationship to bird species diversity / James Zook (freelance), Catherine Lindell (Michigan State University)

Systematics of Costa Rican Lepidoptera / Paul Opler (Colorado State University)

The distribution of *Passiflora* species and associated insects along an altitudinal gradient / Gordon Ward (University of Georgia) / Randy Figueroa, Sergio Ilama

The effects of forest fragmentation on forest insectivorous birds through changes in the insect community / Cagan Sekercioglu (Stanford University) / Parker van Valkenburgh (Stanford University), Randy Figueroa, Jason Figueroa

The evolution of floral characters and reproductive isolation in Neotropical *Costus* / Kathleen Kay (University of Washington) / Michelle Cooper

Tropical intercrop responses to arbuscular mycorrhizas, phosphorus availability and density / Michelle Schroeder (University of Miami)

Visitation rate and foraging behaviour of avian frugivores at fruiting trees in differing agricultural landscapes of southern Costa Rica / Gary Luck (Stanford University)

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

La Selva submitted 300 ha of primary forest to the Costa Rican government's environmental service payments program. This will generate close to \$10,000 a year for five years. Half of these funds will be used to increase surveillance and protection of Braulio Carrillo National Park. The remaining half will be used to finance La Selva's environmental education program. In addition, La Selva staff are working with the Costa Rican government and local organizations on the Río Sarapiquí Watershed Plan and the Sarapiquí's Natural Resources Committee.



A new education building was constructed at La Selva to provide dedicated space for courses.

Facilities and Resources

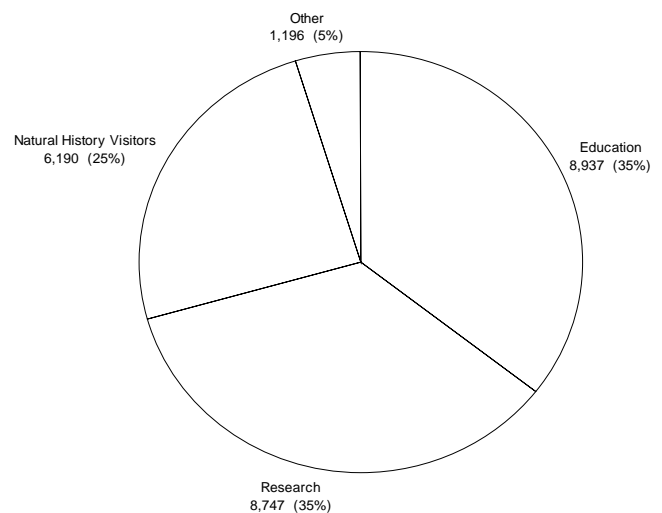
The new education building includes two identical wings with lecture, storage, wet-lab and faculty office space for one course each; the third wing houses two air conditioned laboratories for humidity sensitive equipment, two computer rooms and new space for the library and herbarium. General station maintenance included installing new gutters, painting, repairing roofs, resurfacing the main access road and installing a new waste-water treatment plant. In addition, 950 meters of trails were paved, improving access to the La Selva forest reserve and mitigating erosion. A shelter was constructed at 1,070 m elevation in the Braulio Carrillo-La Selva Corridor to support ALAS' arthropod biodiversity inventory work. The shelter at 1,700 m has since been improved and plans are underway to improve the shelter at 2,000 m. These shelters support important new research along this globally important altitudinal transect.

Publications

In fiscal year 2001, 81 publications based on work conducted at La Selva were published. This included 6 Ph.D. dissertations, 6 Masters, and 2 Licenciatura theses. La Selva's total publication count to date is now 2,237.

Visitation

During fiscal year 2001, 9,030 people visited La Selva. This was a slight increase from the previous year and included 2,894 students, 272 researchers with active projects, and 5,552 natural history visitors (mostly day visitors). In addition to the OTS courses, La Selva hosted 136 groups and courses during the year.



9,030 people visited La Selva in fiscal year 2001 and totaled 25,070 person-days, as outlined above.

Research Highlights

During the year 112 research projects were conducted at La Selva. New long-term projects include:

Distribution of tropical plants in relation to edaphic heterogeneity: Use of indicator species in biodiversity inventories and land use planning - PI: Hanna Tuomisto

Assessing the fine root and mycorrhizal components of net primary production across a tropical rain forest landscape - PIs: Catherine Lovelock; Deborah Clark and Sara Wright.

In other research news, David Clark, Jane Read and Matthew Clark have used 1 m resolution IKONOS satellite imagery to track the survivorship of individual trees, suggesting it may be possible to do tree demography from space.

Research Projects

A comparison of light regimes under human-made multi-species tropical ecosystems and their effect on plant growth / Miguel Cifuentes (North Carolina State University)

A regional land-use map for La Selva / Mauricio Castillo (Instituto Tecnológico de Costa Rica)

A sampling of the Hyliidae of the researchers' swamp / James Watling (Florida International University)

A test of metapopulation incidence function parameters: comparison of predictions from census data and experimental data / Derek Johnson, (University Miami) / Arnaud Raulin (Enita de Bordeaux, France), Yuichiro Suzuki (Bowdoin University), Maya Pierce (Evergreen State College)

***Agalychnis* tree frog ecology** / Michael McCay (University California-Berkeley)

Alternatives for reforestation with native trees in Sarapiquí / Jeremy Haggard (CATIE), Eugenio González (OTS), Juner Torres (Universidad de Costa Rica)

An investigation of existing and proposed hydro-power projects in Sarapiquí, Costa Rica / Elizabeth Anderson (University Georgia) / Laura Ann Schreeg (Michigan State University)

An investigation of structural forest floor heterogeneity and light availability as mechanisms for maintaining the diversity of tree species at La Selva / Laura Ann Schreeg (Michigan State University)

Anti-parasitoid defense mechanisms in tropical lepidopteran larvae / Lee Dyer (Mesa State College) / Craig Dodson (Mesa State College), Grant Gentry (Mesa State College), Monique Hoch (University of Wisconsin)

Ants in barbechas / Robert Dunn (University of Connecticut)

Arthropod diversity in a lowland tropical rain forest / Jack Longino (Evergreen State College), Robert Colwell (University of Connecticut) / Valerie Behan-Pelletier (Agriculture Canada), Danilo Brenes (OTS), John Brown (Southwestern College), Donald Davis (Smithsonian Institution), Katey Fox (Eckerd University), Henry Hespeneheide (University of California-Los Angeles), Carlos Hernández (INBio), Giar Ann Kung (Los Angeles County Museum of Natural History), Evert Lindquist (Agriculture Canada), Piotr Naskrecki (University of Connecticut), Wojciech Niedbata (A. Mickiewicz University, Poland), Kenji Nishida (Universidad de Costa Rica), Nelci Oconotrillo (OTS), Michael Olson (New College), Ziemowit Olszanowski (A. Mickiewicz University, Poland), Maylin Paniagua (OTS), Jens Prena (University of Rostock), Edward Riley (Texas A&M University), Jadranka Rota (University of Connecticut), Michael Sharkey (University of Kentucky), Angel Solís (INBio), Paul Thomas (Field Museum of Chicago), Karl Thunes (Norwegian Forest Research Institute), Ronald Vargas (OTS), David Wagner (University of Connecticut), Rob Westerdoyn (INBio), Manuel Zumbado (INBio).

Arthropods in banana and other tropical monocultures under different pesticide regimes / Robert Matlock (OTS) / Brian Schwartz (OTS)

Bee pollination of trees in a tropical wet forest / Rainer Thiele (Tübingen University, Germany)

Behavior and mathematical modeling of the army ant *Eciton burchelli* / Tim Brown (University of Utah)

Behavioral ecology of *Aphaenogaster araneoides* / Terrence McGlynn (University of California-San Diego) / Melissa Shotell (University of California-San Diego), Megan Kelly (University of California-San Diego)

Behavioral ecology of *Nordus terminalis* (Coleoptera) / Stelios Chatzimanolis (University of Kansas)

- Biodiversity's data base** / Francisco Javier Font Castell (University of Barcelona, Spain)
- Biology of euglossine bees** / Ju-Lin Weng (Universidad de Costa Rica)
- Brood parasitism by Cowbirds (Icteridae) on Montezuma Oropendola** / Emma Cunningham, (Cambridge University, England) / Alejandra Nuñez (University College, England)
- Call variation in *D. pumilio*** / Jonathan Micancin (University of North Carolina)
- Carbon dating of La Selva trees** / Martin Worbes (Göttingen University, Germany), Deborah Clark (University of Missouri-St. Louis)
- Changes in resource acquisition by plants of different life forms as a function of their age and stature** / Jack Ewel (USDA Forest Service), Nalini Nadkarni (Evergreen State College) / J. Alexandra Reich (University of California-Las Angeles), Steve Yanoviak (Evergreen State College)
- Community composition and frog utilization of the rolled-leaf habitat in wetlands associated with tropical dry and wet forest** / Bridgett Chapin (University of Kansas)
- Countryside biogeography of Costa Rica birds** / James Zook (Freelance)
- Current and future carbon budgets for tropical rain forests: a cross-scale analysis (CARBONO)** / David Clark (University of Missouri-St. Louis), Deborah Clark (University of Missouri-St. Louis), Steven Oberbauer (Florida International University), Edzo Veldkamp (Goettingen University, Germany) / Natacha Paola Chacoff (Lieu University), Marianela Fallas (UNA), Hank Loescher (University of Florida), Ana Murillo (UNA), Joseph O'Brien (Florida International University), Jane Read (Syracuse University), Luitgard Schwendenmann (Göttingen University, Germany), Matt Schroeder (Freelance)
- Demography and ecology of the invasive shrub *Clidemia hirta*** / Saara DeWalt (Louisiana State University) / Gareth DeWalt (Louisiana State University)
- Demography and ecophysiology of regeneration of tropical rain forest trees** / David Clark (University Missouri-St. Louis), Deborah Clark (University Missouri-St. Louis)
- Diet shift in leaf-hopper tending by ants and wasps** / James Wetterer (Florida Atlantic University)
- Dietary patterns in a Neotropical lowland rainforest hydrid assemblage** / Scott Boback (Auburn University) / Scott Fitzgerald (Oregon State University)
- Differential seedling survivorship: a search for community level patterns** / Corine Vriesendorp (Michigan State University)
- Dispersal of seeds of three commercial arboreal species, disseminated by vertebrates in fragmented forests in Sarapiquí** / Gabriela Jones (CATIE), Harold Arias (CATIE)
- Dissimilatory nitrate reduction in tropical soils** / Whendee Silver (University of California-Berkeley), Mary Firestone, (University of California-Berkeley) / Eric Dubinsky (University of California- Berkeley), Donald Herman (University of California-Berkeley), Jennifer Pett-Ridge (University of California-Berkeley), Egbert Schwartz (University of California-Berkeley), Andrew Thompson (University of California-Berkeley)
- Distribution and abundance of vascular epiphytes in tropical wet forests: a multiscale approach** / Catherine Cardelús, (University of Connecticut) / James Edward Watkins (University of Florida), Kristie Wendelberger (Freelance)
- Distribution and genetic variation of *Bactris* palms at La Selva** / Sylvia Englund (Thomas J. Watson Foundation)
- Distribution of tropical plants in relation to edaphic heterogeneity: use of indicator species in biodiversity inventories and land-use planning** / Hanna Tuomisto, (University of Turku), David Clark (University Missouri-St. Louis) / Mirkka Jones (University of Turku)
- Distribution of two understory dwarf awasf palms: *Mastiana* and *Cureata*** / Julissa Roncal (Florida International University)
- Dynamics of regeneration in wet tropical forests: establishing a baseline for long-term monitoring** / Robin Chazdon (University of Connecticut), Deborah Lawrence (University of Virginia), Braulio Vilchez (Instituto Tecnológico de Costa Rica) / Laura Cacho (University of Virginia), Luis Diego Carvajal (Instituto Tecnológico de Costa Rica), Jennifer Dolan (Reed College), Alvaro Redondo (Instituto Tecnológico de Costa Rica), Uzay Sezen (University of Connecticut), Vivian Solano (UNA)
- Ecological basis of sustainability in restructured tropical ecosystems** / Jack Ewel (USDA Forest Service) / Ricardo Bedoya Arrieta (OTS), Jenny Pérez (OTS), Angela Mata (Instituto Tecnológico de Costa Rica)



The CARBONO project predicts whole-forest responses based on simple weather and climate data, linking La Selva tree growth to the world carbon cycle.

Ecology and neurobiology of spatial memory in nectar-feeding bats / York Winter, (Munich University, Germany) / Britta Lammers (Erlangen University, Germany), Denisse Tafur Henriquez (Munich University, Germany), Johannes Thiele (Erlangen University, Germany)

Ecology of exclusive male parental care and polygynandry in Tinamous / Patricia Brennan, (Cornell University) / Bernard Brennan (Cornell University), Elfriede Brennan (Freelance)

Ecology of nectar-feeding bats / Otto von Helversen, (Erlangen University, Germany) / Christof Althoff (University Kiel, Germany), Detlev Kelm (Erlangen University, Germany), Kim Podszus (Erlangen University, Germany), Thomas Puettker (University Kiel, Germany), Katja Rex (Munich University, Germany), Katja Soer (Universidad de Costa Rica), Kai Petra Stich (Munich University, Germany)

Ecophysiological leaf monitoring: understory, natural disturbance and openings / Philip Rundel (University of California-Los Angeles) / Arthur Gibson (University of California-Los Angeles) / Arielle Cooley (University of California-Los Angeles), Erin Gibson (University California-Davis), Rasoul Sharifi (University of California-Los Angeles)

Effect of leaf shingling on herbivory rates / Benjamin Strauss (Princeton University)

Effects of abiotic variables on avian distribution patterns / Jai Ranganathan (University of Minnesota)

Effects of volcanic processes on tropical streams / Catherine Pringle (University of Georgia) / Minor Hidalgo (OTS), Nathan Kobun Truelove (Freelance)

Elements of CO², exchange in a tropical forest: soil and bole respiration / Patrick Crill, (Colorado State University) / Andrew Mosedale (University of New Hampshire), Evilene Lopez (University of New Hampshire), Bianca Moebius (University of New Hampshire)

Elevational variation in *Azteca* ant anti-herbivore behavior / Steven Trimble (University of Arkansas)

Evolution of fish egg size in the Cichlidae / Ronald Coleman (University of California-Davis)

Experimental forestry with native and exotic tree species / Eugenio González (OTS)

Factors affecting sex ratio in *Begonia* / John Cozza (University of Miami)

Flora of La Selva / Jay Horn (Duke University)

Floral evolution in *Justicia* spp. (Acanthaceae) / Kathleen Kay (University of Washington)

Floral scent, chemical composition, plant reproductive ecology and evolution / Jette Knudsen (Gothenburg University, Sweden) / Nina Dideriksen (Gothenburg University, Sweden), Clive Nuttman (University of St. Andrews)

Flower water relation in tropical forests / Saharah Moon Chapotin (Harvard University)

Forest regeneration after cacao removal / Carol Horvitz, (University of Miami) / Rachel Beck-King (University of Miami), Mario Blanco (Universidad de Costa Rica), Ronald Lange (University of Miami)

Functional morphology of *Bauhinia* liana stems / Mario Blanco (Universidad de Costa Rica)

Herbivory differences in two color variants of *Triolena hirsuta* and the effect on their population structure / Sarah McCarthy (Michigan State University)

Host and environmental controls on the arbuscular mycorrhizae symbiosis in tropical forests / Catherine Lovelock (Smithsonian Environmental Research Center) / Kelly Andersen (Smithsonian Environmental Research Center)

Hybridization in the genus *Bactris* / William Hahn (Columbia University)

Improved nursery production techniques for five native tree species / Kevyn Wightman (North Carolina State University) / Theodore Shear (North Carolina State University)

Insect competition and pollination of rainforest trees / Joseph Armstrong, (Illinois State University) / Joanne Drabik (Illinois State University), Sara Meguffey (Illinois State University), Richard Swigart (Illinois State University)

Insect herbivores of lowland neotropical rain forest plants: implications of diet breadth and host plant population genetic structure for patterns of insect genetic isolation by distance / Duane D. McKenna (Harvard University)

Interpretation of the soil charcoal record, generation of a phosphorus toposequence map and the investigation of microbial community patterns along the transect in Braulio Carrillo National Park / Beyhan Titiz (University of Denver)

La Selva digital elevation model and streams coverage / José Antonio Guzmán (Instituto Tecnológico de Costa Rica)

Local adaptation in the scale insect *Saissetia coffeae* (Homoptera: Coccidae) / Brian Spitzer (University of California-Davis) / Amy Smith (Freelance), Tierney Berger (University of California-Davis)

Location of army ants by the birds that follow them / Johel Chaves (Universidad de Costa Rica)

Maintenance of bird populations in forest fragments associated with banana plantations / Robert Matlock (OTS) / Ana Margarita Horta (Universidad Nacional de Tucumán), Angela Mata (Instituto Tecnológico de Costa Rica), Brian Schwartz (OTS)

Mating strategies of breeding amphibians / Neil Stuart Osborne (Trent University)

Mechanical defense and locomotor tradeoffs in beetles / Brendan Borrell (University of Texas) / Allison Borrell (University California-Santa Barbara)

Microarthropod roles in ecosystem processes / Jeff Lemieux (Oregon State University), Emilie Grossmann, (Oregon State University) / Michelle Lemieux (Oregon State University)

Molecular analysis of the wild species of the *Bactris* genus / Elena Castillo (Universidad de Costa Rica) / Marielos Mora (Universidad de Costa Rica)

Molecular genetics of native timber trees (*Minuartia*, *Simaruba*, *Hyeronima*) / David Clark (University of Missouri-St. Louis), Deborah Clark (University of Missouri-St. Louis)

Monitoring amphibian populations in the La Selva - Braulio Carrillo biological corridor / Mahmood Sasa (Universidad de Costa Rica) / Alina López (Universidad de Costa Rica), Randall Valverde (Universidad de Costa Rica)

Natural history of the paper wasp *Mischocyttarus collarellus* and behavior of males at the natal nest / Elizabeth Smith (University of Kansas)

Naturally occurring parasitoid levels in tropical banana agroecosystems / Darya Chehrezad (San Jose State University)

Nectar robbing / Helen Young (Middlebury College)

Nutrient content of fruits / Kristen Bell (Oberlin College)

Nutrient dynamics of leaf litter in wet tropical forests of Costa Rica / Tana Wood (University of Virginia), Deborah Lawrence (University of Virginia)

Paleoecology and land-use history of La Selva / Robert Sanford (University of Denver), Sally Horn (University of Tennessee) / Larry Conyers (University of Denver), Jamie Derrick (University of Denver), Chris Malone (University of Denver), Jessica Morris (University of Denver), Brendon McNeil (University of Denver), Dan Ruggles (University Denver), Nathan Wojcik (University of Denver)

Patterns of drift and processes of recolonization by benthic macroinvertebrates in tropical rivers / Luz Boyero (Museo Nacional de Ciencias Naturales, Spain)

Phytogeography of the genus *Trema* in the old- and new-world tropics / James Dalling (University of Illinois-Champaign-Urbana), Rachel Gallery (University of Illinois-Champaign-Urbana)

Piper ant plants and trophic cascades / Deborah Letourneau (University California-San Diego) / Eric Forsberg (University California-Santa Cruz)

Pollinators of *Calyptrogyne ghesbreghtiana* / Marco Tschapka, (University Ulm), Jessica Ludwig (Erlangen University, Germany)

Population genetic structure, a parentage analysis of *Iriartea deltoidea* / Uzay Sezen (University of Connecticut)

Population response of insect herbivores and pathogens to native tree plantations / Heather Snookal (Occidental College)

Protocol for the treatment of the refuse of chemical reagents / Raynon Pomares (Universidad de Costa Rica)

Recruitment limitation, resource-based niches and the maintenance of tropical tree diversity / Richard Kobe (Michigan State University) / Meera Iyer (Michigan State University)

Relationship between three tropical tree species and their soil microbial communities / Keya Chatterjee (University of Virginia), Deborah Lawrence (University of Virginia)

Reproductive strategies of some species of Cyclanthaceae and their associated weevils (Coleoptera: Curculionidae: Derelomini) / Niko Franz (Cornell University)

Reproductive success in the bat *Saccopteryx bilineata* / Christian Voigt (Boston University), Gerald Heckel (Boston University) / Sonja Meister (Erlangen University, Germany), April Ridlon (Freelance)

Reproductive success of tropical trees in small forest fragments: analysis of gene flow, fruit set and inbreeding depression / Catherine Woodward (University of Wisconsin-Madison) / Stephanie Baumann (University of Wisconsin-Madison), Joshua Dunn (Yale University), Joe Meisel (University of Wisconsin-Madison), Anna Trobaugh (University of Wisconsin-Madison)

Roosting ecology of bats / Detlev Kelm (Erlangen University, Germany), Kirsten Jung (Erlangen University, Germany)

Seedling ecology of rare tree species / Yung-Ho (Ophelia) Wang (University of Illinois-Champaign-Urbana), Carol Augspurger (University of Illinois-Champaign-Urbana)

Seeds dispersion by birds in pasturelands in the south of Costa Rica / Frederick Reuben Werner (Cornell University)

Sexual selection and coloration in *Heliconius* butterflies / Adam Boyko (Purdue University)

Signal evolution and speciation in Manakins / John Albert Uy (University of California-Santa Barbara), Adam Stein (University of California-Santa Barbara)

Signal variation and intensity of female anuran preferences / Jaime Bosch (Museo Nacional de Ciencias Naturales, Spain)

Soil organic matter fractions and dynamics in experimental tropical ecosystems / Ann Elizabeth Russell (Iowa State University)

Spatial distribution and temporal stability of *Cecropia* petiole beetle communities / Justin Calabrese (Arizona State University)

Streamflow measurements in two tropical rainforest watersheds / David Genereux (North Carolina State University)

Study on the flight-height of insectivorous bats / Ulrich Marckmann (Erlangen University, Germany)

Systematics and taxonomy of the Poaceae and Cyperaceae / Trevor Hodgkinson (Trinity College, Ireland), Sandra Velthuis (Trinity College, Ireland)

The behavior and ecology of *Azteca pittieri* (Hymenoptera: Formicidae) on *Cordia alliodora* (Boraginaceae) / Chadwick Tillberg (University of Colorado) / Michael Breed (University of Colorado), Kimberly Goetz (University of Colorado), Amber Law (University of Colorado), Reid Coggins (Dartmouth College), Carly Carros (University of Colorado)

The ecology and behavior of army ants / Kjetil Aasen (Museum of Zoology, Norway)

The effects of seasonality on secondary seed dispersal, germination and recruitment of three species of palms at La Selva / Ana Cristina Villegas (OTS), Evan Notman (OTS), Lisa Patrick (Freelance)

The evolution of ant associations in *Piper* subgenus *Macrostachys* / Erick Tepe (University of Miami), María Paz Moreno (University of Miami)

The evolution of reproductive isolation in hummingbird-pollinated *Costus* / Kathleen Kay (University of Washington), Michelle Cooper (University of Washington), Ravi Sawhney (University of Washington)

Traditional herbal medicines in Sarapiquí, La Selva: an ethnobotanical analysis / Stacy Crevello de Sánchez (OTS)

Tree fall direction in La Selva / Ernesto Camelo de Castro (Arizona State University)

Tri-trophic interactions in a lowland wet forest / Lee Dyer (Tulane University) / Craig Dodson (Mesa State College), Angela Smilanich (Mesa State College)

Vocalizations in *Dendrobates pumilio* / Kirsten Hines (Florida International University)

Wing sounds produced by Manakins / Kimberly Bostwick (University of Kansas)

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

A project was developed with funding from Ducks Unlimited on restoring and conserving the wetlands of the Tempisque River Basin. The Tempisque River Basin (which includes Palo Verde National Park) is one of the most important refuges and nesting areas in Central America for resident and migratory waterfowl. Although this project is on going, two major activities were completed during the year: the 75 ha La Jacinta wetland was restored and systematic and regular surveys of aquatic bird species were conducted. A series of activities were also coordinated as part of the initiative for the Tempisque River Basin, including the JICA-funded Regional Network of Monitoring Wells. In addition, Palo Verde staff coordinated the Advisory Committee for Research in Palo Verde National Park. This Committee provides support and feedback on the development and management of the Park.

Publications

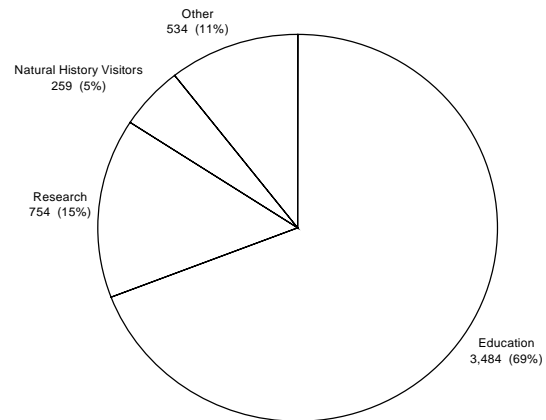
In fiscal year 2001, 10 publications based on work conducted at Palo Verde were published, bringing the total publication count to 427.



The Palo Verde lab houses the Geographic Information System (GIS) for the Tempisque River Basin.

Visitation

During fiscal year 2001, 2,393 people visited Palo Verde. This was a 19% increase from the previous year and included 1,578 students, 277 researchers, and 183 natural history visitors. Natural history visitors suffered a severe decline during the year due mainly to the cancellation of the Elderhostel program. Station usage by researchers increased notably, resulting from recent station improvements (electricity, telephone, internet, databases).



2,393 people visited Palo Verde in fiscal year 2001 and totaled 5,031 person days, as outlined above.

Facilities and Resources

Internet service was connected and station visitors now have reliable access to the Internet 24-hours a day from the public computer in the library. A digital microwave radio communication system was installed and allows transmission of images, voices and data. Recent additions to the library include Doug Gill's (U. Maryland) guides for flowering plants, anurans and reptiles, and mammals of Palo Verde and INBio's bilingual guide to *The Common Trees of Palo Verde National Park*. As part of the initiative for the Tempisque River Basin in the CR-USA Project, the *Bibliographic Database for the Tempisque River Basin* was completed and is available through the Internet and is fully integrated in the OTS BINABITROP database. A GIS system for the Tempisque River Basin was also completed and is currently based at the station. This database has 156 up-to-date digital layers of information.

Research Projects

During the year, 19 researchers conducted 14 projects at Palo Verde.

Countryside biogeography of Costa Rica birds / James Zook (Freelance)

Evaluation of possible differences between *Alouatta palliata* and *Cebus capucinus* as seed dispersers in a tropical dry forest / Catherine Numa (Universidad Nacional de Colombia), Elizabeth Wehncke (Museo Nacional de Argentina)

Foraging in the ant-lion: The harmful effect induced by the predator on the behavior of its prey and the predator's foraging decisions / Brad Dickey (University of Kentucky)

Gene flow into tropical forest fragments / James L. Hamrick (University of Georgia), Victoria Apsit (University of Georgia), Dorset Trapnell (University of Georgia)

Genetic variation in wild and cultivated populations of *Spondias purpurea* / Allison J. Miller (Washington University)

Guidelines for integrated management of the lower Tempisque Basin / Jorge Jiménez (OTS), Eugenio González (OTS)

How do *Centris* males find their sleeping place? / Eva Toth (Rice University)

Long-term dynamics of a seasonally-dry forest in Costa Rica / Heather A. Passmore (Louisiana State University)

Microhabitat of rolled-leaves in wetlands associated with dry and wet forests: Invertebrate communities and usage patterns by frogs / Bridgett K. Chapin (University of Kansas)

Population genetics of *Azteca pittieri* (Hymenoptera: Formicidae: Dolichoderinae) in Costa Rica: Does human activity alter natural patterns of allele dispersal? / Chadwick V. Tillberg (University of Colorado)

Population size, production and foraging sites of the Jabiru in the Tempisque River Basin / Johny Villarreal O. (Universidad Nacional, Costa Rica), Carmen Hidalgo C. (Universidad Nacional, Costa Rica)

Stem contortion development in monkey ladder lianas (*Bauhinia* spp.) / Mario Blanco (Universidad de Costa Rica)

The effects of spatial and temporal heterogeneity in light and soil resources on seedling survival and growth in a tropical dry forest / Meera Iyer (Michigan State University)

When the cupboards are bare: The effect of seasonality on an ant-plant mutualism in a tropical dry forest / Víctor Daniel Carmona (University of Arkansas)

The gene flow into tropical forest fragments project studies the effects of forest fragmentation on the breeding patterns of tropical trees.



Development

Annual Fund

The Annual Fund totaled \$266,000 in unrestricted revenues in fiscal year 2001. Gifts to the Annual Fund are especially important to the overall health of the organization, as they support the on-going operations of the Organization.

Restricted Grants and Contracts

The following grants and contracts were awarded to OTS in fiscal year 2001:

Donor	Purpose	Amount
Andrew W. Mellon Foundation	Endowment	\$1,000,000
Andrew W. Mellon Foundation	Planning grant for South Africa Initiative	\$50,000
Andrew W. Mellon Foundation	David and Deborah Clark's research project at La Selva	\$260,000
Andrew W. Mellon Foundation	Endowment match	\$500,748
Andrew W. Mellon Foundation	Minority Scholars Program	\$250,000
Anonymous	New administrative center in Costa Rica	\$75,000
Coca-Cola Foundation	Minority Scholars Program	\$25,000
William and Flora Hewlett Foundation	Environmental Science and Policy Program in Latin America	\$300,000
Michigan State University (subcontract)	Richard Kobe's research project at La Selva	101,039
National Science Foundation	ALAS IV research project at La Selva	\$959,075
National Science Foundation	La Selva infrastructure improvement	\$184,333
National Science Foundation	REU supplement for Jack Ewel's research project	\$6,400
Richard H. Simons Charitable Trust	New administrative center in Costa Rica	\$350,000
U.S. Fish and Wildlife Service	Wetlands course in the Lower Tempisque	\$10,000
U.S. Fish and Wildlife Service	Latin American Decision-Makers course	\$25,000
U.S. Fish and Wildlife Service	U.S. Decision-Makers course	\$25,000
U.S. Fish and Wildlife Service	Wildlands Management	\$60,000
		\$4,181,595

Donors

A special thank you to the following individuals, foundations, corporations and government agencies for their support in fiscal year 2001. 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 OTS throughout fiscal year 2001. These gifts included equipment, books, periodicals, research equipment and services. A very 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 the organization.

Grand Sponsors (\$100,000 +)

Andrew W. Mellon Foundation
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 Costa Rica-U.S.A. Foundation
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 William and Flora Hewlett Foundation

Major Benefactors (\$20,000 +)

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 Jonathan Fink
 Steve and Louise Fredericks
 William and Darlene Fredericks
 Gadsden High School

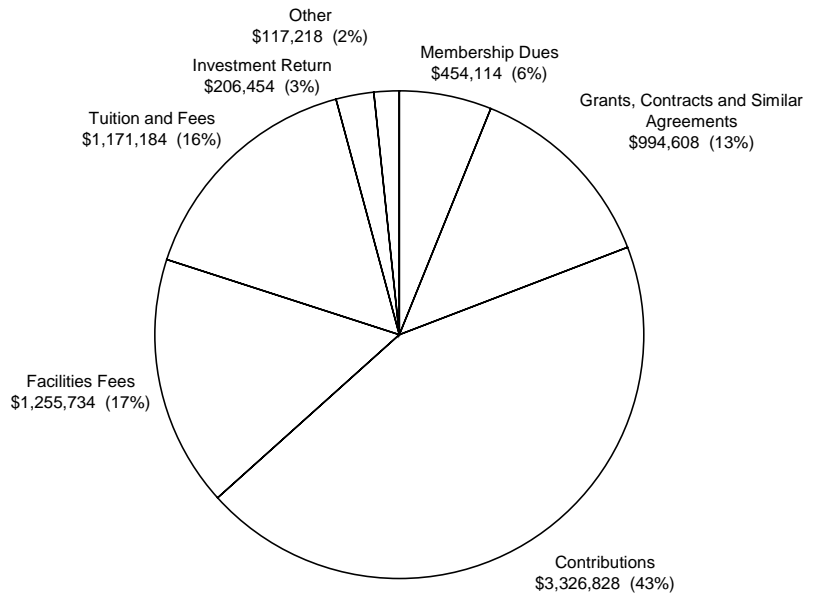
Phyllis R. Gertis
 Carol Goodell
 Richard H. Goodwin
 Alice S. Graefe
 Nancy Greig
 Willard and Mary Hartman
 Clinton and Rose Heard
 Walter and Barbara Hodge
 Carol C. Horvitz Nutt
 Hotel Villa Lapas
 Mrs. Thomas J. Hubbard
 James H. Hunt
 Thomas V. Jackson
 Albert G. Joerger
 Sheldon Kaplan
 Elysabeth Kleinhans
 Clark and Lyla Lampson
 Richard and Carol Laursen
 Egbert G. Leigh, Jr.
 Alan Levine
 Joseph Levine
 Fred Levinson
 Bette Loiselle and John Blake
 George and Alice Luchento
 Robert B. Matlock
 Meredith McBurney
 Rogers McVaugh
 Gary K. Meffe
 Robert and Vicki Murphy
 National Starch & Chemical Matching Gifts
 Peter K. Nelson
 David and Tamar Nicolson
 Paul A. Opler
 John W. Pankhurst
 Ronald H. Petersen
 F. Harvey Pough
 Laurel R. Prevetti
 Quatre Vents Foundation
 Eleanor A. Richmond
 Robert Ricklefs and Susanne Renner
 Michael and Annice Rosenthal
 Rudy L. Ruggles, Jr.
 Shirley W. Sarver
 John R. Sauer
 David Schubert
 Theodore Shear and Francine Durso
 Charles and Yolanda Shemely
 Sinauer Associates Inc.
 Charles Stanberry and Helene Dublisky
 Michael and Karen Taylor
 Terra Incognita
 Carter and Mary Thacher
 Allen Thoma and Diane Fong
 Russell E. Train
 Robert and Joan Tweit
 E. Douglas Waits and Elizabeth Waits
 Nathaniel and Genie Wheelwright
 John and Sandra Williams
 Richard and Kathy Williams
 Don and Kathleen Wilson
 Edward O. Wilson
 David H. Wise
 Donald E. Wiseman
 Chris and Vorna Young

Finances

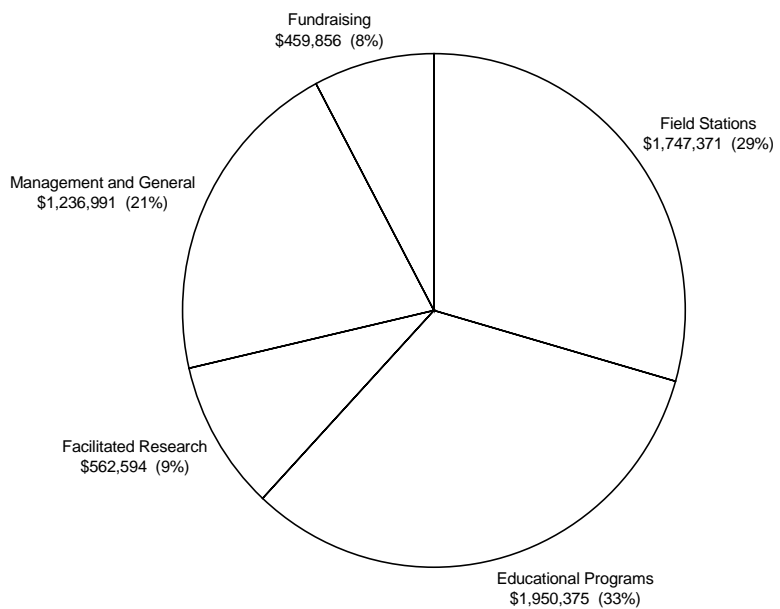
Fiscal year 2001 resulted in a growth of new assets of \$1,568,953, due in large part to restricted grants for the OTS endowments. The organization showed a modest (\$30,851) decrease in total unrestricted assets as the result of a lower than expected Annual Fund.

The following audited financial statements contain columns for both OTS and for ESINTRO, the for-profit subsidiary in Costa Rica created in 1995 to handle OTS sales and related taxable items.

Support and Revenue \$7,526,140



Expenses \$5,957,187



Audited Financial Statements

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, 2001, 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 2000 financial statements and, in our report dated February 23, 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 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, 2001 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.

December 14, 2001

KPMG LLP

ORGANIZATION FOR TROPICAL STUDIES, INC. AND SUBSIDIARY

Consolidated Statement of Financial Position

June 30, 2001

(with comparative financial information as of June 30, 2000)

Assets	Supplementary Information			
	Organization for Tropical Studies, Inc.	ESINTRO	2001 Total	2000 Total
Cash and cash equivalents (notes 3 and 7)	\$551,657	39,780	591,437	1,523,747
Accounts receivable, less allowance for doubtful accounts of \$149,236 in 2001 and \$18,476 in 2000 (note 6)	484,892	37,792	522,684	298,745
Grants and contributions receivable, net	279,731	—	279,731	144,907
Investments (note 3)	5,468,183	—	5,468,183	3,725,854
Land, buildings and equipment, net (note 4)	2,936,656	12,256	2,948,912	2,576,376
Other assets	104,643	82,313	186,956	84,421
Total assets	\$9,825,762	172,141	9,997,903	8,354,050
Liabilities and Net Assets				
Liabilities:				
Accounts payable	113,123	13,029	126,152	32,881
Other liabilities	503,458	14,238	517,696	549,828
Accumulated postretirement benefit liability (note 8)	143,747	—	143,747	129,986
Total liabilities	760,328	27,267	787,595	712,695
Net assets:				
Unrestricted (notes 5 and 7)	4,430,242	144,874	4,575,116	4,605,967
Temporarily restricted (note 5)	2,335,276	—	2,335,276	2,088,902
Permanently restricted (note 5)	2,299,916	—	2,299,916	946,486
Total net assets	9,065,434	144,874	9,210,308	7,641,355
Contingencies (note 7)				
Total liabilities and net assets	\$9,825,762	172,141	9,997,903	8,354,050

See accompanying notes to consolidated financial statements.

ORGANIZATION FOR TROPICAL STUDIES, INC. AND SUBSIDIARY

Consolidated Statement of Activities

Year ended June 30, 2001

(with summarized financial information for the year ended June 30, 2000)

Supplementary Information

Organization for Tropical Studies, Inc.	ESINTRO	Total	Temporarily	Permanently	2001	2000
Unrestricted	Unrestricted	Unrestricted	Restricted	Restricted	Total	Total

Revenues and other support:

Operating revenues:

Membership dues	\$454,114	—	454,114	—	—	454,114	444,400
Grants, contracts and similar agreements (note 6)	994,608	—	994,608	—	—	994,608	990,252
Contributions	650,208	—	650,208	1,276,190	1,353,430	3,279,828	1,197,851
Facilities fees	764,188	491,546	1,255,734	—	—	1,255,734	1,329,393
Tuition and fees	1,171,184	—	1,171,184	—	—	1,171,184	1,013,010
Investment income	159,668	—	159,668	217,333	—	377,001	263,987
Unrealized loss on investments	(60,935)	—	(60,935)	(109,612)	—	(170,547)	(9,274)
Contributed services and facilities (note 6)	47,000	—	47,000	—	—	47,000	43,700
Other	117,218	—	117,218	—	—	117,218	35,934
Total operating revenues	4,297,253	491,546	4,788,799	1,383,911	1,353,430	7,526,140	5,309,253

Net assets released from restrictions (note 5)	1,137,537	—	1,137,537	(1,137,537)	—	—	—
Total revenues and other support	5,434,790	491,546	5,926,336	246,374	1,353,430	7,526,140	5,309,253

Expenses:

Program expenses:

Field stations	1,316,585	430,786	1,747,371	—	—	1,747,371	1,319,315
Educational programs	1,950,375	—	1,950,375	—	—	1,950,375	2,007,206
Facilitated research	562,594	—	562,594	—	—	562,594	569,911
Total program expenses	3,829,554	430,786	4,260,340	—	—	4,260,340	3,896,432

Management and general	1,236,991	—	1,236,991	—	—	1,236,991	965,055
Fundraising	459,856	—	459,856	—	—	459,856	297,550

Total management, general and fundraising expenses	1,696,847	—	1,696,847	—	—	1,696,847	1,262,605
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Total expenses	5,526,401	430,786	5,957,187	—	—	5,957,187	5,159,037
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Change in net assets	(91,611)	60,760	(30,851)	246,374	1,353,430	1,568,953	150,216
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Net assets at beginning of year	4,521,853	84,114	4,605,967	2,088,902	946,486	7,641,355	7,491,139
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Net assets at end of year	\$4,430,242	144,874	4,575,116	2,335,276	2,299,916	9,210,308	7,641,355
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See accompanying notes to consolidated financial statements.

ORGANIZATION FOR TROPICAL STUDIES, INC. AND SUBSIDIARY

Consolidated Statement of Cash Flows

Year ended June 30, 2001

(with comparative financial information for the year ended June 30, 2000)

	<u>Supplementary Information</u>			
	Organization			
	for Tropical			
	Studies, Inc. ESINTRO 2001 Total 2000 Total			
	<hr/>			
Cash flows from operating activities:				
Change in net assets	\$1,508,193	60,760	1,568,953	150,216
Adjustments to reconcile change in net assets to net cash provided by operating activities:				
Depreciation on property and equipment	286,292	1,210	287,502	285,437
Gain on sale of property and equipment	(65,400)	—	(65,400)	—
Increase in accounts receivable	(219,721)	(4,218)	(223,939)	(186,655)
Increase in grants and contributions receivable	(134,824)	—	(134,824)	(121,506)
Increase in other assets	(66,961)	(35,574)	(102,535)	(9,303)
(Decrease) increase in accounts payable and other liabilities	57,148	3,991	61,139	136,538
Increase in accumulated postretirement benefit liability	13,761	—	13,761	13,188
Contributions restricted for permanent endowments	(1,353,430)	—	(1,353,430)	(33,358)
Net unrealized loss on investments	170,547	—	170,547	9,274
	<hr/>			
Net cash provided by operating activities	195,605	26,169	221,774	243,831
	<hr/>			
Cash flows from investing activities:				
Purchases of property and equipment	(681,630)	(6,314)	(687,944)	(230,182)
Proceeds from sales of property and equipment	93,306	—	93,306	—
Purchases of investments	(2,379,100)	—	(2,379,100)	(461,226)
Net proceeds from sales of investments	466,224	—	466,224	577,455
	<hr/>			
Net cash used in investing activities	(2,501,200)	(6,314)	(2,507,514)	(113,953)
	<hr/>			
Cash flows from financing activities:				
Contributions restricted for permanent endowments	1,353,430	—	1,353,430	33,358
	<hr/>			
Net cash provided by financing activities	1,353,430	—	1,353,430	33,358
	<hr/>			
(Decrease) increase in cash and cash equivalents	(952,165)	19,855	(932,310)	163,236
	<hr/>			
Cash and cash equivalents at beginning of year	1,503,822	19,925	1,523,747	1,360,511
	<hr/>			
Cash and cash equivalents at end of year	\$551,657	39,780	591,437	1,523,747
	<hr/> <hr/>			

See accompanying notes to consolidated financial statements.

ORGANIZATION FOR TROPICAL STUDIES, INC. AND SUBSIDIARY

Notes to Consolidated Financial Statements

June 30, 2001

(with comparative financial information for the year ended June 30, 2000)

(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.

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.

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, 2001 and 2000 is as follows:

		2001		2000	
		Costa Rican	Total	Costa Rican	Total
		Operations	Operations	Operations	Operations
Total assets	\$	3,300,783	9,997,903	2,812,392	8,354,050
Total liabilities		183,677	787,595	160,124	712,695
Total revenue and other support		2,592,334	7,526,140	2,313,148	5,309,253
Total expenses		4,645,865	5,957,187	5,117,418	5,159,037

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.

The Organization is exempt from Federal income taxes under Section 501(c)(3) of the Internal Revenue Code.

(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) 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.

(d) 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.

(e) 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.

Revenues from sources other than contributions are reported as increases in unrestricted net assets. Contributions are reported as increases in the appropriate category of net assets, except that contributions which impose restrictions that are met in the same fiscal year they are received are included in unrestricted revenues. 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 recognized 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. Temporary restrictions on gifts to acquire long-lived assets are considered met in the period in which the assets are acquired or placed in service.

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.

(f) 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 329.07 and 308.70 colones as of June 30, 2001 and 2000, 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 305.00 to 329.07 and 282.00 to 308.70 colones to the U.S. dollar during fiscal years 2001 and 2000, respectively. The translation of foreign currencies resulted in a gain of \$209 and a loss of \$2,195 for fiscal years 2001 and 2000, respectively, which are included in the accompanying consolidated statement of activities.

(g) 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.

(h) 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.

(i) 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, 2000, from which the comparative information was derived.

(j) Reclassifications

Certain reclassifications have been made to the 2000 summarized comparative information to conform with the 2001 presentation.

(3) Investments

Temporary investments of \$37,429 and \$257,415 which are included in cash and cash equivalents at June 30, 2001 and 2000, respectively, were invested in money market accounts, earning interest at 4.12% and 5.27% at June 30, 2001 and 2000, respectively. Investments at June 30, 2001 and 2000 consist of the following:

	<u>2001</u>	<u>2000</u>
Stocks	\$5,333	1,334
Bonds	1,514,767	1,490,393
Mutual funds:		
Common stocks	2,462,278	1,416,553
Corporate bonds	1,485,805	817,574
	<u>\$5,468,183</u>	<u>3,725,854</u>

(4) Land, Buildings and Equipment

Land, buildings and equipment are summarized at June 30, 2001 and 2000 as follows:

	<u>2001</u>	<u>2000</u>
Land	\$786,028	786,028
Land improvements	448,528	433,261
Buildings and improvements	2,689,306	2,287,798
Motor vehicles	486,112	405,810
Equipment	1,499,088	1,475,392
Furniture and furnishings	14,398	14,398
Construction-in-progress	64,272	49,524
	<u>5,987,732</u>	<u>5,452,211</u>
Less accumulated depreciation	(3,038,820)	(2,875,835)
	<u>\$2,948,912</u>	<u>2,576,376</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, 2001 and 2000 have been invested in property and equipment or are designated for specific uses.

Unrestricted net assets consist of the following at June 30, 2001 and 2000:

	<u>2001</u>	<u>2000</u>
Net investment in property and equipment	\$2,948,912	2,576,376
Funds designated by governing board:		
Estimated severance pay	206,062	219,031
Asset renewal	610,824	1,115,431
Organizational support	543,451	472,456
Unrestricted and undesignated	<u>265,867</u>	<u>222,673</u>
	<u>\$4,575,116</u>	<u>4,605,967</u>

Temporarily restricted net assets consist of the following at June 30, 2001 and 2000:

	<u>2001</u>	<u>2000</u>
Term endowment funds to be used for fellowships	\$97,598	416,202
Contributions for station improvements and land acquisition	273,947	201,145
Educational programs	1,963,731	1,471,555
	<u>\$2,335,276</u>	<u>2,088,902</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 \$1,137,537 in expenses for fellowships, station improvements, land acquisition and educational programs in 2001. Permanently restricted net assets at June 30, 2001 and 2000 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 \$704,453 in fiscal year 2001 and \$947,872 in fiscal year 2000. Accounts receivable at June 30, 2001 and 2000 include \$90,566 and \$52,732, respectively, due from Duke University for amounts expended for grant purposes but not yet reimbursed.

During 2001 and 2000, 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 \$983,746 and \$902,537 for the years ended June 30, 2001 and 2000, 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 \$47,000 and \$43,700 in 2001 and 2000, 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, 2001 and 2000 without just cause, the liability for severance pay would be \$206,062 and \$219,031, respectively. The Organization has designated cash of the identical amounts to make payments under the law, if necessary. The Board of Directors has designated a portion of the unrestricted net assets for the estimated contingent severance pay liability. Severance payments would be made from the designated net assets, and an amount equal to each year's increase or decrease in estimated liability will be transferred to or from the designated net assets. Payment of such contingent liability is not probable at June 30, 2001 and, accordingly, such amount is not recorded as a liability in the accompanying consolidated statement of financial position.

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 footnote 6 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 \$13,761 and \$13,188 for the years ended June 30, 2001 and 2000, respectively, and the associated liability was \$143,747 and \$129,986 as of June 30, 2001 and 2000, 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.

