

Environmental Field Studies Abroad

1997/1998 COURSE CATALOGUE

THE SCHOOL FOR FIELD STUDIES



The world is your classroom



Semester & Summer Environmental Field Studies Programs

Wildlife Management Studies – KENYA

Marine Resource Studies – BRITISH WEST INDIES

Wetland Studies – BAJA, MEXICO

Coastal Studies – PACIFIC NORTHWEST CANADA

Sustainable Development Studies – COSTA RICA

Rainforest Studies – AUSTRALIA

The World Is Your Classroom *Environmental Field Studies Abroad*

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The Mission

*of The School for Field Studies
is to provide motivated young people
from the U.S. and abroad
with an excellent practical education
in environmental studies,
in order that they
may become more environmentally literate
and aware and make immediate and future
contributions toward the sustainable
management of the world's
natural resources.*

Photos Above: Ed Stashko, Meghan Kelly, Gregg Benan, Pete Coppolillo.
Snorkeling in the clear turquoise waters off South Cayuga Island.
Photo: Matt Weedon.



SFS is the country's oldest and largest educational institution exclusively dedicated to teaching and engaging undergraduates in environmental problem solving. Since our founding in 1980, over 7,500 college and high school students, with a variety of academic interests, have conducted hands-on field work in SFS programs around the world.

Students in fall and spring semester programs and intense 30 day summer courses at the six SFS field study centers earn college credit for participating in real-life field studies of challenging environmental dilemmas. Critical issues addressed by SFS teams include preserving entire ecosystems or individual species, balancing economic development and conservation, and finding ways to manage and maintain wildlife, marine and agricultural resources.

THE SCHOOL FOR FIELD STUDIES

SFS CENTERS AND PROGRAMS

Fall and Spring Semester and 30 Day Summer Programs are Offered at These SFS Centers

The Center for Wildlife Management Studies – KENYA
Semester Program: Wildlife Ecology & Management
Summer Course: Community Wildlife Management

The Center for Marine Resource Studies – BRITISH WEST INDIES
Semester Program: Marine Resource Management
Summer Course: Marine Parks Management

The Center for Wetland Studies – BAJA, MEXICO
Semester Program: Wetland Management: Preserving an Ecosystem, an Economy, and a Community
Summer Course: Preserving Coastal Wetland Diversity

The Center for Coastal Studies – PACIFIC NORTHWEST CANADA
Semester Program: Coastal Rainforests & Marine Resources
Summer Course: Conserving Marine Resources & Coastal Rainforests

The Center for Sustainable Development Studies – COSTA RICA
Semester Program: Studies in Sustainable Development
Summer Course: Alternative Strategies for Preserving Tropical Ecosystems

The Center for Rainforest Studies – AUSTRALIA
Semester Program: Tropical Rainforest Management
Summer Course: Tropical Reforestation

Photos Above: David Silverberg, Jonathan Vlahos

Letter From the President

If you were assuming that your research experience doesn't begin until you get to the field, think again - your most important research needs to start right now as you investigate environmental field study programs. After asking the who, why, what, where and how questions, I believe you'll find The School for Field Studies (SFS) stands alone as the best of your options. **We offer the only opportunity to both learn about and work to solve critical environmental problems.**

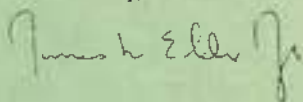
For us at SFS, environmental studies isn't one of many program options, it's our only program - and has been our sole focus for the 16 years of SFS's history. SFS is operated and staffed by experts in environmental education and by environmental professionals. Our programs are carefully located in communities facing complex environmental dilemmas where we think we can make a difference. Once such a community is identified, we commit the resources necessary to successfully address their critical environmental issues by establishing a fully operational Center with facilities, equipment and expertise. Our commitment is in turn rewarded with the opportunity to learn about and work on real problems where our recommendations and fieldwork results are respected and used.

In contrast, did anyone use the conclusions in your last term paper? Did the results of your last lab experiment make a difference to anyone other than your instructor? Do you know how to apply what you learned from these exercises in the future? SFS students can answer these questions with an unqualified and enthusiastic YES. They can tell you about the local stakeholders, from Maasai group ranchers in Kenya, to farmers in Australia, to First Nation groups in British Columbia, with whom they worked to make a difference.

On the following pages, you'll meet the students and faculty of SFS. We've tried to give you a sense, in their own words, of how an SFS program impacted the studies, friendships, perspectives and careers of our participants. Many of our over 7,500 alumni are eager and available to talk directly with you - to access the SFS Peer Counselor Network and speak with an alumnus from your area, school, or the program you're considering, please call the Admissions Office.

Good luck with that research, we're counting on your putting it to good use.

Sincerely,



Jim Elder, President



Photo: Blair McCaw

P.S. Don't let finances keep you from an SFS program. SFS financial aid, totaling over \$500,000 a year, assists one in three SFS participants. Call the Admissions Office for details.

Careful consideration has gone into the decisions on where to locate our six field study centers. Center locations must provide a suitable laboratory in which we can learn about the complex, interrelated nature of most environmental problems. For this reason, we seek to locate in resource dependent communities. These communities must actively demonstrate an interest in the work SFS is doing and request SFS assistance in addressing their resource use issues. At the same time, the site's natural beauty should help reinforce our shared motivation to utilize our natural resources wisely.

Once we have identified a location which meets these criteria, SFS makes a significant investment in developing and supporting the Center's facilities. This includes acquiring housing, classrooms, laboratories, libraries, computer centers, vehicles and research equipment. Whenever possible, Centers employ conservation measures such as solar energy, composting, recycling and wastewater treatments, to serve as "green models" for students and the community.

A stable home base allows us to undertake longterm projects and enables staff to develop strong relationships with the local community and partnerships with regional management agencies. We are working on real problems for real people - which enables students to gain another, sometimes contrary, perspective regarding resource use. And because of these ties and partnerships, chances are high that our results will be used and our efforts will make a difference.

Learn And Work



The Center for Wildlife Management Studies is located on an 81 square kilometer game ranch on the Kenyan savanna. Wildlife in Kenya generates needed revenue from international tourists yet, with the human population increasing, many Kenyans view wildlife as a competitor for water and space. The Center location provides a base from which we can learn about and evaluate the effectiveness of various wildlife management techniques in protected and open range venues. Working with managers from local game ranches and tribal group ranches, our goal is to develop management plans for sustainable wildlife use based on the habitat under investigation.

The Center for Marine Resource Studies is located on the shore of South Caicos Island in the British West Indies. The economy here is almost entirely dependent on conch and lobster fisheries. Working with government agencies, fish processing plants and local residents, we are researching local marine resources to determine if they can sustain the South Caicos economy and what management techniques might make the fisheries sustainable and the fishing industry more efficient.

The Center for Rainforest Studies sits on 153 acres of primary and secondary rainforest in Far North Queensland, Australia. Surrounding forests are now protected but landowners, many of whom are farmers, struggle with conflicts regarding land use, preservation and restoration. The Center's location allows us to explore rainforest dynamics and apply this information to the restoration of currently degraded lands. Government agencies, local conservation groups and farmers are partners in our efforts here.

The Center for Sustainable Development Studies is located on a small farm in Costa Rica's Central Valley, within easy access to a range of habitats and land use models. Agriculture,

Working with local residents, First Nation communities, logging companies, local government and resource managers gives us an opportunity to understand the complexities of the issues in this ecologically rich and rare region.

The Center for Wetland Studies is based outside a small Mexican fishing village on the shores of Magdalena Bay, one of the largest remaining intact wetlands on the Pacific coast. Most residents are economically dependent on the Bay's resources (including fish, shellfish, marine mammals, sea turtles and mangroves) and are exploiting these resources at a rate that has already led to the commercial extinction of some species. Working with government agencies, Mexican and U.S. conservation groups and local residents, we are working to develop recommendations for the sustainable use of the Bay's resources as well as alternative employment options for local residents.



Where You Can Make A Difference

including coffee, bananas and pineapples, is a primary income source for the country along with a growing eco-tourist industry. Land is limited and using it sustainably and effectively is an increasing concern.

Working with government agencies, private organizations and local farming cooperatives, we are evaluating alternative, sustainable land management models for local communities.

The Center for Coastal Studies, on Vancouver Island's Pacific coast, lies within some of earth's only remaining temperate rainforests. These coastal and rainforest systems support fishing, logging and related industries that form the basis of the provincial economy. Controversial land use decisions have polarized local communities; ecological information and management recommendations are needed as decisions with significant economic and environmental implications, are made about future rates and methods of logging and reforestation.



Photo: Wayne Whitehead, Sergei Dedina,
Ed Bashko, Bob Singer, Chris Vazgryn,
David Silverberg, Don Groll

Who Goes On An SFS Program

WORK CLOSELY WITH PEOPLE WHO SHARE SIMILAR GOALS AND INTERESTS.

Each SFS team consists of a field director, three full-time faculty and additional staff, and no more than 32 students. Each year students come to SFS from over 150 public and private high schools, colleges, and universities. (For a partial list of home schools please see page 40). They major in everything from science to economics to liberal arts. They come from across North America and from many other countries. Most semester participants are college sophomores, juniors and seniors; summer participants range in age from 16 to the mid-twenties. Approximately one in three SFS participants receives financial aid from SFS to enable their participation; others are able to access federal aid programs and assistance from their home schools. Please see page 42 or call the SFS Admissions Office at (508) 927-7777 for financial aid information.



"I had never gone camping before, not even in my backyard. The rest of the group had bombarded me with wonderful expectations but I simply didn't know how I would cope without running water overnight, let alone for three nights and four days! I survived the first night in a tent, in fact, I survived the five consecutive trips and was almost sad to return to the Center after the last trip."

Toni M. Schossler,
Oil City, PA - Davidson College



Although SFS students come from diverse backgrounds, they all share a commitment to learning, a concern for the environment, and a desire to make a real contribution to the future of our planet.

ALUMNI COUNSELORS

A network of over 100 SFS alumni are ready and eager to share their experiences with you. To get a first-hand, student perspective please call the SFS Admissions Office at (508) 927-7777. We will put you in touch with an alumnus from your region, school or the program(s) you are considering.

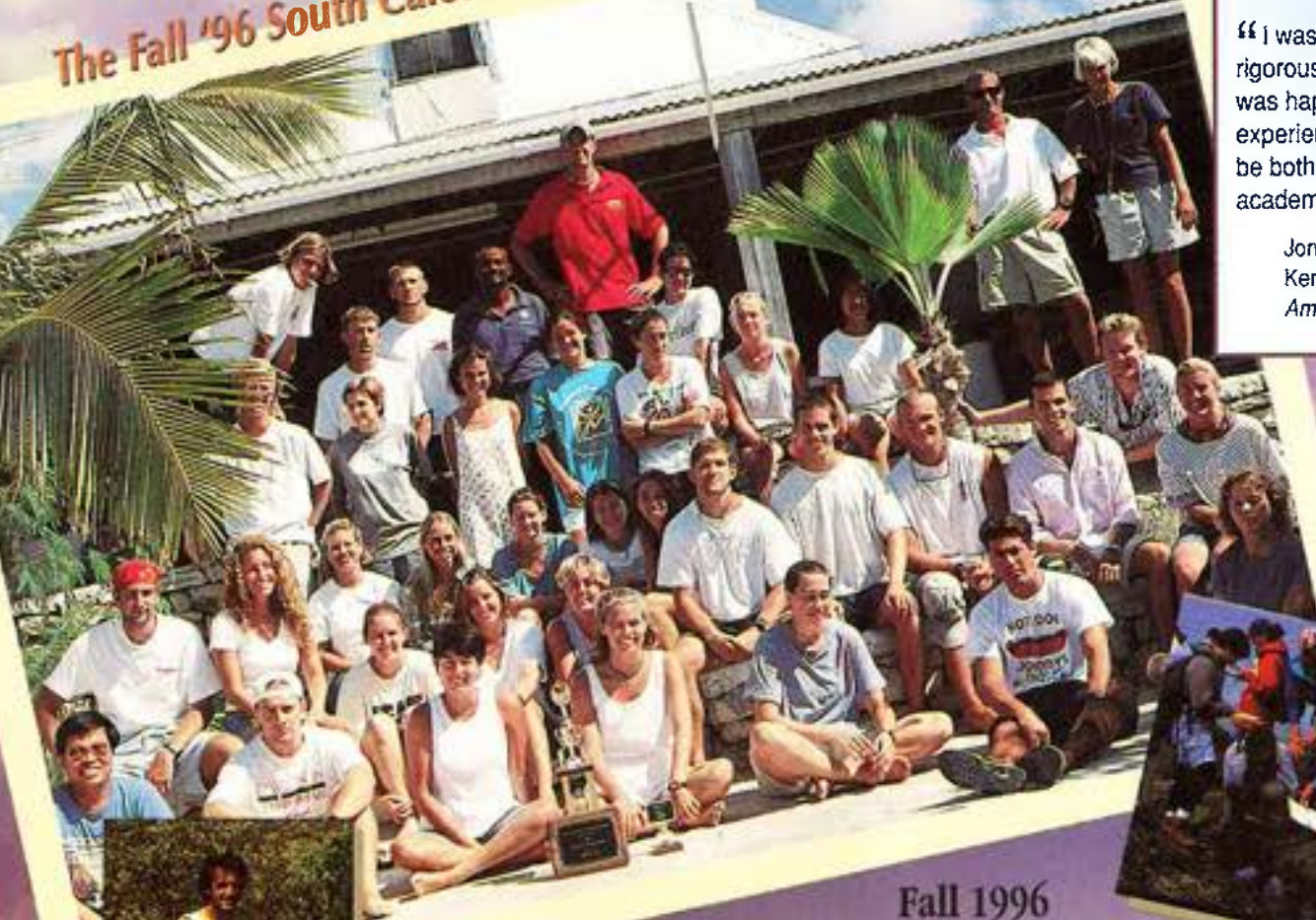


"The other students were wonderful. You can't help but get along with people who have interests similar enough to yours to inspire them to also take part in this program. The great thing was that even though we all shared similar interests, we had different reasons for those interests and different backgrounds."

Stacie Lichon,
Knoxville, TN -
University of Tennessee

Photos: David Battaglia, David Silvestro,
Al Toner, Gregg Thurman, Phil Davison,
Julia Newman, Chris Vuong

The Fall '96 South Caicos Team



"I was looking for a rigorous program and was happy to find my experience in Kenya to be both challenging and academically fulfilling."

Jonathan Vlahos,
Kensington, CA -
Amherst College



Fall 1996 Team At The Center For Marine Resource Studies

Joshua Aalberg, Schuair, MA
Biology/Psych, Keananau Polytechnic Inst.
Stephanie Andros, S. Deerfield, MA
Biology, Colby College
Iain Baker, San Francisco, CA
Env. Studies, Connecticut College
Cecilia Betancourt, Miami Beach, FL
Biology, Williams College
Kimberly Birge, Waterford, CT
Marine Biology, Roger Williams College
Kimberly Blich, Verona, PA
Biology, University of Pittsburgh
Sarah Bullock, Columbus, OH
Anthropology, Trinity College
Karen Burke, Bainbridge Island, WA
Urban Planning, University of Colorado
Anna Cathey, White Marsh, VA
Anthropology, University of Colorado
Dean Chagouras, Mt. Laurel, NJ
Env. Studies, Dickinson College
Marissa Codey, Port Washington, NY
Sci. Tech & Soc, Yassar College
Amy Coleman, North Kingston, RI
Env. Studies, University of Vermont
Kristen Earls, Middlefield, CT
Env. Studies, Connecticut College
Marc Flia, Greenwich, CT
Economics, Carleton College
Emily Frankel, Phoenix, AZ
Ecology & Evol Bio, University of Arizona

Jonathan Frost, Forest City, NC
Biology, Davidson College
Stacie Gallenstein, Galloway, OH
Zoology, Ohio Wesleyan Univ.
Matt Girard, Cordova, TN
Bio/Env Studies, Dartmouth College
Alisa Gray, Skowhegan, ME
Biology, Wheaton College
Jeremy Luther, Ft. Wayne, IN
Biology, Hanover College
Erin Macri, Camas, WA
Marine Biology, Western Washington Univ.
Iena Maun, Martineck, NY
Biology, Wesleyan University
Michele Radcliffe, Owasso, MI
Marine Biology, University of Michigan
Alec Stall, Tampa, FL
Biology/Anthropology, Swarthmore College
Alicia Stevenson, Mystic, CT
Bio: Ecology & Evol, Univ. of New Hampshire
Kcaw Thavaradhara, Logan, WV
Biology, Dickinson College
Benjamin Twining, Hamilton, MA
Env. Science, Harvard University
Richard Waters, Barrington, IL
Biochemistry, Knox College
Sacha White, Willsboro, NY
Env. Studies, Union College
Sarah Wickenden, Camden, ME
Biology, Dickinson College

"Another wonderful surprise was students' attitudes towards learning. At my college, I used to be one of the few people willing to participate in classes. In my SFS course, every single student contributed to the lectures, offering many different opinions, leading to interesting discussions that often lasted several hours."

Marcela Kostihova,
Czech Republic -
North Central College

"I decided I needed to learn more about the environment because this would be a major issue in international relations in the coming decades. That is how I found myself, a creative writing/international relations major, bound for Australia to study tropical rainforest ecology. Looking back, I realize what a varied group we were. Some were art students, some biology students, others unsure. In this diversity, we learned from each other."

Ben Bedard,
New Vineyard, ME -
University of Maine

Who Teaches SFS Programs

LEARN FROM EXPERIENCED FACULTY

Teaching you, providing you with the context and the knowledge and the skills to understand and address complex environmental issues, is the core of the SFS mission. We have designed the SFS program to be a guided experience, emphasizing teaching and mentoring and providing you with access to as much information and guidance as possible.

Every SFS Center is staffed with a field director and three full-time faculty (usually an ecologist, a resource manager and an ecological economist) who live on-site and are easily accessible to answer your questions or give you input. Additional support is provided by student affairs managers, interns, site managers and local support staff. This level of staffing provides students with a remarkably low student to faculty ratio (no higher than 10:1) and enables you to gain an interdisciplinary perspective on complex environmental issues. The teaching staff at each SFS Center have over 20 years of professional experience in the subjects and ecosystems we're studying - they know their stuff! These men and women are committed educators, selected for their interdisciplinary teaching and research approaches as well as their leadership qualities. They are successful practitioners in careers you may be considering and are the source of a wealth of information and advice.



David Wilson,
Site Manager,
Center for
Rainforest
Studies.



Toni Jackman, Kenya

"The more I got to know each faculty member, the more I appreciated them as committed professionals and as people and friends. I would put all of them on my list of true to life heroes."

Benjamin Gaddis,
Salt Lake City, UT -
Willamette University

"The SFS staff were the most incredible human beings I've ever known. With an energy and enthusiasm I doubt few others could rival, they organized us from a group of disoriented strangers into a family... Marian helped us realize that any good environmentalist needs to understand economic motivations to truly understand environmental destruction. She also showed us that just because you like to teach economics doesn't mean you can't play the guitar, accordion, and piano and play on the beach like a 10 year old."

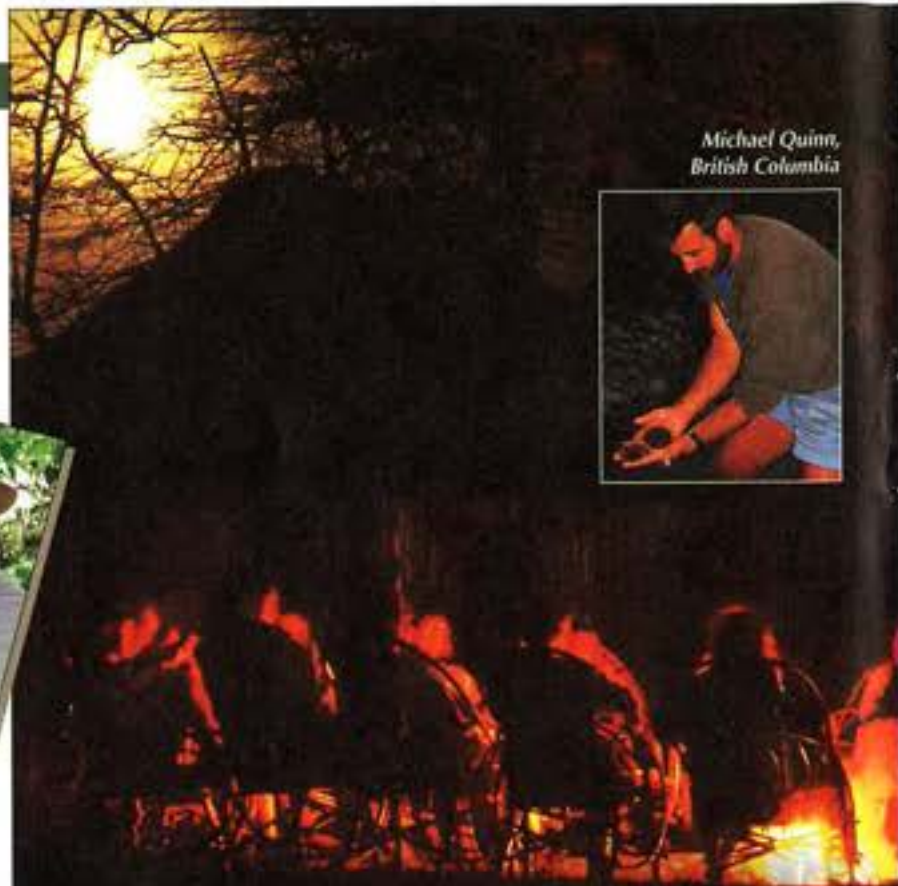
Amy LeBlanc, Lewiston, ME -
College of The Holy Cross



Derek Berliner, Kenya

"The energy and enthusiasm of the staff was contagious, they obviously loved what they were doing and where they were. The constant contact with the faculty at dinner, relaxing on the porch, etc., tore down the typical professor/student roles found in many universities."

Susan Bolden,
Meyersdale, PA -
Allegheny College



Michael Quinn,
British Columbia



teach (tēch) v.

1. To impart knowledge or skill.
2. To provide knowledge of.
3. To cause to learn by example or experience.

"Webster's Dictionary"

FACULTY PROFILES

Michael Ghiglieri
Field Director
Center for Coastal Studies



After receiving a B.S. and M.A. in wildlife ecology, Michael began his Ph.D. at the University of California at Davis. His research on wild rainforest chimpanzees in the Kimbale Forest of Uganda led to a new standard for chimp research and several books including *East of the Mountains of the Moon*. Before and after teaching at Northern Arizona University, Michael spent many years as a river guide leading expeditions in Ethiopia, Papua New Guinea, Turkey, Peru, Tanzania, Sumatra and Alaska. He is the author of numerous articles, books and award winning documentaries with ecological themes. Michael has led programs at SFS Centers in Kenya, South Caicos, Palau and Australia before coming to British Columbia with his wife and two children.

Lisa Bradshaw
Tropical Ecologist
Center for Sustainable Development Studies



After receiving an undergraduate degree with high honors from the University of Michigan, Lisa enrolled in a Ph.D. program at the University of California at Davis. Her research took her to Nicaragua, where she spent two years investigating the impacts of different cover crops on coffee growth. She joined the Center staff in 1993 and has spent the past three years engaging SFS students in cutting edge research on integrated pest management and gender roles. Lisa has presented findings from these efforts at international symposia in the Netherlands, the U.S., Costa Rica and Mexico.

John Grant
Ecologist
Center for Rainforest Studies



John was born and raised in Ireland where he earned a degree with Honors in Zoology from University College, Dublin. He then traveled "down under" where he conducted research on Gould's Long-eared Bats en route to a Ph.D. in Zoology from the Australian National University. In addition to teaching college students, John has a background in the tourism industry and has first-hand experience with the role of tourism in rainforest management. He first taught with SFS in 1988-89 and has been a resident faculty at the Center since 1994. An avid and knowledgeable ornithologist, John has converted countless SFS students into birdwatchers.

Dennis Morgan
Coastal Ecologist
Center for Coastal Studies



A native of Canada, Dennis has spent most of his life in the Pacific Northwest. While working on a Masters' degree in Environmental Studies at the University of Oregon, Dennis taught at the Oregon Institute for Marine Biology. For the next few years, he conducted and then published field research in Oregon and British Columbia while also serving as the Director of The Friends of BC Forests. Dennis joined the staff of the Center when it opened in 1995 and has since amazed students with his extensive knowledge of the area. An explorer at heart, Dennis spends his free time walking rivers, fishing, sea kayaking and playing guitar.

Bernardo Aguilar
Ecological Economist
Center for Sustainable Development Studies



Bernardo is an agricultural, resource, and applied economist as well as an agrarian and environmental lawyer. Prior to joining SFS in the fall of 1992, Bernardo was a First Instance Judge on the Supreme Court of Justice, San Jose, Costa Rica. His teaching experience includes courses in Inferential Statistics at the Latin American University of Science and Technology and guest lectures at the Organization for Tropical Studies and the Institute for Central American Development Studies. He received a Masters' Degree from the University of Georgia, where he was a Fulbright Scholar from Costa Rica. In addition, Bernardo has a specialist graduate degree in law from the University of Costa Rica. His research interests and experience include ecological economic valuation, effectiveness of environmental regulation, and environmental ethics.



Wayne Vos, Kenya

"I could not have asked for a more caring, vivacious and genuine faculty. Student opinions were openly received and encouraged. The enthusiasm could clearly be seen on an academic and personal level. They were not only interested in our performance as students, but also in understanding us as individuals with aspirations. They became our guides, teachers, friends and mentors."

Cynthia Terrana,
Peekskill, NY -
SUNY Plattsburgh

"It's really refreshing to be good friends with your professors instead of just viewing them as teachers. They gave me honest opinions and advice that will definitely help me in making future career decisions."

Michael Mattie, Thornton, CO -
Claremont McKenna College

"Living, eating and camping with your professors makes for a continuous learning experience. Our lessons weren't confined to lecture periods. If I had a question, an expert on the subject was likely to be sitting next to me a dinner or on the other side of the campfire."

Mark Faherty, Brockton, MA
University of
New Hampshire

Our goal is to enable you to come away from your SFS experience with a new understanding of environmental issues, as well as an increased commitment and new skills to help improve the environment and the lives of people dependent on the environment. We particularly want to help you understand the complexity and interrelatedness of all aspects of environmental problems.

We believe that the most effective way to achieve this goal is to offer you, as an integral part of your environmental studies at SFS, a chance to participate in making a meaningful contribution



Photo: Bill McCormick

Students in Costa Rica assessing potential economic and conservation impacts of setting aside private land, in this case the habitat for several primate species, as a preserve that would also attract ecotourism.

towards solving environmental problems. To deliver this opportunity, we have created an integrated curriculum incorporating:

- 1 an interdisciplinary, (ecology, resource management, economics, applied anthropology, and political science), "case studies" approach to teaching;
- 2 problem-solving through field work which aims to provide solutions to local environmental problems;
- 3 involvement in the local community through field and service projects undertaken at the request of a local partner/client; and
- 4 participation in an educational journey during which you are asked to be a member of the crew, not a passenger; where we expect and encourage you to take a pro-active role in all aspects of your education.

"When environmental education is done well, students of natural systems and cycles and of how humans impact them. They understand how values influence decision making and how people should relate to the environment and to each other."

To deliver an excellent environmental education, SFS offers:

1. The interdisciplinary, "Case Studies" approach to teaching.

All SFS programs begin with an investigation of local environmental problems in the form of a case study. A case study is an analysis of an actual (not simulated) environmental problem which requires that a decision be made. Drawing from a number of disciplinary perspectives (usually ecology, resource management, economics, applied anthropology, and political science), we study those theories and tools that are relevant to understanding a particular complex problem. In each case study, we seek to identify ways in which natural resources can be developed economically in a manner which can be sustained indefinitely, a concept known as sustainable development.

Gain An



Photo: Jonathan Vlahos

In the course of the case study, you will be faced with making a decision, usually with less than complete data and less than perfect solutions. For example, in Kenya, the elephant problem has become a defining international image of wildlife management. The politics of international conservation have run headlong into issues over national sovereignty. Our case study on the effectiveness of the ivory ban as a way to manage the elephant population challenges you to reconcile local economic needs with national and international conservation interests.

Faculty lectures and readings provide theoretical information necessary to understand the problems raised by the cases. Guest lectures by individuals who are often intimately involved in the issue under study provide a rich (and, at times, conflicting and confusing) context which is typical of major social problems. Courses are integrated with field work, and practical, interdisciplinary activities enable us to gain hands-on experience as we address these issues. Debates, policy statements, or management plans are often used in the concluding and evaluative stages of the case study.

have an understanding and appreciation through economic, political, and cultural systems... have a clear sense of their own values on regarding sharing natural resources.”

Mary Paden, Environmental Education Director,
World Resources Institute

Photo: David Silverberg



Mastering the daily challenges of living with a large group in a rustic setting fosters problem solving, teamwork and risk management skills increasingly sought and valued by employers.

2. Problem-solving through field work which aims to provide solutions to local environmental problems.

All SFS programs include a field research component, providing you with an opportunity to make an immediate contribution to the improvement of a local environmental issue while putting the

Interdisciplinary Perspective

theories you are learning in the classroom into practice. The School's mission does not seek to promote research for its own sake. Rather, we seek to produce first-rate applied research in the form of practical reports to local resource managers as an essential part of our educational process.

Photo: Michael Guglielmi



Understanding the range and managing the habitat of the endangered, flightless cassowary is the focus of several projects conducted at the Center for Rainforest Studies. Because directed research projects are chosen from a list of projects requested by local clients, you know someone is interested in and will use your results.

You will have the opportunity to design and carry out a field project related to the current goals of the Center. These projects usually last for more than half the program, culminating in presentations to both the local community and the larger outside community of scientists, researchers and representatives from SFS partners and clients.

3. Involvement in the local community through field and service projects undertaken at the request of a local partner/client.

Case studies and field work can only be successful if we develop solid relationships with local individuals, organizations, and agencies interested in conservation. Our clients are stakeholders who are personally impacted by the environmental issue under study. Our partners are working on critical local environmental issues related to the Center.

Photo: Beth Gader



Engaging in environmentally related community service projects provides opportunities to get to know local residents on a personal, informal level. In South Caicos, SFS students started a science club at the High School. Club members, in turn, helped our students stage a "SEA DAY", when island children come to the Center to learn more about their surrounding ocean environment.

4. Participation in an educational journey during which you are asked to be a member of the crew, not a passenger; where we expect and encourage you to take a proactive role in all aspects of your education.

We seek to put some control of – and responsibility for – your educational process in your hands. We trust that, if given this opportunity, you will not only participate more fully in your education, but also benefit more fully from the results. Your responsibility to learn in an SFS program is not limited solely to academic study; it extends to many aspects of group dynamics, community relationships, daily living, and institutional relations.

Field work can be fraught with daily challenges – tools and equipment break down, field projects fail for reasons outside of your control, and a “foreign” environment, in almost all senses of the word, creates obstacles as well as opportunities. SFS teams often live in isolated settings; participants spend up to three months living in close proximity with up to forty other team members and may, at times, be asked to give up personal freedoms for the good and safety of the group. Identifying effective solutions to environmental problem-solving requires a sensitivity to, and an understanding of, the local context. Mastering these challenges requires developing problem solving, team and relationship building and risk management skills that are useful long after you leave the field.

An SFS experience results in impacts that extend far beyond daily impressions on students while they are in the program...

Conservation Impacts:

The goal of our conservation focus is to create projects at each Center that provide solutions to real environmental problems at the local and regional level and that offer models for creating policies, methodologies, and planning tools to deal with global environmental problems. Recent conservation projects undertaken by SFS teams have resulted in:

- the inclusion of a reforestation plan, proposed by students and faculty at The Center for Rainforest Studies, that will improve both water quality and conditions for agriculture and farming, into an overall management strategy for the Lake Tinaroo watershed currently being developed by the Department of Primary Industries in Atherton, North Queensland;
- the creation and implementation of a marine environmental education program that has been formally incorporated into the curriculum at the high school on South Caicos Island;
- the implementation of seasonal hiking restrictions on a trail on Mount Lukenya, enforced and publicized in a brochure by the Mountain Club of Kenya, after research conducted by SFS students indicated raptor nesting habitat in close proximity to a heavily travelled hiking path;
- the formation of the Magdalena Bay Conservation Working Group, a collective of Mexican and U.S. conservation organizations who, with SFS, will spearhead efforts to conserve and sustainably develop the Bay's critical wetland resource;
- the design, construction, and development of education materials and monitoring processes for an environmentally sensitive section of a Wildside Heritage trail, intended to increase ecotourism on Flores Island, British Columbia, in conjunction with members of the Ahousaht First Nation Band and the Western Canadian Wilderness Committee;

In addition, numerous papers based on directed research projects conducted by SFS students and faculty have been published or presented at international conferences in 1996. Students and staff at The Center for Sustainable Development Studies presented or authored several papers including:

"Health Determinant Factors in Privately Owned Managed Ecosystems: Contributions to the Development of Socio-Ecological Indicators for Protected Areas in Costa Rica" by co-authors Joshua Tull (University of Pennsylvania), Erin Carlson (Stanford University), Marisa Maier (Brown University), Mary Anne Peine (University of Tennessee), Bill Taylor (Macalester College), Derek Young (University of Rhode Island), and SFS faculty Bernardo Aguilar at the Ecological Summit 96, held in Copenhagen, Denmark.

Environmental Impacts:

Dr. Steve Goosem, Senior Principal Scientist at Australia's Wet Tropics Management Authority remarked:



Students at the Center for Coastal Studies presenting their directed research.

"After reading the student reports on their various projects, it is obvious your centre provides a very practical, experienced based course. In conservation and management terms, these projects have gathered data which is the basis for a collective revegetation monitoring program of the Yungaburra area, with the potential to lead much farther afield. I

am really impressed with the students' work and the initiative of your centre

in devising such worthwhile, hands-on research opportunities."

Robert Redbeard, the manager for Heritage Resource Conservation at Pacific Rim National Park in British Columbia noted:

"The studies conducted by SFS will be of considerable value in the development of a theme of managing for biodiversity of the area. The work and dedication of your staff and students is appreciated and of considerable assistance."

Community Impacts:

A Turks and Caicos government official observed that:

"Since SFS has been on South Caicos, grades on high school science exams have gone from last in the country to first and I believe SFS's presence in the community and work in the schools is primarily responsible."

And Crispin Mendoza, a fisherman and whalewatching guide in Baja, Mexico, reacted to the imminent arrival of SFS in Magdalena Bay:

"More than anything else, SFS and its students could help us solve our environmental problems. This is something I definitely think SFS could do."



Many participants find volunteering with local children in the community to be a memorable part of their SFS experience.

Photo: Lynn Maltreparel



Photo: Kathy Abbott

"Participating in research which could help preserve this fragile ecosystem made me remember why I was majoring in biology and environmental studies. It is easy to lose sight of your goals when the textbook is your teacher and not the world around you. Working on my project made all the concepts and issues I've been studying for years more tangible."

Rachel Cohen, Newtonville, MA - Oberlin College

Preparation for Future Careers:

By developing leadership skills...

Verna Case, Professor of Biology at Davidson College notes:

"The SFS experiences have been a marvelous addition to our Biology curriculum at Davidson. Students return to campus with the self-assuredness that comes from having their sense of the world, and their place in it, challenged. Their experiences totally integrate learning

By acquiring technical knowledge and analytical skills...

"I participated in the Australia summer program as a high school student and completed a Westinghouse Science Research paper based on my research. The work that I did that summer has been an integral part of my life. I was lucky enough to work as

Photo: David Silverberg



"After talking with professors, I chose to go to the Pacific Northwest. The courses offered there related to the forestry, economic and ecology skills I'd need to get a job in the forestry field in the U.S. The approach to learning used by SFS prepared me with the skills to confidently approach complicated environmental problems and culminated in the best learning experience I've ever had."

Sean Libbey,
Westwood, MA -
Muhlenberg College

Environment, The Community, Your Future

and living so that the boundaries of the "academic" world and the "real world" dissolve. They have developed skills in problem-solving, critical thinking and research. In summary, the SFS experience develops leaders, both in and out of the classroom."

a National Park Service Interpretive Ranger in the Rockies this summer, largely because of my SFS experience."

Jennifer Ng - Wellesley College

By developing personal confidence...

"My SFS experience has opened up a whole new world for me. Now I have the confidence and knowledge that I can succeed in a foreign country and I now desperately desire to work internationally. Politics, international relations, cultures and economics are now fields of fascination for me which is amazing considering I applied to SFS with my major interest being ecology."

Mark Nickum, Bloomington, IL -
Knox College

By gaining hands on experience...

"This program has really helped me focus the next few years of my life. From the contacts I made in the islands, I leave for a job teaching marine ecology in the Florida Keys at the end of the month. I'm sure the reference from my SFS faculty member was a major influence on their decision to hire me."

John Richardson, Bremerton, WA -
University of Washington

Photo: Liana Babbar



"This program made a huge impact on the way I see the world and the environmental problems facing us today. It made me look at environmental problems from a different angle - how to best go about solving them. Before I went to Costa Rica, I was extremely concerned about the environment, but I never knew what I could do to help; I always felt the problems were too big to be solved in the near future. This course made me see that every little bit helps and that small contributions quickly add up to be important contributions to the environmental movement."

Kelly Boyden, Tacoma, WA - University of Puget Sound

SFS SEMESTER PROGRAMS

Curriculum

Fall and spring semester programs run for 14 weeks and enroll up to 32 students. To facilitate credit transfer, we have separated the lectures and field work in the integrated semester curriculum into four separate university courses, each carrying 4 semester credits. Three of these courses (*usually incorporating an ecological, resource management, and socio-economic or applied anthropology perspective*) focus on theory using local examples. Each involves the traditional elements of an undergraduate course including more than 50 hours of lecture, readings, written assignments, exams, field trips, oral and written evaluations. The fourth course, Directed Research, involves over 150 hours of coursework including instruction in research design and completion of an individual field project addressing a component of the semester's research objective. (Please see page 38-39 for individual course descriptions).

Schedule

Semester programs run for 95 days including a five day midterm break (*the only time you are free to travel on your own*). We compress a 16 week semester into 14 weeks (*by working on weekends among other methods*), so be prepared for an intensive learning process.

The program begins with a ten day-long introductory module orienting you to the site and the local environmental issues. An average of three weeks is allotted to each of the case studies. Several days at the end of these periods are set aside for synthesis and evaluation. The program ends with a 'Re-Entry' Module offering an opportunity to reflect on the experiences of the semester, clarify values and consider career possibilities.

Our schedule varies. The first half of the semester includes approximately 15, one to one and one half hour long, lectures a week plus 3-5 other meetings (*organizational, research/paper presentations, guest lectures*). Afternoons are generally filled with field trips or laboratories. Academic activities are usually held six days a week. On average, we spend 3-4 weeks off-campus on field trips. (*Students at the South Caicos Center spend significantly less time off-campus*).

Later in the semester, there are fewer lectures and organized classes and more time is allocated for Directed Research projects. Additional meetings offer training sessions in the skills (*statistics, paper writing formats, computer spreadsheets, and laboratory analysis*) needed to complete your research.

In addition to daily chores like kitchen duty, several hours are scheduled each week for a thorough site clean-up.

Prerequisites

Semester participants must be at least 18 years old, must have successfully completed at least one college level ecology or biology course, and should have completed at least one semester at a college or university. Other prerequisites may apply; please be sure to check individual program descriptions.

NOT JUST YOUR

Many considerations drive the daily schedule in the field and every day is a little different from those before or after. There are some consistencies too — every day brings some new discovery, a new awareness or understanding and a sense that time is passing too quickly. The following journal entry offers a glimpse into a day at the Center for Rainforest Studies in Australia...

6:00 a.m. woke up really early and decided to join Joe, Kristin, Jennifer and Matt who were going birding with one of our faculty, John...it was amazing, the rainforest was wrapped in pale green mist and our sense of hearing became our primary sense. John is incredible - he knows everything about the rainforest and birds. We heard the dawn chorus (*like an orchestrated symphony of birds!*) and saw rainbow lorikeets and a sulfur-crested cockatoo...

8:30 a.m. we were the last ones to breakfast - everyone was already heading from the veranda to the classroom for Josh's lecture on tree species diversity and rainforest restoration...after a quick frisbee break, Tessie lectured on costing out reforestation...

12:30 p.m. lunch was quick so we could squeeze in time to check the seedlings down at the shade house... next week we'll be volunteering with local residents to plant hundreds of these babies - can you believe students and staff from this Center have already planted 10,000 trees on the Tableland - it's like SFS is going to replant the rainforest all by themselves!



AVERAGE DAY!



2:00 p.m. Field trip time! Everyone piled into the vans for the short drive to Barry Thurling's farm. Barry's a really great Aussie farmer who's been restoring the forests along the stream on his farm with SFS help.



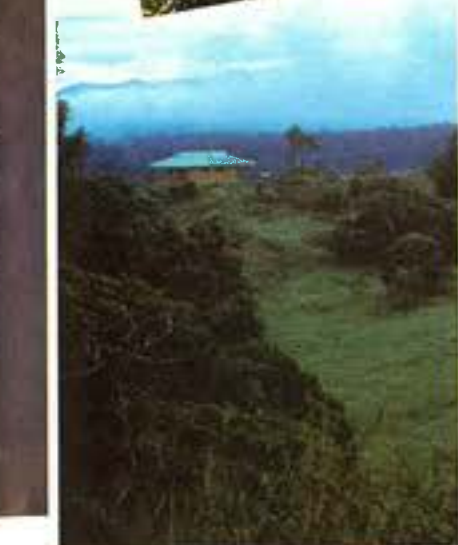
Spent the afternoon planting trees and were rewarded with Damiesonn plum treats (*from the rainforest!*) made by his wife. I hope to do my directed research there measuring how past plantings have been improving water quality...



5:30 p.m. On the way home we detoured to the waterfall for a much needed swim break... saw a couple of rock wallabies (*sort of like miniature kangaroos*) while we were there;

7:30 p.m. My team's turn to cook dinner tonite - we made pasta because we got back so late and almost everyone still needs to do their scientific article critique for tomorrow...

10:00 p.m. what a beautiful night: after listening to Jason play guitar, we walked back to the cabin and I even recognized some of the southern constellations - it feels like home here and time is going so fast...



SFS SUMMER COURSES

Curriculum

Summer courses are 30 days long and during this period we focus on a single case study question. Each course carries four semester credits in environmental studies and involves elements of an undergraduate course including more than 40 hours of lecture, readings, written assignments, exams, field trips, oral and written evaluations. In addition, you will have the opportunity to design and carry out a field project related to the current goals of the Center. These projects usually last for more than half the program, culminating in presentations to the local community and interested scientists and representatives from SFS partners and clients.

Schedule

SFS summer programs run for 30 days, enroll 32 students and are taught by three faculty. You will be involved in activities seven days a week with only one or two unscheduled days during the program. Be prepared for an intensive learning process. Daily schedules vary from course to course, depending on research agendas, weather, field trips and logistics. Typically, we awaken early and either attend a morning lecture or head out to the field. We devote much of the day to field work, returning to the Center in the late afternoon to process our data or, if we haven't already done so, to participate in our daily lecture. After dinner we may have a guest lecture, group discussion or study time.

Later in the course, we spend less time in lectures and more time working on directed field projects. Additional meetings may be scheduled to offer training in skills (*statistics, paper writing formats, computer spreadsheets, and laboratory analysis*) needed to complete your research. Everyone should expect to be involved in kitchen/cooking duty and site clean-up.

Prerequisites

Summer courses are taught at the college introductory level. Our low student to faculty ratio and interactive teaching approach allow us to adjust the content and pace of the course to suit the needs of the team. While most summer participants have completed at least one college biology or ecology course, talented and motivated students with no ecology background have had comparable academic success. To apply to a summer program, you must be at least 16 years old by the time the program begins and must have successfully completed at least the junior year of high school. Other prerequisites may apply; please check specific program descriptions.

Photos: Cagan Sekercidglu, Michael Ghiglieri, Ed Stashko, Jim Elder

KENYA

CENTER FOR
WILDLIFE MANAGEMENT STUDIES

CENTER PROGRAMS

Wildlife Ecology and Management

Semester Program — Page 16

Community Wildlife Management

Summer Course — Page 17

Center Objective

To develop scientifically sound and culturally and economically appropriate guidelines for managing Kenya's wildlife and habitat that respect both the country's need for agricultural production and its history and identity as a famous haven for wildlife.

Critical Environmental Issues

Kenya's reputation and reality are on a collision course. Increasing human population has so stressed the country's patterns of land-use that huge tracts of wildlife habitat have been reallocated to food production. Reduction and degradation of natural habitats and the increasing incursion of agriculture into traditional migration corridors threaten the survival of wildlife populations – and the tourist industry they support. Moreover, current methods of food production such as cattle ranching are unsustainable and will require sacrificing yet more land. Wildlife, Kenya's chief natural resource, may provide an ecologically appropriate solution to the dilemma – but first these questions must be answered:

- ♦ What is the status of existing wildlife populations?
- ♦ Which current land-use patterns are sustainable?
- ♦ What benefits can landowners obtain from encouraging wildlife?
- ♦ What are the cultural and economic barriers to changing land-use patterns in Kenya?

Center Clients/Partners

Recent clients and partners include a Maasai group ranch, the Mountain Clubs of Kenya, the Kenya Wildlife Service, and the Wildlife Clubs of Kenya. Private raisers of game (*Including Game Ranching Ltd., the home of our Center*) welcome our research involving the ecological impacts of game ranching. Our findings may also be of use to tribal cooperatives seeking alternative methods of food production and revenue.

Field Director: Toni Jackman, M.S., Wichita State University (*Geology*).

Resident Faculty: Richard Hatfield, M.S., Cornell University (*Agricultural Economics*) and M.I.M., American Graduate School of International Management.

Derek Berliner, M.S., University of Witwatersrand (*Ecological Modeling*).

Wayne T. Vos, Ph.D., University of Natal (*Botany*).



Site Description

Kenya's starkly beautiful countryside deserves its stunning reputation. Authors and adventurers from Hemingway to Dinesen have mesmerized us with its harsh desert, arid plains, gentle savannas and dense rainforests. These provide the stage for a variety of plant and animal life: acacia thorn trees and croton thickets which shelter antelope, zebra, rhino, and elephant, as well as the lions, cheetahs and leopards which prey on them.

Kenya sits astride the equator so days and nights are of equal length with abrupt,



Photo: Wayne Vos

We will visit conservation areas with lush vegetation, high biodiversity, and large herds of grazers as well as areas where large populations of feeding elephants have left a stark and lunar-like landscape and dramatically decreased biodiversity. We will also talk with Kenyans living adjacent to these areas who must deal with marauding wildlife which threaten crops and lives.

vivid sunrises and sunsets of breathtaking color. Darkness arrives by 7 p.m. every night of the year and then the African sky offers up a panorama of unfamiliar stars. Our familiar constellations may be visible, but they skirt the northern edge of the sky.

The unfamiliar can be a daily companion at Jua Kali, our field station based in a remote corner of an experimental game

Center For Wildlife Management Studies

Photo: Jonathan Vlahos



The classroom "chumba" and student "bandas" or living quarters at Jua Kali.

ranch on the high plains. Oryx and vervet monkeys wander freely through our cluster of thatched roofed huts. Umbrella shaped thorn trees, rich plains, wildebeest, impala, zebra and the diverse array of tropical birds that characterize the ranch environment are constant reminders that we are in Africa. To complete the picture, densely vegetated Mount Lukenya dominates the northern horizon; Dinesen's beloved Ngong Hills lie due west.

Center Facilities

Our Center for Wildlife Management Studies is based at Game Ranching Ltd., a forty minute drive from Nairobi. The main headquarters of this 81-square-kilometer ranch lies several kilometers from our rustic field station. Students sleep in grass thatched bandas and rely on kerosene for light. An open dining/lecture hall, library, separate student center, outhouses and open-air showers complete our base camp.

Living and Working Conditions

Days follow a structured pattern. Mornings are reserved for lectures, afternoons for field work, and after-dinner hours for presentations and guest lectures. Each term includes extended field trips (three during a semester and one during summer courses) of at least a week each to sites in other parts of the country. During expeditions, activities, field lectures and research are scheduled to take advantage of the particular opportunities available at each site. When we are at the Center, time is set aside each week for maintenance work and community service projects. Toward the end of the term, our schedule becomes more flexible as directed research and data gathering take precedence.

Even at rest, we will seem on safari; a generator powers only the main building where lap top computers are available, and vehicle access is usually by four-wheel drive. Student teams often help prepare meals, sometimes with the aid of a local cook. Foodstuffs are Western with an

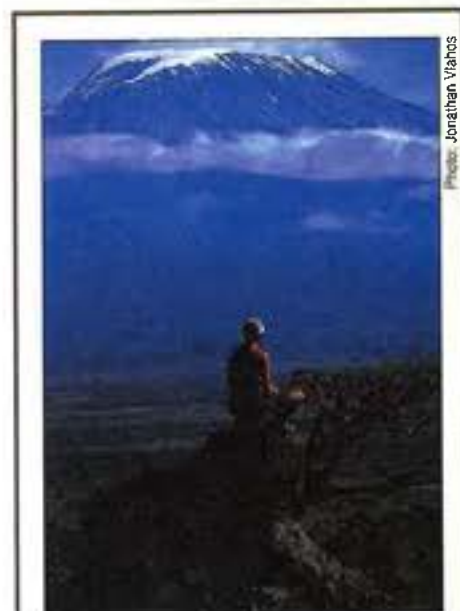


Photo: Jonathan Vlahos

"One of the greatest strengths of the program was its focus on real problems. Issues were presented with all their complexities, and there was never any pretense of there being clear solutions. The most valued skill I acquired is knowing how to look at and think about resource issues more objectively and thus more effectively."

Mark Faherty, Brockton, MA -
University of New Hampshire

African influence (the Kenyan traditional diet emphasizes animal protein, but we try to procure fruit and vegetables). Game meat from animals raised and slaughtered on the ranch provides our usual non-vegetarian meal options.

Despite our equatorial location, the climate is temperate. Days can be hot, with temperatures rising into the high 80's; nights are cool enough for sweaters. From January to March, there can be 10 hours of cloudless sunshine in a 12-hour day; as April approaches, the rainy season begins.

Members of the Center staff come from various regions of Kenya and belong to several Kenyan tribal groups, including Kamba, Turkana and Luo. Our field trips and discussions with local farmers, pastoralists, park wardens and management officials bring us into contact with other tribal groups and indigenous communities, providing exposure to the multifaceted Kenyan society.

Semester & Summer Course Details
Continued on Next Page



Photo: Jonathan Vlahos

"We had a chance to meet many people from the local community. On community day, we sang songs and played games with the children who lived on the ranch - I'm not sure who had more fun - us or them."

Stacey Lichon, Knoxville, TN -
University of Tennessee

K E N Y A

WILDLIFE ECOLOGY AND MANAGEMENT

Program Dates:

September 9 – December 12, 1997

January 31 – May 6, 1998

Departure Point:

Nairobi, Kenya

"We spent time with Kenyan farmers and traditional Maasai and Samburu people. Participating in their ceremonies, schools and dances is a once in a lifetime experience . . . I learned about life in Kenya through their eyes. Their attitudes about America, African wildlife and Kenyan politics gave me a perspective that I never could have gained from a book."

Kathleen Gobush, Barnard College
Washington, D.C.

ENVIRONMENTAL
ISSUES

The habitat required by Kenya's wildlife, its most famous and economically valuable resource, is increasingly threatened by modern pressures and the country's soaring rate of population growth. Many Kenyans struggle to raise enough food just to survive. Farmers are being forced onto land that is marginal or unsuitable for agriculture and traditional pastoralist lifestyles are also threatened. Previously nomadic peoples, such as the Maasai, and the cattle herds that provide their primary sustenance, have been confined to diminished areas while their numbers grow, leading to overgrazing and rangeland devastation. The wild animals which have co-existed for centuries with these non-hunting people are now seen as competitors for scarce water and grazing resources.

The parks and reserves which offer protection to wildlife are being isolated as the traditional dispersal areas surrounding the protected areas are converted to food production using methods hostile to wild animals. Reduced habitat undermines the long-term viability of Kenya's irreplaceable wild animal populations. These animals are a magnet, drawing more than a half-million tourists each year. Ecologically appropriate solutions to the conflict between food production and wildlife habitat must be found.



Photo: Jonathan Vlahos

"My group's directed research looked at flight distances of giraffe, wildebeest and zebra and compared that data with survey responses on viewing distances preferred by potential tourists. Our goal was to determine whether tourism would be a viable economic option for the game ranch on which the Center is located."

Ross Pineo, Meadville, PA -
Dickinson College

We begin the semester with an overview of the problem-oriented case study approach and the environmental context of Kenya before examining three case studies and pursuing directed-research projects integrating material from the three courses.

Semester students will be registered in four academic courses:

BI/EE (NS) 371	Techniques of Wildlife Management
BI/EE (NS) 372	Wildlife Ecology
EE (SS) 302	Environmental Policy and Socioeconomic Values
EE 491 or 492	Directed Research

Please see pages 38-39 for course descriptions.

Case Study #1

How do we manage rangeland resources for optimal and sustainable wildlife production?

To accommodate Kenya's burgeoning human population, highly productive rangeland has been converted to barely viable agricultural use, disrupting the seasonal migration patterns of both wildlife and pastoralist cattle herds. Government efforts to settle livestock-herding tribes have resulted in the redesignation of communal tribal land into clearly delineated group ranches or subdivided private holdings. Concentrations of herbivores have degraded land and

diminished the economic viability of large tracts of grassland and savannas. We will examine the methods and techniques needed to rehabilitate, maintain or improve rangeland. Understanding vegetation analysis, herbivore effects, niche partitioning and plant succession will help us with the ecological assessment and monitoring that are key elements of any management plan. Our base on a game ranch affords us opportunities to test and monitor the outcomes of management techniques including the effects of fire, adding water points, and varying stocking rates and cropping quotas of wild animal populations.

Case Study #2

Is wildlife utilization an economically viable and ecologically sustainable land-use alternative?

Game ranching, once seen as the solution to inappropriate agricultural techniques in Kenya's traditional rangelands, has not fulfilled its early promise. Traditional inheritance practices and imposed group ranch partitioning have diced land into non-viable agricultural and pastoral units and



COMMUNITY WILDLIFE MANAGEMENT

Program Dates:

Session I: June 11 - July 10
Session II: July 17 - August 15

Departure Point:

Nairobi, Kenya

Course Number: EE (NS) 350

residents must now consider alternative protein and income sources. During field trips to ranching establishments and in discussion with local experts on wildlife, we will explore the conditions under which wildlife management utilization is a sustainable land-use option. Using economic analyses and anthropological interviewing techniques, we will investigate cultural, economic and practical barriers to wildlife ranching. Possible commercial uses of wildlife will be considered from game cropping to regulated sport hunting to eco-tourism. We will evaluate the regional Wildlife Forums formed by owners seeking cooperative management options to maximize return on wildlife utilization and explore future possibilities for optimizing wildlife potential.

Case Study #3

What are the most viable strategies for managing pachyderms?

Sparsely populated areas surrounding parks and reserves have historically served as dispersion areas for migratory herds and large animals such as elephants. As these areas are developed or used for agriculture, wildlife managers face serious dilemmas of elephant/human interaction. The Kenyan government's policy toward elephant management is strictly hands-off. By contrast, neighboring Zimbabwe culls elephants to balance park wildlife. These contrasts spur an immense controversy over methods for managing elephant populations and ecosystems in a sustainable manner. We will examine various management options including the ivory trade ban, sport hunting and elephant birth control. Rhinoceros management and conservation present an entirely different set of concerns which we will also explore during visits to rhino sanctuaries.

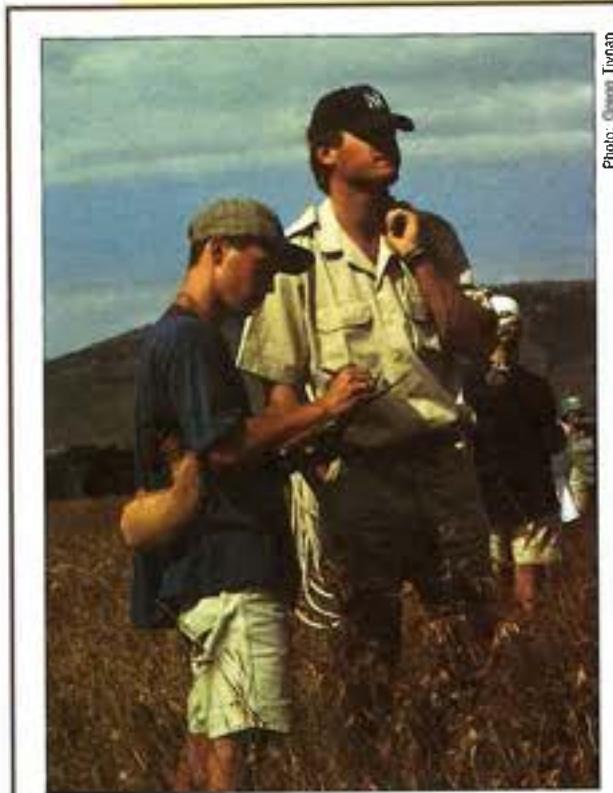


Photo: Osweg Tivnan

Managing animals requires managing the land they live on. Here students conduct vegetation analyses with Center client L.D. van Essen, who requested SFS assistance in developing rangeland management strategies on the Ol Chorro Oiroua group ranch.

During the 30 day summer program, we will focus on addressing a single case study. We will investigate whether the economic utilization of wildlife can provide sufficient benefits to encourage community-based management of these resources and lead to more sustainable land-use practices as well as the conservation of wildlife populations currently residing outside of protected areas.

Field Work Focus

- ♦ Determining whether land-use strategies now in place are ecologically sustainable.
- ♦ Investigating the tribal and cultural factors affecting land use in Kenya.
- ♦ Exploring stresses on natural resources caused by game ranching vs. cattle or agriculture.
- ♦ Exploring cultural and practical barriers to utilizing wildlife for economic benefit.

Course Objectives

We will research potential solutions to the conflict between current wildlife management practices and traditional land-use practices. Reconsidering wildlife as a source of income generation, as well as objects of tourist enthusiasm, may provide a sustainable land-use option. We will

explore possible commercial uses of wildlife from game cropping, to regulated sport hunting, to eco-tourism. We will evaluate the regional Wildlife Forums formed by owners seeking cooperative management options and explore future possibilities for optimizing wildlife potential:

Faculty lectures introduce African climatology and geomorphology, plant and animal identification, socio-economic parameters, animal social organization and behavior, plant/herbivore interactions, and theories of island biogeography and biodiversity. Guest speakers may include experts in ecology and Maasai culture as well as local game ranchers discussing range management issues and techniques.

Field work on the ranch exposes us to ecological assessment techniques, mapping, vegetation analysis, animal population censusing, biometry, behavioral observation and sampling. During field trips to parks, reserves, private ranches and critical wildlife areas, we will meet with wildlife managers and compare behavior and productivity of free-ranging wildlife in protected areas with that of animals confined on game ranches or in protected areas. Interviews with community members provide insight into cultural perceptions that may influence our recommendations and their ultimate implementation.

CENTER FOR MARINE RESOURCE STUDIES

CENTER PROGRAMS

Marine Resource Management

Semester Program — Page 20

Marine Parks Management

Summer Course — Page 21

Center Objective

To assist local residents and managers develop scientifically sound, culturally and politically acceptable and economically feasible policy recommendations that will lead to the sustainable use, development and stewardship of the marine resources of the Turks and Caicos Islands (TCI).

Critical Environmental Issues

Developing sustainable fisheries is an immediate concern for this fishing community that is economically dependent on fluctuating lobster and conch harvests. In addition, the country's spectacular and relatively unspoiled marine environment is attracting developers of second homes and resorts who may contribute to the degradation of the very attributes which drew them here initially. The Department of Environmental and Coastal Resources must determine how to develop and manage the fisheries, parks, reserves and other human activities for the benefit of residents and visitors alike without degrading valuable marine resources. In the process of developing an ecosystem management and resource utilization plan, there are many questions that need to be answered such as:

- ◆ What are sustainable levels of harvest for conch, lobster and fin fishes?
- ◆ What is the potential for mariculture of commercially important fin fishes and invertebrates?
- ◆ What are appropriate levels of coastal development?
- ◆ How can the system of parks and reserves be used to promote ecotourism and help the nation's economy?
- ◆ How can TCI's marine and coastal resources contribute to local community development?

Center Clients/Partners

The Department of Environment and Coastal Resources, the Tourism Department, the National Trust, the British Overseas Development Administration, the TCI public schools, the Caicos Conch Farm, local seafood processing plants and community organizations are our principal clients and partners in undertaking ecological studies and resource assessments, marine environmental education and monitoring critical environmental impacts.

Field Director: Tomas Vergel C. Jamir, M.S., University of the Philippines (*Physical Oceanography*); M.S., M.Ag., M.A., M.B.A., Ph.D. candidate, Oregon State University (*Marine Resource Management, Fisheries Science, Geography, Business and International Development*).

Resident Faculty: Philip W. Davies, Ph.D., James Cook University of Northern Queensland, Australia (*Marine Biology*).
Julia Yeatman, Ph.D., James Cook University of Northern Queensland, Australia (*Marine Biology*).
Additional faculty members to be announced.



Site Description

The Turks and Caicos Islands (TCI) lie at the southeastern end of the Bahamian Archipelago, approximately 100 miles north of the Dominican Republic. Just east of South Caicos, the Caicos bank plunges 7000 feet into the deep ocean abyss. A shallow sand bank, averaging 10 feet deep, stretches for nearly 60 miles to the west. This small patch of tropical ecosystem supports one of the largest remaining fisheries for both Caribbean spiny lobster and Queen conch.

From the air, the local waters appear as a patchwork of blues and greens. This mosaic effect is caused by the variety of marine habitats – seagrass beds, mangrove-studded



Photo: Matt Weedon

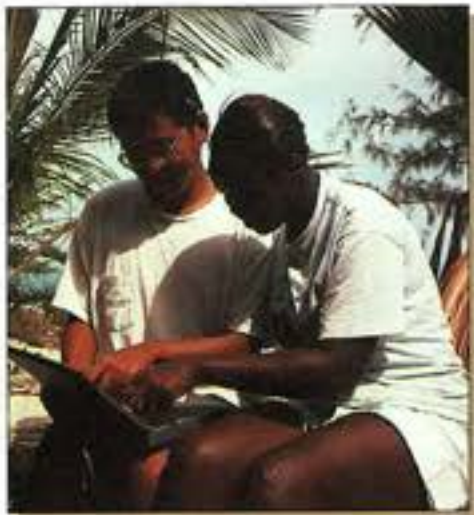
Classes are taught on land and underwater. "We had to know and identify all of the fish, 60 species of invertebrates, and 40 species of corals. Every time we were in the water snorkeling or diving, we were essentially doing our homework!"

Matt Weedon, Irving, Texas - Austin College

woodlands, sandy shoals, and patch, fringing and deep reefs – that surround the islands. Diving into turquoise waters, where visibility is often over 100 feet, one is amazed by the variety of fish and invertebrate species. Over 40 species of

Center For Marine Resource Studies

Photo: Andrew Gude



TCI resident Robin Cox (right) participated in a summer course, bringing a local perspective to the Center. "For the first time, I participated in actual research – not something that had been done repeatedly by various groups with the outcome already known. This research gave me insight into what the life of a field biologist is really like, helping students like me decide if this is what we want to do with our lives."

Susan Bolden, Meyersdale, PA - Allegheny College

corals and 200 species of fish live in the immediate habitat including spotted eagle rays, sharks, groupers, snappers and mahimahi. The islands are inhabited by lizards, crabs, birds and a large Caribbean iguana population.



There are many opportunities to get to know local residents from interviews with local fishermen, to weekly soccer games, to community functions and our activities in the local schools. SFS students host a SEA DAY at the Center to help elementary school students learn more about their ocean environment.

The Center looks out over clear blue waters with nothing but open ocean all the way to the African coast. As in many island communities, fresh water supplies are limited here. An early challenge faced by students is adapting from their American standards of using more than 50 gallons of water per day to island standards of less than eight gallons per day per person.

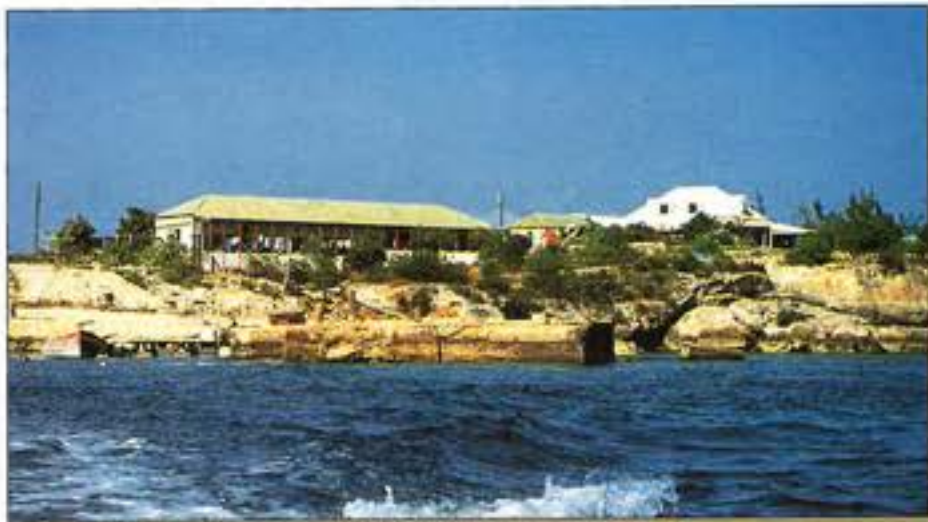


Photo: Jim Elder

Center Facilities

The SFS Center is based in a rustic former hotel on the southern edge of South Caicos Island. A rainwater catchment system supplies water, a precious commodity here. Our goal is to operate as sustainably and self-sufficiently as possible with respect to our use of natural resources.

The main Center facility has a large, screened-in dining area, kitchen, classroom, library/computer area and a covered veranda overlooking the sea. Students live 3 or 4 to a room in two residence wings extending out from this hub of campus activity. We are fully equipped for marine operations with full access to two docks, four motorized boats, a commercial SCUBA compressor and plenty of tanks. The site affords easy access to unspoiled reefs and other marine habitats.

Living and Working Conditions

A typical day during the first half of the semester includes two morning lectures and a reading hour. Afternoons are devoted to field work, often comprised of data collection using SCUBA or snorkeling, or, since we won't be in the water every day, explorations of other islands or the coastal zone. Evenings may include a guest lecture or workshop. Time is set aside each week for center maintenance and for local community service projects. During the second part of the term, we will have fewer lectures and classes as more time is allocated for directed research projects. Free time is limited but we have opportunities to get to know the friendly Turks and Caicos Islanders through coursework, community projects and recreation.

This is a true arid, tropical climate with hot (80-95's) days and warm (70-80's) nights. Tradewinds keep our rustic site comfortable and free of biting insects for much of the year. Many field work sites can be accessed by snorkeling in the warm (upper 70's) ocean waters. When we dive, it will be in waters under 60 feet deep, as that is where most of the sea life occurs. Although the Center employs a cook, students participate regularly in kitchen duty. Meals consist of simple food – rice, beans, pasta, fresh fish, conch and, occasionally, fresh vegetables.

Semester & Summer Course Details
Continued on Next Page

SOUTH CAICOS ISLAND MARINE RESOURCE MANAGEMENT

Program Dates:

September 9 – December 12, 1997

January 31 – May 6, 1998

Departure Point:

South Caicos Island, BVI



Faculty member Andrew Gude examines a day's lobster catch. Individual local divers have caught more than 1,000 pounds of lobster in a single day, diving without the use of SCUBA.

ENVIRONMENTAL ISSUES

The Turks and Caicos Islands (TCI) are a major exporter of conch and spiny lobster – two important sources of local income. South Caicos has been the country's most important port for the fishing industry which, in turn, is the economic mainstay of the area. The potential depletion of this resource and its impact on employment and social structure has become a major concern.

Throughout the Caribbean, communities have encouraged development as a means to diversify and strengthen their economies. This has often led to rapid, and sometimes detrimental, social, economic and ecological change. Tourism and industrial development could become major issues for South Caicos, as they already are on neighboring islands. Rapid development may offer residents short term financial gains while threatening the island's resource base. If the TCI are to escape the detrimental environmental effects of development, it is imperative that alternative community development strategies, that are environmentally sound and sustainable as well as socially responsible and beneficial to local residents, be identified and developed without delay.

Note: If you intend to use SCUBA you must be certified before arrival; divers and snorkelers must bring their own equipment; weights and tanks may be rented on site.



We often see hawksbill, loggerhead and green turtles on our dives and snorkels and occasionally on our trips to the docks where they may be offered for sale as part of the daily catch.

We begin the semester with a study model introducing the problem-oriented case studies approach. We then spend the remainder of the semester examining two specific case studies and conducting directed research projects integrating material from our three courses.

Semester students will be registered in four academic courses:

BI/EE (NS) 373	Tropical Marine Ecology
EE (NS) 374	Principles of Resource Management
EE (SS) 302	Environmental Policy and Socioeconomic Values
EE 491 or 492	Directed Research

Please see pages 38-39 for course descriptions.

Case Study #1

What levels of conch, spiny lobster and finfish harvest will bring about sustainable and profitable returns to the fishery industry?

How can local communities effectively manage the fisheries for the longterm good of society? We will examine the past, present and future of the island's primary economic force – the lobster and conch fisheries. Because these fisheries are showing signs of decline, our focus will be on resource sustainability. After conducting stock assessments in the field, we will discuss strategies for maintaining

sustainable yields through natural habitat improvement, stock enhancement, fishing regulations and folk-based fisheries management. Visits to seafood processing plants, a conch farm and meetings with local fishermen and fisheries officials may engender discussions on appropriate fisheries management policies and programs. We will also consider the less developed fin fishery industry, which may increase in importance if the conch and lobster fisheries continue to decline while demand from tourists and international markets increases. We will examine their biology, habitat requirements and potential for commercial harvests and mariculture. Using computer simulations, we will study potential outcomes and yields of various fishing decisions. Catch per unit effort, fishing gear efficiency appraisals, compliance issues, value-added product development and market studies will be carried out to assess the economic potential of the conch, lobster and fin fishery. Our recommendations will consider the sustainability of the resource, economic costs and the social and political implications of different management objectives, policies and programs.



SOUTH CAICOS ISLAND

MARINE PARKS MANAGEMENT

Case Study #2

What alternative community development strategies are available to the Turks and Caicos Islanders that are environmentally sound, economically feasible and socially responsible?

The TCI have been experiencing rapid development over the last two decades: from the influx of affluent residents, large hotel chains, international divers and tourists, and regional migrants to multinational firms scouting for industrial locations that provide strategic access to the lucrative U.S. and European markets. Despite these developments, few benefits trickle down to the local communities – leaving most of the islanders poor, unemployed and increasingly marginalized. At the same time, this largely unmanaged development is increasingly impacting the TCI's coral reefs, fisheries, mangroves, and fragile soil resources. We will extensively survey the resources that TCI have to offer. Our investigation will take us to the salinas with its boiling hole and pink flamingos, the iguana island, the Six Hills Cay bird nesting site, the mangrove woodlands and nearby waste disposal dump, the white sandy beaches of Bell Sound and different dive sites around the island. Working closely with local officials, community leaders, tour operators, business owners, educators and other residents, we will discuss development issues, environmental problems and community projects as well as brainstorm ideas on alternative development strategies, industries and technology transfer approaches for South Caicos. We will also look into the failures of past projects and study the environmental, economic and social impacts of current and future developments on local communities and their coastal resources.



Photo: Ed Stashko

Species identification time. "Until I came to South Caicos, I could never fully comprehend how biology and economics were interrelated. These subject areas are usually taught as two distinctly separate disciplines. I wish more colleges taught courses using the case studies method."

Janet Kemp, Chicopee, MA - College of the Holy Cross

Program Dates:

Session I: June 11 - July 10

Session II: July 17 - August 15

Departure Point:

South Caicos Island, BWI

Course Number: EE (NS) 351

During the 30 day summer program, we will concentrate our efforts on determining whether the marine parks around South Caicos are effective in protecting and enhancing reef fish, conch and lobster stocks.

Field Work Focus

- ♦ Habitat association studies on conch, lobster and commercially important fin fishes.
- ♦ Comparative stock assessments and modeling of conch and lobster populations.
- ♦ Artificial feeding and survival experiments on transplanted juvenile conch from the Caicos Conch Farm.
- ♦ Developing and testing CORE-VISTA (Coral Reef Visitor Satisfaction Assessment System) at marine parks and ecotour sites.

Course Objectives

The reefs surrounding the TCI provide excellent habitat for fish and lobster while conch are found in the shallow banks. The reefs also attract tourists, the greatest source of potential new revenue for the area. However, the reefs are under assault from many sources – land and sea based pollution, diver and boat damage, dredging, dumping and construction. In 1992, a park system was

approved by the government of the TCI to preserve critical natural areas, manage the harvest of renewable resources, and promote income-generating ecotourism.

We will focus on research that enables us to understand how the bank ecosystem works, its resource development potential, the threats facing these resources, and the role of marine parks in protecting and enhancing reef fish, conch and lobster stocks. Our results may lead to policy recommendations, marine parks management plans, debates, community projects, and/or innovation and appropriate technology transfer. Faculty lectures on marine ecology, fish stock assessment, coastal zone management and ecotourism development provide the framework for our fieldwork. Guest lecturers will discuss management approaches and economic alternatives, while interviews with local residents and fishermen provide further social and economic information for our investigations. We will catalog resources in the vicinity of South Caicos and further afield when possible. In the course of our field work, we will become familiar with the use of transects, techniques for population sampling and statistical analysis. Field projects may be marine or terrestrially based and may involve environmental assessment/impact studies, marine park design, working with local agencies, school, fish plants, tourist resorts or fishermen.

Note: If you intend to use SCUBA you must be certified before arrival; divers and snorkelers must bring their own equipment; weights and tanks may be rented on site.

CENTER FOR RAINFOREST STUDIES

CENTER PROGRAMS

Tropical Rainforest Management

Semester Program — Page 36

Tropical Reforestation

Summer Program — Page 37

Center Objective

To develop environmentally sound, culturally acceptable and politically and economically feasible alternatives for the conservation and management of the unique Queensland rainforest.

Critical Environmental Issues

The need to balance ecology and economics is acutely felt in North Queensland which hosts Australia's remaining tropical rainforests. While many forests now have protected status, the country still struggles with the conflict between resource use and preservation and the fate of degraded lands. We will attempt to answer such questions as:

- ◆ What changes in wildlife laws, protected lands, zoning rules and land management practices would halt the slow demise of the cassowary locally?
- ◆ What combination of planting strategies and plot maintenance procedures yield the greatest reforestation success?
- ◆ Will forest corridors reduce the negative effects of habitat fragmentation and improve the longterm preservation of plants and animals?
- ◆ Are continued agricultural development and human settlement compatible with preservation and maintenance of biodiversity in Australian tropical rainforest regions?

Center Clients/Partners

We will share our data with the Commonwealth Science and Industrial Research Organization, the Wet Tropics Management Agency, the Atherton Shire Council, and the Cairns and Far North Environmental Centre as well as with the Queensland National Parks and Queensland Forest Service. Local farmers, ranchers and foresters have a particular interest in our findings.

Field Director: Ken Weagle, M.Sc., Lakehead University
(*Aquatic Ecology*).

Resident Faculty: John Grant, Ph.D., James Cook University
(*Vertebrate Ecology*).

Tessie Tumaneng, M.Sc.F., University of the Philippines (*Forestry*).

Josh Farley, Ph.D., Cornell University
(*Resource Economics*).



Site Description

The State of Queensland constitutes Australia's northeast corner; Tropical Far North Queensland hosts the greatest biological, climatic and social diversity in all Australia. Chief among its treasures: The country's only remaining rainforests, less than 1% of its land area, which lie cradled in a narrow, broken belt along the northeast coast. Australia's dense and verdant rainforests are as rich and valuable as their better-known New World counterparts – in



Students and faculty have planted over 6,000 trees in deforested areas. Over 5,000 seedlings are now growing in our shade house (above); our goal is to plant 2,000 trees per year. Increasingly, private land holders are seeking solutions to watershed and water quality issues. Now that much of the forest around the Center is protected, we need to better understand the relatively new concept of reforestation.

Photo: Ed Sleshko

CENTER FOR WETLAND STUDIES

CENTER PROGRAMS

Wetland Management: Preserving an Ecosystem, an Economy, and a Community

Semester Program — Page 24

Preserving Coastal Wetland Diversity

Summer Course — Page 25

Center Objective

To assist residents and scientists understand the impacts of exploiting the unique coastal wetland ecosystems in Baja California and to develop feasible recommendations for sustainable resource management and employment alternatives for a resource dependent local community.

Critical Environmental Issues

Conservation organizations have identified Magdalena Bay as one of the most important coastal habitats to protect in Mexico. Over half the world's fish catch is wetland dependent; wetlands are second only to rainforests in primary productivity. Most of California's wetlands have been lost to development, highway construction, pollution and agriculture. Now the same forces threaten Mexico's Pacific coast.

For centuries the Bay has supported some of the world's most productive fisheries, attracting local and foreign fishers and whalers. Today, many economically important fish, shellfish and crustacean fisheries are near collapse, their stocks depleted. As related industries are impacted, causing a local financial crisis, the illegal harvesting of sea turtles and shellfish is escalating. Large-scale aquaculture and ecotourism initiatives have been proposed as economic alternatives for the area. The resulting development, harbor dredging, highway and building construction, power plants, and human population growth will eliminate critical habitats and impact water quality.

The residents of Puerto San Carlos are economically dependent on the marine resources of the Bay. They have requested assistance in better understanding how they can sustainably utilize their natural resources and diversify the local economy. To assist them and help conserve one of North America's most important wetlands, we will address the following questions:

- ◆ How can residents' needs be reconciled with the ecological limits of the Bay?
- ◆ How can a community-based model of development ensure ecological and social sustainability?
- ◆ What economic alternatives (e.g. ecotourism, aquaculture) can be developed that will reduce pressure on the area's overexploited fisheries?
- ◆ What is the status of threatened sea turtles, marine mammals and seabirds in the Bay?

Clients/Partners

The Center is sponsored in Mexico by the Universidad Autonoma de Baja California Sur, which offers local assistance and cooperation in the operation of Center programs. Additional partners include SEMARNAP (*Mexican Secretariat of the Environment, Natural Resources and Fisheries*), the Center for Interdisciplinary Marine Science, and local fishing and whale cooperatives.

Field Director: Bob McCready, M.M.A., University of Washington (*Marine Affairs*).

Resident Faculty: Susan Gardner, Ph.D., University of Washington (*Fisheries*).

Andres Latapi-Escalante, Ph.D. candidate, Universidad Nacional Autonoma de Mexico (*Applied Anthropology*).



Site Description

The narrow, 800 mile long peninsula of Baja California separates the Sea of Cortez from the Pacific Ocean. Located 700 miles south of the U.S. border, Magdalena Bay runs for 200 miles along the peninsula's west coast, protected from the open waters of the Pacific by five barrier islands.

The Bay marks the transition zone between warm equatorial and cooler northern waters that combine to nurture a level of biodiversity and productivity matched by few other marine ecosystems in the world. Clear blue waters host scores of marine mammals as well as economically important populations of sardines, lobster, scallops, shrimp, abalone, grouper and halibut and support an internationally based fishery.



Gray whales, bottlenose dolphins, sea turtles and sea lions can all be found in the Bay's waters. Resort developers, drawn by the region's natural resources, sheer physical beauty and accessibility from major U.S. and Latin American cities, are buying up miles of coastline.

Photo: Marilyn Kazmers/SharkSong

Center for Wetland Studies

Our central location near town ensures that we will have the opportunity to become integrated into the community and learn about local culture and values. Community projects may include offering environmental education programs in the schools. The ability to converse in Spanish, even at a basic level, is welcomed and appreciated by the residents.

Photo: Bob McCready



Center Facilities

Our Center is located on the outskirts of Puerto San Carlos, a 4,000 person fishing community. Sandy beaches lined with palms and mangroves fringe our two acre strip of property that reaches out into the turquoise waters of Magdalena Bay. Center facilities are now under construction and will open in 1997. From their four person cabins, students will have panoramic views of the Bay and the spectacular sunsets that drape the mountains and dunes of the off-shore islands in orange and purple shadows. Additional facilities include a computer room, library, classroom, laboratory, kitchen, dining and study areas

Photo: Marilyn Kazmers/SharkSong



Sometimes likened to Chesapeake Bay, Magdalena Bay is the largest intact wetland on the northern Pacific coast. Unusually productive waters here have given rise to an unparalleled diversity of plants, animals and marine life. Mexican and U.S. resource managers agree, we cannot afford to lose the habitat provided by the Bay – it is among the last of its kind.

and bath/shower house. Faculty live in small houses on-site. The Center is being developed as a "green model" for local residents and includes conservation measures such as solar power and a wetlands wastewater treatment system. Our location, literally steps away from the Bay and mangrove systems and a half mile from town, offers unequalled access to our study sites.

Living and Working Conditions

The town is bordered on the north and south by extensive mangrove channels, the starkly beautiful desert of the Santo Domingo Valley lies to the east. Across the Bay, the purple hills and dunes of Isla Magdalena are silhouetted against the blue skies of the western horizon. Local services include three clinics, a post office, small stores, restaurants, an elementary school, two high schools and three fish canneries.

Dirt streets are lined with colorful plywood and cement houses surrounded by

gardens filled with old boats, fishing nets and ornamental plants. The people who live here relate to their landscape, life, families and work in a way that has been all but lost in the United States – this is the real charm of Puerto San Carlos.

We will rise early and alternate morning lectures with afternoon field work and data collection. This program has a community orientation so we will spend time working with local fishing cooperatives, offering environmental education programs in the local schools, and designing and implementing community service projects.

Temperatures are quite warm from July through September; the coolest months are April and May when a warm jacket is needed in the evening. Because travel to field work sites will often be in small skiffs known as pangas, and conditions can get choppy with the ever-present breeze, foul-weather rain gear is a necessity.

Center life will stress the concept of community and all students will be expected to do their share of site maintenance and clean-up. We will share cooking duties with a local cook, relying on the typical Mexican fare of beans, rice, fish, meat, poultry and vegetables.

Semester & Summer Course Details
Continued on Next Page

Photo: Marilyn Kazmers/SharkSong



Mangrove filled lagoons give way to white sand beaches backdropped by a colorful, cacti-strewn desert. "To have this beautiful marine world coupled with the desert sand, climate and landscape was absolutely amazing! Discovering a sweet-smelling plant that grows on a rocky desert cliff while sweating through a research hike is guaranteed to put a smile on your face, provided the spectacular view of ocean and desert hadn't already accomplished that."

Toni M. Schlosser, Oil City, PA - Davidson College

MAGDALENA BAY, MEXICO

WETLAND MANAGEMENT: PRESERVING AN ECOSYSTEM, AN ECONOMY, AND A COMMUNITY

Program Dates:

September 9 – December 12, 1997
January 31 – May 6, 1998

Departure Point:

La Paz, Baja California Sur, Mexico

The Bay is one of the most important habitats on the Pacific flyway and is home to over 100 species of migratory and resident birds including pelicans, eagles, and herons as well as white ibis and brant.

ENVIRONMENTAL ISSUES

Most residents of Puerto San Carlos, and the other towns and villages that dot the shores of Magdalena Bay, are dependent on the resources of the Bay for their livelihoods. These resources have historically included abundant populations of fish, shellfish and crustaceans. Over-fishing has led to the collapse of economically important fisheries and the subsequent closing of several area canneries. The added pressure of a national economic recession has led to an increase in the illegal harvest of sea turtles and shellfish, further depleting the marine resource base.

Continued fishing at current rates is clearly unsustainable yet, despite the critical importance of fisheries to the local economy, little research has been done to date on fisheries management in the Bay. In addition to better understanding sustainable management of both the commercial shrimp, tuna and sardine fisheries and the small-scale halibut, grouper, lobster, scallop and abalone fisheries, alternative employment options for fishers need to be identified. Options such as resort development and large aquaculture operations may offer near term economic gain but for whom, for how long and at what eventual cost to the marine resource base and social culture of the local community?

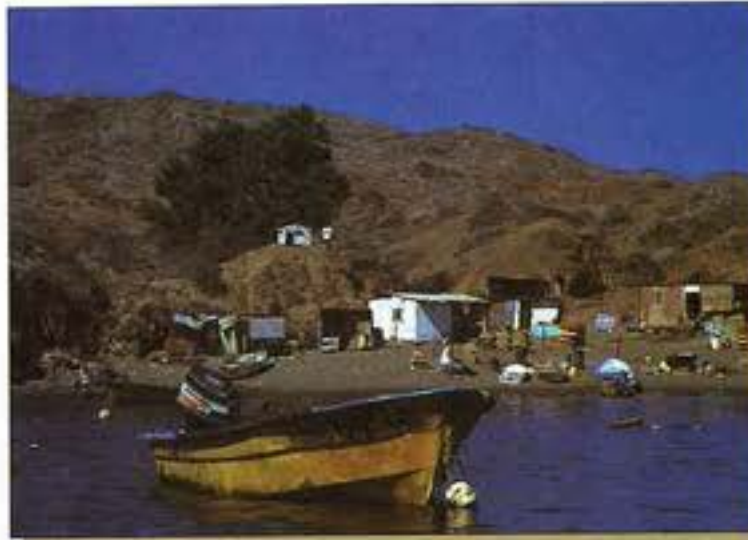


Photo: Jim Elder

Many local fishers live in villages and fishing camps such as this along the shores of the Bay. Little research has been conducted on the small-scale fisheries here and SFS can provide a much needed contribution to the management of this declining but extremely important sector of the local economy.

We begin the semester with an orientation to the case studies approach and Spanish-language lessons before moving into the three case studies and directed research projects.

Semester students will be registered in four academic courses:

BI/EE (NS) 379	Coastal Ecology
EE (NS) 374	Principles of Resource Management
EE (SS) 303	Economic and Ethical Issues in Sustainable Development
EE 491 or 492	Directed Research

Please see pages 38-39 for course descriptions.

Case Study #1

What are the impacts of the contamination of its intertidal zones on Magdalena Bay's biological and economic productivity?

Coastal wetlands are among the most productive ecosystems on earth, generating 24% of the earth's net primary productivity. Activities including toxic dumping by canneries, oil spills in Puerto San Carlos' industrial port, ongoing sewage outfalls and

coastal development are threatening the Bay's productivity. We will focus on the mangroves, sea grass beds, mud flats, and other intertidal areas near Puerto San Carlos to determine specific sources of contamination. By establishing a water quality testing and biological monitoring program, we can compare the most contaminated areas with sites that have not been impacted by pollution. Working with local residents we will assess the economic, social, cultural and human health impacts of the problem, and design strategies to be implemented locally to mitigate these problems.

Case Study #2

How can the unsustainable exploitation of the Bay's marine resources and small-scale fisheries be prevented and what are economic alternatives to fishing?

Our focus will be on species such as grouper, lobster, scallops, sharks and rays as we collect catch data to estimate population



MAGDALENA BAY, MEXICO PRESERVING COASTAL WETLAND DIVERSITY

Program Dates:

Session I: June 11 - July 10
Session II: July 17 - August 15

Departure Point:

La Paz, Baja California Sur, Mexico
Course Number: To be Announced

size and distribution of different stocks. We will also interview fishermen and accompany them fishing, explore changes in fishing technology, assess the effectiveness of fishing cooperatives as a management mechanism, and attempt to ascertain the traditional management approaches that have evolved over the past decades. Our efforts will include an analysis of the viability of eco-tourism and aquaculture as alternative employment for fishers.

Case Study #3

Can the development of a comprehensive Integrated Coastal Zone Management plan help prevent the over-exploitation of the Bay's marine and coastal resources?

Our goal will be to conduct the research necessary to create and implement an integrated coastal zone management (ICZM) plan for the region which takes into consideration the fisheries, gray whale tourism, resort and marina development, aquaculture, port and shipping, sewage disposal, and agriculture. We will also design processes for the continuous monitoring and evaluation of the plan. This will include defining coastal problems; collecting baseline data on the status of turtle, fish, bird, and marine mammal populations; generating statistics on the demographics of resource users of the Bay; and collecting information on existing management agencies.

***Note:** Applicants are strongly encouraged to complete at least one semester of Spanish prior to the start of this program.*



Photo: Marilyn Kazmers/ShakSong

A growing ecotourism industry based on whale-watching may cause the gray whale population to stop using the Bay as a winter calving and breeding grounds. In 1992, approximately 4,000 tourists came here to whale-watch. In 1995, the number of whale-watchers increased to 25,000.

who continue to slaughter black and loggerhead sea turtles, the unsustainable use of resources by many of Magdalena Bay's residents threatens the viability of this incredible wetland. Identifying the most critically threatened areas is an essential first step in designing strategies to protect these resources.

We will collect ecological, socio-economic, and cultural information from resource users using a rapid rural appraisal method. We will then organize and analyze these data using computerized and manual mapping. Using these maps, we will identify critically threatened areas and design strategies for their protection and management. Lectures will introduce integrated coastal zone management, ecological economics, coastal ecology and fisheries management. Based on our findings, we may recommend the creation of a national park, sanctuary or biosphere reserve, or even smaller management zones that prohibit certain activities in the most ecologically sensitive areas.

During the 30 day summer program, we will focus our efforts on determining the effectiveness of using methodologies such as rapid rural appraisals and mapping to identify critically endangered wetland resources and to design a protected area strategy for Magdalena Bay.

Field Work Focus

- ◆ Collecting data on the threatened biodiversity of the Bay with a special focus on wetland habitats, fisheries and sea turtle populations.
- ◆ Determining which resources are most critically threatened.
- ◆ Conducting a rapid rural appraisal project with local residents to collect data on endangered habitats.
- ◆ Creating computer and manually generated maps of the most threatened areas of the Bay.
- ◆ Producing recommendations for designating special management zones, protected areas, national parks or preserves.

Course Objectives

From fishing cooperatives that overharvest lobster, shrimp, scallop and sardines, to canneries that pollute rich mudflats and seagrass beds with toxic effluent, to ranchers who cut too many mangroves for fenceposts and poachers

CENTER FOR COASTAL STUDIES

CENTER PROGRAMS

Coastal Rainforests and Marine Resources

Semester Program — Page 28

Conserving Marine Resources and Coastal Rainforests

Summer Course — Page 29

Center Objective

To study issues related to the restoration of degraded timberlands, watersheds, and fisheries and to recommend strategies that may lead to: building a sustainable fisheries system; promoting the conservation of threatened species; creating a sustainable timber industry; and developing a diverse local economy.

Critical Environmental Issues

The future of this area is being hotly debated, from logging camps and the homes of native peoples to the seats of government. The provincial economy is heavily dependent on logging and related industries. As a result, the irreplaceable coastal rainforests here (*containing some of the largest and oldest trees in the world*) are being cut; more than 60 percent of Vancouver Island's mature forests have been felled, more than a quarter of the coastal region is now denuded.

Old logging practices altered the critical flow of water from coastal watersheds to the estuaries and ocean; threatening migrating birds, fish and marine mammals. As future logging rates are determined, there is a great need for ecological information and management recommendations. To help find new ways to support economic development of this region while preserving its natural and cultural heritage, we must address issues including:

- ◆ How do old growth forest and near shore marine ecosystems interact and how can their diversity and productivity be maintained?
- ◆ What alternative uses of the rainforest and coastal areas might be ecologically and economically viable (e.g. *ecotourism, fish hatcheries, alternate timber extraction regimes*)?
- ◆ Where do logging, fishing, native peoples' and environmental interests overlap?
- ◆ What areas of Clayoquot and Barkley Sounds should be fully protected as wilderness, partially protected/partially developed and fully developed?

Center Clients/Partners

Current clients and partners include Pacific Rim National Park, the Tla-o-qui-aht, Uchucklesaht and Huu-Ay-Aht Tribes of Nuw-Chah-Nulth First Nations, Port Alberni-Clayoquot Regional District, Ministry of Forests, Long Beach Model Forest, MacMillan and Bloedel Ltd., Canadian Department of Fisheries and Oceans, Northwest Ecosystem Initiatives, Scientific Panel on Sustainable Development, and Community Futures.

Field Director: Michael P. Ghiglieri, Ph.D., University of California, Davis (*Biological Ecology*).

Resident Faculty: Marian Weber, M.A., University of Alberta (*Economics*) and University of Toronto (*Economic History*). Ph.D. Candidate.

Dennis Morgan, M.S., University of Oregon (*Environmental Studies*).

Michael Quinn, Ph.D., York University (*Environmental Studies*).

Additional adjunct faculty.



Site Description

Much of the world's rare temperate rainforest can be found along Vancouver Island's rugged and beautiful west coast. Here, a half million acres of timber resources, claimed to be worth literally billions of dollars, meet bountiful Pacific waters in one of the last large wilderness areas left in North America. The estuaries lying between these ancient forests and the sea support extensive shellfish beds, migrating waterfowl, and vital nursing grounds for fish including one of the world's largest salmon fisheries.



Photo: David Silverberg

Our base at the Bamfield Inn is accessible only by boat. The fireplaced living room offers spectacular views looking out across Bamfield Inlet to the forested islands of the Deer and Broken Groups in Barkley Sound where black bears prowl the beaches, casually flipping over 300 pound boulders in search of crabs.

Primeval old growth forests of towering cedar, Sitka spruce and Douglas fir trees shelter wildlife ranging from small forest mammals to bald eagles to wolves and black bears. The coastal marine zone supports abundant fish and seabird populations as well as marine mammals including killer whales, porpoises and sea lions. For much of the year, the villages where we are based – Bamfield, Tofino and Ucluelet – are home to small communities of both native and non-native people totaling several thousand individuals. During the summer months however, over a million visitors flock to the area to hike, camp, fish, sea kayak and whalewatch.

Center for Coastal Studies



Photo: David Silverberg

The Center was invited by the Ahousaht Band Council to conduct research on the proposed Ahousaht Wildside Heritage Trail on Flores Island. Our goal was to assist the council by providing them with the information necessary to make the best management decisions for the trail.



Photo: David Silverberg

From our observation point on the decks of the research vessel ALTA, areas of clearcut logging are plainly visible on the hillsides of old growth forest bordering Barkley Sound. There is a great need for ecological information here as future logging rates are determined.



Dr. Mark Johannes leads a discussion on watershed assessment and restoration initiatives. "Coming from Canada, I knew Vancouver Island is an incredibly exciting place to study conservation. In terms of forest management, it's arguably the focal point of the world!"

Tammy Attia,
Halifax, Nova Scotia -
Dalhousie University

Center Facilities

Our Center is based in the Bamfield Inn. We overlook Bamfield Inlet with stunning beaches and intertidal zones a brief hike away. The Inn's main house contains the dining/study/lecture area, kitchen, lounge, library, workshop and discussion rooms and faculty and staff living quarters. A student residence building contains 2-3 person rooms each with a bathroom and shower. There is a nearby laundry room as well as faculty offices with a computer room.

Living and Working Conditions

The coastal town of Bamfield offers a few restaurants, several fishing inns, a post office, Coast Guard station, Red Cross medical clinic, and a tiny grocery. Bamfield lies at the end of a ferry run and a logging road and is bordered by the spectacular Pacific Rim National Park. We buy food locally - the same basics of meat, dairy, fruit and vegetables as we are used to in the U.S. plus fresh fish - and share the cooking and clean-up. Time is set aside for recycling, Center maintenance and community service opportunities such as building trails with a National Park crew, giving presentations at local high schools, or meeting with conservation groups.

This region boasts the mildest temperatures in Canada and has two major seasons: a wetter season from November through March, and a drier season from April through October. Temperatures range from an average of 40° F in January to the low 70's in the summer. It rarely snows on

the coast but, this is a rainforest with over 120 inches of rain per year! Sunny spring and summer days will find us in tee-shirts but sturdy foul weather gear is also a must year-round.

Weather and tides drive our lecture and field work schedule so weekly schedules vary. After several days of orientation, we will average 15 lectures a week plus other weekly meetings (*organizational, research/paper presentations, guest lectures*) in the first half of the program. Later in the program, more time is allocated for Directed Research projects with groups of 2 to 7 students and a staff member travelling to research sites to collect data. Additional meetings offer training in the skills (*statistics, paper writing formats, computer spreadsheets and laboratory analysis*) needed to complete the research.

Navigating the dense forests can be difficult. Curtains of ferns filter the few rays of sunlight that penetrate the evergreen canopy; moss carpets massive rocks and trees while wildlife find shelter in the jumble of ferns and bushes. Small and large boats facilitate our water-based research along the rocky coasts and sandy beaches that are littered with driftwood and occasional flotsam from the 100 vessels which have sunk near here in the "Graveyard of the Pacific."

Semester & Summer Course Details
Continued on Next Page

VANCOUVER ISLAND

COASTAL RAINFORESTS AND MARINE RESOURCES

Program Dates:
September 9 – December 12, 1997
January 31 – May 6, 1998

Departure Point:
Vancouver Island, British Columbia

"My directed research team's partner was the Hsu-Ay-Aht First Nations Band. We mapped two native salmon streams in order to calculate salmon habitat inventory and to develop restoration measures to reestablish productivity."

Ben Alder, Delmar, MD -
George Washington University

ENVIRONMENTAL ISSUES

Coasts have provided a wealth of resources for humankind for thousands of years; it's no accident that a majority of great civilizations and cities emerged in coastal regions. The Clayoquot and Barkley Sound regions provide perfect laboratories for exploring the relationship between ecosystems and the economy. The coastal and rainforest systems here support fish, shellfish, marine mammals, shorebirds, agriculture, aquaculture, forestry, tourism, recreation and transportation.

Excessive logging threatens both the quality and quantity of fresh water flow. Recent studies have found extensive damage to salmon spawning streams from clearcutting. As fish catches diminish and the future of logging is debated, the region's small communities are struggling with potential changes in their way of life. While immediate job loss is of deep concern, destruction of the productive capacities of the ecosystems upon which their livelihood depends remains an even deeper threat. Over the past ten years, controversial land-use decisions for this area have further polarized not only the communities of Clayoquot and Barkley Sounds, but people across Canada and around the world.



Photo: David Silverberg

Lessons learned working with a leading developed country as it attempts to solve economic and environmental conflicts can be applied to situations you may encounter in a future career as an environmental professional in the U.S. or used as a model in developing countries facing similar challenges.

We begin the semester with two weeks of orientation and preliminary lectures plus a week-long introduction to research techniques, statistics and scientific writing before moving into the three case studies and directed research projects.

Semester students will be registered in four academic courses:

BI/EE (NS) 379	Coastal Ecology
EE (NS) 374	Principles of Resource Management
EE (SS) 303	Economic and Ethical Issues in Sustainable Development
EE 491 or 492	Directed Research

Please see pages 38-39 for course descriptions.

Case Study #1

How can we insure that protected areas of Barkley and Clayoquot Sounds are managed to maintain ecological integrity and are integrated into regional strategies for sustainable communities and ecosystems?

Western Vancouver Island's system of protected areas ranges from small private reserves to very large national parks – with a host of legislated and policy-mandated lands in between. These areas, key components to the

overall strategy to protect biodiversity and insure ecological sustainability, are experiencing pressures from burgeoning recreational use and threats against their ecological integrity. Many areas have been reduced to island fragments that cannot protect the longterm viability of their key flora and fauna. Using the spectacular Pacific Rim National Park Reserve as our laboratory, we will address the challenge of coordinating activities at a landscape level to insure protected areas are linked, communities participate in decision making, lands are co-managed, biological benchmarks are established and economic opportunities for developing sustainable communities are considered.

Case Study #2

How can the coastal watershed be managed to support a healthy marine ecosystem as well as viable fisheries?

The near-shore areas of Clayoquot and Barkley Sounds support important shellfish fisheries and serve as a nursery ground for fish that spend their adult lives in the ocean.



VANCOUVER ISLAND

CONSERVING MARINE RESOURCES AND COASTAL RAINFORESTS

There is concern that the salmon and shellfish fisheries here are declining. Restoring healthy fisheries involves habitat protection and enhancement, and changes in harvest pressure. The international dilemma of managing a common fisheries resource will be explored in depth. Working on the docks or from boats, we will focus on the physical, chemical, and biological characteristics of stream and near-shore habitats, and potential impacts of watershed logging practices on salmon and shellfish populations.

Case Study #3

What is the bio-physical consumption of resources in coastal temperate rainforest communities?

We will investigate how resources and raw materials (e.g., wood fiber, fish, and minerals) are used by people in local communities, considering a range of human activity from individual household consumption to commercial business and industrial enterprises, including the SFS Center! This information will allow us to determine what patterns of use are detrimental to resource longevity and which are sustainable. Our goal is to determine the relationship between all activities and resource uses (including solar energy) for a typical rural, resource-based community in the Pacific Northwest made up of traditional fishermen, loggers, and First Nations people. Because trade can adversely affect the sustainability of resource use in one community for the benefit of another, this research is important in contributing to our understanding of sustainability in a global context.



A field trip to a logging operation provides another perspective on logging. The provincial economy is heavily dependent on logging and related industries. A single cedar, 300 feet tall and 18 feet in diameter, can bring \$30,000 at the lumberyard.

streams. There is concern that the salmon and shellfish fisheries of Clayoquot and Barkley Sounds are declining and local groups have requested studies on alternative harvesting methods.

We will explore stream and near-shore habitats and analyze impacts of logging practices on salmon and shellfish populations. Lectures introduce stream ecology, biotic integrity, nutrient cycles, energy flow and coastal zone management. Directed projects may focus on the ecological functions of coarse, woody debris in near-shore habitats; stream restoration methods; costs of restoration vs. conservation; and an economic and ecological analysis of alternative logging methods. Assessments of salmon and shellfish abundance can contribute to a long-term database on stock and productivity trends. Research may be conducted from docks where catches are brought in or from power boats. Our efforts are intended to support the creation of a resource management plan that encourages sustainable economic development while preserving natural resources.

Note: We will be camping, away from the Center, throughout most of the summer program.

Course Dates:

Session I: June 11 - July 10
Session II: July 17 - August 15

Departure Point:

Vancouver Island, British Columbia
Course Number: EE (NS) 353

During the 30 day summer program we will focus on an issue of concern to local groups, including the First Nations: How can the coastal watershed be managed to support a healthy marine ecosystem as well as viable forestry practices?

Field Work Focus

- ◆ Identifying and analyzing alternatives to current unsustainable land-use practices.
- ◆ Evaluating reforestation methods for stabilizing soils and restoring wildlife habitat.
- ◆ Investigating watershed and forest management options that preserve key marine resources.
- ◆ Examining the economic and ethical considerations regarding land-use alternatives.

Course Objectives

Research indicates that logging can have detrimental effects on streams, impacting the spawning of adult fish and the rearing of juvenile fish. Near-shore marine habitats, important for salmon and shellfish, can also be impacted by logging in watershed forests because the health of these habitats is influenced by the quantity and quality of the water and materials delivered by the

COSTA RICA

CENTER FOR
SUSTAINABLE DEVELOPMENT STUDIES

CENTER PROGRAMS

Studies in Sustainable Development

Semester Program — Page 32

Alternative Strategies for
Preserving Tropical Ecosystems

Summer Course — Page 33

Center Objective

To develop sustainable management models for Costa Rica's abundant but threatened natural resources using small communities as the operational unit and honoring the social, cultural and economic development needs of local residents.

Critical Environmental Issues

Costa Rica faces the challenge of protecting endangered ecosystems which are both environmentally and economically valuable without the option of placing additional land under federal protection; most of the land that can be preserved legally, more than one-fourth of the entire country, already has been so designated. Yet the need for productive agricultural land is escalating, and unsustainable practices outside of conservation areas threaten the longterm survival of these areas. Both traditional and alternative land-use options pose potential natural resource deterioration including water quality, soil erosion and pesticide build-up. To identify sustainable development options for the local community, we must answer such questions as:

- ♦ Can we use nature as a model for the design of new tropical agroecosystems?
- ♦ How can people and forests interact more effectively?
- ♦ What are the sociopolitical and economic factors affecting agricultural practices in Costa Rica?
- ♦ Is ecotourism a sustainable option for communities?
- ♦ What is the role of grassroots entrepreneurship in sustainable development?

Center Clients/Partners

A number of private organizations and government agencies look forward to sharing our research results, from Costa Rica's National Park Service and its central tourist authority to the Costa Rican Institute for Electricity to privately held preserves, the Forest Service, and the small cooperatives organized by farmers.

Field Director: Liana Babbar, Ph.D., University of Michigan (*Natural Resources*).

Resident Faculty: Bernardo Aguilar, M.S., University of Georgia
(*Agricultural and Applied Economics*).

Jose Luiz Diaz, M.A., Vanderbilt University (*Economic Development and Social Planning*).

Lisa Bradshaw, Ph.D., University of California at Davis (*Ecology*).

The SFS Center for Sustainable Development Studies is the result of a cooperative effort between SFS and a consortium of schools including the University of Michigan, and Allegheny, Colby, Dickinson and Middlebury Colleges. A portion of the spaces in each semester are reserved for students from Consortium schools.



Site Description

Two of Costa Rica's four borders are beaches; the Pacific lies to the west and the warmer, calmer Caribbean to the east. Similar in size to West Virginia, the country seems to tilt toward the Pacific; the sloping, hilly emerald terrain is sharply cut by swift rivers. More than half the population lives in the Central Valley, home to both the capital, San Jose, and Atenas, the 17,000-person county where our Center is located.



Photo: Liana Babbar

"There is so much I learned in Costa Rica that I would not have even begun to understand in a cold classroom in Central Ohio . . . by actively participating and actually seeing and analyzing the environmental problems, I came away with a greater sense of what is a sustainable system."

Susan Studer, Elida, OH • Denison University

Costa Rica's natural resources have made it a prime destination for ecotourists and with good reason. Its cloud forests, rainforests and mountain plains shelter more than 6,000 plant species (including more than 1,000 orchid varieties). Costa Rica's butterflies are so famous that "butterfly ranching" has emerged as an economic sector; over 500 species are found here. More than 800 bird species – quetzals, toucans, hummingbirds, scarlet macaws – are found in the wet and dry forests. And

Photo: Liana Babbar



We spend a third of our time on off-site field trips. Our case study on Sustainable Entrepreneurial Models will include a visit to a cooperative mangrove charcoal business.

Photo: Liana Babbar



Data collected by staff and students on indicators of ecosystem health, integrated pest management strategies and gender roles in agroecosystem management have been shared locally and also presented at international conferences in Mexico and Denmark during the past year.

the magnificent beaches are among the world's largest-known nesting grounds for sea turtles.

Farms producing mangoes, oranges, lemons, avocados and papayas lie on all sides below our small farm on the crest of a hill above Costa Rica's Rio Grande. Not far away, four rivers run to meet it; significant patches of forest lie along their banks.

Local farmers, many working properties from 1-10 hectares in size, also grow vegetables, coffee, and sugar cane, and raise cattle. In the past five years, their concern for the future of their area has led them to replant more than 100 hectares with trees, and to organize into groups whose goal is ecosystem restoration.

Center Facilities

The Center for Sustainable Development Studies is in Barrio Los Angeles, a small town on the outskirts of Atenas. The main property includes a large house where faculty live and meals are eaten. Students live in a refurbished chalk factory that has been converted to dormitory space; there are five large bedrooms (6-7 students to a room), two bathrooms, classrooms, a small laboratory, and a library/computer room.

Cooking is shared between students and a local cook. Meals are a feast for vegetarians and adventurous souls excited by ethnic cuisine: rice, beans, vegetables, plantains, and abundant, locally grown tropical fruit. For variety, locally raised meat and poultry are also available.

Living and Working Conditions

During the first half of the program, our days at the Center start with lectures or field work. An important feature in the early part of the program is Spanish lessons aimed at easing communication with local residents. We will take numerous field trips, some short hops within the Central Valley, some to public and private preserves a distance away. Evenings are reserved for guest lectures and presentations from local experts, but we do slot in time for relaxation and group sports. During the latter part of the program, much of our time is spent on directed research.

Because the population's land-use choices are among our chief concerns, we will spend sizable blocks of time on local farms and speaking with agricultural cooperatives. Community involvement, which may extend to community service projects or volunteering, is an important feature of this program.

At 2,600 feet above sea level, nights are cool, days warm and possibly damp. During the course, we visit other, very different regions: two areas of lowland tropical forest which include a rainforest, a cloud forest and a coastal ecosystem.

Photo: Liana Babbar



A program with local school children. "We had many opportunities to interact with the local community from daily encounters to a community clean-up to giving a lecture at the local school . . . the friendliness of the local people went well beyond anything I've been used to and we were always welcome to take part in any community activities."

**Marcela Kostihova,
Czech Republic -
North Central College**

Semester & Summer Course Details
Continued on Next Page



ALTERNATIVE STRATEGIES FOR PRESERVING TROPICAL ECOSYSTEMS

Program Dates:

Session I: June 11 - July 10

Session II: July 17 - August 15

Departure Point:

San Jose, Costa Rica

Course Number: EE (NS) 352

Case Study #3

What are the impacts of Foreign Direct Investment and Sustainable Entrepreneurial Models?

Development in a Third World country most often comes at the price of involvement by industrialized nations, usually by those countries in which the interested multinational corporations have their bases. These interests in Central America are most often fruit-producing concerns which, like their parent companies, are profit-driven. Such operations compete with local traditional and grassroots businesses for land, capital and labor. Since they are not locally based, they tend to show less concern than indigenous businesses for the health of local ecosystems. On the other hand, traditional agricultural businesses may be sustainable, but have slender economic success. Our search for a sustainable and profitable alternative will take us from the cloud forest to the mangroves of the Pacific coast to study three agricultural-product businesses – blackberries, bananas and mangrove charcoal. Using field observations and interviews, we will focus on ecosystem stability as well as on the cultural and economic factors affecting success.

Prerequisites: Applicants must have completed a college level course in each of the following: ecology or environmental studies; international development or economics or anthropology; and Spanish; prior to participating.

Applicants from Allegheny, Colby, Dickinson and Middlebury Colleges and the University of Michigan should consult their Environmental Studies Department for application information.



Photo: Liana Sabbat

"I feel the program's biggest impact was the opportunity for an individual to contribute and make a real difference at the local level without being overwhelmed by the global nature of most environmental issues. I also feel that many of the ideas brought up in the program are very transferable to other parts of the world."

Richard Blair, Dry Fork, VA - Virginia Polytechnic Institute

During the 30 day summer program, we will visit several regions of Costa Rica and focus our attention on the question of whether the current management and design of Costa Rica's protected areas effectively meet the goals and objectives of conservation.

Field Work Focus

- ◆ Determining how much habitat protection is supplied by currently protected areas.
- ◆ Investigating whether current regulations protecting areas including buffer zones, create true protection or mere "paper parks."
- ◆ Determining whether private initiatives can preserve ecosystems as efficiently as protected areas.
- ◆ Investigating whether privately protected areas are economically viable.

Course Objectives

Encouraging protection strategies on private lands may hold the key to preserving wildlife populations both here and in other countries. This is particularly true now, when tourism is about to become Costa Rica's No.1 source of income. Success will require investigating both environmental and cultural impacts and identifying persuasive economic benefits that will result from sustainable use.

Our search to identify successful management strategies will take us to both officially protected and privately created preserves. Faculty lectures will address the history of Costa Rican national parks, models of natural resource protection, economics and sustainable development, and managing for diversity. Guest speakers will explain federal protection schemes and the operation of private reserves. During our visits, we will conduct ecological inventories of protected areas, measure impacts on watersheds, and conduct community interviews with owners whose lands border the parks. Assessments of the economic and social impacts of preservation and degradation will be considered as we prepare to recommend the most viable preservation strategies.

SEMESTER PROGRAM

Center for Rainforest Studies

A U S T R A L I A

TROPICAL RAINFOREST MANAGEMENT

Program Dates:

September 9 – December 12, 1997
January 31 – May 6, 1998

Departure Point:

Cairns, Queensland, Australia



Tree planting at Pelican Point. "Many study abroad programs are located at foreign universities where students take classes just as they would at their home school. I was looking for more, I wanted to find a program where students worked in biologically significant ecosystems and developed skills that can't be taught in a classroom. I found this at SFS."

David Moeller, Mars, PA -
Washington University

ENVIRONMENTAL ISSUES

The narrow belt of rainforest which borders the Queensland coast has suffered the same fate as most other rainforests; agriculture, ranching, mining and logging have destroyed and disrupted habitat. Australia, realizing that its forests shelter unique primitive plant species, birds and marsupials found nowhere else on earth, moved to confront the threats to its rainforests faster than most tropical countries. In 1988, most of its remaining tropical forests were declared protected under World Heritage designation.

This decision was very controversial, and is still not fully accepted by some Queensland residents. Australia's active exploration of these issues puts it years ahead of most tropical rainforest countries, and solutions developed here may serve as models for the rest of the world. Yet authorities still struggle with the question of how much land to allot to recreation, wilderness, reforestation, etc.



A view of the neighboring farm. "I have seen oceans of green before; I live in a state that is still 80% forested. But nothing I had ever seen compared to the greenness of the rainforest. Every spectrum of the color green was represented. Layers upon layers of forest, trees and land. I knew then that I had come to the right place."

Joshua King,
Hampden, ME -
Tufts University

We begin the semester with two weeks of orientation and preliminary lectures before moving into the three case studies. A week-long introduction to research techniques, statistics and scientific writing precedes the directed research projects in the latter part of the semester.

Semester students will be registered in four academic courses:

BI/EE (NS)369	Rainforest Ecology
EE (NS) 370	Principles of Forest Management
EE (SS) 302	Environmental Policy and Socioeconomic Values
EE 491 or 492	Directed Research

Please see pages 38-39 for course descriptions.

Case Study #1

What are the most viable reforestation strategies for the Atherton Tableland?

Rainforest areas protected by the Australian government may be too small, fragmented, or vulnerable to human activities to provide for the longterm viability of some plant and animal populations. Restoration of degraded areas which were cleared for farming may ease the problem, particularly in creating wildlife corridors to reduce fragmentation and extinction effects. Yet the success rates of different reforestation

strategies, e.g. natural regrowth, low diversity plantings, and high diversity plantings are virtually unknown. Through field trips to natural areas and areas reforested in a variety of ways, we will seek to understand the role that reforestation can play in restoration, wildlife conservation and watershed protection. We will hear lectures from forestry professionals and grassroots reforesters; study and compare a variety of experimental plantings; and help to design experimental plots for longterm monitoring.

Case Study #2

What are the best management strategies for conserving and managing cassowaries and the habitats they populate on the Atherton Tableland?

The flightless cassowary, a rare inhabitant of our surrounding forests, is the touchstone for conservation efforts in North Queensland. Though treasured, the bird is in slow but steady decline. A severe lack of data on its range, habitat needs, food sources, density and distribution has

Center for Rainforest Studies

Photo: Kathy Abbott



As part of our efforts to identify strategies to conserve cassowaries and manage their habitats, we will visit Mission Beach, part of this endangered bird's range.

The Center for Rainforest Studies, called "Warrawee" – "you are welcome here" in the local Aboriginal language, is located amid 153 acres of rainforest and secondary growth forest. "One can learn as much supplemental information as possible because the learning resource, the rainforest, is literally on the other side of the door."

Asher Cutter, Reading, MA - Tufts University



Photo: Ed Stashko

some respects, perhaps even more so. They are treasure houses of primitive flowering plants, species long since extinct on other continents. They shelter an astonishing array of bird species from the brilliant king parrot to the flightless, ostrich-like cassowary. And, they are home to a range of marsupials including possums, bandicoots, tree-kangaroos and gliders, all evidence of an evolutionary pattern seen nowhere else in the world.

Our Center for Rainforest Studies lies in the midst of this bounty: Of the property's 153 acres, approximately a third is mature rainforest, and another 50 acres are forest regrowth. The site – called "Warrawee," aboriginal for "You are welcome here" – lies in the northern foothills of the Atherton Tableland. Although remote (*the nearest town is a 20 minute drive away*), you will stop regretting the seclusion the first morning you wake to the birds' dawn chorus, or the first time a group of flying foxes sweeps overhead at dusk.

Center Facilities

The field station lies at 700 meters elevation in the midst of a rolling, hilly property surrounded by protected World Heritage forests. Students live dorm-style in four, eight-person cabins; faculty occupy additional cabins nearby. The main building has lecture, computer and library rooms, a collection of research equipment, a kitchen and washing machine; solar and standard electricity provide our power.

Living and Working Conditions

The sounds of scurrying wildlife and singing birds outside our rustic cabin windows provide a natural alarm clock. After breakfast on the patio of the main building, we're off to one of several morning lectures. Lunch is often eaten in the field, where we spend most of the afternoon engaged in field work or visiting sites of interest. As nightfall approaches, we return to the Center. Dinner may involve a culinary adventure to be shared with the group or with our neighbors at the regularly scheduled "barby" hosted by the Center.

Once we begin our directed research projects, lectures diminish and field work and data analysis increase. We will work

in forest and modified habitats on the SFS property as well as in the adjoining protected forests and nearby private lands. The communities of the Atherton Tableland are small and residents get to know us quickly. As a result, volunteer opportunities – building trails, giving presentations at local high schools, meeting local conservation groups, and planting seedlings – are available.

We buy food locally – the same basics of meat, fish, dairy, fruit and vegetables as we are used to in the U.S. – and we do the cooking and clean-up. Students also organize recycling and composting and participate in weekly Center maintenance. At 17 degrees south of the equator, the Atherton Tableland has two seasons: wet and hot, or cool and relatively dry. The Australian summer stretches from November to March, and can produce heavy rains and soggy roads; dry season arrives in April, along with night temperatures that can sink as low as freezing. Winter days are usually about 25 degrees C.

Semester & Summer Course Details
Continued on Next Page

SEMESTER PROGRAM

Center for Sustainable Development Studies

C O S T A R I C A

STUDIES IN SUSTAINABLE DEVELOPMENT

Program Dates:

September 9 – December 12, 1997
January 31 – May 6, 1998

Departure Point:

San Jose, Costa Rica



"The Center was located in a typical rural area. We used the same telephone as the ticos, we shopped at the same pulperia, we ate at the same restaurants . . . in other words, we had a wonderful opportunity to learn about the real Costa Rica and its people."

Matthew Finer, Lancaster, PA -
University of Pittsburgh

ENVIRONMENTAL ISSUES

Costa Rica faces a struggle common to many developing countries: How to preserve its beautiful (and increasingly economically valuable) natural resources while fostering its population's desire for First World-style prosperity. The struggle is vividly evident in its land protection efforts: It has placed 27% of its land mass into preserved areas, yet at the same time suffers some of the world's highest rates of deforestation in unprotected lands just beyond the parks' borders.

Concern is growing that some of the abundant but separate preserved patches are too small to provide longterm wildlife habitat. At the same time, agricultural practices threaten the environment while the economic and cultural need for agriculture continues. And, although Costa Rica's remaining natural riches have attracted international attention, there is no concrete evidence that ecotourism is a sustainable solution to the economic dilemma. The development which follows on its heels may be as destructive as agriculture has been to date.



Photo: Ed Slashko

Located in Costa Rica's fertile Central Valley, the Center offers easy access to public and private preserves. "When we did our directed research on the ecological health of La Carpintera protected zone, our results could be applied in a real way . . . it makes me proud to know my results will be used and that my time was spent in a way that was beneficial to me and to Costa Rica."

Kristen Yates, Sparta, NJ -
College of William
and Mary

We begin the semester with a module introducing the problem-oriented case study approach, as well as Spanish-language lessons before moving into the three case studies and pursuing directed research projects.

Semester students will be registered in four academic courses:

EE (NS)	377	Tropical Ecology and Sustainable Development
EE (SS)	301	Sociopolitical Systems and Sustainable Development
EE (SS)	303	Economic and Ethical Issues in Sustainable Development
EE	491 or 492	Directed Research

Please see pages 38-39 for course descriptions.

Case Study #1

How can Costa Rica achieve sustainable agriculture as it moves into the twenty-first century?

Agriculture provides one of the largest contributions to Costa Rica's GNP, coming mostly from large-scale monocultures destined for export. Because Costa Rica has set aside so much of the country's land for conservation, the possibility of expanding agricultural lands no longer exists. With land already constrained, Costa Rica faces pressure from population growth, development, and escalating environmental degradation as a result of conventional agricultural practices and

imported technologies. The future of farming here is further complicated by new policies addressing commercial relations and socio-political organization. By observing and performing quantitative analyses of agroecosystems in different regions, we can assess current land use and recommend alternative options. Specifically, we can make recommendations regarding which policies, production practices and scale of efforts will ensure sustainable agriculture.

Case Study #2

How can community-based incentives more effectively promote conservation and production?

Successful conservation depends on support from neighboring communities. Costa Rica has focused attention on conservation for many years and communities have an increasing awareness of issues relating to production and conservation. Many communities are working with specific objectives with regard to protection, conservation and production; some are promoting their fabulous natural resources as tourist attractions. No one knows whether tourism offers longterm economic viability: it may trigger negative social and cultural impacts, and further strain fragile forest



TROPICAL REFORESTATION

Program Dates:

June 11 – July 10

July 17 – August 15

Departure Point:

Cairns, North Queensland, Australia

Course Numbers: EE (NS) 355

frustrated conservation and management efforts, and its interaction with the local ecosystem is little understood. Field trips to high density parts of its range (*the well known Mission Beach management area*), lectures by professional wildlife managers, seat censuses, and a habitat project will augment our contributions to the database on this shy and little-known bird. In addition, we will critique and revise a management plan for cassowaries on the Tableland to be submitted to the newly organized Conservation Research Center in Cairns.

Case Study #3

How can restoration forestry practices improve the management of the Johnstone River watershed?

Watersheds are increasingly the focus of conservation efforts, both in terms of biodiversity and environmental services. At the same time, the past use and current state of watershed resources are, in most cases, good examples of the conflicts and challenges associated with the management of common property resources. Reforestation schemes have been initiated in the upper reaches of the Johnstone River catchment that have or will have a significant effect on the river's hydrology and water quality and on human and animal health downstream. Background material will provide an overview of historical development, past uses and current demands for watershed resources, and the importance of the conservation of the watershed in relation to broader environmental policy. We will then consider ways, including participating in local reforestation efforts and water quality monitoring, in which reforestation practices and policy can improve the environmental quality within a watershed.



Photo: Kathy Abbott

"My experience in ecological research and especially directed research helped me realize what I did and did not like about biology and, more specifically, research. I found that there are several ways to help the environment other than just in 'environmental science' labeled careers."

Ann Huger, Lexington, VA - Hollins College

During the 30 day summer program, we will focus our energies and attention on addressing a key question for local managers and residents: What are the most viable reforestation strategies for the Atherton Tableland?

Field Work Focus

- ♦ Determining what forest birds, mammals and reptiles use replanted areas, and how they affect planted rainforest succession.
- ♦ Investigating the potential for creating wildlife corridors between fragmented rainforest parks.
- ♦ Investigating the success of different tree species and planting patterns in restored areas.
- ♦ Assessing interest of local land owners in developing timber and wildlife values on their own lands.

Course Objectives

Designation as a World Heritage Site did not eliminate local pressures on the forests; struggles continue over how to manage the multi-use forests, which degraded patches to restore, and whether sustainable use is achievable given the slow pace of forest regeneration. To investigate the dynamics of reforestation, we will develop and implement a plan to convert a stretch of farm land between two protected rainforest areas into a

reforested habitat corridor. This will involve designing and assessing specific reforesting and management strategies and physically planting seedlings, some of which have been grown in the Center's shade house. We will also study the ecology and development of already planted rainforest projects.

Lectures addressing relevant topics in conservation biology, forest ecology, tropical resource management and population demographics provide a base for our fieldwork. This information will be supplemented by guest lectures on reforestation strategies. We will become familiar with a number of field research techniques such as transect use, quadrat measurement, resource mapping, and bird and animal live-trapping that will be useful in conducting our directed research projects.

For more information on this Center, please see Pages 12-13.

Alumni Profile

Chris Brueske

Environmental Consultant

SFS Program: *Landscape Ecology – Designing Parks for Preservation Summer Course - Colorado*

The most rewarding aspect of my SFS experience was the feeling that I was

doing something constructive in the environmental field. Often, college-aged people are really interested in environmental issues but can't find an outlet for their constructive energy.

SFS provided this outlet by sending students to some of the highest profile areas of environmental management plans, land use decisions, and regulatory policies. My SFS experience made me realize that I personally could have a positive effect on environmental issues, and this realization convinced me to pursue a career in the environmental field.

In the current job market, the large number of qualified environmental professionals makes it difficult to obtain a position in the environmental field without experience. The work that SFS conducts is very directed and hands-on; I have found that the specific skills I developed at SFS were very marketable to employers. The research experience I gained at SFS allowed me to obtain a series of research and graduate assistantships, an internship with a Chicago-based wetlands firm, and my current job with CH2M Hill, an environmental consulting firm in Denver. While most of my work now focuses on cleanup of hazardous waste sites, I use the skills I developed at SFS, such as air photo interpretation and field sampling protocols regularly.

On a personal level, my best memories of SFS are the people I met and the ideas we exchanged. I reunited with members of my SFS team several times after the course, for trips to the Grand Canyon and Mount Saint Helens.

BI/EE (NS) 371 Techniques of Wildlife Management introduces students to the questions, principles and tools used by resource managers in the Kenyan savannah ecosystem. Students will study habitat assessment, plant and animal identification, plant and animal associations and distributions, and other approaches to evaluating the savannah ecosystems. The behavioral, physiological, and social responses of animals to a changing environment will be examined. Selected field and laboratory techniques useful for monitoring ungulate populations and optimizing management practices will be presented. Decision-making processes on which wildlife management programs are based, will be addressed.

BI/EE (NS) 372 Wildlife Ecology presents students with the information and conceptual background necessary to understand the underlying ecological principles of the East African savannah ecosystem. We will focus on the fundamental processes and inter-relationships between the biotic and abiotic environment. We begin with a discussion of basic ecological principles, setting them against the background of East Africa. The factors underlying distributions, population biology and behavioral ecology will be examined along with competition and predation using African examples. Theoretical models will be discussed in light of our observations on the ranch and on field trips.

BI/EE (NS) 373 Tropical Marine Ecology discusses the interactions that determine the distribution and abundance patterns of tropical marine organisms, with emphasis on the ecology of near-shore areas. Basic principles of ecology are integrated with an understanding of the sea as a habitat for life. Physical, chemical, and geological oceanography are discussed. Major groups of dominant marine organisms of the region are described and examined in the field. Major near-shore marine habitats are examined, along with their associated biotic communities. Coral reef ecosystems are emphasized to illustrate basic concepts. Applications to the management of indigenous marine resources are discussed and demonstrated.

BI/EE (NS) 369 Rainforest Ecology introduces the structure and function of tropical rainforests including the floral and faunal components. Ecological processes that maintain biodiversity and the evolutionary processes that generate it will be presented. We will examine the dynamic relationships between plants and animals including pollination and seed dispersal. On a larger scale, we will examine tropical vegetation patterns along climatic gradients and then discuss mechanisms for preserving and restoring tropical ecosystems.

EE (NS) 370 Principles of Forest Management presents the ecological and analytical tools used in the management of terrestrial, living resources. We will use examples from the tropics to stress the theories and skills that provide the foundation for land management worldwide. The assessment and minimization of adverse environmental impacts caused by resource development, as well as the restoration and rehabilitation suffering from chronic human induced disturbances, provide key foci for applying the principles learned in this course.

EE (NS) 374 Principles of Resource Management introduces practical tools used in addressing complex environmental problems including coastal zone planning, guidelines for ecologically sustainable development, environmental impact assessment, fisheries management techniques, and protected-area planning and management. We will review these tools in terms of their application to local issues and to case studies from the Caribbean, the United States, Central America, and East Africa.

EE (NS) 377 Tropical Ecology and Sustainable Development examines the ecological impact of human activity, especially agriculture in a tropical country. The agroecology of important crops will be studied with emphasis on biodiversity as the source of production means and materials. Students will identify renewable and nonrenewable resources and examine their historical use by people in the region. We will study the long term and large scale impact of local agricultural and other practices on the national and global environment (e.g. *water pollution, waste management, climate change*). Options for alternative resource use, land restoration and preservation will be examined from ecological, socio-political and economic viewpoints. Factors that constrain or promote particular options will be included. Basic field techniques and measurements will also be covered.

BI/EE (NS) — Students choose to register for either Biology or Environmental Studies credit

EE (NS) — Environmental Studies (*Natural Science*)

EE (SS) — Environmental Studies (*Social Science*)

“The SFS programs are an integral part of the environmental curriculum at Boston University. We have a hard time keeping students on campus! To me, the greatest feature of the SFS programs is their ability to integrate information from many traditional disciplines into a coherent, reasoned analysis of environmental problems. We have undergraduate environmental majors in the natural and social sciences. Students from both programs reap great benefits from the SFS experience that ties important concepts together and gives them a real-world laboratory in which they apply those ideas.”

Cutler Cleveland
Director Center for
Energy and Environmental Studies
Boston University

BI/EE (NS) 379 Coastal Ecology examines the ecological processes at the interface between land and sea in order to provide an understanding of how human perturbations can impact both marine and terrestrial systems. The watershed concept will be used to explore nutrient flow, energy cycling, erosion, coastal circulation, productivity, and biotic interactions. This course is designed to provide a basic understanding of how natural systems work in order to help guide resource managers toward ecologically sound and sustainable decisions. Field work exposes students to techniques of surveying and monitoring and the study of biotic interactions in a complex physical/chemical milieu.

EE (SS) 301 Socio-Political Systems and Sustainable Development examines the historical development of Costa Rica within an international context to understand the stages of economic, political and social development that have taken Costa Rica from social and economic isolation to a position of political and social leadership in the Central American isthmus. Topics to be discussed include 1) pre-Columbian Central American and the Meso-american influence;

2) social and economic development during the colonial period; 3) the foreign presence in Costa Rica; 4) the banana republics; 5) coffee and economic development; 6) social and economic development during the 1980s-90s.

EE (SS) 302 Environmental Policy & Socioeconomic Values provides insight into the broad social context which surrounds the natural resources under study and which will determine, in part, which approaches to resource management are practiced. Objectives include the development of an understanding of: sociocultural context including hierarchies and power structures, formal and informal decision making processes, value systems relevant to natural resources including religious factors and environmental ethics, and past and present uses of natural resources; economic factors (*local, regional, and external*): ownership patterns; attitudes and other factors that affect change and their historical bases, and legal basis for enforcement of environmental policy. The course also introduces subjects such as the major constituencies which affect conservation (*NGO conservation groups, economic interests, etc.*) and their underlying philosophies.

EE (SS) 303 Economics and Ethical Issues in Sustainable Development develops the principles and applications of Ecological Economics, or the scientific and management aspects of sustainability. Allocation, distribution and scale will be presented as parameters to assess the sustainability of development models (*at a macro and micro level*). Basic concepts of ecological economics cost-benefit valuation techniques will be presented and applied. The roles of local people, the government, and private, national, and bilateral aid agencies will be examined as constraints for the implementation of sustainable development models. We will address the problem of designing and setting up sustainable development models with communities. The empowerment of local people and their reaction to non-local proposals for sustainable development will be examined through the review of specific case studies.

EE 491 (Fall) EE 492 (Spring) Directed Research prepares students to distinguish hidden assumptions in scientific approaches and separate fact from interpretation, cause from correlation, and advocacy from objectivity. Specific tools will include experimental design, field techniques, basic descriptive statistics and parametric and non-parametric quantitative analysis. Succinct scientific writing, graphic and tabular presentation of results, and effective delivery of oral presentations will be emphasized.

Alumni Profile

Dave Gold

Environmental Consultant

SFS Program: *Conservation of Marine Mammals Semester - Mexico*

My SFS experience had a lasting impact on me intellectually, socially, and spiritually. For the first time, I saw science in action, and it woke me from a fog of academic mumbo jumbo. The program was a constant learning experience, whether we were learning about marine mammal behavior or the realities of scientific grant writing or how to interact with people whose language you can't speak well. Every day I became more confident in my own abilities and more willing to undertake challenges. I enjoyed facing these challenges with my fellow students; many of us remain close to this day (*almost seven years later*). The undisturbed environment which served as our classroom remains clear in my memory, inspiring me daily to work to protect natural resources.



I am presently employed at an environmental consulting firm in Tucson, Arizona and the skills I developed with SFS are consistently applicable. I spend about 20 percent of my time in the field, doing endangered species surveys or delineating "jurisdictional waters of the United States." The rest of my time at work is split among a variety of projects. For example, I am evaluating impacts to water resources associated with the expansion of three mining operations, developing an irrigation management and integrated pest management plan for a golf course, and writing a model ordinance to restrict landscape watering in municipalities in Arizona. I am also working on a team that is developing policy recommendations to resolve major water problems in the Colorado River Basin. Diverse interests are at stake in these projects and science will play a critical role in resolving conflicts. The value of my scientific training from SFS is obvious. I highly recommend the SFS experience; a textbook can only take you so far.

Alumni Profiles

Bruce Crawford

**Environmental Educator,
Chesapeake Bay Foundation**

SFS Program: *Marine Resource Management Semester - Caribbean*

Growing up in Pittsburgh, Pennsylvania, I rarely got a chance to experience the ocean, its natural wonders, and the people who strive to exist with it. My experience with SFS in the Caribbean changed all that. Living, working, and learning for three months on South Caicos influenced me in many ways. I learned valuable lessons on water conservation as I watched our cistern sink lower and lower during a drought. Living with 30 different people day in and day out provided me with an incredible outlet for cooperative learning and sharing of experiences.



Today I work for the Chesapeake Bay Foundation. I live and work on Smith Island, located off the Eastern Shore of Maryland. As an environmental educator, I help run three day field trips for 6th-12th graders (*and adult trips*). Our objective is to teach children about the Bay's ecology, diversity, complex problems, and to hopefully inspire them to help save the Bay. We use the outdoors as our exclusive classroom and attempt to give children critical thinking skills about the Bay and its problems. My SFS experience has provided me with practical skills applicable to education, along with showing me first hand the wonders of hands-on, field-based education.

Geraldine Tierney

Environmental Planner

SFS Program: *Ecology of Spinner Dolphins Summer Course - Hawaii*

SFS gave me my first experience performing field research. Although I was an undergraduate biology major at the time, the first opportunity I had to design and conduct a research problem came during my SFS program. The course gave me a feel for the excitement, rewards and hardship of field ecology.

Since then, I've gone on to earn a M.S. in forest ecology, and I've spent many years trying to bring environmental science into government policy-making. For three years I worked as consultant to the U.S. EPA, researching climate change and threats to biological diversity in the U.S., and helping to create a framework for federal policy.

Currently, I'm an environmental/GIS planner for a local government in upstate New York where my work has a tangible impact on the community in which I live. SFS's focus on both the science and politics of environmental issues is one which I share. I feel lucky to have had the opportunity to get started with SFS.



Academic Credit

All SFS participants are registered at and receive credit from Boston University in Boston, which accredits SFS programs. The only exceptions are students from SFS Affiliate and Consortium schools who receive credit directly from their home institutions. (*Students from these schools should see sections on Page 41 regarding Affiliate schools and on Page 33 regarding Consortium schools*).

A non-refundable registration fee of \$150 for semester programs and \$100 for summer courses is due from all SFS students 10 days after acceptance into the program.

All SFS courses are approved and assigned course numbers by Boston University. SFS semester programs incorporate four courses and carry a total of 16 semester credits in biology or environmental studies from Boston University. Summer courses carry 4 semester credits in environmental studies. Approximately six weeks after the conclusion of the program, you will receive an official transcript from Boston University. Many students have arranged either to transfer credit from Boston University or to receive credit directly from their home school.

The following is a partial list of the home schools of previous SFS participants. Over 200 institutions, including the majority of these schools, have accepted or awarded credit for SFS participation. As the final decision regarding credit transfer rests with the home institution, **you should check with your advisor/registrar before going into the field.** If you have questions on credit, please call the SFS Admissions Office and we may be able to direct you to someone on your campus who is familiar with credit transfer for SFS programs. Many schools award credit on a case by case basis and credit granted to previous students does not imply automatic credit approval.

Albion College	Ithaca College
Allegheny College+	Kenyon College*
American University	Knox College
Amherst College	Lehigh University
Barnard College	Lewis and Clark College
Barry University	Lynchburg College
Bates College	Macalester College
Baylor University	McGill University
Bennington College*	Miami University*
Binghamton University	Michigan State University
Boston College	Middlebury College+
Boston University+	Mills College
Bowdoin College	Mount Holyoke College*
Bowling Green State University	Muhlenberg College
Brandeis University*	New York University
Brown University	Northwestern University
Brigham Young University	Oberlin College
Bryn Mawr College	Occidental College
Bucknell University	Ohio State University
Carnegie Mellon University	Ohio University
Case Western Reserve University	Ohio Wesleyan University
Claremont McKenna College	Oregon State University
Clark University*	Pacific Lutheran University
Colby College+	Pennsylvania State University
College of William and Mary	Pepperdine University
College of the Holy Cross	Pitzer College
College of Wooster	Pomona College
Colorado College	Providence College
Connecticut College*	Purdue University
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Dalhousie University	Rice University
Dartmouth College	Rutgers University
Davidson College*	Saint Lawrence University
Denison University*	Saint Michael's College
DePauw University	Saint Olaf College
Dickinson College+	Santa Clara University*
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Drew University	Skidmore College
Duke University	Smith College
Earlham College	Southern California
Emory University	Stanford University
Evergreen State College	S.U.N.Y. College of Environmental Sciences and Forestry*
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*Home School of 6 or more
 SFS participants in 1996*

* **Member of Sustainable
 Development Studies
 Consortium**
*(please see page 31
 and 33 for details)*
 * **SFS Affiliate School**

SFS Affiliate Program

The SFS Affiliate Program was initiated to help students maximize their SFS experience by building better linkages to the academic community from which SFS students are drawn. Students from Affiliate institutions receive preferential admission and financial aid from SFS. The home schools provide direct academic credit for SFS participation and have curricular input into the SFS program. An SFS liaison has been identified at each affiliate school who is available to provide on-campus advising on SFS programs. Applicants from Affiliate schools must obtain permission to participate from their campus Affiliate Representative. The current SFS Affiliate Members are:

Bennington College
 - Dr. Kerry Woods

Boston University
 - Dr. Cutler Cleveland

Brandeis University
 - Dr. Attila Klein

Clark University
 - Dr. Todd Livdahl

Colby College
 - Dr. David Fimage

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 - Dr. Dennis Gordon

Scripps College
 - Ms. Valerie Eastman

**SUNY College of Environmental
 Sciences and Forestry**
 - Dr. Neil Ringler

University of Miami
 - Dr. Dan DiResta

Wells College
 - Dr. Thomas Vawter

Letter from an SFS Participant

My name is Sarah Fried and I participated in The School for Field Studies program in Atenas, Costa Rica. If you are thinking about a program with SFS, you are in for the experience of a lifetime. I can honestly say that those three months were the most interesting, exciting, and inspiring months of my life.

I am now a senior at Duke University with a major in Environmental Science and Policy. This background, certainly apropos to the program, was helpful but not necessary. In fact, I was pleased to discover that many of the other participants on my program came from various backgrounds ranging from



Photo: Moises Leon

SFS students try their hand at picking coffee.

biology to business management to English literature. These differences served to increase the depth and perspectives of our discussions: and believe me, we certainly had some knock 'em dead arguments.

One thing I didn't expect was the opportunity to meet so many of the wonderful local residents. Each person will take their own unforgettable impressions and stories of their encounters back with them to carry and remember for the rest of their lives. Thanks to SFS, I had an experience that has truly changed my outlook on life and humanity. I encountered people, places and adventures I never dreamed of. I learned more during these three months than any college course could have taught me.

If you crave new experiences, new ideas, and adventure, SFS is the place for you. Every program and every group is different. However, I can promise that after spending time in this country rife with cultural and physical beauty, you will leave a changed, enriched and inspired individual. I know I did.

Other SFS alumni and I would be happy to share more information about our experiences with you. To contact us, please call Donna Dowal in The SFS Admissions Office.

Hasta Luego

Sarah Fried

Requirements for Admission

We are seeking a body of curious students with a thirst for learning and the maturity and personal initiative to make use of our unique educational opportunities. Our goal is to create well balanced teams of students who will best benefit from and contribute academically and socially to this experience. Applicants should also exhibit enthusiasm, character, compassion, flexibility and social concern, as well as a willingness to, at times, put the needs of the group ahead of your own. The essay in which you define your motivation for participating in an SFS program is a strong determining factor in the admission process.

Participants are screened by the Admissions Committee to insure that they are choosing the appropriate course for the right reasons and that they have the background necessary for a successful academic and personal experience. The Committee strives to bring together students from diverse academic, economic, cultural and social backgrounds, with varied interests and talents, who support the mission of The School and are committed to working with others toward a common goal. If you are willing to commit your emotional, intellectual, and physical energies to working toward a better understanding of crucial environmental issues, we encourage you to apply to join us.

Before completing your application for admission, carefully consider the fact that this experience will likely be very different from your academic experience to date. We are setting off together on a journey during which we ask that you consider yourself to be crew not passengers. We expect and encourage you to take a proactive role in all aspects of your education from scheduling activities to choosing research projects to risk management.

Admission to SFS is open to qualified students without regard to sex, race, sexual orientation, color, national or ethnic origin, economic status, physical or mental disability or other protected status.

Acceptance

Applications for all programs are reviewed on a rolling admission basis, as soon as all required information is received. **The Admissions Committee meets on the 1st and the 15th of every month, and more often during peak application periods.** Teams fill quickly. We strongly urge you to apply early to join the course of your choice. Waiting lists are maintained for courses that fill early.

All acceptances are contingent upon medical approval. Course syllabi will be sent to all accepted applicants and are available upon request.

HOW TO APPLY

An Application for Admission and SFS Reference Form can be found at the back of this catalogue.

All applicants for admission are required to submit an SFS application form and essay, a \$35 application fee and an SFS reference form before the application will be reviewed. In addition, all applicants must submit an official current transcript to complete their application

Applicants for semester programs should be 18 years of age and have completed at least one college-level ecology or biology course and, preferably, at least one semester of college.

Applicants for summer courses should be at least 16 years of age and have completed at least the junior year in high school.

For further information regarding admission, please call the SFS Admissions Office at

508-927-7777

Financial Aid

We are committed to involving as many qualified students as possible in SFS programs and will work with you to facilitate your participation. **Thanks to generous support from foundations, corporations and individuals, one in three SFS students received financial assistance through SFS in 1996.**

SFS Financial Aid, in the form of scholarships and/or interest free loans, is available to qualified students based on need. For the 1997-98 academic year, we expect to have over \$270,000 in scholarship and \$250,000 in loan funds to make the SFS experience accessible to over 200 students facing financial challenges. Some applicants receive a combination grant and loan while others receive only loan funding. In addition, many applicants receive aid through their home schools or other outside sources as well. You may qualify for SFS assistance even if you are not receiving aid from your home school.

If you will need financial assistance in order to participate in a summer or semester program, we strongly encourage you to request, complete and return an SFS Financial Aid Application

as soon as possible. **For an application or more information on how to qualify for assistance, please call the SFS Admissions Office at (508)927-7777.**

Semester students: We expect that you and your parents will contribute at least the same amount that you are paying per semester at your home school, and more if you are able. A growing number of schools allow students to take some or all of their institutional financial aid off-campus. Check with your financial aid office to see what aid you can apply to your SFS program. **We encourage you to investigate applying for federal financial aid funds including Stafford Loans through your home school.** Because the credits you earn for your SFS participation will, in all likelihood, be applied toward your degree, your school may be able to process a Stafford Loan to assist your SFS participation. If you encounter difficulty in arranging to use federal financial aid funds for your SFS program, please ask your financial aid officer to give us a call and we will try to help you out.

Expectations and Responsibilities

Changes and Cancellations

SFS programs are obviously different from travel or adventure programs. We have tried to give accurate portrayals of every program in this catalogue. All course descriptions have been written in consult with faculty members. However, each project is unique and often cannot be implemented exactly as planned for a variety of reasons. There are factors which, although monitored closely, are beyond our control. For example:

- ◆ Over half of our projects take place in highly regulated and sensitive environments, usually requiring special permits, such as in Kenya and Mexico.
- ◆ Some projects depend on the goodwill and generosity of individuals and institutions which lend support.
- ◆ Tenuous weather situations, natural disasters or changes in political conditions in another country may require last-minute changes in sites or research plans.

You are advised that these or other variables (*including staffing*) may result in changes before or during a course. **As the course catalogue is often written up to a year before a program actually goes into the field, students should rely on their program syllabus for up-to-date course descriptions.** Indeed, part of your challenge lies in adapting to changing conditions and overcoming the obstacles they may present. In other words, the elephants are not always where we want them to be, so please be flexible.

Student Conduct

You are expected to conduct yourself in a mature and responsible manner. SFS reserves the right to require any participant to withdraw from any program at any time if the faculty deem the student's conduct to be detrimental to or incompatible with the interest, harmony, comfort or welfare of the course — including use of alcohol or drugs not authorized by a medical doctor, or uncooperative or disruptive behavior. Should such a decision be made, SFS will notify your parents and return you to the point of course departure, at which time any and all responsibility on the part of The School for Field Studies will cease.

Responsibility

In organizing and managing these courses, The School for Field Studies (SFS), its agents, employees, and staff give notice that they act solely on behalf of and for the benefit of the participants, on the express agreement that SFS shall not be liable, financially or otherwise, for non-performance or unsatisfactory service; for injury to persons including death; for loss of, or damage to property; for accident or delay; and/or for expenses arising from strikes, weather, quarantine, sickness, government regulation, or from any act or omission of its agents or employees, and/or airline, railroad, bus company, automobile rental agency, hotel, or other supplier of service.

The School for Field Studies is a charitable corporation located in Beverly, Massachusetts, U.S.A. All matters relating to or arising out of or involving in any way your relationship with SFS shall be governed by Massachusetts law and any legal dispute shall be determined by a Massachusetts court.

SFS reserves the right to refuse any applicant admission to any program if he/she is deemed unsuited for the project for any reason. All courses, fees, and dates are tentative until verified and confirmed in writing by The School for Field Studies.

The School for Field Studies admits students of any sex, religion, race, color, national or ethnic origin, sexual orientation, or economic status to all the rights, privileges, programs, and activities generally accorded or made available to students of The School and does not discriminate on the basis of sex, religion, race, color, sexual orientation, national or ethnic origin, physical or mental disability or other protected status in the administration of its educational policies, admissions policies, scholarship loan programs, and other School-administered programs. SFS is an equal opportunity institution.



Photo: Chris Vaughan

"It was the most intense learning experience of my entire life. A complete ecological, social, academic, and intellectual immersion in the concept of sustainability."

Frederick Werner, Chevy Chase, MD -
University of Michigan

Scholarship Donors

Generous support from numerous individuals and the following have made the SFS Financial Aid Program possible:

The Andreas Foundation

The Charles Engelhard Foundation

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Foundation

The Laurance S. Rockefeller Trust

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"I would like to thank the SFS Student Scholarship Fund and its donors. Without the financial aid I was awarded I would have been sitting at home and missing out on the greatest summer of my life."

Matthew Finer,
Lancaster, PA -
University of
Pittsburgh

Tuitions, Costs and Refund Policies

Fees, Tuitions and Deposits

Like other non-profit, tax exempt educational institutions, SFS meets its expenses with a combination of tuition charges and income from grants and donations. Your tuition pays for instruction, room and board, and ground transportation during the course. It also covers group equipment, medical supplies, scientific instruments and material. **It does not include transportation to and from departure point.**

A non-refundable deposit of \$350 for summer courses or \$500 for semester programs is due no later than 10 days following acceptance in order to reserve a place in the program. All students will be registered for academic credit. A non-refundable registration fee of \$100 for summer courses or \$150 for semester programs is due with your deposit. *(Deposits and registration fees for financial aid candidates are non-refundable 10 days following financial aid offer. You must complete and return the financial aid application within 10 days of acceptance to qualify for refund status.)*

Full tuition is due sixty days prior to course departure. You will not be allowed to participate in the program with an outstanding tuition balance. **Note:** The tuition fees listed in this catalogue are based on estimates made up to a year in advance of departure and involve many variables - currency rate, outside project support, enrollment projections, etc. - all of which may change. The tuition for each program is tentative until confirmed in writing by SFS.

In addition to tuition charges, please also consider the following to determine the total cost of participation:

Transportation and Travel

Arrangements: To insure orderly arrival at the site as well as low fares, we work with one travel agency to handle all travel. This agent will arrange travel to the program, with any special arrangements you require. If you do not use the SFS agent, you **must** have your travel plans approved by the SFS Admissions Office. You will receive specific travel details after your acceptance. You are responsible for passport/visa fees as well as all transportation costs to and from the departure point.

Tuition

SFS Fall and Spring Semester Programs:

Wildlife Management Studies/KENYA	\$11,600*
Marine Resource Studies/BRITISH WEST INDIES	\$11,200*
Wetland Studies/MEXICO	\$11,200*
Coastal Rainforests and Marine Resources/CANADA	\$11,200*
Sustainable Development Studies/COSTA RICA	\$11,200*
Tropical Rainforest Studies/AUSTRALIA	\$11,600*

** Tuitions listed are for Spring 1997 programs. Fees for Fall 1997 and Spring 1998 will be announced in Spring 1997.
(All semester programs have an additional \$150 registration fee).*

Summer 1997 Programs (30 Days)

(All summer programs have an additional \$100 registration fee)

Community Wildlife Management/KENYA	\$3,450
Marine Parks Management/BRITISH WEST INDIES	\$3,090
Preserving Coastal Wetland Diversity/MEXICO	\$2,750
Conserving Marine Resources and Coastal Rainforests/CANADA	\$2,750
Alternative Strategies for Preserving Tropical Ecosystems/COSTA RICA	\$2,960
Tropical Reforestation/AUSTRALIA	\$3,270

Clothing and Equipment: SFS will provide food, cooking equipment, tents and all scientific and research equipment. You are responsible for personal gear including sleeping bags, backpacks, clothing, SCUBA gear *(if applicable)*. You may find you already have much of what you need.

Physical Examination and Medical Insurance: You must present a completed SFS Medical Form, signed by a doctor, no later than 30 days before program departure. Students with late medical forms may forfeit their space. All medical forms must be approved by the SFS Medical Committee. You must be able to meet the physical challenges presented by SFS programs without undue risk to yourself or others. Academically qualified individuals may be disqualified from participating on medical grounds. You will not be allowed to join an SFS program without proof of up-to-date medical coverage and a signed medical release.

Refund Policies

Summer Courses: Registration fees are non-refundable and non-transferable. Deposits are non-refundable. If you withdraw prior to 21 days before the start of the course, it may be possible to transfer your non-refundable deposit to another SFS program within a 12 month period. If you withdraw 21 days or less before the start of your course, SFS will retain 50% of the course tuition. No refunds are made once the course has begun.

Semester Programs: Registration fees are non-refundable and non-transferable. Deposits are non-refundable. If you withdraw more than 30 days prior to the start of the program, SFS will retain 50% of the program tuition; it may be possible to transfer your non-refundable deposit to another SFS program within a 12 month period. If you withdraw from a course 30 days prior to the program commencement to 14 days after the program departure, SFS will retain 75% of the tuition. No refunds are made after the second week of the program or to students asked to leave the program.

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Cover Photos: Jonathan Vlahos, Wayne Vos,
David Silverberg, Matt Weedon, David Bathgate,
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Design: Ken Gray

Pre-Press: Susan Gerner, Linda Mansefield

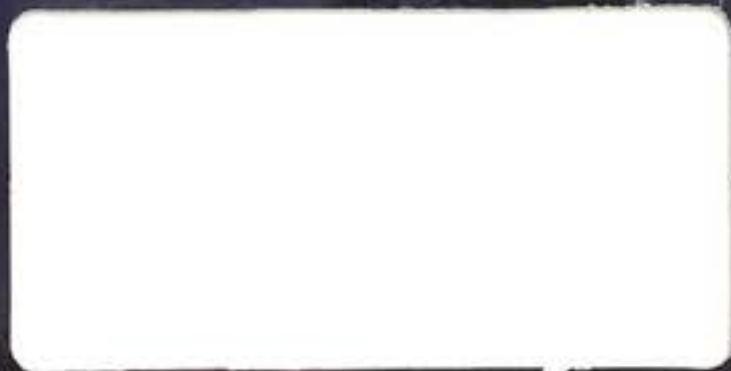
Film Prep: Ultra Scan, Inc.

Printing: Bradford & Bigelow

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