

Environmental Field Studies Abroad

1998/1999 COURSE CATALOGUE

The SCHOOL for FIELD STUDIES



ENVIRONMENTAL PROBLEM SOLVING
ECOLOGY * RESOURCE MANAGEMENT * ECONOMICS

Semester & Summer Environmental Field Studies Programs

Marine Resource Studies – BRITISH WEST INDIES

Rainforest Studies – AUSTRALIA

Coastal Studies – PACIFIC NORTHWEST CANADA

Wetland Studies – BAJA, MEXICO

Sustainable Development Studies – COSTA RICA

Wildlife Management Studies – KENYA

Environmental Field Studies Abroad

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Teaching children to swim in South Caicos so they can explore their marine environment.

Planting trees to restore wildlife corridors in Australia

Understanding how wildlife impacts Kenyan communities.

Working with First Nation groups to preserve Vancouver's Islands threatened forests and streams.

Repairing the local road as a community service project in Costa Rica.

Collecting data to address threats to biodiversity in Mexico's Magdalena Bay.

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.



THE SCHOOL FOR FIELD STUDIES

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Photos Above: Diana Babbur, Susan Gahner, Tom Jackman, Dennis Morgan, Carol Ridenour, Ed Stashek

Snorkeling in the clear turquoise waters off South Caicos Island.

Photo: Matt Weedon

Center for Coastal Studies
PACIFIC NORTHWEST
CANADA

Center for Wetland Studies
MEXICO

Center for Marine Resource Studies
BRITISH WEST INDIES

Center for Sustainable Development Studies
COSTA RICA

Center for Wildlife Management Studies
KENYA

Center for Rainforest Studies
AUSTRALIA

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 8,500 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 Marine Resource Studies – BRITISH WEST INDIES

Semester Program: Marine Resource Management
Summer Course: Marine Parks Management

The Center for Rainforest Studies – AUSTRALIA

Semester Program: Tropical Rainforest Management
Summer Course: Tropical Reforestation

The Center for Wetland Studies – BAJA, MEXICO

Semester Program: Conservation Strategies for a Coastal Wetland 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 Wildlife Management Studies – KENYA

Semester Program: Wildlife Ecology & Management
Summer Course: Community Wildlife Management

Photos Above: David Silverberg, Michael Quinn, Matt Weedon

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.

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

Learn And Work Where You Can Make



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, what management techniques might make the fisheries sustainable and the fishing industry more efficient or if other sources of income must be identified.

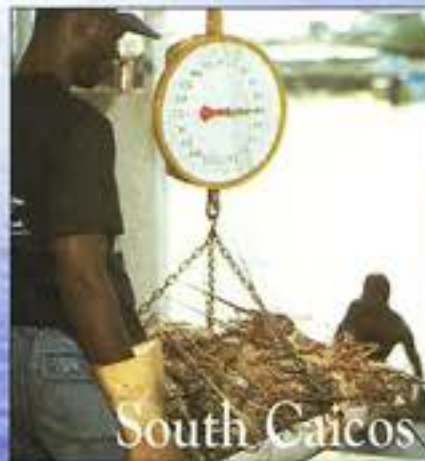
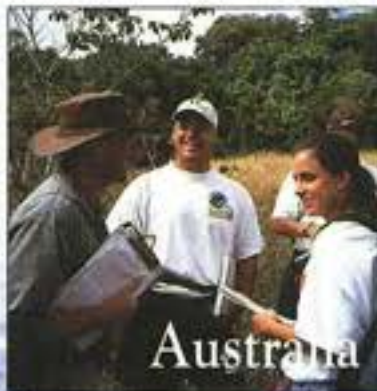
The Center for Rainforest Studies sits on 153 acres of primary and secondary rainforest in Far North Queensland, Australia. Surrounding forests are now protected, but landowners, many of whom are farmers, struggle with conflicts regarding land use, preservation and restoration. The Center's location 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.

Phyllis Latta-Burton, Don Ford,
Michael Quinn, Rob Robinson, Bob Singer,
Ed Stull, and Wheeler Whithead.

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, 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.

A Difference

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. 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 developing recommendations for the sustainable use of the Bay's resources as well as for alternative employment options for local residents.



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



"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

Joshua Aalberg, Scituate, MA
Biology/Psych. Rensselaer Polytechnic Inst.
Stephanie Andriole, S. Deerfield, MA
Biology, Colby College
Iain Baker, San Francisco, CA
Env Studies, Connecticut College
Cecilia Belancourt, Miami Beach, FL
Biology, Williams College
Kimberly Birge, Waterford, CT
Marine Biology, Roger Williams College
Kimberly Bicha, 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 Chigounis, Mt. Laurel, NJ
Env Studies, Dickinson College
Marissa Codey, Port Washington, NY
Sci, Tech & Soc, Vassar College
Amy Coleman, North Kingdon, RI
Env Studies, University of Vermont
Kristen Earls, Middletfield, CT
Env Studies, Connecticut College
Marc Elia, 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.
Lena Maun, Mattituck, 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
Keow Thavavadhara, Logan, WV
Biology, Dickinson College
Benjamin Twining, Hamilton, MA
Env Science, Harvard University
Richard Waters, Barrington, IL
Biochemistry, Knox College
Sachia White, Willsboro, NY
Env Studies, Union College
Sarah Wickenden, Camden, ME
Biology, Dickinson 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

WORK CLOSELY WITH PEOPLE WHO SHARE SIMILAR GOALS AND INTERESTS

Each SFS team consists of a center director, three full-time faculty and additional staff, and approximately 32 students. Each year students come to SFS from over 200 public and private high schools, colleges, and universities. (For a partial list of home schools please see page 37). 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 38 or call the SFS Admissions Office at 1-800-989-4418 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 1-800-989-4418. We will put you in touch with an alumnus from your region, school or the program(s) you are considering.



"My fellow students were an inspiration to me. Whether in academics, humanity, persistence or perseverance, there was always a role model among my peers. From them I learned a lot about myself, about human beings in general, about living as an imperfect person in an imperfect world, about environmental points of view, gender issues and about optimism and hope for humanity."

Jacob Landmesser,
Orange, CA -
University of California, Irvine

Photos: David Bethgate, Phil & Julia Davies,
Vishal Grover, David Silverberg,
Greg Tivnan, Al Tozer, Chris Vaughan

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 Center 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.



Ben Mahnke,
Student Affairs
Manager,
Center for
Marine Resource
Studies



Dennis Morgan, British Columbia

An integral part of the SFS experience is the concept that students act "as crew, not passengers".

Students are encouraged to take responsibility for their academic, cultural and social growth. Every SFS center is staffed with a Student Affairs Manager (SAM) to assist students in these endeavors. Among many other tasks, SAMs coordinate volunteer and service opportunities in the local community and help students develop leadership skills. Included in these skills are the ability to recognize, analyze and manage risk. SAMs are supported by a full-time Risk Manager based at SFS Headquarters.



Richard Hatfield,
Kenya



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"



Susan Gardner, Mexico

"One of the great things about living with our professors was that the learning never stopped; it wasn't a 9 to 5 job for them. You could often find a group of students with a faculty member discussing environmental economics or regulations during dinner. The faculty inspired us on a personal and professional

FACULTY PROFILES

Abdelwahab S. M. Sinnary

Resident Faculty

Center for Wildlife Management Studies/Kenya

Born in Sudan, "Sinnary" as he is known to staff and students, came to Kenya in the 1980's



after receiving a degree in Natural Resources and Environmental Studies at the University of Juba, Sudan.

He received Masters and Ph.D. degrees in the Biology of Conservation from The University of Nairobi where his research was based on the Hopcraft Ranch, site of the SFS Center, investigating population dynamics of giraffe and antelope. He has taught on the faculty of Veterinary Medicine in Uganda, and lectured in the Department of Zoology at the University of Nairobi and for the Kenyan Wildlife Service. Sinnary, who regularly amazes SFS students with his "awesome" soccer skills, lives at the Center with his wife and two children. Before joining SFS fulltime in 1996, he lectured in SFS programs and was employed as a Wildlife Manager on the Hopcraft Ranch.

Susan Gardner

Resident Faculty

Center for Wetland Studies/Baja, Mexico

Susan attended the University of North Carolina and received a B.S. in Marine Science from Long Island University. She has a Master's degree from North Carolina State University in Toxicology. Her doctoral work at the University of Washington



focused on assessing the adverse effects of purple loosestrife and its control on wetland aquatic communities.

She continued her research as a post-doctoral fellow at NOAA and as a recipient of a National Research Council fellowship award, investigating the potential effects of contaminants in harbor porpoises at the Northwest Fisheries Science Center in Seattle. In addition, Susan has been involved in cancer research and in projects on dolphins, eel grass, and lemon sharks. Susan joined SFS in 1996 and taught in the inaugural semester at the Center.

Jose Luis

Díaz
Naranjo
Resident
Faculty

Center for Sustainable Development Studies/Costa Rica



Jose Luis, known to his students as Chepe, was born and raised in Costa Rica where he received a degree in Social Planning from the Universidad Nacional. In 1989, he received a Fulbright Scholarship to attend Vanderbilt University where he received a Masters Degree in Economic Development. His studies have taken him to Israel and Holland and, upon his return to Costa Rica, he taught economics and social theory at the Universidad Nacional. The author of over a dozen publications, he has presented his research at symposia in the U.S., Nicaragua and Costa Rica. In addition to teaching and research, he has served in leadership roles in a number of community development organizations. Chepe joined the staff of SFS in 1993.

Pamela Wright

Center Director

Center for Coastal Studies/ British Columbia

Pam grew up in rural Canadian communities before heading off to

Lakehead University where she earned an Honors Bachelor of Outdoor Recreation degree. She then earned both Masters and Ph.D. degrees from the School of Natural Resources at Ohio State University with funding from the U.S. National Park Service and the Man in the Biosphere Program. Before coming to SFS in 1997, Pam taught in the graduate program at Simon Fraser University and served as Chair of the B.C. Outdoor Recreation Council. Her research has been conducted in remote areas, from the Northern Yukon to the Kitlope Slope - an area five hours by boat from the nearest settlement. She has developed an extensive network of contacts in government, academics, conservation and First Nations that she is now sharing with her SFS students.



Joshua Farley

Resident Faculty

Center for Rainforest Studies/Australia



Josh's first exposure to study abroad came while he was an undergrad at Grinnell College in Iowa. He spent a semester in Mexico studying Spanish, followed by a semester studying marine biology in Costa Rica. After graduation, he embarked on a year of independent study in Latin America where he traveled and learned about economic, social and political systems. Josh received a Masters of International Affairs from Columbia University and is working on a Ph.D. in Agricultural, Resource and Managerial Economics at Cornell University. Before coming to SFS in 1996, Josh taught English in Brazil, developed and led a civil construction project in Liberia, and worked with a Mayan Indian agricultural cooperative in Belize.

level. There's nothing like a gruelling volleyball match versus the staff, followed by three hours of essay exams. We never won those matches but I think it was because we were so drained from exercising our brains!"

Jen Kliris,
Tiburon, CA -
University of
California/Berkeley



Wayne Vos, Kenya

"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

"Wayne Vos would spout out Latin names and random information about flowers, birds and animals all the time. He would stop in the middle of the road to look at a bird species (that he spotted while driving 40 miles an hour along a dirt road!) he'd never seen before. The faculty impressed me quite a bit."

Laura Zuppo,
Long Neck, DE -
Cedar Crest College

Our goal is to enable you to come away from your SFS experience with an understanding of complexity and interrelatedness of environmental issues, as well as an increased commitment and new skills to help improve the environment and the lives people dependent on that environment. We believe this can be best achieved by offering you a chance to make a meaningful contribution towards solving environmental problems. To deliver this opportunity, we have created an integrated curriculum incorporating:

Gain An Interdisciplinary Perspective

1. an interdisciplinary "case studies" approach to teaching;

All SFS programs investigate local environmental problems in the form of case studies. Drawing from a number of disciplinary perspectives (*usually ecology, resource management, economics, applied anthropology, and political science*), we study the theories and tools that are relevant to understanding a particular complex problem. In each case study, we seek answers that enable natural resources to be developed economically in a manner which can be sustained indefinitely, a concept known as sustainable development.

Faculty lectures and readings provide the theoretical information you need to understand the problems raised by the cases. Guest lectures by individuals who are intimately involved in the issue under study provide a rich (*and, at times, conflicting*) context that is typical of major social problems. Lectures are integrated with fieldwork and practical, interdisciplinary activities enable us to gain hands-on experience as we address these issues.



Case studies require you to make 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.



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.

2. learning problem-solving through field work designed to identify solutions to local environmental problems;

All SFS programs include a field research component, giving you the opportunity to make an immediate contribution to the improvement of a local environmental issue while you put the theories you are learning in the classroom into practice. We don't seek to promote research for its own sake but do 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.

You will design and carry out a field project related to the current goals of the Center or program. 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.

The following pages will provide you with numerous examples of how SFS staff and students have impacted local environmental issues and worked with local communities. An SFS experience can also have a profound impact on the way you view the world and your place in it. These impacts extend far beyond daily impressions while you are in the field and may include:

Impact The Envi The



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.

3. involvement in the local community through field and service projects under taken 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.

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 believe 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 extends beyond academic study to many aspects of group dynamics, community relationships, daily living, and institutional relations.

Field work is fraught with daily challenges - equipment breaks down, field projects fail for reasons outside of your control, and a "foreign" environment, in many 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 will, 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.



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.

developing leadership skills...

"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

acquiring technical knowledge and analytical skills...

"One of the greatest strengths of the program was its focus on real problems. All sides of 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

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

gaining hands-on experience...

"Although I was a biology major, my first opportunity to design and conduct a research project came during my SFS program. The course introduced me to the excitement, rewards and hardship of field ecology. Since then I've earned a M.S. in forest ecology and have worked to bring environmental science into government policy-making. As a consultant to the U.S. EPA, I've researched climate change and threats to biological diversity and helped to create a framework for federal policy. Now 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 was lucky to have the opportunity to get started with SFS."

Geraldine Tierney, Environmental Planner

Environment,
Community, Your Future

world, and their place in it, challenged. Their experiences totally integrate learning 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."

Verna Miller Case, Professor of Biology -
Davidson College

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 course involves the traditional elements of an undergraduate course including more than 50 hours of lecture plus 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 36 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 an 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.

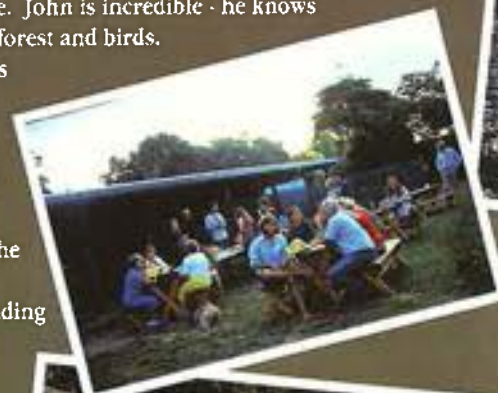
NOT JUST YOUR

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 which wasn't easy after last night's bush dance in town 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 king parrots 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, Festus 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 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. We had a quick pasta dinner 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 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 directed field project from a list of projects 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

Photo: Matt Weedon



"As good as the lecture portion of the class was, the field exercises were even more educational. We spent afternoons in the ocean learning numerous data collection techniques from using quadrats to map habitat, to how to measure coral growth, to how to identify many of the species of fish, coral and plant life that surrounded us."

Sarah Glaser, Manhattan, KS -
Kansas State University

Center Clients/Partners

The Department of Environment and Coastal Resources, the Tourism Department, the National Trust, the Department of Planning, Citizens for Positive Action, 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 the monitoring of critical environmental impacts.

Recent Center Contributions

Research projects assessing stock levels of lobster and conch have provided important information for the Fisheries Department. The Center has hosted or supported a number of public forums and activities, attended by the governor and other officials, to enable community members to come together to discuss communal problems. SFS students offer environmental education programs and tutoring in the local schools and host an annual SEA DAY at the Center for local school children. Other contributions include the creation of an underwater interpretive trail in a marine park and clean-ups of local beaches and reefs. A current project testing the effectiveness of artificial lobster shelters in critical nursery and feeding grounds is showing early potential to significantly increase lobster yields.

ALUMNI PROFILE



Bruce Crawford
Smith Island,
Maryland
Environmental Educator,
Chesapeake Bay
Foundation

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 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.



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.

"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."

Turks and Caicos
Government Official

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

Semester & Summer Course Details
Continue on Next Page

For more information
and an internet tour of this Center,
please check out
www.sitesalive.com

SOUTH CAICOS ISLAND

MARINE RESOURCE MANAGEMENT

Our focus during the semester is on the development and management of fishery resources and the attractions offered by the spectacular natural marine environment which could potentially attract paying visitors. We begin with a week of orientation and preliminary lectures. Course material is integrated and presented in 2-3 interdisciplinary case studies focusing on local environmental problems and resource conflicts. Case studies change as problems are solved and new clients and issues are identified.

Recent case study questions include:

- ♦ How can the conch and lobster fishery be managed to bring about sustainable and profitable returns to the South Caicos community?

Faculty member Andrew Gude examines a day's lobster catch. "Until I came to South Caicos, I could never fully comprehend how biology and economics were interrelated. These subjects 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**

- ♦ What alternative community development strategies are available to the Turks and Caicos Islanders that are environmentally sound, economically feasible and socially responsible?
- ♦ Which planning and environmental assessment procedures are best for the TCI to protect its natural resources as development takes place?

Faculty lectures are supplemented with guest lectures. A dozen or more local experts including government officials, resource managers, researchers, fisherman, educators, community leaders and business owners/developers meet with students during the course of the semester.



Photo: Ed Stashko

Field Work and Field Trips

Days are spent in a combination of lectures, field exercises and research. Our field work sites include the colorful and fish filled reefs and shallow banks, seagrass beds, mangroves and beaches surrounding the island as well as the docks, schools and community of South Caicos. Field trip destinations include the historical boiling hole and salinas salt ponds, the Bell Sound Bonefish Nursery and Marine Reserve, the Admiral's Aquarium Reef Snorkeling Trail, and the High Point Resort development construction areas. Additional forays may include development projects at Ambergris Cay or Fish Cay or government offices on other islands.

Semester Program Dates:

September 9 - December 12, 1998
February 1 - May 7, 1999

Departure Point:

South Caicos Island, TCI, BWI

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 page 36 for course descriptions.



Photo: Ed Stashko

Weekly soccer and basketball matches are a big community draw. "The Center was a focal point of the community. Perched atop a cliff, the School was always visible to the town and, more important, the town was always visible to us. The view was a constant reminder of our purpose in the program, to give something back to the community of South Caicos."

**Drew Van Voorhees, Clinton, CT -
University of Connecticut**

MARINE PARKS MANAGEMENT

During the 30 day summer program, we will concentrate our efforts on one case study question: How can the proposed Admiral Cockburn Land and Sea National Park effectively protect and enhance conch and lobster stocks?

Directed Research

Every student will complete and present the results of a directed research project chosen from a list of projects requested by local clients. A week-long introduction to research techniques, statistics and scientific writing precedes the directed research projects.

Recent projects have included:

- ◆ Baseline stock assessment of target coral reef fish on the South Caicos fringing reef;
- ◆ The viability of manta tow as a means of broad scale stock assessment of Queen Conch;

Species identification time.

"Directed research was my favorite part of the program because it really allowed the students to become leaders. We were able to formulate a research project from the beginning design to preparing a final draft and presenting it. I had the honor of presenting my research groups' conclusions to the Governor of the Turks and Caicos Islands and other officials. This gave me a feeling that all my hard work was for something."

Brendan J. Reed, Edgemont, PA -
University of Richmond

- ◆ An investigation of the need for integrated coastal management in East Bay;
- ◆ A study of the impact of abandoned fish traps on the marine environment.

Involvement in the local community

The Center is literally steps away from the town of Cockburn Harbor and students quickly become involved with the community. Students get to know local residents through interviews, social activities and community forums. Much of the community involvement centers around the local schools where SFS students tutor in reading, work with the high school Science and Math Club and judge the debate competition. In addition, students give swimming lessons and host a SEA DAY at the Center to introduce elementary school students to the marine environment. Recent student groups have started a Big Sister/Big Brother program. Weekly soccer and basketball matches attract enthusiastic crowds as SFS teams challenge local teams (*usually unsuccessfully*) for the coveted tournament trophy.



Photo: Ed Slashko

Program Dates:

Session I: June 11 - July 10

Session II: July 17 - August 15

Departure Point:

South Caicos Island

Course Number: EE (NS) 351

Field Work Focus

- ◆ Comparative stock assessments and modeling of conch and lobster populations;
- ◆ Artificial feeding and survival experiments on transplanted juvenile conch;
- ◆ Habitat association studies on lobster;
- ◆ Environmental impact assessment of proposed resort development.

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. These

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 conch and lobster stocks. Our results may lead to policy recommendations, marine parks management plans, 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 specific management approaches and economic alternatives, while interviews with local residents and fisherman will 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.

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

Tropical Rainforest Management

Semester Program - Page 18

Tropical Reforestation

Summer Program - Page 19

ENVIRONMENTAL PROBLEM

Australia's only remaining rainforests lie cradled in a narrow, broken belt along the country's northeast coast in the state of Queensland. The rainforests here have suffered the same fate as most of their counterparts elsewhere in the tropics; 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 earlier than most tropical countries. In 1988, most of its remaining tropical rain forests were declared protected under World Heritage designation.

This decision was quite controversial. Australia's active exploration of these resources and the need to balance ecology and economics puts it years ahead of most tropical rainforest countries. At the same time, the country still struggles with the conflict between resource use and preservation, with so much land devoted to recreation, wilderness, reforestation, etc., and how to decide the fate of degraded lands.

The Center's field work and research focuses on the restoration of degraded forests, pasture lands, and watersheds with the goal of helping to strengthen and revitalize the greater Tableland ecosystem to the benefit of human and non-human species. Scientists and resource managers have recently realized that restoration is as important, and sometimes more important, than preservation. There is a critical need for management plans that take the ecological, economic, political and social requirements of the communities here. We believe that what you discover in Australia can be applied not only here but to other tropical systems as well.

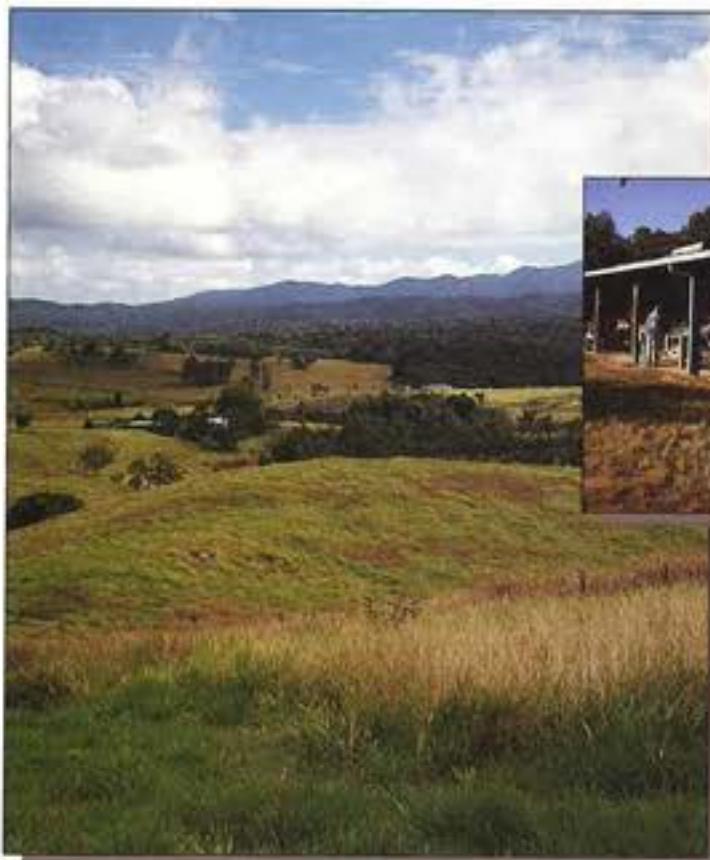


Photo Kathy Abbott

The rainforests of Far North Queensland are treasure troves of primitive flowering plants long 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 bandicoots, tree-kangaroos and gliders, species found nowhere else in the world.



Center Facilities

Far North Queensland, Australia

Called "Warrawee," aboriginal for "You are welcome here," the Center lies at 700 meters elevation in the northern foothills of the Atherton Tableland. The rolling, hilly site is surrounded by protected World Heritage forests. A third of the property's 153 acres is mature rainforest, and another 50 acres are forest regrowth. The nearest town is a 20 minute drive away but you'll stop regretting the seclusion the first morning you wake to the birds' dawn chorus or when a group of flying foxes sweeps overhead at dusk.

Students live in eight-person cabins; faculty occupy cabins nearby. The main building has lecture, computer and library rooms, and a kitchen. Solar and standard electricity provide our power. The

Australian summer stretches from November to March, and can produce heavy rains, soggy roads and warm temperatures; dry season arrives in April, along with night temperatures that can sink as low as freezing. Winter days are usually about 25 degrees C.



Center faculty have years of experience in Australia and over 50 years of combined experience as professional practitioners in their areas of expertise.

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

Program Director: Festus Fasehun, Ph.D., Iowa State University (Forest Biology)

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

Josh Farley, M.A., Columbia University (International Affairs)

Photo: Ken Weagle



Students can learn a variety of field techniques including soil and water sampling and analysis, tropical tree and bird identification, cost benefit analyses, and forest plantation assessments. Here students install peizometers to examine groundwater movement in rainforest plantings. "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, 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

Center Clients/Partners

We work and share our data with the Wet Tropics Management Agency, the Atherton Shire Council, Queensland Department of Natural Resources, Water Watch Program, Yungaburra Primary School, Queensland Department of Environment, Queensland Department of Primary Industries and the Malanberrra Aboriginal Clan. Local farmers, ranchers and foresters have a particular interest in our findings.

Recent Center Contributions

Students from the Center have planted over 8,000 trees, most grown from seed in the Center's shade house, in nearby deforested areas. Students in 1997 have worked with the Atherton Shire Council to develop a management plan for the Tolga Scrub, a rare and endangered patch of rainforest facing ongoing degradation from over use. Elements of the plan included weed control, replanting canopy gaps and creating an education program focusing on this area for use in local schools. Student directed research projects continue to monitor the succession and use of the Tooheys Creek Wildlife Corridor which represents one of the first of its kind experiments to establish a corridor between forest fragments using wildlife species.

ALUMNI PROFILE



Asher Cutter
Reading, Massachusetts
Fulbright Scholar,
Australia

I've always been interested in natural history and was a double major in biology and environmental science at Tufts University. In my junior year I headed off to Australia with SFS. Despite the fact that the wet tropics in Australia are small compared to those in the Americas, they are a no less wonderful place to study tropical ecology and environmental management. New species of invertebrates are constantly being discovered; my directed research project alone yielded over 20 undescribed ant species. It also allowed me to make contacts with members of the Australian scientific community. After SFS, I had a research internship at the Smithsonian and, upon my graduation, was awarded a Fulbright Scholarship to study for a year in Australia. My studies with SFS directly influenced my decision to apply for this scholarship and my research is an elaboration of my SFS project.



Photo: Ed Siegho

Students and faculty have planted over 8000 trees, most grown from seed in the Center's shade house. Our goal is to plant 2000 trees per year. Increasingly, private land owners are seeking solutions to watershed and water quality issues. Now that much of the land around the Center is protected, we need to understand the relatively new concept of rainforest restoration.

"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."

Dr. Steve Goosem
Senior Principal Scientist,
Australia Wet Tropics
Management Authority

For more information
and an internet tour of this Center,
please check out
www.sitesalive.com

Semester & Summer Course Details
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TROPICAL RAINFOREST MANAGEMENT

Our focus during the semester is on the restoration and management of degraded forests, pasturelands and watersheds. We begin with a week of orientation and preliminary lectures. Course material is integrated and presented in 2-3 interdisciplinary case studies focusing on local environmental problems and resource conflicts. Case studies change as problems are solved and new clients and issues are identified.

Recent case study questions include:

- ◆ Are continued agricultural development and human settlement compatible with preservation and maintenance of biodiversity in Australian tropical rainforest regions?

A visit to Mission Beach introduces us to the habitat of the endangered cassowary. "My experience helped me realize what I did and did not like about biology and, more specifically, research. I found that there are ways to help the environment other than just in "environmental science" labeled careers.

Ann Huger, Lexington, VA -
Hollins College

- ◆ What combination of planting strategies and plot maintenance procedures yields the greatest reforestation success?
- ◆ Will forest corridors reduce the negative effects of habitat fragmentation and improve the longterm preservation of plants and animals?
- ◆ What changes in wildlife laws, protected lands, zoning rules and land management practices would halt the slow demise of the cassowary on the Atherton Tableland?

Faculty lectures are supplemented with guest lectures. Fifteen to twenty local experts including resource and park managers, officials from government management agencies, researchers, farmers, aboriginal and community group leaders lecture and meet with students during the course of a semester.



Photo: Kathy Abbott

Field Work and Field Trips

Days are spent in a combination of lectures, field exercises and research. Our field work sites include forest and modified habitats on the SFS property as well as the adjoining protected forests and nearby private lands including banana, cane and dairy farms. 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. Additional trips may include tree nurseries, the Mission Beach and Licuala Forests Cassowary Habitats, the ancient Stockwellia rainforest on Mt. Bartle Frere, the lowland rainforests at Eubanangee Swamp, and the Daintree area to study ecotourism and aboriginal land management.

Semester Program Dates:

September 9 - December 12, 1998

February 1 - May 7, 1999

Departure Point:

Cairns, Queensland, Australia

Students are 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 page 36 for course descriptions.



Photo: Ken Weagle

Helping with a community planting at Toohey's Creek to establish a corridor between forest fragments. "Over the years, the Center has built up a good reputation among the local residents and that has been an important part of our experience. The local community makes it possible for us to understand and learn about Australian culture and what living in Australia is really like."

Rebecca Caswell, Spofford, NH -
Simmons College



TROPICAL REFORESTATION

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?

Directed Research

Every student will complete and present the results of a directed research project selected from a list of projects requested by local clients. A week-long introduction to research techniques, statistics and scientific writing precedes the directed research projects.

Recent projects have included:

- ◆ The use of Toohey's Creek corridor by avian communities;
- ◆ The development of enrichment plantings for a disturbed remnant forest at Tolga Scrub;
- ◆ Socio-economic and ecological cost benefit analysis of riparian reforestation along the Upper Johnstone River;
- ◆ An exploration of species ethnobotanically significant to aboriginal groups.

"Learning from indigenous rainforest peoples was the most exciting thing I've ever done; I can't wait to rediscover this feeling during my graduate studies, indeed, to rediscover this feeling again and again throughout my life! I consider myself very lucky to have had such field research experience during my undergraduate career. The directed research gave me excellent practice in writing research proposals, alerted me to some of the nuances and difficulties of performing field research, and prepared me to approach future endeavors with confidence."

Dorian Fougères, Pittsburgh, PA -
Cornell University



Photo: Kathy Abbott

Program Dates:

June 11 - July 10

July 17 - August 15

Departure Point:

Cairns, North Queensland, Australia

Course Numbers: EE (NS) 355

Tropical Reforestation

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 techniques 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 reforestation 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.

Involvement in the local community

The communities of The Atherton Tableland are small and residents get to know us quickly. Interviewing farmers, community members, resource managers and aboriginal clan members enables us to gain insight into a variety of perspectives on environmental management. In addition, students participate in a number of volunteer and social activities. Activities include but are not limited to: building trails and planting seedlings; giving presentations at local schools; working with local conservation groups; participating in local sports competitions, bush dances and community festivals and hosting our neighbors at "barbys" at the Center.

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

Conservation Strategies for a Coastal Wetland Community

Semester Program — Page 22

Preserving Coastal Wetland Diversity

Summer Program — Page 23

ENVIRONMENTAL PROBLEM

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. The same forces now threaten Mexico's Pacific coast.

For centuries, Magdalena 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.

Resort developers, drawn by the region's physical beauty, natural resources, and easy accessibility from U.S. and Latin American cities, are buying coastal property. Large-scale aquaculture and ecotourism initiatives have been proposed as economic alternatives for the area. The resulting development, harbor dredging, highway construction, power plants, and human population growth will eliminate critical habitats and impact water quality.

Most residents of Puerto San Carlos are economically dependent on the Bay's marine resources, yet little research has been done on fisheries management here. Residents have requested assistance in better understanding how they can sustainably utilize their natural resources and diversify the local economy. Continued fishing at current rates is clearly unsustainable. Options such as resort development and aquaculture may offer alternative jobs for fishers and 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?



Located 700 miles south of the U.S. border, Magdalena Bay runs for 200 miles along the west coast of the Baja California peninsula. An important habitat on the Pacific flyway, the Bay is home to over 100 species of migratory and resident birds. Blue waters host scores of marine mammals including sea lions, dolphins and whales. Economically important populations of tuna, sardines, scallops, shrimp, abalone, grouper and halibut support an internationally based fishery. On-shore, mangrove-filled lagoons give way to white sand beaches backdropped by a colorful, cacti-strewn desert. Spectacular sunsets drape the mountains and dunes of the off-shore islands in orange and purple shadows.



Center Facilities

Our Center lies on the outskirts of Puerto San Carlos, a 4,000 person fishing community. Beaches lined with palms and mangroves fringe our two acre property. Students share four person cabins. Additional facilities include a computer room, library, classroom, laboratory, kitchen, dining and study areas and



bath/shower house. Faculty live in small houses on-site. Local services include three clinics, a post office, small stores, restaurants, three 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. Temperatures are quite warm from July through September; the coolest months are April and May when a warm jacket is needed in the evening. Meals are based on the typical Mexican fare of beans, rice, fish, meat, poultry and vegetables.



Center faculty have many years of experience working in Mexico and as professional practitioners in their areas of expertise.

Center Director: Luis E. Calderon Aguilera, Ph.D.,
Universidad Politecnica de Cataluna, Spain

Program Director: Leon Watson, Ph.D., Michigan
State University (Resource Development)

Resident Faculty: Susan Gardner, Ph.D.,
University of Washington (Fisheries)
Salvador Garcia-Martinez, M.A., M.S.,
Oregon State University (Economics,
Marine Resource Management)

Photo: Jim Elter



Conversations with local fisherman provide new perspectives. "I used to feel the best answer to our problems was to declare all open land wilderness and stop development, population growth, and just about every other socio-economic activity. My SFS experience showed me that the best method for dealing with environmental problems is something different: compromise. It's not that someone is always right and someone is always wrong. Everyone has a stake in something and conflicts are a natural result. People need to be given the option of getting involved and helping to solve these problems themselves."

Richard Shefferson, Lake Villa, IL -
Northeastern Illinois University

Center 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), Municipalidad de San Carlos, the Center for Interdisciplinary Marine Science, the Ministry of Fisheries, and local fishing and whale cooperatives.

Recent Center Contributions

The Center opened in early 1997, funded in part by one of the first ever debt swaps for environmental education. Students and staff have already made several important contributions to the community. A water quality analysis project, designed to discover the sources and impacts of contamination of the wetlands, has led to a monitoring program and a joint project between the Center and a local cannery to improve wastewater treatment. Students completed a socio-economic analysis of a new crab fishery, providing valuable data to assist in the development of management strategies to the Ministry of Fisheries. A student initiated community-based conservation planning process has laid the groundwork for the creation of a management plan for the new Magdalena Bay Sustainable Development Zone, a project in which SFS is a key player.

ALUMNI PROFILE



Dave Gold
Tucson, Arizona
Environmental
Consultant

My SFS experience had a lasting impact on me. 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, 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 and more willing to undertake challenges.

I'm now an environmental consultant in Tucson, Arizona. I spend 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 might be spent 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, or writing a model ordinance to restrict landscape watering. I'm also on a team developing policy recommendations to resolve major water problems in the Colorado River Basin. Diverse interests are at stake 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...



Photo: Susan Gardner

Learning new observation and data collection skills on the beach near the center. "I had read about all of these problems but actually being able to see them really made a difference. I could see the fish scales from the cannery lining the beaches. I could see the oil slicks floating on the water. I could see the problems were real and that something needed to be done. The program heightened my awareness from something distant to something very real."

Rafael Neal McDonald-Tovar, Peabody, MA -
Princeton University

Semester & Summer
Course Details
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M A G D A L E N A B A Y , M E X I C O

CONSERVATION STRATEGIES FOR A COASTAL WETLAND COMMUNITY

Our focus during the semester is on collecting biological and socio-economic data necessary for the creation of a sustainable development management plan for the region and on increasing the capacity of local residents to sustainably manage their resources. We begin with an orientation, Spanish-language lessons and lectures on the history, socio-economics, culture and resource-use patterns of Mexico and Magdalena Bay. Course material is integrated and presented in 2-3 interdisciplinary case studies focusing on local environmental problems and resource conflicts. Case studies change as problems are solved and new clients and issues are identified.

Recent case studies have included:

- ◆ What are the impacts of the contamination of its intertidal zones on Magdalena Bay's biological and economic productivity?
- ◆ How can the unsustainable exploitation of Magdalena Bay's small-scale fisheries be prevented and what are the economic alternatives to fishing?

Bottlenose dolphins, sea turtles and sea lions can all be found in the bay waters. Resort developers, drawn by magnificent natural resources and easy access from major cities, are buying up miles of coastline. A growing whale-watching industry could cause the gray whale population to stop using the Bay as a winter calving and breeding ground. In 1992, approximately 4000 tourists came here to whale-watch; in 1995, the number increased to 25,000.

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

Faculty lectures are supplemented with guest lectures. Fifteen to twenty local experts including resource managers, university faculty, researchers, representatives of national or international conservation initiatives, and local employers, fishermen and community leaders lecture and meet with students during the course of the semester.



Photo: Marilyn Kazmers/SharkSong



Photo: Jim Elder

Field Work and Field Trips

Days are spent in a combination of lectures, field exercises and research. Our field work sites include the beaches, mangroves, waters and communities of Magdalena Bay. Small skiffs, called "pangas", facilitate our water-based research. We will make several visits to the small fishing village of Puerto Magdalena, home of the most traditional fishing families of the peninsula. Other field trip destinations may include the Estero San Buto to explore small aquaculture initiatives; the intertidal zones of Punta Santa Maria; and the starkly beautiful dunes and sandy white beaches at Punta Delgada.

Semester Program Dates:

September 9 - December 12, 1998

February 1 - May 7, 1999

Departure Point:

La Paz, Baja California Sur, Mexico

Students are 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 page 36 for course descriptions.



Photo: Susan Dew McCready

People here relate to their landscape, life, families and work in a way that has been all but lost in the U.S. - this is the real charm of Puerto San Carlos. Our location near town ensures we have the opportunity to become integrated into the community. "I think the best part of the course was the friendships we developed with the local community. Each week I looked forward to our community activities ranging from scavenger hunts with the high school to community clean-ups to designing environmental ed programs for the elementary school. The people of Puerto San Carlos were truly wonderful and I will never forget them."

Heather Bumgarner, Altoona, PA -
Pennsylvania State University



MAGDALENA BAY, MEXICO

PRESERVING COASTAL WETLAND DIVERSITY

During the 30 day summer program we will focus our efforts on one of the critically endangered wetland resources (eg. fin or shellfish fisheries, water quality) as part of our efforts to develop sustainable management strategies for the Bay's resources.

Directed Research

Every student will complete and present the results of a directed research project selected from a list of projects requested by local clients. A week-long introduction to research techniques, statistics and scientific writing precedes the projects.

Recent projects have included:

- ◆ An ethnographic assessment of the socio-economic aspects of the Pacific Blue Crab fishery;
- ◆ Human ecology and contamination in Puerto San Carlos;
- ◆ Bivalve spat as a means of developing aquaculture in Magdalena Bay;
- ◆ Building community interest in resource management.

Students assessing impacts of development on water quality. The largest gap in our understanding of how to manage the world's ecosystems lies in our knowledge of marine ecosystems. 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.

Involvement in the local community

Because this program is oriented toward helping the community conserve its natural resources and develop sustainably, we spend significant time working within the local community of Puerto San Carlos. Any attempt to converse in Spanish is recognized and appreciated. In addition to working with local clients and interviewing fisherman, business owners, and community leaders, we also are involved in a number of volunteer and social activities. These include developing environmental education programs in the local schools, participating in community meetings and local conservation activities, and playing in local volleyball and soccer tournaments.

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



Photo: Susan Gardner

Program Dates:

Session I: June 11 - July 10

Session II: July 17 - August 15

Departure Point:

La Paz, Baja California Sur, Mexico

Course Number: EE (NS) 356

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 of the Bay's resources are most critically threatened (wetland habitats, fisheries, sea turtle populations);
- ◆ Conducting a rapid rural appraisal project with local residents to collect data on endangered habitats;
- ◆ Producing recommendations for designating special management zones or protected areas.

Course Objectives:

From fishing cooperatives that overharvest fish and shellfish, canneries that pollute rich mudflats and seagrass

beds with toxic effluent, ranchers who cut too many mangroves for fenceposts and poachers who continue to slaughter sea turtles, the unsustainable use of resources by many 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 park or reserve or even smaller management zones that prohibit certain activities in the most ecologically sensitive areas.

Coastal Rainforests and Marine Resources

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Conserving Marine Resources and Coastal Rainforests

Summer Course — Page 27

ENVIRONMENTAL PROBLEM

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

Today, 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. Certain logging practices have altered the critical flow of water from coastal watershed to the estuaries and ocean, threatening migrating birds, fish and marine mammals. Recent studies have found extensive damage to salmon spawning streams from clearcutting. As fish catches diminish and the future of logging is debated, local 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. Recent 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. As future logging rates and styles are determined, there is a great need for ecological information and management recommendations. The lessons learned working with a leading developed country to solve its environmental and economic conflicts are directly transferable to the U.S. or to other developing countries facing similar challenges.



Much of the world's last temperate rainforests are found along Vancouver Island's rugged west coast where a half million acres of timber, claimed to be worth billions of dollars, meet bountiful Pacific waters. The estuaries lying between these old growth forests and the sea support shellfish beds, migrating waterfowl, and nursing grounds for fish including a large salmon fishery. Forests of towering cedar, Sitka spruce and Douglas fir 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.



Center Facilities Bamfield, Vancouver Island

Bamfield is home to a small community of both native and non-native people. The village offers a few restaurants, fishing inns, a post office, Coast Guard station, Red Cross medical clinic, and a tiny grocery. Our Center, accessible only by boat, is based in Aguilar House, overlooking Bamfield Inlet. Stunning beaches and intertidal zones are steps away. The main house contains the dining/study/lecture area, kitchen,

lounge, library and computer rooms. Students are housed in four large rooms, each with a bath. Faculty and staff live in adjacent buildings. This region boasts the mildest temperatures

in Canada; temperatures range from an average of 40°F in January to the low 70's in the summer. Sunny spring and summer days will find us in tee-shirts but this is a rainforest, with over 120 inches of rain per year, and sturdy foul weather gear is also a must year-round. Weather and tides drive our lecture and field work schedule. Small and large boats facilitate our research along the rocky coasts and sandy beaches.

Photo: David Silverberg



Center faculty have over 35 years of experience in Canada and have spent over 20 years as practitioners in their areas of expertise.

Center Director: Pamela Wright, Ph.D., Ohio State University (Natural Resources).

Resident Faculty: Dennis Morgan, M.S., University of Oregon (Environmental Studies)
Additional faculty to be announced.



Because SFS students identified more potential black bear dens than were thought to exist in an area slated for clear-cutting, the logging companies may reconsider plans for this area. "I wasn't just attending classes, I was immersed in my studies both mentally and physically. The lectures directly related to the field work. Everything had an application. I wasn't striving to finish a paper, I was striving to stop a proposed cutblock or restore an unhealthy stream. I wanted to understand what I was learning so I could apply it and make a difference."

Melody Kemp, Indianapolis, IN • Marian College

Center Clients/Partners

Clients and partners include Uchucklesaht and Huu-Ay-Aht Tribes of Nuw-Chah-Nulth First Nations, Pacific Rim National Park, Bamfield Parks Committee, 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, EcoTrust, Bamfield Community School and Bamfield Preservation and Development Society.

Recent Center Contributions

Staff and students at the Center have assisted the Huu-Ay-Aht band with recommendations for salmon creek restoration and have identified a large number of previously unmapped culturally modified trees with historical significance to First Nation communities that may qualify the areas in which they are found for preservation. They analyzed cut block plans for ecological sustainability and have added information on critical wildlife

habitat including black bear dens, nesting areas for the endangered Marbled Murrelet, and salmon streams in areas proposed for clear-cutting. This material was shared with local communities, planning authorities and logging companies. Recent SFS teams have completed an interpretive trail and environmental education program for a wood products company and an interpretive trail on Flores Island for the Ahousaht First Nation band.

ALUMNI PROFILE



Elizabeth Moody
Beverly, Massachusetts
Student- Western State
College, Colorado

I spent the Spring semester in Bamfield with SFS. My research project involved surveying black bear habitats in an area slated for logging. Other students identified "culturally modified trees (CMTs)" that were used centuries ago for making tools or canoes and therefore have cultural importance to First Nation bands. Our findings showed many more bear dens and CMTs than were previously thought to exist. We presented this information to the Ministry for the Environment and hopefully it will lead to the removal of this area from consideration for logging. At the end of the semester, four other students and I had the great honor of being invited back to do more research on stream assessments over the summer for the Huu-ay-aht band. In a logging area it's very important to know the streambed composition and gradient and whether fish can live there. This kind of information determines the logging companies' plans for the area. I felt like I made a difference through my work, and I'm thinking of going back to Canada after graduation. Maybe I can still do some good there.



Photo: Michael Quinn

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. There is a great need for ecological information here as future logging rates and styles are determined.

"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."

Robert Redhead
Manager for Heritage
Resource Conservation,
Pacific Rim National Park

Semester & Summer Course Details
Continue on Next Page

VANCOUVER ISLAND

COASTAL RAINFORESTS AND MARINE RESOURCES

Our focus in the semester program is on issues related to community watershed planning and management in coastal ecosystems. We begin with a week of orientation and introductory lectures. Course material is integrated and presented in 2-3 interdisciplinary case studies focusing on local environmental problems and resource conflicts. Case studies change as problems are solved and new clients and issues are identified.

Recent case study questions include:

- ◆ What are the impacts of forestry on the Ritherdon River and once the impacts are determined, how can it be restored?

Students at Henderson Lake, one of our field trip destinations, are working in partnership with First Nation groups to help restore the economically important salmon run. Aquatic vertebrate and invertebrate sampling, stream and habitat assessments are among the field techniques used in our research.

- ◆ How do we assess and develop a landscape level plan for ecosystem management in Huu-ay-aht territory?
- ◆ What is the bio-physical consumption of resources in coastal temperate rainforest communities?
- ◆ How do we increase awareness of the coastal temperate rainforest?
- ◆ How can the coastal watershed be managed to support a healthy marine ecosystem as well as viable fisheries?

Faculty lectures are supplemented with guest lectures. Fifteen to twenty local experts including municipal foresters, park managers, First Nation elders and resource managers, researchers from local universities and the Bamfield Marine Station, salmon fisherman, local artisans, and community leaders lecture and meet with students during the semester.



Photo: Dennis Morgan

Field Work and Field Trips

Days are spent in a combination of lectures, field exercises and research. Our field work sites include the temperate forests, lakes, beaches and coasts of the watersheds and islands near Bamfield. Field trips allow us a comparative perspective and may include visits to Cape Beale in the spectacular Pacific Rim National Park, Carmanah Provincial Park (home to some of the largest and oldest trees in the world), the salmon fisheries at Henderson Lake (classified as the wettest place in North America), active logging operations, First Nation communities including Flores Island in Clayoquot Sound and Hot Cove Springs, and the communities of Ucluellet and Tofino.

Semester Program Dates:

September 9 - December 12, 1998

February 1 - May 7, 1999

Departure Point:

Vancouver Island, British Columbia

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 page 36 for course descriptions



Photo: Michael Quinn

Working with a variety of clients and living in the small town of Bamfield enables us to experience both Canadian (it is different from the U.S.!) and First Nation cultures. During social outings and meetings with local First Nation groups, we are introduced to the concept of Hishuk ish ts'awalk, "everything is one," which forms the basis of their approach to conservation and the environment.



CONSERVING MARINE RESOURCES AND COASTAL RAINFORESTS

Directed Research

Every student will complete and present the results of a directed research project selected from a list of projects requested by local clients. Research is preceded by an introduction to research techniques, statistics, and scientific writing.

Recent projects have included:

- ◆ A forestry restoration plan for Lot 533 of the Huu-Ay-Aht First Nation Reserve;
- ◆ Preliminary cost benefit analysis of Henderson Lake Hatchery;
- ◆ The interpretive/education potential for Keeha Beach First Nations Heritage Site;
- ◆ Sockeye salmon spawning habitat and stream morphology assessment;
- ◆ The potential for wildlife viewing in the Sarita Estuary.

Taking a core sample. "After talking with my professors, I chose to go to the Pacific Northwest. The courses offered related to the forestry, economic and ecology skills I'll 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

Involvement in the local community

Students have many opportunities to integrate into the local Bamfield community to experience Canadian culture and to experience the rich culture of the many First Nation bands who have inhabited this region for thousands of years. In addition to tutoring in the schools, engaging in local sporting events, and participating in community recycling efforts, students have hosted coffeehouses at the Center as well as a BC Rivers Festival, community workshops and a forest field trip for local residents. Student research presentations are open community events. SFS students have had the unique opportunity be included in a number of events hosted by First Nation groups including the most significant native celebration (Potlatch) of the decade.

We will spend 30 days in one of the last and most spectacular wilderness areas in North America addressing an issue of major concern to local groups, including the First Nations. We will explore the concept of ecosystem-based management and address the question of what information and methods are required to insure that local protected areas are managed to maintain ecological and cultural integrity and are integrated into regional strategies for sustainable ecosystems and communities?



Photo: Michael Quinn

Program Dates:

Session I: June 11 - July 10

Session II: July 17 - August 15

Departure Point:

Vancouver Island, British Columbia

Course Number: EE (NS) 353

Field Work Focus

- ◆ Habitat identification and mapping;
- ◆ Assessing environmentally sensitive areas including restoration and management techniques;
- ◆ Bioregional mapping and cultural resource inventory techniques including ethnobotanical methods and oral history interviewing;
- ◆ Working forest assessment techniques.

Course Objectives

The Nuu-Chah-Nulth have a deep belief in the spirituality and sacredness of life and of the earth, and in a oneness between humans and their environment. This philosophy contributes to a framework for a

new form of resource management or stewardship that is ecosystem-based. For these theories to become reality, they must be developed into specific, on-the-ground management practices.

We will use traditional First Nation territorial lands and other protected areas around Bamfield as our laboratory. These areas, which are key components to the overall strategy to protect biodiversity and insure ecological sustainability, are experiencing escalating pressures from burgeoning recreational use, logging and development, and threats against their ecological integrity. Many areas have been reduced to island fragments that cannot protect the long-term viability of their key flora and fauna. We will address the challenge of coordinating activities at a landscape level to insure protected areas are linked, aboriginal and non-aboriginal communities participate in decision making, lands are co-managed, biological benchmarks are established and economic opportunities for developing sustainable communities are considered.

Studies in Sustainable Development

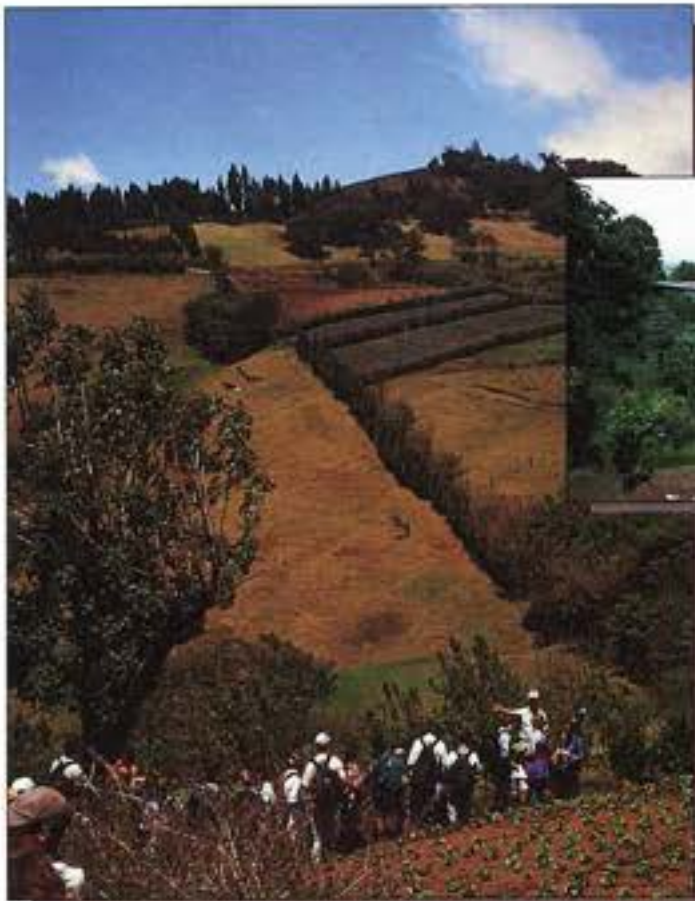
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Alternative Strategies for Preserving Tropical Ecosystems

Summer Course — Page 31

ENVIRONMENTAL PROBLEM

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 an impressive 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. It is now recognized that protected areas cannot fulfill their mission to safeguard biodiversity and contribute to sustainable development while operating as isolated units. Issues such as river pollution, soil protection, and the need for biological corridors to address migration can only be addressed by protecting whole regions. Concurrently, the economic and cultural need for productive agricultural land for Costa Rica's vast array of export crops is escalating. Both traditional and alternative land-use options pose potential natural resource deterioration including water quality, soil erosion and pesticide build-up. Although Costa Rica's remaining natural riches have attracted international attention, there is no concrete evidence that ecotourism is a sustainable solution to this growing economic dilemma. The development which follows on its heels may be as destructive as agriculture has been to date.



Bordered by Caribbean and Pacific beaches, Costa Rica's spectacular natural resources make it a prime destination for ecotourists. Green hillsides are dotted with farms growing coffee, mangoes, bananas, citrus and pineapples. Cloud forests, rainforests and mountain plains shelter more than 6,000 plant species (including more than 1,000 orchid varieties). With 500+ species of butterflies, "butterfly ranching" has emerged as an ecotourism venture. More than 800 bird species - quetzals, toucans, hummingbirds, scarlet macaws - are found in the wet and dry forests. And the magnificent beaches are among the world's largest-known nesting grounds for sea turtles.

Center Facilities
Atenas, Costa Rica

Our base is a small farm on a hillside overlooking the Rio Grande river in the fertile Central Valley. The property includes a large house where faculty live and meals are eaten. Students live in a refurbished chalk factory converted to dormitory space; there are five large bedrooms (6-8 students to a room), bathrooms, classrooms, a small laboratory, and a library/computer room. With the help of local cooks, meals are a feast for vegetarians and adventurous souls excited by ethnic cuisine: rice, beans, vegetables,

plantains, and locally grown fruit, meat and poultry. At 2,600 feet above sea level, nights are cool, days warm and possibly damp. The local community of Barrio Los Angeles is a short walk

from the center while all of Costa Rica's varied and spectacular ecosystems are an easy day trip away.



Center Faculty have over 50 years of combined experience in Costa Rica and as practitioners in their areas of expertise.

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

Program Director: Bernardo Aguilar, M.S., University of Georgia (Agricultural and Applied Economics), License in Agrarian Law, University of Costa Rica.

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

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

Photo: Liana Babbar



Data collected by staff and students on indicators of ecosystem health, integrated pest management strategies and gender roles in agroecosystems have been shared locally and also presented at international conferences in the U.S., Mexico and Denmark. "It makes me proud to know my research 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

Center Clients/Partners

A number of private organizations and government agencies look forward to sharing our research results including Costa Rica's National Park Service, the Ministry of the Environment, the Ministry of Agriculture, the Municipal Government, the Community Association of Atenas, the Universidad Nacional, and the Costa Rican Institute for Electricity as well as privately held preserves and the local cooperatives organized by farmers.

Recent Center Contributions

SFS students and staff have developed an operational management plan for two protected areas, Cerro Atenas and Rio Grande, in one of the most important watersheds in Costa Rica. At the request of local farmers, the center studied and recommended means for controlling the economically devastating white fly using integrated pest management options with natural extracts from local medicinal trees. Results of this work have been presented at international symposia. Working with the Institute of Legal Research at the University of Costa Rica, students have conducted diagnostic studies on Costa Rican environmental regulations. Other publications resulting from Center efforts include guidelines for protecting Costa Rican wildlife in captivity and a book chapter detailing our studies on the energy necessary to produce coffee locally and recommendations for alternative, poly-cropping systems with lower environmental impacts.

ALUMNI PROFILE



Wesley Clow
Woodbury, CT
Environmental Spills
Manager

I've traveled quite a bit, and of all the trips I've taken, Costa Rica with SFS is still the best. I have pictures of everywhere I've been, but it's the Costa Rica pictures that draw the most attention. It was that kind of place. I'm 28 now, and I can still clearly remember my experiences there, especially the friendly people and the beautiful rainforest.

I grew up in Northford, CT and I was always into the outdoors. In Costa Rica, I did my semester research on insect diversity, studying the size, type and diversity of insects living in bromeliads. The following summer I graduated from Eastern Connecticut State University with a bachelor's in groundwater hydrology and later went to work with the Tyree Organization in 1992.

Today I'm the manager of their Environmental Spills Division. My specialty is cleaning up hazardous waste. Everyone has spills and somebody has to oversee how they're cleaned up. I handle any kind of spill in my region, which is New York and Connecticut. Some are underground storage problems, but most are surface spills involving gasoline and other substances. Last July we were sent to a Fedex crash at Newark Airport. There were 12,000 gallons of jet fuel on the ground and 250 drums of hazardous waste on the plane. Each incident is different and you have to decide how to deal with it to solve the problem. Problem-solving was one of the most important things I learned from my SFS experience and I use it every day.



Photo: Liana Babbar

A community service project to repair the road. "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 included in any community activities."

Marcela Kostihova, Czech Republic -
North Central College

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.

Semester & Summer Course Details
Continue on Next Page

STUDIES IN SUSTAINABLE DEVELOPMENT

Our goal is to contribute to management plans for the sustainable development of the communities in the Atenas region by focusing on agricultural production, reforestation, community development, management of protected areas and the development of alternative economic opportunities including ecotourism. We begin with Spanish language lessons and introductory lectures. Course material is integrated and presented in 2-3 interdisciplinary case studies focusing on local environmental problems and resource conflicts. Case studies change as problems are solved and new clients and issues are identified.

We spend a third of our time on off-site field trips including a visit to an experimental mangrove charcoal business. "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



Photo: Liana Babbar

Recent case study questions include:

- ◆ How can Costa Rica achieve sustainable agriculture as it moves into the twenty-first century?
- ◆ How can community-based incentives more effectively promote conservation and production?
- ◆ How viable is grassroots-based sustainable development in small communities in view of the trends imposed by the globalization of the economies in less developed countries?
- ◆ How viable are ecotourism and other alternative resource utilization options?

Faculty lectures are supplemented with guest lectures. Fifteen to twenty local experts including resource and park managers, officials from government management agencies, researchers, farmers and cooperative members, representatives of multi-national corporations, community leaders and local grassroots organizers meet with students during the semester.

Field Work and Field Trips

Days are spent in a combination of lectures, field exercises and research. Our field work sites include local coffee plantations, farms, preserves, forests and the communities of Atenas. Field trips include the protected zones of the Central Valley to study watershed management and the cloud forests of the central highlands to explore alternative farming methods and natural forest management. Other destinations may include the Atlantic lowland rainforest regions of Talamanca and Sarapiquí, the site of intensive banana production. Three very different cultures interface here and provide us with examples of grassroots sustainable resource use including medicinal plant cooperatives, organic agriculture, and sustainable forest management using water buffaloes. Travel to the Pacific lowlands allows us to explore the contrast in production methods between grassroots cooperatives and multinational corporations.

Semester Program Dates:

September 9 - December 12, 1998

February 1 - May 7, 1999

Departure Point:

San Jose, Costa Rica

Semester students will be registered in four academic courses:

EE (NS) 374

Tropical Ecology and Sustainable Development

EE (SS) 371

Sociopolitical Systems and Sustainable Development

EE (SS) 303

Economic and Ethical Issues and Sustainable Development

EE 491 or 492

Directed Research

Please see page 36 for course descriptions.



Photo: Jessica Hanman

Soccer matches pit SFS against local teams.

"A simple walk 500 meters down the road to the only public telephone in La Presa would entail a countless number of potential conversations with local children, teenagers, parents and the elderly. The community was willing to engage in conversation with us about anything from soccer to farming strategies. I felt accepted and a part of the community."

David Grandmaison, Duluth, MN -
St. John's University

Prerequisites: This program is offered at the intermediate level. Applicants must have completed a college level course in each of the following: ecology or environmental studies; international development, 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.



ALTERNATIVE STRATEGIES FOR PRESERVING TROPICAL ECOSYSTEMS

During the 30 day summer program we will visit several regions of Costa Rica to help develop management plans for the protected areas around designated parks as well as guidelines for assessing current land use practices in these areas.

Directed Research

Every student will complete and present the results of a directed research project selected from a list of projects requested by local clients. A week-long introduction to research techniques, statistics and scientific writing precedes the projects.

Recent projects have included:

- ◆ Integrated pest management in annual crops;
- ◆ Labor and sustainable development;
- ◆ The role of women in protection of natural resources;
- ◆ Sustainable harvesting of medicinal plants;
- ◆ Bird species diversity and effects on fruit orchards;
- ◆ Holistic indicators of ecosystem health;
- ◆ Cultural continuity.

A flower farm is one of many field trip destinations. "My directed research project - at first an intimidating proposition since my educational background was in communications and not environmental studies - was the most rewarding effort of my academic career. This wasn't a fabricated assignment - it was real! Our interactions with local families provided a complete cultural experience...no classroom experience can provide that type of learning."

Matthew Provost, Wareham, MA -
Ithaca College



Photo: Liana Babbler

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

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

Costa Rica's model system of preserving biodiversity through the establishment of an extensive national park system has led to the development of an important economic industry - ecotourism. Tourism is about to become Costa Rica's No.1 source of income

surpassing coffee and banana production. Costa Rica is not only preserving biodiversity for its own sake, but to provide for the current and future economic needs of its people.

Our search to identify successful management strategies may take us to a tropical cloud forest, the Guanacaste Conservation area, the Poas Volcano, the Carara Biological Reserve and a number of other Protected Zones. 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 national protection schemes and the operation of private reserves. During our visits we will involve local community members and investigate the sustainable use of natural resources, watersheds, soils, fauna, buffer zones, and sustainable agricultural production. Assessments of the economic and social impacts of preservation and degradation will be considered as we prepare to recommend the most viable preservation strategies.

Involvement in the local community

Because the communities' land-use choices are among our chief concerns, we spend sizable blocks of time on local farms and speaking with agricultural cooperatives. Any sincere attempt to converse in Spanish is recognized and appreciated. Students quickly become involved in local activities ranging from weekly soccer games to community festivals to tutoring in local schools, volunteering in orphanages, repairing roads and establishing local recycling efforts.

Wildlife Ecology and Management

Semester Program — 38

Community Wildlife Management

Summer Course — 39

ENVIRONMENTAL PROBLEM

Kenya's reputation and reality are on a collision course. The habitat required by Kenya's wildlife, its most famous and one of its most economically valuable resources, is increasingly threatened by modern pressures and the country's high 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. Semi-nomadic peoples such as the Maasai, and their cattle herds, have been confined to diminished areas while their numbers grow. This is leading to overgrazing and rangeland devastation. The wild animals which have



Photo: Weaver Whitehead

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 and the booming tourist industry they support. The search for ecologically appropriate solutions to the conflict between food production and wildlife habitat must proceed without delay.

Authors and adventurers have mesmerized us with descriptions of Kenya's harsh desert, arid plains, gentle savannas and dense forests. Acacia thorn trees and croton thickets shelter antelope, zebra, rhino, and elephant, as well as the lions, cheetahs and leopards which prey on them. Our field station, Jua Kali, lies in a quiet corner of a game ranch on the high plains. Oryx and vervet monkeys, umbrella shaped thorn trees, wildebeest, impala and the diverse array of tropical birds that characterize the ranch environment are reminders that we are in Africa. Mount Kenia dominates the northern horizon; the Ngong Hills lie due west.



Center Facilities

Our Center is based at Game Ranching Ltd., an 81 square kilometer ranch forty minutes outside Nairobi. Students sleep in grass thatched bandas. An open dining/lecture hall, library,



separate student center, outhouses and open-air showers complete our base camp. Our setting is rustic. A generator powers the main building where computers are available, and vehicle access is

usually by four-wheel drive. Student teams help prepare meals with the aid of a local cook. Foods are Western with an African influence. Game meat from animals raised and slaughtered on the ranch provides our usual non-vegetarian meal options; fruits and vegetables are usually available. Despite our equatorial location, the climate is temperate. Days can be hot, with temperatures in the high 80s; nights are cool enough for sweaters and blankets.



Center faculty have over 40 years of combined experience in Africa and as professional practitioners in their areas of expertise.

Center Director: Philip Winter, M.A.,
Cambridge University

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

Resident Faculty: Wayne T. Vos, Ph.D., University
of Natal (Botany)

Abdelwahab Sinnary, Ph.D., University of
Nairobi (Biology of Conservation)

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.

Center Clients/Partners

Recent clients and partners include Maasai group ranches such as the Ol Doinyo Nyokie Group Ranch in Magadi and the Olmotonyi Group Ranch in Transmara. We also work with the Lukenya Academy, the Kenya Wildlife Service, and the Wildlife Clubs of Kenya. Game Ranching Ltd., the ranch on which our Center is based, and other privately owned ranches in the Machakos Wildlife Forum have also utilized our research involving the ecological impacts of game ranching.

Recent Center Contributions

SFS has been in Kenya for over fifteen years and has contributed to the management plans for several Maasai group ranches. Using GPS and computer digitization, students and staff created maps of Game Ranching Ltd. that will serve as a base on which geographical and biological data can be layered for use in making future management decisions on stocking rates and cropping quotas. Other management decisions will be facilitated as a result of student research on the

effects of rainfall on Fringe-eared Oryx herd dynamics and the effects of seasonal rainfall on wildebeest recruitment and pregnancy rates. A student built solar heater will enable the ranch to cut down on the amount of increasingly scarce firewood needed for heating and cooking. A highlight of recent programs has been our visits to the town of Magadi, where we have helped build a school library and taught the local school children about the environment through skits, songs, and readings.

ALUMNI PROFILE



Robert Fuhrmann
Gardiner, Montana
Park Ranger

Almost ten years have passed since I went to Kenya with SFS. I've worked as a park ranger and naturalist at Yellowstone National Park for the past five years. The park is really beautiful and I'm outside quite a bit. I manage the visitor's center at Mammoth Hot Springs where we do public education, slide shows, evening campfires and field walks and talks.

I grew up in Deerfield, Illinois. Before coming to Yellowstone, I did wildlife research in Alaska and studied marine biology at Woods Hole (Mass.) I always knew I wanted to do this kind of work, and it's great. I received my bachelor's degree in biology from Lawrence University, as well as teaching certification. Now I'm finishing my master's in fish and wildlife management at Montana State University.

Working in the park lets me use my background as a naturalist. When I'm not at the visitors' center or doing other official park ranger duties, I study wildlife. Right now I'm studying red fox habitat use and distribution in northern Yellowstone Park, so it's not much different than what I was doing in Kenya. The only noticeable difference is that in Africa, the wildlife was larger. But I still get excited by the field trips.

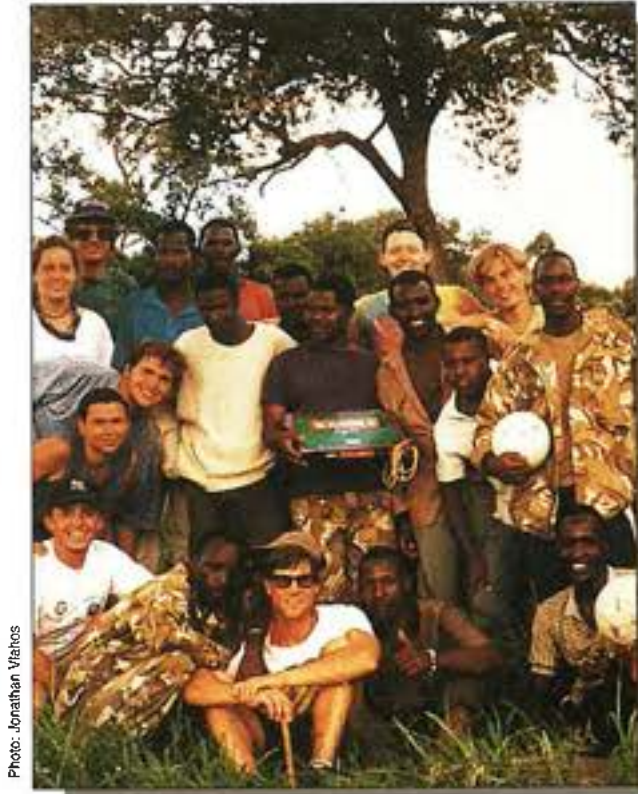


Photo: Jonathan Vlahos

Center staff with students. "Every day we were immersed in new and conflicting ideals as one of the guest speakers, professors, or even students threw a new angle in our discussion. My mind was turned inside out with conflicting reasoning from morality to economics. Never before have I been forced to question my ideals this way. The professors never once let us get away with blanket generalizations, without pushing us to make those ideals applicable to the real world."

Amielle DeWan, Huntington, NY -
Binghamton University

Semester & Summer Course Details
Continue on Next Page

K E N Y A

WILDLIFE ECOLOGY AND MANAGEMENT

Our focus in the semester program is on wildlife management in areas that are not currently protected. This where up to 70% of all Kenya's wildlife is reportedly found and where there is the most to lose and therefore the best chance to have a positive impact. We begin with a week of orientation and preliminary lectures. Course material is integrated and presented in 2-3 interdisciplinary case studies focusing on local environmental problems and resource conflicts. Case studies change as problems are solved and new clients and issues are identified.

"We were submerged in the Maasai culture. We participated in traditional dances and songs, shared meals, and were welcomed into the homes of community members. Villagers seemed eager to provide the information we were seeking and anxious to hear our results when we presented them. We exchanged ideas on wildlife utilization, conservation, tourism and game ranching. It was an experience to be remembered by both cultures, for we each learned much about our own lives by experiencing one radically different."

Kristen Schmid, Belleville, NJ -
Farleigh Dickinson University

Recent case study questions include:

- ♦ Is rangeland degradation on Ol Doinyo Nyokie Maasai Group Ranch reversible?
- ♦ How can we reduce the conflict between elephants and the Maasai people living adjacent to Amboseli National Park?
- ♦ How do we manage rangelands resources for optimal and sustainable wildlife production?
- ♦ Is game cropping an environmentally sustainable, economically viable, and socially acceptable land use option in Machakos District?

Faculty lectures are supplemented with guest lectures. Fifteen to twenty local experts including wildlife researchers, government officials, park and resource managers, local professors and conservation representatives lecture and meet with students during the course of the semester.

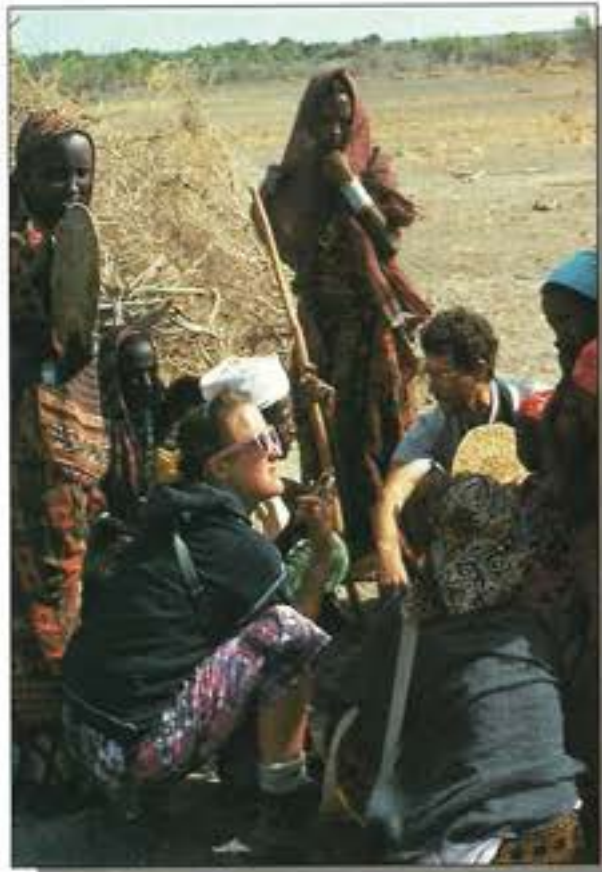


Photo: Michele Gadd

Field Work and Field Trips

Days are spent in a combination of lectures, field exercises and research. Our field work sites include the acacia thickets, and extensive rangelands and savanna of the GRL and other local ranches. Field trips enable us to compare conditions on the ranches with those in protected areas and in the heavily impacted areas just outside the parks. Field trip destinations may include Nairobi National Park, Amboseli National Park, manyatta visits to Maasai villages, farms at Namelok and Kimana, the markets at Machakos, and a climb to explore the microclimates of Mt. Lukenya.

Semester Program Dates:

September 9 - December 12, 1998

February 1 - May 7, 1999

Departure Point:

Nairobi, Kenya

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 page 36 for course descriptions.



Photo: Gregg Tivnan

Radio-tracking is one of the technologies we use to assess the flight distances, food preferences and ranges of giraffe, antelope, kongoni and impala populations on the ranch. Understanding vegetation analysis, herbivore effects, niche partitioning and plant succession will help us with the ecological assessment and monitoring that are key elements to any range management plans. "The most valued skill I acquired was knowing how to look at and think about resource issues more objectively and thus more effectively."

Mark Faherty, Brockton, MA -
University of New Hampshire



COMMUNITY WILDLIFE MANAGEMENT

During the 30 day summer program, we will focus on a single issue:
How can wildlife using communal lands be managed to minimize
conflict with the local community?

Directed Research

Every student will complete and present the results of a directed research project chosen from a list of projects requested by local clients. A week-long introduction to research techniques, statistics and scientific writing precedes the projects.

Recent projects have included:

- ◆ Using cattle as a management tool for enhancing rangeland productivity and wildlife habitat;
- ◆ An investigation into the declining populations of Thompson's Gazelle on GRL;
- ◆ Ethnopharmacology and medicinal herb harvesting of the Kamba Tribe;
- ◆ Effect of giraffe herbivory on the Desert Date tree;
- ◆ Long-term vegetation monitoring on GRL.

Managing animals requires managing the land they live on. In our community wildlife management efforts we will work with Maasai group ranches to determine optimal ways for wildlife and communities to coexist on shared lands. 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.

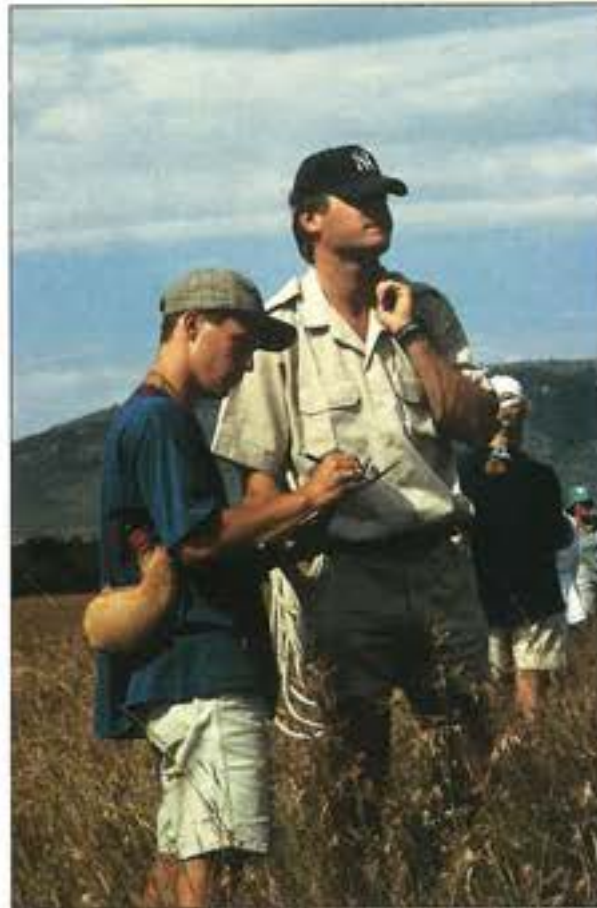


Photo: Gregg Twinn

Program Dates:

Session I: June 11 - July 10

Session II: July 17 - August 15

Departure Point:

Nairobi, Kenya

Course Number: EE (NS) 350

Field Work Focus

- ◆ Determining whether current land-use strategies are ecologically sustainable;
- ◆ Evaluating existing wildlife densities and distributions in relation to land-use patterns;
- ◆ Exploring community decision-making;
- ◆ Conducting socio-economic surveys;
- ◆ Exploring viable approaches and options from a community perspective.

Course Objectives

At the invitation of a local group ranch or other communal interest, 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 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 then weigh the potential benefits of utilizing wildlife with alternative land-use options such as agriculture.

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

Field work exposes us to ecological assessment techniques, mapping, vegetation analysis, animal population censusing, biometry, behavioral observation and sampling. During field trips to parks, group ranches and critical wildlife areas, we will meet with wildlife managers and have an opportunity to compare behavior and productivity of wildlife in protected areas with that of animals 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.

Involvement in the local community

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. Manyatta visits with the Maasai in areas off the regular tourist routes enable us to meet and spend time with the people who are most impacted by wildlife interactions. Our community service work in some of the local schools has been very well received as students teach us songs and stories and we respond in kind.

Semester Course Descriptions

BI/EE (NS) 371 Techniques of Wildlife Management introduces students to the questions, principles and tools used by resource managers in the Kenyan savanna ecosystem. Students will study habitat assessment, plant and animal identification, plant and animal associations and distributions, and other approaches to evaluating the savanna 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 savanna 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 of areas 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) 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.

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*)

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 regarding Affiliate schools and on Page 29 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 your 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	Lewis and Clark College	University of Iowa
Allegheny College*	Lynchburg College	University of Kansas
American University	Macalester College	University of Maryland
Amherst College	McGill University	University of Massachusetts
Barnard College	Miami University*	University of Miami*
Baylor University	Michigan State University	University of Michigan*
Bates College	Middlebury College*	University of Minnesota
Baylor University	Mills College	University of New Hampshire
Bemington College*	Mount Holyoke College*	University of North Carolina
Binghamton University	Muhlenberg College	University of Pennsylvania
Boston College	New York University	University of Pittsburgh
Boston University*	Northwestern University	University of Puerto Rico
Bowdoin College	Oberlin College	University of Puget Sound
Bowling Green State University	Occidental College	University of Redlands
Brandeis University*	Ohio State University	University of Rhode Island
Brown University	Ohio University	University of Richmond
Bryant Young University	Ohio Wesleyan University	University of San Diego
Byrd, Mowr College	Oregon State University	University of Southern California
Backnell University	Pacific Lutheran University	University of Tennessee
Carnegie Mellon University	Pennsylvania State University	University of the South
Case Western Reserve University	Pepperdine University	University of Utah
Claremont McKenna College	Pitzer College	University of Vermont
Clark University*	Pomona College	University of Virginia
Colby College*	Providence College	University of Virginia
College of William and Mary	Purdue University	University of Wisconsin
College of the Holy Cross	Reed College	Vanderbilt University
College of Wooster	Ree University	Vassar College
Colorado College	Regis University	Villanova University
Connecticut College*	Saint Lawrence University	Wake Forest University
Cornell University	Saint Michael's College	Washington University
Dalhousie University	Saint Olaf College	Washington and Lee University
Dartmouth College	Salem State College	Wellesley College
Davidson College*	Santa Clara University*	Wells College*
Denison University*	Scripps College*	Wesleyan University
DePauw University	Skidmore College	Whitman College
Dickinson College*	Smith College	Willamette University
Duke University	Stanford University	William Smith College
Drew University	S.U.N.Y. College of Environmental Sciences and Forestry*	Williams College
Duke University	Swarthmore College	Wittenberg University
Earlham College	Texas A&M University	Yale University
Emory University	Tufts College	
Evergreen State College	Trinity University	
Franklin and Marshall College	Tufts University	
Georgetown University	Tufts University	
George Washington University	University of Alberta	
Gettysburg College	University of California-Berkeley	
Gunnell College	University of California-Irvine	
Hamilton College	University of California-Los Angeles	
Hampshire University	University of California-Santa Cruz	
Hampshire College	University of California-San Diego	
Harvard University	University of Cincinnati	
Humboldt State University	University of Colorado	
Indiana University	University of Connecticut	
Ithaca College	University of Florida	
Kenyon College*		
Knox College		
Lehigh University		

The 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:

Hennington College - Dr. Kerry Woods	Whitman College - Ms. Susan Brick
Boston University - Dr. Carter Cleveland	
Brandeis University - Dr. Anita Klein	
Clark University - Dr. Todd Livdahl	
Colby College - Dr. David Fimagne	
Connecticut College - Dr. Maria Elena Vieira-Bianco	
Davidson College - Dr. Verna Miller-Case	
Denison University - Dr. Juliana Mulroy	
Dickinson College - Dr. Janet Wright	
Kenyon College - Dr. Ray Oelthaus	
Miami University - Dr. Donald Kaufman	
Mount Holyoke College - Ms. Joanne Picard	
Santa Clara University - Dr. Dennis Gordon	
Scripps College - Ms. Valerie Eastman	
SUNY College of Environmental Sciences and Forestry - Dr. Neil Ringler	
University of Miami - Dr. Dan Dillista	
Wells College - Dr. Thomas Vawter	

Home School of 6 or more SFS participants in 1997

* *Member of Sustainable Development Studies Consortium (please see page 29 for details)*

* *SFS Affiliate School*

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 critical 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 a passenger. We expect and encourage you to take a proactive role in all aspects of your education from scheduling activities to choosing research projects to managing risk.

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

1-800-989-4418

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 1997.**

SFS Financial Aid, in the form of scholarships and/or interest free loans, is available to qualified students based on need. For the 1998-99 academic year, we expect to have over \$275,000 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 1-800-989-4418.**

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: Jonathan Vlahos

"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

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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:

Marine Resource Studies/BRITISH WEST INDIES	\$11,620*
Tropical Rainforest Studies/AUSTRALIA	\$11,890*
Wetland Studies/MEXICO	\$11,620*
Coastal Rainforests and Marine Resources/CANADA	\$11,620*
Sustainable Development Studies/COSTA RICA	\$11,620*
Wildlife Management Studies/KENYA	\$12,120*

** Tuitions listed are for Spring 1998 programs. Fees for Fall 1998 and Spring 1999 will be announced in Spring 1998.
(All semester programs have an additional \$150 registration fee).*

Summer 1998 Programs (30 Days)

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

Marine Parks Management/BRITISH WEST INDIES	\$3,095
Tropical Reforestation/AUSTRALIA	\$3,385
Preserving Coastal Wetland Diversity/MEXICO	\$2,795
Conserving Marine Resources and Coastal Rainforests/CANADA	\$2,795
Alternative Strategies for Preserving Tropical Ecosystems/COSTA RICA	\$2,995
Community Wildlife Management/KENYA	\$3,585

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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Marine Resource Management

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Marine Parks Management

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ENVIRONMENTAL PROBLEM

The Turks and Caicos Islands (TCI) are a major exporter of conch and spiny lobster. South Caicos has been the country's most important port for the fishing industry which, in turn, is the economic mainstay of the island. The potential depletion of this resource and its impact on employment and social structure has become a major concern and developing sustainable fisheries is an immediate priority for this fishing community. 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.

At the same time, the country's spectacular and relatively unspoiled marine environment is drawing developers of second homes and resorts who may contribute to the degradation of the very attributes which drew them here initially. 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.

The TCI lie at the southern end of the Bahamas, 100 miles north of the Dominican Republic. The local waters appear as a patchwork of blues and greens, a mosaic effect caused by the seagrass beds, mangrove-studded woodlands, sandy shoals, and patch, fringing and deep reefs that surround the islands. Over 40 species of 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 iguanas. Sea turtles are often seen as are two species of dolphins.



Center Facilities

The Center is based in a former hotel on the southern edge of the island. A rainwater catchment system supplies water, a precious commodity here. The main facility has a large, screened 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. We are fully equipped for marine operations with access to two docks, four motorized

boats, a commercial SCUBA compressor and plenty of tanks. Many field work sites can be accessed by snorkeling in the warm ocean waters. Dives will usually be in waters under 60 feet deep, as that is

where most of the sea life occurs. This is a true arid, tropical climate with hot days and warm nights. Tradewinds keep our rustic site comfortable and free of biting insects for much of the year. Students assist the cook with kitchen duty. Meals consist of simple food - rice, beans, pasta, fresh fish, conch and occasionally, fresh vegetables.



Photo: David Liscio



Center faculty have many years of experience as practitioners in their areas of expertise.

Field Director: Tomas Jamir M.S., University of the Philippines (Physical Oceanography), M.S., M.A., M.A., M.B.A., Oregon State University

Program Director: Andrew Gude, M.S., Portland State University (Natural Resource Management)

Resident Faculty: Mark Nolan, M.S., California Polytechnic State University (International Agricultural Development)

Christophe Bene, Ph.D., University of Paris (Health & Life Sciences)

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Semester Program: *Marine Resource Management*

Summer Course: *Marine Parks Management*

The Center for Rainforest Studies – AUSTRALIA

Semester Program: *Tropical Rainforest Management*

Summer Course: *Tropical Reforestation*

The Center for Wetland Studies – BAJA, MEXICO

Semester Program: *Conservation Strategies for a Coastal Wetland 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*

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Semester Program: *Wildlife Ecology & Management*

Summer Course: *Community Wildlife Management*

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