



S F S THE SCHOOL
FOR FIELD STUDIES

17

SEMESTER & SUMMER PROGRAMS



Environmental Field Studies Abroad

AUSTRALIA
BHUTAN
CAMBODIA
COSTA RICA
PANAMA
PERU
TANZANIA
TURKS & CAICOS

cat.fieldstudies.org

The world needs environmental leaders.

Will you be one of them?

On most mornings, the first SFS students to wake are living in northeast Australia close to one of the world's oldest rainforests. The sun unveils an ecosystem that is the product of millions of years of evolutionary history, as well as a group of students and faculty determined to conserve it. As the sun crosses the sky, SFS students interview Cambodian fishers along the Mekong River; explore the Tiger's Nest Monastery in Bhutan's Paro Valley; and track a memory of elephants through the Serengeti.

From a constellation of field stations, our students examine and research local environmental issues in some of the world's most biodiverse and iconic ecosystems. But SFS is there not just to marvel at the natural world; we are there because these places are threatened by unparalleled, complex challenges including climate change, population growth, and biodiversity loss. Whether in Panama's Caribbean waters or high in Peru's Sacred Valley, SFS students pursue a more sustainable future through fieldwork, scientific inquiry, and Directed Research. This is what we do. Above the coral, beneath the trees—this is where you are needed.





Since our founding in 1980, our mission has been to educate new generations of environmental leaders to address the most pressing global challenges. These leaders are found across the academic spectrum, and pursue a diversity of knowledge, including ecology, resource management, economics, applied anthropology, and political science. More than 17,000 students have participated in SFS programs, and our alumni frequently tell us that SFS ignited passion and direction for their careers. SFS alumni are environmental leaders in academia, activism, business, government, and NGOs.

As the sun sets into the turquoise waters of the Turks and Caicos Islands and the stars rise over Costa Rica's Central Valley, SFS students may reflect on the day's accomplishments and inspiration, and consider the varied challenges ahead. Each day in the field is unique, but the days grow together toward a universal goal: to become part of something greater than yourself. The world is looking for the next generation of environmental leaders. Will you be one of them?

“On the night we arrived at the Center, I looked up and saw the Milky Way, which I'd only seen once before. The lack of light pollution, as well as being in the Southern Hemisphere, revealed so many constellations and stars I'd never seen before. Every night on my way back to the cabin, I'd stop to gaze up at the clear sky, awestruck, and listen to the odd calls of the nocturnes. Stopping to observe even the most obvious or common aspects of nature for a few minutes can be quite fascinating, especially on an isolated continent where most of its lifeforms are endemic. And taking the time out to do this is so worth it. Seeing the beauty of it all—and learning about the many successful and ongoing efforts of locals and scientists—inspired me and gave me new hope for the future of environmentalism. It reminded me why I chose this field in the first place. There's something beautiful worth saving, and people are already working to do so.

— Megan Hansen, Dickinson College, Australia Fall '15



SFS: At a Glance

A Legacy of Environmental Leadership

The School for Field Studies (SFS) was founded in 1980 with the belief that the stewardship of our planet required a new generation of environmental leaders. Our founders believed that global conservation takes more than the scientific community—that it hinges on the engagement of a diverse array of informed and committed individuals from many professions. In pursuit of this mission, SFS sent its first 75 students into the field in the summer of 1981.

Today, with more than 17,000 alumni and building on three-and-a-half decades of environmental field education and research, SFS is known as the premier environmental study abroad program. At our global network of field stations, students collaborate with local community partners and engage in scientific inquiry to address critical environmental problems and work toward lasting solutions.

Who Studies with SFS?

- Each year, nearly 600 students from 175 universities attend SFS in cohorts that may range from 10 to 36 students at each Center.
- Students from across the spectrum of academia participate in SFS' summer and semester programs. Students come from disciplines such as biology, environmental science, history, anthropology, political science, art, education, economics, pre-vet and pre-med, engineering, business, communications, area studies such as Asian and Latin American studies, and many others.

Semester and Summer Programs

- SFS' interdisciplinary, experiential approach to education is designed to actively engage students in the learning process.
- Students learn through classroom lectures, field lectures and exercises, group projects, Directed Research, and other activities.
- Semester programs comprise four courses—three disciplinary courses and a Directed Research course—and in many programs, an additional culture and language course.
- Summer programs consist of a single four-week course (or six weeks in Bhutan) that combines lectures with field exercises, expeditions, and short research projects. Two summer courses may be taken back-to-back in the same or different countries for a total of eight weeks.

- Program activities take place six days a week with part of one day devoted to community engagement, and one day off per week.
- All SFS courses are taught in English.

What is Directed Research?

Through Directed Research (DR)—as opposed to independent research—students conduct research on a specific topic that is part of the SFS Center's long-term strategic research plan, which has been developed in partnership with local community stakeholders and clients.

The course, taught by resident SFS faculty, provides students with the opportunity to apply the scientific process in a mentored field research project that addresses a local environmental issue. Through the DR project, students contribute to a growing body of scientific research that informs local conservation and resource management decisions.

Emphasis on Skill-Building

With SFS, students will develop a suite of skills and techniques used in natural and social science field research. They will:

- Practice field methods as varied as species identification, animal behavior observations, habitat assessment and mapping, survey design, research ethics, valuing ecosystem services, ecological restoration techniques, and animal and plant population sampling techniques
- Develop important, transferable skills such as research design, time management, data analysis, and science communication
- Live and work as part of a community, exercising leadership and developing critical thinking and team-building skills

Community and Culture

- SFS programs provide cultural experiences through a community-based model. We are permanent residents in the communities where we operate and have developed long-term strategic research plans in collaboration with local partners.
- The SFS academic model is cross-cultural. Through coursework, research, and community engagement, students learn firsthand the value of incorporating local knowledge into the process of defining problems and collaboratively exploring solutions.
- At the end of each program, SFS students present their DR findings to local community members and stakeholders, thereby making relevant contributions that address the environmental issues faced by our partners.
- Our close relationships with local communities provide ample opportunities for service and engagement. Students participate in a variety of cultural events and celebrations. Many SFS programs include an opportunity to spend a day in the home of a local family.

Safety in the Field

The health and safety of our students is of utmost importance to SFS. While safety can never be guaranteed, SFS takes a comprehensive approach to the assessment, mitigation, and management of risk in order to protect and enhance the student experience. Our dedicated Safety and Student Life Team oversees student preparation, staff training, global monitoring, and emergency response across all SFS programs. For contact information and a more detailed description of our safety model, please visit cat.fieldstudies.org/safety.



Everything we learned was relevant to where we were, which not only allowed us to appreciate our surroundings, but also what we were learning. This I never took for granted. It's incredibly fulfilling to know that what we learn in our classrooms is not some abstract idea, but a tangible reality of which we are also a part.

— **Kana Yamamoto**

University of California, Berkeley
Peru Fall '15



Research Philosophy

Your SFS international field research will set you apart from your undergraduate classmates, provide you with transferable and marketable skills, and enhance your personal, academic, and professional pursuits for years to come.

At SFS, research is embedded within our long-term commitment to the communities where we live and work. SFS Centers partner with their local, national, and international stakeholders to collaboratively develop and implement long-term strategic research plans. These plans inform each Center's research objectives, promoting a continuous exchange of knowledge among the Center, its students, and local community members. Reciprocity is central to our mission.

SFS is recognized by our partner universities for giving you challenging, mentored field research experiences. We believe that research is an important component of undergraduate education; it improves your critical thinking and analytical skills, your comprehension of scientific literature, and your ability to conceptualize and communicate complex ideas. When you conduct research as undergraduates, you also benefit from the opportunity to clarify career aspirations, build persistence, balance collaborative and individual work, and grow as leaders and teammates.

During an SFS program, you engage in both basic and applied science, discover new knowledge about phenomena, and use that information to help solve existing problems. This is "user-inspired research." In a nutshell, this means your research project will help our host communities address important environmental issues. SFS will help you to put a face on environmental concerns, discover their complexities, grapple with conflicts occurring between local stakeholders' needs and finite natural resources, and propose solutions for sustainable resource use. At SFS we:

- **Focus on problem-solving** - You examine real-world environmental issues critical to local communities.
- **Take a community-based approach** - You interact with community members and agencies to execute research projects that meet community-defined goals.
- **Use an interdisciplinary model** - Environmental problems need complex responses, requiring an integrated academic approach that incorporates disciplines including biology, ecology, policy, management, ethics, anthropology, and socioeconomics.
- **Encourage collaborative efforts** - You jointly design and conduct research projects to find solutions to environmental issues. The focus is on *doing good science*, and understanding that good science is the foundation of sound environmental policies.
- **Emphasize dissemination of information and scientific communication** - We encourage you to present your research in national and international forums, and our students frequently co-author articles in peer-reviewed publications.

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AUSTRALIA

SEMESTER PROGRAM

SEMESTER PROGRAM DATES

Spring 2017: January 30 – May 4

Fall 2017: August 28 – November 30



Tropical Rainforest Studies

THE ENVIRONMENTAL CONTEXT

For thousands of years, the tropical forests of Far North Queensland, Australia, have been home to Aboriginal groups that have and continue to play a vital role in co-managing the Wet Tropics World Heritage Area. The Wet Tropics is also the location of an astounding number of plants, birds, and marsupials found nowhere else in the world. Daintree National Park, where the rainforest-covered mountains meet the coast, contains some of the oldest living plants on Earth. Giant strangler figs, woody climbing vines, epiphytes, large pythons, colorful parrots, giant cassowaries, bandicoots, and tree kangaroos fill the Wet Tropics with color, sound, and complexity.

Northeastern Queensland's ancient rainforests preserve millions of years of evolutionary history, though unfortunately, these repositories have been greatly affected by habitat loss and fragmentation, and are now at risk from climate change. The area once supported extensive rainforests, but logging, mining, and agricultural production over the past two centuries have destroyed and degraded rainforest habitats, disrupting the patterns and processes that keep these forests vibrant.

In addition to habitat fragmentation, climate change is also contributing to the loss of plant and animal species. The Wet Tropics of Far North Queensland are viewed as the "canary in the coal mine" in observing the effects of climate change. Climate models predict a significant rise in local temperatures over the next century, causing devastating impacts across the region. The rise in temperature is predicted to result in the loss of more than half of all regionally endemic bird and mammal species.

The iconic Great Barrier Reef, lying off the Queensland coast, is also under threat. From climate change to sedimentation, this unparalleled ecosystem has suffered from extensive coral bleaching and smothered corals. The degradation of upland rainforests severely impacts the sedimentation runoff into the Great Barrier Reef, directly connecting what is happening in the rainforests with the loss of critical reef species.

Australia continues to be a global front-runner in recognizing the significance of ecosystem services and restoration ecology practices to maintain and ensure healthy rainforests and reefs. The country has largely halted rainforest destruction and established effective protected areas, and is leading research efforts in tropical forest restoration and confronting the threat of forest species loss from climate change more proactively than most tropical countries. Still, the integrity and survival of these ancient and majestic rainforests hinge upon developing management solutions that consider both global and local impacts on biodiversity while also supporting economic and social sustainability for local communities.



“This program is full of once-in-a-lifetime experiences. I wake up excited for every single day, because I never know when I’ll see a rare animal or try something I could never experience at home.

— Jacqueline Rhinier
Franklin & Marshall College
Australia Spring '16



THE SFS CENTER FOR RAINFOREST STUDIES

The Center lies on the edge of the Atherton Tablelands in the heart of the traditional land of the Yidinji people, not far from the small town of Yungaburra. Protected World Heritage forests and farmland surround rolling hills covered in tropical foliage. Student cabins are nestled within the rainforest, which comprises 97 percent of the property's 153 acres. The site is alive with the sounds of the rainforest, and sightings of tropical birds, bandicoots, pademelons, musky rat kangaroos, amethystine pythons, and other rainforest species are common. Students share eight-person cabins with separate shower and bathroom facilities. The main building of the field station houses the classroom, dining area, and common room, while the lab is just a short walk away.



OUR CURRICULUM AND RESEARCH

The astonishing biodiversity of Australia's rainforests and the country's dynamic conservation efforts make Queensland an extraordinary laboratory for students to study rainforest management and restoration. Students consider the role of catchments (watersheds), riparian restoration, and connections between rainforest and reef. Management strategies developed here may serve as a model for conserving and restoring other rainforests around the world.

The ecological and economic benefits of rainforests are increasingly well understood; however, less is known about rainforest ecosystem dynamics and—particularly in this part of the world—how to effectively restore and manage highly fragmented rainforest habitats. Our goals are to examine the dynamics of rainforest ecosystems, including the long-term impacts of fragmentation and climate change, and, in turn, to develop rainforest conservation and restoration strategies that benefit rainforest flora and fauna and human communities.

The program's curriculum and strategic research plan address the critical local and regional environmental problem of loss and fragmentation of once extensive rainforests, and examine environmental policies on local and national levels. SFS staff and students, in collaboration with local landholders and stakeholder organizations, focus on enhancing the condition of tropical rainforests and determining how to regenerate and restore the rainforest of the Atherton Tablelands, particularly the upland remnant forests threatened by climate change and the riparian forests that play such an important role in the health of downstream ecosystems like the Great Barrier Reef. Students also work with several indigenous groups to explore the cultures and livelihoods of Aboriginal communities, current and historical natural resource management by these groups, and the connection of these communities to their surrounding changing environments.

Students are involved in a diverse range of activities that play a vital role in monitoring and preserving the health and well-being of both the local environment and people. For example, students conduct research and partake in:

- A local restoration effort that is internationally ranked as one of the best in Australasia, and which helps inform restoration efforts around the globe
- Determining the habitat needs of endemic species such as Lumholtz's tree-kangaroo, a local marsupial
- Investigating the potential responses and resilience of biotic communities to climate change and major climactic events
- Restoration and sustainable tourism projects led by local and Aboriginal peoples
- The connection between the cultures and livelihoods of Aboriginal communities and their surrounding environments, including the World Heritage Sites of the Wet Tropics and the Great Barrier Reef

COURSES

Semester students are registered in four academic courses accredited through the University of Minnesota:

Course No.	Name	Credits
SFS 3020	Environmental Policy and Socioeconomic Values	04
SFS 3690	Rainforest Ecology	04
SFS 3700	Principles of Forest Management	04
SFS 4910	Directed Research	04

Please see page 48 for course descriptions

Program Highlights

- Live in the heart of the rainforest, study ecology and conservation, and explore environmental policies and practices that shape sustainable development in the region
- Spend a day on a Great Barrier Reef island and explore rainforest, reef, and coastal zone issues
- Camp in Chillagoe and explore the Outback's caves, rock formations, remnant dry rainforests, and eucalypt savanna
- Enjoy a multiday excursion to Cape Tribulation and Daintree National Park, home to one of the oldest tropical rainforests in the world: hike through lowland rainforests, mangrove forests, and palm forests; boat the Daintree River, famous for its crocodiles; and visit the canopy tower at the Daintree Discovery Centre
- Engage with Mandinglbay Yidinji rangers and explore how their coastal management practices influence the World Heritage Wet Tropics rainforest and the largest coral reef system in the world, the Great Barrier Reef

Field Experiences

- Lend a hand at the TREAT (Trees for the Evelyn and Atherton Tablelands Inc.) nursery and reforestation sites to learn about and participate in the most contemporary methods in rainforest restoration
- Explore the countries of local Aboriginal groups, gaining an understanding of indigenous cultures and their use and management of natural resources
- Visit a variety of different ecosystems to learn about the ecology, geology, and historical biogeography of the Atherton Tablelands, including conducting research in two sites that are part of the longstanding Australian Supersite Research Network
- Study the endemic flora and fauna of Australia and gain an understanding of their ecological services in the tropical rainforest, including learning about how invasive species impact Australian ecosystems
- Study the threat that climate change poses to tropical rainforests and use modeling tools to predict its impact in the Wet Tropics
- Use spatial tools, such as GIS, to assess land use change and habitat use by different species



- Develop field research skills including animal identification and observation techniques, radio tracking, spotlighting, rainforest management strategy assessment, and interview and traditional knowledge gathering
- Practice skills in hypothesis testing, data recording and analysis, research design, scientific writing, and presenting scientific results to a variety of audiences including the local community

Directed Research Project Examples

- Work alongside indigenous people to help determine barriers to and opportunities for the development of ecocultural tourism
- Use climate modeling, rainforest corridor plantings, and assessment of forest restoration successes to improve species' resilience
- Study patterns of colonization of restored rainforest by vertebrates like yellow-bellied gliders and tree kangaroos
- Use plant functional traits to predict drought and cyclone resistance
- Study long-term effects and recovery of forests from selective logging
- Assess the ecological values of secondary forests

SFS at Work

While SFS students come away with countless memories, new perspectives, skills, and friends, they also leave something of value behind. Our ongoing research and close ties with community stakeholders allow students to make contributions including:

- Assisting community members with propagating, planting, and maintaining more than 15,000 trees over the last few years to restore degraded forests, improve water quality, and sequester carbon
- Assessing tree seedling recruitment and growth, while working toward recommending best practices for successful restoration
- Helping community members to restore and return more than one mile of rainforest from grassland along the lower Peterson Creek
- Contributing to research that informs biodiversity management action plans for species such as Lumholtz's tree-kangaroo

Get Involved with the Community

The Atherton Tablelands and Wet Tropics have been home to The SFS Center for Rainforest Studies for more than 25 years. SFS is an active and engaged partner with many community organizations including TREAT, Landcare, Tablelands National Park Volunteers, and Tree Kangaroo and Mammal Group. Our research provides scientific data and has direct policy implications for local decision makers. It also creates important linkages between our Center and the diverse stakeholders involved in rainforest restoration and management and the development of sustainable communities and industries.

Our students forge strong connections with residents who are passionate and knowledgeable about environmental stewardship. Participating in restoration projects alongside citizen volunteers, students come to understand rainforest ecosystems and management from a local perspective. SFS students and staff add significantly to the social fabric of the community by getting involved in community volunteer projects and social activities such as:

- Helping local reforestation groups and communities plant rainforest trees, and monitor how the plantings are doing over decades of reforestation efforts
- Participating in community flora and fauna surveys for conservation purposes
- Attending special lectures, workshops, and celebration days dealing with the local wildlife in conjunction with regional and national conservation groups
- Hosting community dinners and participating in short homestays
- Attending bush dances and community festivals, visiting the Malanda theatre, and socializing at the local pubs and sporting competitions
- Engaging with Aboriginal elders to learn more about their culture and efforts to reclaim their role in land management



Directed Research was the most challenging thing that I have ever undertaken, but it is a significant personal accomplishment.

It solidified for me exactly what a field biologist does and the scientific research behind the management and conservation of wildlife. I have gained a better understanding of myself, about what I want in life and where I am going. I feel better prepared as a burgeoning biologist seeking to study life and ensure its conservation for generations to come. I had the best experience of my life, and also made a family of lifelong friends that I will always share a connection with.



Daniel Erickson

University of Wisconsin-Madison
Australia Fall '15

For details and how to apply, visit: cat.fieldstudies.org/australia



AUSTRALIA & NEW ZEALAND

SUMMER PROGRAM

SUMMER 2017 PROGRAM DATES

Session I: June 5 – July 5

Session II: July 10 – August 9



Tropical Rainforest Studies

Rainforest ecosystems harbor some of the world's highest levels of biodiversity. In Australia and New Zealand, rainforests also host extraordinary remnants of the world's oldest species of plants and animals. Large areas of northeastern Queensland, Australia, were once covered in spectacular tropical rainforests, preserving millions of years of evolutionary history. Over the centuries, however, logging, farming, and development have destroyed and disrupted rainforest ecosystems and habitats, leaving fragile fragments that are often too small or isolated to sustain some species.

Though many of Australia's tropical forests and species are now protected under World Heritage legislation, they continue to be threatened by climate change and invasive species. Similarly, in northern New Zealand, only fragments of ancient forests remain to house endemic fauna and flora, as well as to provide food, medicine, spiritual, and economic value to residents and visitors.

SESSION I: RAINFOREST MANAGEMENT STUDIES IN AUSTRALIA AND NEW ZEALAND

Students compare and contrast the ecological, geographic, social, economic, and historical factors that have shaped natural resource management in northeastern Australia and northern New Zealand. These two countries share a similar Gondwanan history; however, European settlement patterns, indigenous histories, and economic development differ significantly between the two countries.

In New Zealand, students discover the country's critically endangered flora and fauna and the impacts that have led to their decline. In Australia, students build on their New Zealand experiences by examining similarities and differences in political structure, co-management arrangements, land-use patterns, and biogeography in the two countries.

Field Experiences

- Examine the influence of fragmentation and other pressures on abiotic and biotic elements of forest communities in Australia and New Zealand
- Visit the ancient rainforest refugia at Daintree National Park
- Explore the ancient podocarp and Kauri forests of northern New Zealand
- Examine historic Aboriginal and Maori land-use practices in Australia and New Zealand and experience contemporary indigenous culture

SESSION II: TECHNIQUES FOR FIELD RESEARCH IN AUSTRALIA

In this second summer session, the emphasis is on learning and practicing field research methods in ecology, resource management, and social science. Examining the effects of habitat loss and fragmentation in rainforest systems and changes to the human communities living near them, students explore Australia's tropical rainforests and develop effective field skills while learning about rainforest restoration, conservation, impacts on the Great Barrier Reef, and sustainable development.

Field Experiences

- Learn sampling design, plant identification, forest survey techniques, animal survey methods, and social science research techniques
- Experience largely intact lowland rainforest and contrast these with the fragmentation effects impacting the rainforests of the Atherton Tablelands
- Visit a Great Barrier Reef island and learn about the links between riparian restoration and water quality on the reef

SUMMER COMBINED: SESSIONS I + II

This summer program offers two four-credit courses that may be taken individually or in combination to provide a thorough introduction to biodiversity conservation and the socioeconomic factors influencing land and resource management in two countries. Students participating in both sessions receive a \$1,000 discount.

For details and how to apply, visit: cat.fieldstudies.org/australia

COURSES

Summer students are registered in one or two academic courses accredited through the University of Minnesota:

Course No.	Name	Credits
SFS 3540	Rainforest Management Studies in Australia & New Zealand	04
SFS 3550	Techniques for Rainforest Research in Australia	04

Please see page 51 for course descriptions



“We all come from many different places and backgrounds, but we have meshed together to discover the wonders of the natural world and learn how we might effectively conserve the spirit of the land.”

— Hannah Floren

University of Puget Sound
Australia Summer '16



BHUTAN

SEMESTER PROGRAM

SEMESTER PROGRAM DATES

Spring 2017: February 13 - May 24

Fall 2017: August 28 - December 6



Himalayan Environment and Society in Transition

THE ENVIRONMENTAL CONTEXT

The Kingdom of Bhutan, a small, landlocked country nestled in the rugged eastern Himalayas, sits between two of Asia's geopolitical giants, India and China.

Incredibly mountainous, Bhutan ranges from 400 feet above sea level at its southern border to more than 24,000 feet above sea level. Despite having the same latitude as Miami, the northern reaches of Bhutan have permanent glaciers, which feed the rivers that are vital to the economy and ecology of the country.

Bhutan's geography creates numerous eco-zones, providing habitats for a vast array of plant and animal species. Located in one of the major biodiversity hot spots in the world, the country is home to myriad birds, butterflies, and rhododendrons. The takin, snow leopard, golden langur, black-necked crane, and tiger are among Bhutan's diverse and charismatic fauna. The high percentage of forest cover is an increasingly valuable resource that the Bhutanese strive to manage sustainably for the benefit of both humans and nature.

The country's rich cultural traditions and social and political institutions reflect the Buddhist principle of The Middle Path, integrating people and nature, traditional knowledge, and modern science. Bhutan is best known for its development philosophy of Gross National Happiness, an approach to development that measures progress and prosperity with the physical, spiritual, social, and environmental health of citizens and the natural environment. Gross National Happiness is understood to have four pillars—sustainable socioeconomic development, preservation and promotion of culture, conservation of environment, and good governance—all oriented toward a more holistic approach of governance.

Because the majority of people still reside in rural areas and practice small-scale agriculture and forest product extraction, sustainable management of local natural resources is critical for achieving the country's holistic development goals.



“I have never experienced such cultural immersion. I cannot stress enough how kind and welcoming all the people are, going above and beyond to make our time here more enjoyable. I admire the selfless generosity that seems to be without a second thought.

— Colleen Corrigan
SUNY Plattsburgh
Bhutan Fall '15



UGYEN WANGCHUCK INSTITUTE FOR CONSERVATION AND ENVIRONMENT

The Ugyen Wangchuck Institute for Conservation and Environment (UWICE) is a government institution that serves as a center for research, policy dialogue, and training in the fields of conservation and environmental sciences. SFS students live and study on the UWICE campus in the town of Jakar, nestled in the Choekhor valley of Bumthang. The facility is the former palace of Bhutan's first king, built in traditional Bhutanese architecture with colorful decorations both inside and out. The UWICE campus offers magnificent views of the surrounding valley, the mountains swathed in clouds, and cattle or ponies grazing in the yard.





OUR CURRICULUM AND RESEARCH

The program curriculum and research agenda address issues related to modernization in Bhutan: the support of rural livelihoods and the conservation of biodiversity in the face of a changing society and landscape. By getting to know the local and national institutions that contribute to the management and governance of environmental resources, students gain an appreciation of the complexity of identifying and addressing conservation issues in a developing region.

SFS staff and students, in collaboration with our partner, the Ugyen Wangchuck Institute for Conservation and Environment (UWICE), examine the government's goal of enhancing the condition of forest, river, and mountain ecosystems while balancing modernization and cultural preservation. SFS students contribute to the advancement of SFS and UWICE's shared research agenda in several priority areas including sustainable forestry, conservation biology, water resources, socioeconomic, well-being, and policy. Underlying themes of the joint research we undertake include biodiversity conservation, natural resource and water management, rural-urban migration, climate change impacts and adaptation, and sustainable livelihoods.

The semester curriculum comprises three thematic components, all centered on the environment.

- **People's relationship with nature:** Students explore the human-nature interface through the lenses of religion, society, and culture. The program strives to uncover the knowledge, perceptions, beliefs, and attitudes about nature from an array of stakeholders. Students evaluate human dependence on and vulnerabilities to the processes, resources, and events in nature.
- **Democratization, governance, and rural development:** Students learn about the policies and institutions in Bhutan that provide conditions necessary for livelihood security, good governance, and equitable socioeconomic development.
- **Ecology, conservation, and resource management:** Students study key species and their habitats, as well as Bhutan's conservation and natural resource management strategies—main pillars supporting human welfare and economic development in Bhutan.

The three-month program operates primarily in the forests, fields, and villages of the central district of Bumthang. Trekking across valleys and ridges and through villages, students learn about culture, Buddhist philosophy, and environmental issues, and gain an intimate knowledge of the local ecosystems and rural livelihoods. Students develop skills in assessing environmental problems, defining research questions, conducting field research, and communicating results.

COURSES

Semester students are registered in five academic courses accredited through the University of Minnesota:

Course No.	Name	Credits
SFS 3040	Political and Socioeconomic Dimensions of Environment	04
SFS 3060	Mountain Ecology	04
SFS 3050	Land Use, Natural Resources, and Conservation	04
SFS 4910	Directed Research	04
SFS 2010	Religion and Culture of Bhutan	02

Please see page 48 for course descriptions

Program Highlights

- Explore Thimphu—the only capital city in the world without traffic lights—and experience the friendly people of Bhutan while engaging the senses visiting shops, temples, and market stands
- Visit some of the most influential and inspiring places of Buddhist worship in the Kingdom including *Taksang* (Tiger's Nest Monastery), Trongsa Dzong, and Punakha Dzong
- Participate in a multiday trek through villages, old-growth forests, and riverine ecosystems up to 14,000 feet above sea level

Field Experiences

- Explore Phobjikha Valley, an important wetland conservation area for the globally threatened black-necked crane
- Conduct biodiversity studies and habitat assessments in forests, fields, and along rivers
- Study traditional agricultural systems and practices, and assess how modernization affects the agro-ecosystem and rural household economies
- Explore lower-elevation subtropical Himalayan broadleaf forests to observe unique flora and fauna
- Pursue socioeconomic research in towns, on farms, and with businesses to assess how development in the Kingdom has influenced livelihoods
- Visit monasteries to learn about the role of Buddhism in Bhutanese society and culture, especially as it relates to environmental concerns and national happiness
- Develop field research skills including species identification, biodiversity assessment, survey design and interviewing techniques, environmental impact and protected-areas assessment, GIS or remote sensing, habitat assessment and mapping species distributions, scientific writing, and oral presentation



Directed Research Project Examples

- Compare timber productivity in community forests and private forests
- Examine the effect of cattle grazing on blue pine encroachment
- Study the connections between land use and water quality
- Assess the abundance and status of key economic species; perform baseline biodiversity analyses
- Investigate the impact of roads on community forest and agrarian livelihoods
- Determine how rural-to-urban migration impacts food security and nutrition across the country
- Examine the interest in and potential for payment for ecosystem services

Get Involved with the Community

Community reciprocity is at the heart of the SFS organizational and educational model. SFS students face the real-world complexities of issues affecting our host communities. With the results of our research, we offer data and recommendations that inform decision makers and build relationships between SFS and local stakeholders involved in biodiversity conservation and resource management.

As at our other Centers throughout the world, SFS is a part of the social fabric of the communities in which we are hosted. SFS students get involved in community volunteer projects and social activities such as:

- Stream cleanup in Jakar town
- Soccer matches against UWICE and local teams
- Environmental education with nature clubs in local schools
- Trail maintenance and landscaping on UWICE campus
- Service to the monastic community
- Day-stays with local families
- Attending local *tsechus* (festivals)

Our Partner in Bhutan

The Ugyen Wangchuck Institute for Conservation and Environment (UWICE) is a governmental institution founded in 2008 and housed within the Royal Government of Bhutan's Ministry of Agriculture and Forests, whose mandate is to provide a center for research, policy dialogue, and training on issues related to environmental conservation.

Building on six years of collaboration, SFS and UWICE partnered to provide students with a field-based environmental studies semester program to explore the ecological, societal, and economic aspects of critical environmental issues in Bhutan. The program is delivered by SFS faculty and an international team of scientists, including leading Bhutanese experts in conservation and resource management. The research that SFS students conduct as part of this program is closely aligned with the research priorities of UWICE and the Bhutanese government.

Note: The program operates in rugged and rural environments, and we live and study at altitude (around 10,000 feet elevation). Our work takes us (often by foot) to higher altitudes. The recreational trek and field work require participants to be in excellent physical condition. Our facilities and other rural infrastructure are rustic, and the Bhutanese diet is fairly simple.



Bhutanese farmers gave us a warm wave as we passed by their fields and children ran behind us, shouting any English words they could remember.

Often we walked along the river, realizing that its constant rushing made the perfect background music for our thoughts. Our trek concluded at Mebar Tsho—the Burning Lake—a holy place in Bhutan. The site is adorned with countless prayer flags and butter

candles. Both foreigners and Bhutanese visit the lake, as it is just as beautiful as it is holy. We sat together on the rocks above the water, listening to the Buddhist chanting of the site's caretaker.



Emma Story Hayward

Eugene Lang College
Bhutan Fall '15

For details and how to apply, visit: cat.fieldstudies.org/bhutan



BHUTAN

SUMMER PROGRAM

SUMMER 2017 PROGRAM DATES

June 5 – July 13

This is a six week program



Eastern Himalayan Forests and Rural Livelihoods

In Bhutan—a Himalayan country with towering mountains, lush forests, and a distinct cultural heritage—progress is measured not just by economic growth, but also through good governance, cultural preservation, and environmental conservation. Bhutanese communities maintain rich cultural traditions, and the country has developed social and political institutions imbued with Buddhist principles of The Middle Path, balancing people and nature, traditional knowledge, and modern science. Sustainable management of natural resources—including soil, water, biodiversity, and minerals—is critical for Bhutan, as these resources are fundamental to the national identity, as well as the local and national economies.

Bhutan's recent transition to a constitutional monarchy and the trends in rural-urban migration put new pressures on the environment. Issues related to human-wildlife conflicts in rural areas, agricultural production and food security, forest resource governance, and environmental policy create a complex web that ultimately affects the well-being of humans and nature.

Curriculum and Research Focus

Traveling through Bhutan, students learn about culture and history, religious traditions, environmental issues, and conservation policies, all while exploring the role that environmental services and natural resources play in rural livelihoods and national development. In this program, the country itself becomes the classroom, as we explore local environmental issues and rural livelihoods through a broad array of learning opportunities including lectures from local experts, field exercises, an optional trek and a short research project.

Through their research, students contribute to the advancement of SFS' joint research agenda with the Ugyen Wangchuck Institute for Conservation and Environment (UWICE) in areas including sustainable forestry, watershed management, and rural development. Students develop skills in assessing environmental problems, defining research questions, conducting field research, and communicating results to local stakeholders.

In this six-week program, students conduct a research project on themes related to natural resource management. Project themes and examples include:

- Social, economic, and environmental impacts of natural resource management practices including community forestry
- Forest conservation and rural livelihoods, including non-wood forest product economies
- Payment for ecosystem services assessment
- Climate change, water management issues, and flood preparedness

Field Experiences

- Conduct interviews with Bhutanese citizens who have resource-based livelihoods, exploring the relationship between human well-being and natural resources
- Learn important features of local forest species, including species composition and community dynamics; practice forest survey field techniques
- Consider how culture and religion influence interactions with the surrounding environment
- Take a multiday trek through cultural and natural landscapes, up and over the ridge between Choekhor and Tang Valley
- Visit the stunning Punakha Dzong and monasteries in Bumthang

The cultural elements of the program include multiple interactions with local schools and government institutions, visits to monasteries, and participation in local festivals. Sports and other activities with UWICE staff and local children keep us rooted in the community.

Note: The program operates in rugged and rural environments, and we live and study at altitude (around 10,000 feet elevation). Our work takes us (often by foot) to higher altitudes. The trek and field work require participants to be in excellent physical condition. Our facilities and other rural infrastructure are rustic, and the Bhutanese diet is fairly simple.

For details and how to apply, visit: cat.fieldstudies.org/bhutan

COURSES

Summer students are registered in one academic course accredited through the University of Minnesota:

Course No.	Name	Credits
SFS 3580	Eastern Himalayan Forests and Rural Livelihoods	06

Please see page 51 for course descriptions



“Each delicate painting on the wall of a *dzong*, each colorful flower dotting the landscape, each welcome scent of lemongrass—we beg our minds to absorb each detail and memorize each intricacy. We cannot get enough of the magical world around us.

— Amanda Soled
Haverford College
Bhutan Summer '15



CAMBODIA

SEMESTER PROGRAM

SEMESTER PROGRAM DATES

Spring 2017: January 30 – May 10

Fall 2017: August 28 – December 6



Conservation, Ethics, and Environmental Change

THE ENVIRONMENTAL CONTEXT

The mighty Mekong River, with headwaters originating in the Tibetan plateau and emptying into the massive delta in Vietnam, is a ribbon of life which provides habitats to threatened species and sustains millions of people. The Lower Mekong Basin, extending over most of Cambodia and incorporating the great Tonle Sap Lake, is home to the Irrawaddy dolphin, Cantor's giant softshell turtle, the Greater Adjutant Stork and other threatened species. Cambodia hosts diverse ecosystems—including lowland evergreen forests, dry dipterocarp forests, seasonally flooded gallery forests, and estuarine mangroves—which are a part of the Indo-Burma global biodiversity hotspot.

While there are high levels of biodiversity in the Lower Mekong Basin, conservation efforts, including the implementation of environmental policies, are just beginning. Cambodia, a post-conflict nation, is engaged in rapid economic development and experiencing increasing environmental change. Growing threats to its biodiversity include: hydropower dam projects on the main-stem Mekong and its tributaries, illegal logging, economic land concessions, overfishing, and the privatization of communal resources.

Our program explores the ethical challenges surrounding environmental change and development. Rural livelihoods in Cambodia, which have traditionally combined farming, fishing, and foraging for forest and aquatic resources, remain very dependent upon natural resources. Yet research indicates that natural resources are declining, leaving many rural livelihoods in transition. This program focuses on detailing the drivers of environmental change in Cambodia, including economic development, deforestation, and climate change, and analyzing strategies, particularly community based participatory approaches, which seek to find a sustainable balance between human needs and conserving biodiversity.



“Science is most powerful when we recognize the impacts it can have—and needs to have—on the lives of people. I’m incredibly grateful to SFS and the Directed Research experience for embracing this lesson wholeheartedly.

— Clare Blackwell
Tufts University
Cambodia Spring '16



THE SFS CENTER FOR MEKONG STUDIES

The program is based in the city of Siem Reap, adjacent to the temples of Angkor, Phnom Kulen National Park, and the Tonle Sap Lake. The Center is a private compound with a large, two-story residence with shared bedrooms and bathrooms, wireless internet, a spacious common area with a loft, an open-air dining room, and a swimming pool, garden, and yard for sports, fitness, or relaxing. Located just ten minutes by tuk-tuk from the downtown, students have easy access to the bustling life of Siem Reap, which enhances opportunities for cultural engagement. However, the Center is also a short distance away from our primary field sites in rural villages, forests, the Tonle Sap Lake, and Angkorian temples.



OUR CURRICULUM AND RESEARCH

Students in this program learn about the complexity of Cambodia's struggle to balance biodiversity, development, and human needs. Through coursework, field excursions, and Directed Research, students focus on conservation, environmental ethics, and rural livelihoods by studying the interface between livelihoods and the environment, assessing biodiversity and ecology, and gaining an understanding of natural resource use and governance.

The program has a particular emphasis on qualitative field research methods. Students are enriched in their studies by meeting and interviewing a wide variety of villagers and the members of various local and international conservation and development organizations.

The greater Siem Reap region provides many riverine and terrestrial habitats to explore. The UNESCO World Heritage Site of Angkor serves as a backdrop for understanding Cambodian culture and religious pluralism, blending Buddhist, Animist, and Hindu beliefs. Students learn how Buddhism has directed societal norms and principles regarding environmental protection.

In addition, students explore a variety of regional development and conservation challenges and community-based solutions during travel across rural and urban Cambodia. While on the road, students visit key conservation sites along the Mekong River, gain appreciation for Cambodia's recent history in Phnom Penh, and discover coastal ecosystems and development pressures in Kampot Province.

The program also travels overland to the Mekong Delta in Vietnam, where students experience contrasting political, social, and economic systems from those of Cambodia. Students explore key environmental issues in the Delta including climate change, water resource use, and agricultural development.

Program components and topics include:

- Ecology of the flora and fauna of the region and threats to biodiversity
- Traditional rural livelihood strategies of fishers, farmers, and foresters, and current drivers of change
- Ethical issues surrounding environmental change and economic development, and the role of ethics in environmental governance and policy
- Scientific principles and practical elements of conservation management
- Comparisons of Cambodian and Vietnamese state approaches to conservation, development, and resource management
- Community-based natural resource management and ecotourism models

COURSES

Semester students are registered in five academic courses accredited through the University of Minnesota:

Course No.	Name	Credits
SFS 3800	Conservation Science and Practice	04
SFS 3810	Ecosystems and Livelihoods	04
SFS 3820	Environmental Ethics and Development	04
SFS 4910	Directed Research	04
SFS 2080	Language and Culture of Cambodia	02

Please see page 48 for course descriptions

Program Highlights

- Travel across Cambodia, studying the diverse ecosystems and livelihoods of the Lower Mekong Basin
- Evaluate opportunities and challenges in tourism development while exploring the resplendent Khmer temple complex of Angkor, the world's largest pre-industrial urban complex
- Participate in baseline biodiversity surveys in the Tonle Sap Biosphere Reserve and investigate the status of migratory bird species
- Stay in bungalows at a community fishery project in coastal Cambodia to learn about community-based natural resource management and plant mangroves along the tidal flats of the Gulf of Thailand
- Explore Cat Tien National Park in Vietnam, visiting a primate rehabilitation center and learning about indigenous peoples' connections with forests from Chau Ma elders
- In Vietnam, observe the built environment of the Mekong Delta including complex irrigation systems and flood mitigation structures that control the confluence of the Mekong River and the South China Sea

Field Experiences

- Visit the Angkor Center for Conservation and Biodiversity and learn how captive endangered species are being cared for before they are reintroduced into the wild
- Explore sites in Phnom Kulen National Park while undertaking qualitative research on community-based ecotourism initiatives
- Get to know the many major social justice and environmental organizations that operate in Siem Reap and Phnom Penh, and learn about the international conservation non-governmental organization (NGO) community
- Study conservation efforts for the endangered Irrawaddy dolphin and Cantor's giant softshell turtle along the Mekong River in Kratie Province
- Interview coastal fishers and fishing families on Tonle Sap Lake to discover challenges and adaptation strategies to declining natural resources



- Visit Phnom Bokor National Park to assess development approaches in a highland protected area
- Study mangrove restoration projects on the Cambodian coast in Kampot
- Develop social science research skills including research design and interviewing techniques, environmental impact and protected-areas assessment, and the use of qualitative data analysis software
- Gain field science research skills including species identification, bird and bat population monitoring techniques, multivariate statistical analysis, and scientific writing

Directed Research Project Examples

- Assess changing livelihood strategies of local residents on the Tonle Sap and in the forested Kulen highlands
- Study biodiversity in the Tonle Sap aquatic ecosystem
- Evaluate the range of medicinal plant usage in rural communities
- Understand the role of monks and Buddhism in environmental education, environmental ethics, and wildlife conservation
- Examine approaches to natural resource governance and management in protected areas
- Explore the impacts of boat noise disturbance on the Tonle Sap

Get Involved with the Community

Community reciprocity is at the heart of the SFS organizational and educational model. SFS students face the real-world complexities of issues affecting our host communities. With the results of our research, we offer data and recommendations that inform decision makers and build relationships between SFS and local stakeholders involved in biodiversity conservation and resource management.

As at our other Centers throughout the world, SFS is a part of the social fabric of the communities in which we are hosted. Our urban location in Siem Reap and our partnership with local university Paññāsāstra University of Cambodia (PUC) offers SFS students a variety of opportunities to engage with community projects and social activities such as:

- Engaging with the rich cultural heritage of Cambodia, including Khmer language lessons and local homestays
- Interacting with local students inside and outside of Paññāsāstra University's campus, through activities including community cleanup days, cooking and traditional dance classes
- Attending community festivals, pagodas, and traditional Apsara dance performances
- Partnering with local NGOs and institutions to address environmental issues
- Exploring local markets to practice language skills and try regional foods



How uniquely valuable this intimate opportunity is, to work with and learn from passionate ecologists, biologists, and sociologists from drastically different backgrounds.

For all our diversity, these differences make us strong. We're able to spend tuk-tuk rides and bus trips intoxicated by spirited debates about ethics and orientalism, compassionate ecology and ubiquitous spirituality. I've never

felt anything like this before. This program is more challenging than I ever could have imagined, but what a joy to be challenged studying ethics and ecosystems in Cambodia.



Taylor Walker

Hollins University
Cambodia Spring '16

For details and how to apply, visit: cat.fieldstudies.org/mekong



COSTA RICA

SEMESTER PROGRAM

SEMESTER PROGRAM DATES

Spring 2017: January 30 – May 10

Fall 2017: August 28 – December 6



Sustainable Development Studies

THE ENVIRONMENTAL CONTEXT

Costa Rica is internationally recognized as being a leader in biodiversity conservation and protection of natural resources. The country supports more than five percent of the world's species and boasts 230 protected areas—about 26 percent of the land area of the country. Cloud forests, rainforests, volcanoes, coastal environments, and mountaintops shelter as many as 9,000 different plant species, including at least 1,300 species of orchids alone. Costa Rica's various tropical ecosystems contain more than 12,000 species of butterflies and 900 species of birds, such as quetzals, toucans, hummingbirds, and scarlet macaws. This remarkable biodiversity provides a rich platform for nature-based tourism, which is one of the country's primary economic drivers. The diverse landscape mosaic of forests, pastures, coffee farms, and agricultural fields, as well as the stunning beaches and extensive mangroves, offer residents and tourists alike a natural haven for good food, rich culture, and the exploration of tropical biodiversity.

However, Costa Rica faces a challenge common to many developing countries: preserving beautiful—and economically valuable—natural resources while increasing prosperity and encouraging development. The Costa Rican “paradise” is increasingly threatened by population growth, urban development, inappropriate waste disposal, and agricultural shifts and monoculture expansion. Though Costa Rica has a strong history of conservation and legal protection of natural resources, people's health and livelihoods are being adversely affected by the rapid conversion of rural agricultural landscapes to urban areas, the consequent loss and fragmentation of forests, and the increasing demand for water. Finding long-term solutions in sustainable practices is imperative for Costa Rica's future.



“I knew I needed a change of scenery to broaden my worldview and expand my understanding of what I had learned at school, and I couldn't have picked a better place to find it!”

— **Stefanie Farrington**
Clark University
Costa Rica Spring '16



THE SFS CENTER FOR SUSTAINABLE DEVELOPMENT STUDIES

The Center, located an hour from the capital city of San José, comprises a campus facility integrated with a small Rainforest Alliance Certified™ mango and orange farm overlooking the fertile Central Valley. Practicing sustainability is part of the student learning and living experience. The Center's facilities include a dormitory and cafeteria, indoor and outdoor classrooms, an organic garden and greenhouse, a soccer field, a basketball court, a swimming pool, and a forested area with trails. The campus is part of the small neighborhood of La Presa/Los Angeles, and the friendly town of Atenas is only three miles away. Costa Rica's tropical forests, beaches, mountains, and volcanoes are all within a day's travel.





OUR CURRICULUM AND RESEARCH

Costa Rica is currently undergoing a period of rapid economic and social change. As this resource-rich and biodiverse country develops, it is increasingly influenced by globalized markets and policies, such as free-trade agreements. Costa Rica's economy has shifted its focus from agriculture to services. At the same time, rapid rural-to-urban conversion is straining natural resources in ecologically fragile areas. These shifts have prompted groups to demand social and environmental justice, including their Constitutional right to a healthy environment. The country is at a critical juncture as resource management decisions are being made in an effort to keep pace with competitive global markets.

The program examines different development and resource management models that Costa Rica uses to protect the biodiversity of its ecosystems while promoting socioeconomic benefits for its people, including marginalized groups such as indigenous people, minorities, and those living in poverty. Students will examine the effects of globalization on development issues such as agriculture, biodiversity protection, economic development, urban sprawl, population growth, waste management, and water quality. Students will see how the SFS Center farm compares with other sustainable farms in the region through an assessment of ecosystem services in the agricultural landscape.

This program focuses on evaluating the actual success of Costa Rica's world-renowned conservation systems and developing alternative strategies for economic development and biodiversity conservation, such as land-use planning, organic agriculture, and conservation outside of protected areas. Visits to cloud forests, dry forests, volcanoes, lowland rainforests, farms, and plantations offer opportunities to examine management schemes, identify benefits of protected areas, and determine which systems offer the best options for economic development, the maintenance of cultural norms, and the preservation of biodiversity. Understanding the priorities for Costa Rica's policies, within the context of environmental changes, is crucial as students analyze potential sustainable solutions for Costa Rica and the Central American region.

Program Highlights

- Take an extended field expedition to Nicaragua to compare and contrast development and resource-use issues: hike the volcanoes of Isla Ometepe; explore the rich cultural history of Granada; and study impacts of tourism in the region
- Visit several national parks to investigate the pressures of ecotourism on small gateway communities and learn about tropical forest ecology
- Explore the biodiversity and cultural significance of cloud forest habitats such as the Monteverde Cloud Forest Reserve

Field Experiences

- Learn about bio-indicators of ecosystem health and rainforest ecology
- Explore Poás Volcano National Park, learning about the geology of Costa Rica and highland ecosystems, management strategies in national parks, and park usage by visitors
- Develop management policies by continuing long-term bird monitoring programs and analyzing the impact of roads on fauna in protected areas
- Spend time in the community of El Sur, hiking through primary rainforest and examining sustainable tourism practices
- Conduct social science research in the local towns and conservation areas to better understand both residents' and tourists' perceptions about the surrounding environment
- Visit Finca El Toledo, a family-owned and shade-grown organic coffee farm, and learn firsthand about a successful model for integrating conservation and agricultural production in the tropics
- Explore rare and threatened tropical dry forest ecosystems while camping in the national parks of the Guanacaste Province and studying one of the most successful management models for protected areas in Latin America
- Develop field research skills including habitat assessment and mapping, species identification, infrastructure assessment in protected areas, GIS or remote sensing, scientific writing and oral presentation, and survey design and interview techniques

COURSES

Semester students are registered in five academic courses accredited through the University of Minnesota:

Course No.	Name	Credits
SFS 3820	Environmental Ethics and Development	04
SFS 3770	Tropical Ecology and Sustainable Development	04
SFS 3740	Principles of Resource Management	04
SFS 4910	Directed Research	04
SFS 2050	Language, Culture, and Society of Costa Rica	02

Please see page 48 for course descriptions



Directed Research Project Examples

- Investigate Carara National Park's management practices in response to increased tourism
- Evaluate the socioeconomic benefits of Costa Rica's national parks for neighboring communities
- Analyze the impact of road traffic noise on the avifauna of national parks
- Measure ecosystem services, including biodiversity conservation and carbon sequestration, in agroforestry systems such as shade-grown coffee farms
- Evaluate the impacts of artificial feeders on the ecology of hummingbirds in Monteverde Cloud Forest Reserve
- Assess public perception of the problems and solutions associated with environmental impacts resulting from climate change, urbanization, or management of solid wastes

SFS at Work

While SFS students come away with countless memories, new perspectives, skills, and friends, they also leave something of value behind. Our ongoing research and close ties with community stakeholders allow students to make contributions including:

- Evaluating the impact of invasive species on plant diversity in the Municipal Forest of Atenas
- Conducting biophysical assessments of micro-watersheds for local authorities such as the Ministry of Environment, the Ministry of Health, and the Atenas municipality
- Evaluating the ecological status of freshwater springs in the Cerro Atenas Protected Zone
- Monitoring visitation in national parks of the Central Volcanic Mountain Range Conservation Area

Get Involved with the Community

Conversations and collaborations with local residents, small business owners, and farmers about their perspectives and needs provide the framework for SFS research plans. Our Center is an important stakeholder and partner for local municipalities and ministries, development organizations, and many national parks. The Center has maintained a collaboration agreement with the National System of Conservation Areas for the last 15 years, and more recently has established relationships with local NGOs and universities.

A cornerstone of the program is the opportunity for student engagement in Atenas and surrounding areas. The Center collaborates with local organizations on projects such as:

- Engaging in the community: U.S. culture and English interaction with local students; environmental education with local schools; and recycling projects
- Establishing nurseries of native tree species, and reforestation and watershed conservation projects with local organizations
- Participating in soccer games, community festivals, and short homestay visits



I am enamored with Costa Rica. I love the *tranquilo* mentality that is nothing short of contagious.

I love seeing the smiling faces of the 5:45 a.m. crowd of La Presa during my morning runs. I love that a farmer stopped to have a 45-minute conversation about life while I was conducting research on his land. I love the afternoon rainstorms, and I love the green



forests and mountains that stretch as far as the eye can see. I have grown to love this country for everything that it is and perhaps even more for everything that it is not.

Jessica O'Toole
University of Denver
Costa Rica Fall '15

For details and how to apply, visit: cat.fieldstudies.org/costarica



COSTA RICA

SUMMER PROGRAM

SUMMER 2017 PROGRAM DATES

Session I: June 5 – July 5

Session II: July 10 – August 9



Sustainable Development Studies

Costa Rica is known worldwide for its conservation efforts, which have attracted millions of tourists to its natural protected areas. Accelerated economic growth and urban development, however, frequently take place without coordination of land-use planning, consideration of water and energy sustainability, and the use of adequate waste management systems. These pressures, in combination with climate change impacts, are challenging the sustainable development goals of the country and threatening its biodiversity.

SESSION I: SUSTAINING TROPICAL ECOSYSTEMS: BIODIVERSITY, CONSERVATION, AND DEVELOPMENT

Students explore and address key features of sustainable development strategies including the most pressing challenges occurring at the intersection of conservation and economic progress.

Students learn about Costa Rica's historical and current sustainable development strategies, as well as tropical ecosystem function and connectivity, allowing them to understand the impacts of development on the environment and on society. The course introduces students to models of economic development and biodiversity conservation with field exercises, lectures, and trips in and around Costa Rica's protected areas. A short field research project gives students a practical introduction to research design and methods for achieving conservation goals.

Field Experiences

- Explore the biological diversity of the rainforests of Braulio Carrillo National Park in the Volcanic Cordillera Conservation Area
- Compare and contrast biodiversity protection in examples of conventional and organic agriculture
- Evaluate tourism services and park management practices in Poás Volcano National Park

SESSION II: APPLIED RESEARCH TECHNIQUES AND STRATEGIES TOWARD SUSTAINABILITY

Students learn about the ecological, natural resource management, and socioeconomic drivers impacting protected areas and surrounding communities and farms in Costa Rica. This program focuses on developing relevant research questions that address local issues related to sustainability. Students propose alternative approaches toward sustainable development in an effort to help address challenges to conservation goals.

Field Experiences

- Explore the biological diversity of the rainforests of Braulio Carrillo National Park in the Volcanic Cordillera Conservation Area
- Compare and contrast biodiversity protection in examples of conventional and organic agriculture
- Evaluate tourism services and park management practices in Poás Volcano National Park

SUMMER COMBINED: SESSIONS I + II

This summer program offers two four-credit courses that may be taken individually or in combination to provide a thorough introduction to the sustainability of tropical ecosystems, as well as field research techniques for addressing conservation questions. Students participating in both sessions receive a \$1,000 discount.

SUMMER COMBINED IN PANAMA AND COSTA RICA: SESSIONS I + II

This eight-week combined summer program gives students an opportunity to gain a two-country comparative perspective on the impacts of tourism and development on the natural environment and human communities (see page 30). By engaging in field-based research, students come away with both a conceptual framework for understanding the challenges of addressing complex conservation questions, as well as direct, hands-on experience in two different Central American countries. Students participating in both sessions receive a \$1,000 discount.

For details and how to apply, visit: cat.fieldstudies.org/costarica

COURSES

Summer students are registered in one or two academic courses accredited through the University of Minnesota:

Course No.	Name	Credits
SFS 3520	Sustaining Tropical Ecosystems: Biodiversity, Conservation, and Development	04
SFS 4930	Applied Research Techniques and Strategies toward Sustainability	04

Please see page 51 for course descriptions



“I have gained further interest in studying how the effects of forest fragmentation from human impact affect the diversity and structure of forests. Thanks to SFS, I have a better understanding of what conducting research is all about, as well as a new perspective on the importance of sustainability.”

— Breanne Held
Otterbein University
Costa Rica Summer '15



PANAMA

SEMESTER PROGRAM

SEMESTER PROGRAM DATES

Spring 2017: January 30 – May 10

Fall 2017: August 28 – December 6



Tropical Island Biodiversity Studies

THE ENVIRONMENTAL CONTEXT

Panama is the great connector between two continents, a corridor that links the natural riches of Central America to South America. Few places on Earth can claim the density of species and ecosystem richness of this isthmus. The Bocas del Toro Archipelago, located on the Caribbean side of the country, is a complex and biologically diverse area composed of islands, mangrove forests, coral reefs, and seagrass meadows. The islands themselves are covered with diverse terrestrial ecosystems—from humid lowland rainforests to freshwater marshes—that are habitats for an abundance of birds, monkeys, sloths, butterflies, arachnids, and the distinctive poison dart frog. Many of the islands' beaches are important nesting grounds for threatened marine turtles. Commonly referred to as the “Galápagos of the Caribbean,” the island systems of Bocas del Toro contain a remarkable wealth of natural resources.

Bocas del Toro is at a critical juncture. Due to a boom in tourism, poorly managed development, and inadequate municipal services, the region's coastal ecosystems are rapidly being converted into tourist infrastructure, resulting in a loss of biodiversity. Population growth, unchecked extraction of resources, water and waste management issues, pollution, and increased recreational practices of humans have put strains on the natural places of the archipelago, many of which form the basis of tourism in the region. Sustainable natural resource harvesting, conservation, and monitoring are critical components of maintaining the economic, societal, and ecological stability of the region.

The degradation of the islands' marine ecosystems and commercial overfishing in the region have also compromised the livelihoods of Bocatoreños. The area's burgeoning service economy is attracting a growing corps of low-scale wage earners. While this income is important, the adverse effects of this economy are particularly apparent for indigenous people who are the most economically vulnerable. The emerging tourism-based service economy has promoted a transition from traditional subsistence livelihoods for locals to livelihoods based on cash earnings. This change has resulted in a loss of connection between people and their environment, and may compromise the stewardship of local habitats and key natural resources.



“Looking at the shimmering water, the classroom out on the pier, the reflection of the palm trees in the pool, and tasting the delicious cooking, I knew that I had made the right choice.

— Emma Johnson
Davidson College
Panama Fall '15



THE SFS CENTER FOR TROPICAL ISLAND BIODIVERSITY STUDIES

The Center is located on Isla Colón, the largest and most populous island in the Bocas del Toro Archipelago. Located on a quiet waterfront a short distance from Bocas Town, it is common to hear the sounds of frogs, birds, and howler monkeys as well as the hustle and bustle of the nearby town while at the Center. Caribbean waters are the backyard of the Center, providing plenty of activities for students including snorkeling, paddle boarding, and swimming. The classroom is located over the water with views of nearby islands. However, with such close proximity to the coral reefs, jungles, and beaches of Bocas, our classroom for active learning extends over vast parts of the island system, all of which are just short distances away. The facility also includes a dining/study area, outdoor classroom, indoor classroom (to shelter from occasional tropical deluge), student lounge, pool, plenty of hammocks, and a library/laboratory.



OUR CURRICULUM AND RESEARCH

Bocas del Toro is home to biologically diverse marine and terrestrial ecosystems, such as coral reefs, mangrove cays, white sand beaches, and tropical rainforests. However, poor management of both the development of these areas and the subsequent resource use by residents and tourists has put increasing pressures on these ecosystems threatening the human, animal, and plant communities that depend on them.

The curriculum of the program focuses on defining key island systems, both natural and human, and how they interface. Our research in Bocas del Toro has already revealed patterns and processes at the nexus of biodiversity, conservation, and human welfare that merit ongoing study. Through field observations and research, students identify and understand the pressures, both direct and indirect, on the environment and social systems.

Students also evaluate the responses by local stakeholders and policymakers aimed at mitigating pressures and restoring balance in the environment. Interviewing the residents of the Bocas del Toro region about their livelihood strategies, approaches to farming, and use of natural resources help us to assess the sustainability of land and resource use in the region. Bocas del Toro is home to an eclectic mix of people—including Latinos, Afro-Antilleans, Ngöbe-Bugle, Chinese and expatriates—and each group occupies a niche in the social and economic systems of the islands, and has a distinctive way of relating to the environment. The archipelago offers myriad opportunities to examine how natural systems and human systems are able to mutually exist—but not necessarily without conflict—in this small island region of the rural Caribbean.

Through coursework and research, students gain an understanding of the interdependence of the livelihood strategies of island residents, population structure of key species, and habitat arrangements and conditions. Equipped with foundational knowledge, students then apply sustainability principles to identify potential management strategies. Guest lectures by Panamanian and international researchers, government environmental officials, and community members help students understand the social, economic, and policy context for environmental management in the region.

Program Highlights

- Explore lowland evergreen rainforests, and experience the diversity of plants and animals, such as insects, birds, monkeys, sloths, plants, and several species of poison dart frogs, including the emblematic strawberry poison dart frog
- Snorkeling to identify species such as sea stars, corals, jellyfish, coral reef fish, stingrays, and sea turtles, as well as to research human impacts on coral reefs, mangroves, seagrass beds, and other marine habitats
- Visit indigenous communities and learn about livelihood strategies as well as the challenges of adapting to a rapidly changing economic environment

Field Experiences

- Take shallow-water excursions to the fragile coral reef ecosystems where multitudes of marine species thrive
- Make frequent walks through the rainforest and learn about canopies, competition for space, and soil composition and health
- Interview and interact with local stakeholders including government agencies, nonprofits, and educational and business leaders to understand the complex implications of management on ecosystems
- Visit and participate in sea turtle conservation projects and patrol nesting beaches with Sea Turtle Conservancy watchmen during nesting and hatching seasons
- Tour several farms and plantations, including cacao and banana, in Almirante and Changuinola on the mainland to understand the impact of diverse forms of agriculture on the local economy and coastal environment
- Perform coral bleaching and coral disease assessment within the Isla Bastimentos National Marine Park Marine Protected Area (MPA) to quantify the current and future impacts of climate change on coral reef ecosystems
- Visit eco-lodges and resort hotels to understand how different types of land development put varied pressures on fragile marine habitats and ecosystems

COURSES

Semester students are registered in five academic courses accredited through the University of Minnesota:

Course No.	Name	Credits
SFS 3020	Environmental Policy and Socioeconomic Values	04
SFS 3790	Tropical Coastal Ecology	04
SFS 3740	Principles of Resource Management	04
SFS 4910	Directed Research	04
SFS 2070	Language, Culture, and Society of Panama	02

Please see page 48 for course descriptions



- Develop field research skills including marine and terrestrial organism behavioral observations, biodiversity and habitat assessment, survey design and interviewing techniques, environmental impact and protected-areas assessment, scientific writing and oral presentation

Directed Research Project Examples

- Status of key marine species, including corals, lobsters, and reef fish, and the importance of these species to the livelihoods of local fishers
- Condition of marine and terrestrial habitats, including coral reefs, seagrass beds, mangroves, and lowland evergreen rainforests, and strategies for monitoring changes over time
- Effect of disturbance as an indicator of rainforest species diversity and habitat suitability
- Impacts of habitat and biodiversity loss due to human activities
- Changes in marine species abundance and diversity in proximity to Bocas Town and the Bastimentos MPA
- Viability of poison dart frogs in fragile ecosystems affected by anthropogenic factors such as habitat loss, land cover changes, and a warming climate
- Knowledge about the tourism sector in Bocas del Toro and how it is supported and actively managed by local stakeholders
- Livelihood strategies of residents, such as fisheries, ecotourism, agriculture, ranching, and forestry; and decision-making processes of families that extract natural products for subsistence and income generation

Get Involved with the Community

Conservation, resource use, forest preservation, and marine species monitoring are important to local farmers and fishers, resource managers, and concerned community groups. With the results of our research, we offer data and recommendations that inform decision makers and build relationships between SFS and the stakeholders involved in tropical island system conservation and management. SFS students get involved in community engagement projects and social activities such as:

- Participating in excursions and projects that benefit the greater Bocas community including developing environmental education activities for children, gardening at the local high school, and beach cleanups
- Meeting with members of the indigenous Ngöbe community to learn more about their culture and efforts to promote their role in land management and sustainable natural resource use
- Hosting community lectures or workshops
- Attending community festivals such as Carnaval and Dias de Patria



“**At the *Colegio* (high school) we led an interactive lesson on social science and trash in Bocas.**

As I worked to glean answers from the students, we made small talk and attempted to teach each other words from English and Spanish, laughing at our own mispronunciations. I was struck by our similarities: the jokes we told, the aligning aspirations to study science or be an engineer.



It made solving the trash problem in Bocas seem attainable when so many of the students were committed to and hopeful for finding a solution.

Katie Ebinger

University of Colorado
Boulder
Panama Spring '16

For details and how to apply, visit: cat.fieldstudies.org/panama



PANAMA

SUMMER PROGRAM

SUMMER 2017 PROGRAM DATES

Session I: June 5 – July 5



Tourism and Island Systems

A lush tropical landscape and warm waters make the Bocas del Toro Archipelago a magnet for tourism. The rapid growth in tourism over the last two decades is having a detrimental impact, however, on the environment. Almost 150,000 tourists visit Bocas annually and the physical infrastructure struggles to support requirements for potable water, waste management, housing, transportation, and agriculture.

Tourism has also changed the social and economic dynamic of the region, and not always in a positive manner. The extent and rate of change is important to identify, document, and assess in order to mitigate its impact on the people and ecosystems of Bocas del Toro.

SESSION I: TOURISM AND ISLAND SYSTEMS: ASSESSMENT OF SUSTAINABLE PRACTICES

This course introduces students to the study of tourism via a historical and ecological understanding of Bocas del Toro. Students examine the challenges presented by a growing reliance on tourism for livelihoods and economic development. Students assess the impact of tourism on the natural environment within the context of the larger cultural, economic, and political dimensions. They learn about the complexities of creating environmental policies that both conserve the region's natural resources and support livelihoods and economic sustainability for local communities.

The course emphasizes the human dimensions of tourism. Students become familiar with the biodiversity of the islands, paying particular attention to the natural elements that attract tourists to the region. Walking through farms and forests and snorkeling in the clear waters of the archipelago, students see a variety of tropical habitats—coral reefs, mangroves, lowland rainforest—and fauna including poison dart frogs, howler monkeys, sloths, and bottlenose dolphins. They also visit popular tourist destinations, observe tourist activities, and learn to use various assessment techniques to measure tourism practices and tourism impacts on ecosystem function.

By interacting with local stakeholders—indigenous community members, seasonal residents, nonprofits, business owners, and government agencies—students collect data and information on belief systems, traditions, and livelihood practices and how they play a role in the management and protection of this fragile island ecosystem.

Field Experiences

- Interview local stakeholders regarding their perceptions of tourism and its role in Bocas del Toro
- Practice environmental assessment techniques to identify drivers of human-induced stress in natural systems (snorkeling and swimming skill level dependent)
- Visit a Marine Protected Area (MPA) to determine how tourism can support protected areas
- Compare ecotourism lodges with large-scale resort hotels, assessing their impacts on social, economic, and environmental systems
- Perform cost-benefit analyses on tourist activities and identify the positive and negative effects on natural systems and livelihoods in the archipelago
- Study the impacts and policies related to tourism centered on watching wild animals in their natural habitats (e.g., dolphin watching)
- Draft model plans and proposals for optimizing sustainable tourism in Bocas del Toro

SUMMER COMBINED IN PANAMA AND COSTA RICA: SESSIONS I + II

This summer program offers one four-credit course that may be taken individually or in combination with a four-credit course in Costa Rica (see page 24) to provide a thorough introduction to environmental management, tourism, and sustainable development in tropical ecosystems.

The eight-week combined summer program gives students an opportunity to gain a two-country comparative perspective on the impacts of tourism and development on the natural environment and human communities. Students gain a conceptual framework for understanding the challenges of addressing complex conservation questions, as well as direct, hands-on experience in two different countries. Students participating in both sessions receive a \$1,000 discount.

For details and how to apply, visit: cat.fieldstudies.org/panama

COURSES

Summer students are registered in one academic course accredited through the University of Minnesota:

Course No.	Name	Credits
SFS 3000	Tourism and Island Systems: Assessment of Sustainable Practices	04

Please see page 51 for course descriptions



“Having the field station nestled on a beach allows us to go snorkeling, paddle boarding, and swimming in the Caribbean even in the 30 minutes between lunchtime and our next lecture. Palm trees surround the station, giving us a chance to crack open a coconut during the hot afternoons.

— **Tamara Hijazi**
Bucknell University
Panama Fall '15



PERU

SEMESTER PROGRAM

SEMESTER PROGRAM DATES

Spring 2017: February 13 – May 24

Fall 2017: August 28 – December 6



Biodiversity and Development in the Andes-Amazon

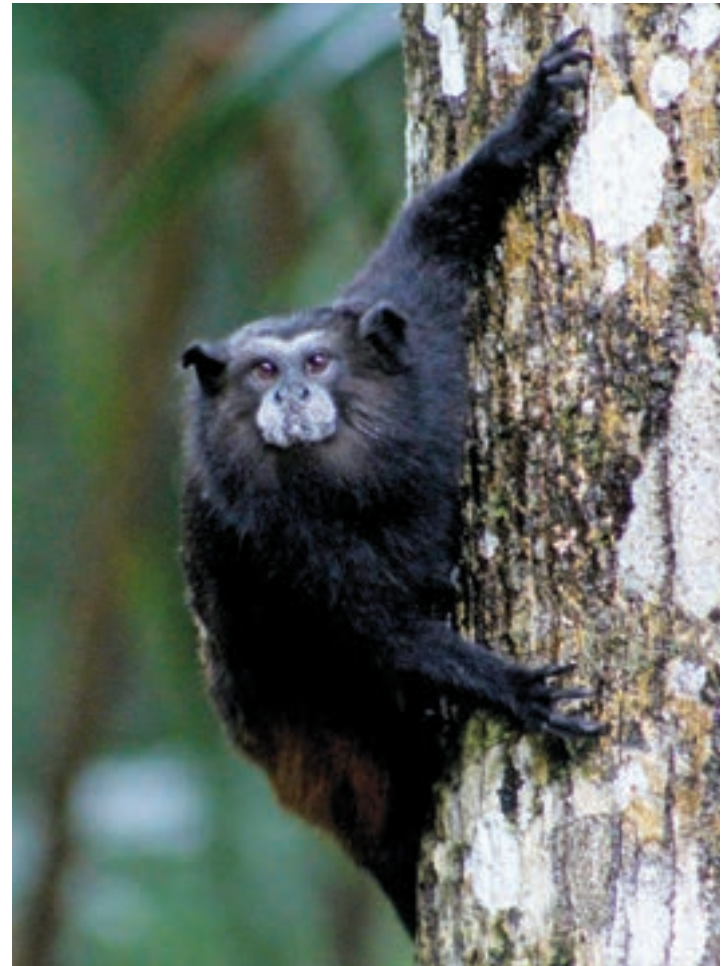
THE ENVIRONMENTAL CONTEXT

From the glacial lakes and tropical montane forests of the Peruvian Andes to the extensive humid tropical rainforest and cloud forests that make up the upper reaches of the Amazon watershed, the dramatic elevation gradient easily earns Peru a place among the five most mega-diverse countries in the world. The complex topography and array of habitats support diverse flora and fauna and are also home to many indigenous groups. Because of the wealth of social and ecological diversity, Peru is a leading destination for biodiversity enthusiasts, anthropologists, scientists, educators, and students from around the world.

The rich natural resources of the Andes-Amazon region have supported human populations for millennia, including indigenous groups who still live in these forests. Today, populations in the highland region are declining due to migration, while the Amazon region draws people looking for opportunities to engage in both extractive and productive activities. These changes to the Peruvian social landscape threaten the unique ecosystems, habitats, and species through urban and peri-urban development, road installation, destructive logging, unregulated mining, and high-input agriculture. In addition, effects of climate change and loss of traditional knowledge are impacting resource availability and use.

Peru is currently in the process of figuring out which conservation efforts in the region are effective in curbing extractive practices and protecting the local landscape, and which are not. Several grassroots organizations, along with larger international conservation organizations, are working toward changing perceptions, attitudes, and behaviors regarding natural resources in Andean and Amazonian communities in order to protect the remaining habitats and cultures.

The goal of this program is to contribute to the baseline knowledge of biological diversity and to understand the impacts of the rapidly changing demands on natural resources in order to help promote the sustainable management of the unique and globally important Andes-Amazon region.



“In the Sacred Valley, valleys give way to rolling mountains and snowcapped peaks. Brilliant blue sky gives way to powerful thunderclouds. The experience of learning and growing beneath these sky-scraping glacial mountains and star-strewn skies will stay with me for the rest of my life.

— **Samuel Eller**
University of San Diego
Peru Spring '16



THE SFS CENTER FOR ANDES-AMAZON STUDIES

Our primary field station and campus is a guest house in the Sacred Valley region outside of Cusco with a classroom, dining area, gardens, and nearby recreational areas. During an extended expedition into the Amazonian cloud, premontane, and lowland forests, students stay at the Villa Carmen Biological Station (pictured) and Wayqecha Cloud Forest Biological Station—both operated by our partner the Amazon Conservation Association (ACA) and its sister organization, Asociación para la Conservación de la Cuenca Amazónica. The field stations' infrastructure includes classrooms, labs, gardens, and many miles of trails.



OUR CURRICULUM AND RESEARCH

This program seeks to understand the conflicts and synergies of conservation and development in western Amazonia and the adjacent Andean highlands. Students learn firsthand about the ecological patterns and processes that underpin the extraordinary biodiversity of the Andes-Amazon region along the eastern slope of the Peruvian Andes. Students explore the concepts of ecological resilience, dispersal and divergence of species, and the value of ecosystem services, as well as the effects of climate change and land use on regional and global biodiversity and human well-being.

Students are able to explore the vast biodiversity of the region, from the glacial origins of the headwaters of the Amazon in the Andean highlands, to the Amazonian lowland rainforests, and all of the cultures, conservation practices, and livelihoods in between. The program includes multiday expeditions to both the pristine lowland Amazon rainforest and the Sacred Valley of the Incas in the Andes to experience the cultural and biological diversity of these vastly different regions. While in the lowlands, students explore rare primary tropical rainforests and learn about the history of people whose traditions and livelihoods are intimately connected to wild places. In the Sacred Valley, an area surrounding the modern city of Cusco which has great importance to the cultural and ecological history of the region, students explore how natural resources have been managed over millennia in an environment that has extreme weather conditions and steep elevation gradients.

The rich ecosystems of the Andes-Amazon support a diversity of social actors and cultural groups who employ a suite of livelihood strategies that are both typical of resource-rich, rural areas and unique to Peru. Students explore how the region became such a biodiversity hot spot, and consider how nature-society interactions, such as agriculture, resource extraction, tourism, and rural development, have shaped the natural landscape and the social and economic conditions in the region.

Through coursework, field exercises, and Directed Research, students experience the richness of the Andes-Amazon region, study community dependence on the environment, examine threats to the environment and to social networks, and explore the tools and strategies that both mitigate threats and promote well-being among different communities. Our research projects are geared towards identifying the range of socio-ecological issues, as well as basic questions about biodiversity, that help us guide and inform the program's research agenda.

COURSES

Semester students are registered in five academic courses accredited through the University of Minnesota:

Course No.	Name	Credits
SFS 3830	Tropical Ecology of the Andes-Amazon	04
SFS 3840	Political Ecology of Developing Landscapes	04
SFS 3800	Conservation Science and Practice	04
SFS 4910	Directed Research	04
SFS 2090	Language, Culture, and Society of Peru	02

Please see page 48 for course descriptions

Program Highlights

- Including Machu Picchu, explore the Sacred Valley of the Incas, investigating highland tropical forests, historical and modern methods of natural resource management, and the interface between society and the environment
- Stay in the Amazonian rainforest, visiting the Villa Carmen biological station in the town of Pillcopata, to gain an understanding of research being conducted in the rainforest and the livelihoods of a community inextricably linked to the rainforest
- Visit floodplain rainforests in the Manu Biosphere Reserve to understand the different forest types and species composition of one of the most biodiverse areas in the world
- Experience a cloud forest ecosystem at Wayqecha Biological Station, studying long-term impacts of climate change in the area and comparing the flora and fauna with those of other tropical rainforests

Field Experiences

- Explore a variety of biomes—lowland tropical rainforest, upland forests and grasslands—in the Andes-Amazon region
- Study salt licks and mammal ecology
- Investigate the concept of ecosystem management in national parks
- Examine resource management and tourism in the Sacred Valley, renowned for its meeting of two distinct cultures—Inca and Spanish
- Learn and practice a series of field techniques to collect data on biodiversity and habitats: looking at tree fern diversity along elevation gradients, assessing the functional morphology of butterflies and bats, or measuring forest composition along a vegetation cover gradient
- Interview and interact with local stakeholders to understand perceptions and dependence on local resources such as rubber trees, coca, cacao, potatoes, or even llamas
- Track how traditional ecological knowledge is transmitted or used in different parts of Peru
- Learn about and see the impacts of different conservation policies on local species distributions
- Consider the impacts of elevation, slope, and aspect on species distributions



- Develop field research skills including species identification, biodiversity assessment, survey design and interviewing techniques, environmental impact and protected-areas assessment, GIS or remote sensing, habitat assessment and mapping species distributions, scientific writing and oral presentation

Directed Research Project Examples

- Study the effects of agricultural and extractive practices on plant community structure and composition
- Investigate and map charismatic megafauna (e.g., jaguar and primate) habitat preferences
- Examine the vulnerability of species (e.g., tree ferns) to a changing climate
- Conduct baseline biodiversity studies at varying elevations
- Survey the livelihood strategies of residents of Andean and Amazonian migrant communities
- Assess local knowledge, attitudes, and perceptions of conservation efforts in the region among multiple social groups and organizations
- Examine perceptions by local people of land use and land cover change
- Observe and document development and tourism in rapidly growing Amazonian towns
- Explore the properties of locally used medicinal plants

Get Involved with the Community

Peruvians are proud of their diverse cultures and have a very strong national identity. Appreciation of food, civility, and hard work all feature strongly in the local ethics. Student engagement with the local residents is supported by studies of Spanish language and a focus on understanding and observing the cultural norms and social mores in the region.

Students have opportunities to interact with our neighbors as well as indigenous communities in the rainforest and the highlands. SFS facilitates community volunteer projects and social activities such as local environmental education, recycling and waste management, and teaching English.

As in all SFS programs, with the results of our research we offer data and recommendations that inform decision makers and build relationships between SFS and local stakeholders involved in biodiversity conservation and resource management.

Our Partner in Peru

Envisioning a sustainable world, an environmentally educated and responsible human population, and thriving, healthy ecosystems, SFS and Asociación para la Conservación de la Cuenca Amazónica (ACCA) have joined together in an academic and research partnership which aims to strengthen the local scientific community and inform conservation decisions. Environmental research, reciprocity with the surrounding community, and education are at the core of the SFS and ACCA collaboration.

Note: The program operates in rugged and rural environments and within dynamic climatic zones. Students live and study at high altitude (at times over 10,000 feet elevation) for portions of the program; excursions and field work require participants to be in excellent physical condition. Our facilities and other local infrastructure are rustic. Additionally, tropical weather patterns demand flexibility in program planning, so some shifts in itinerary may be necessary, especially during the wet season.



“That Amazonian dream that many of us have as children, which seems so far-fetched and unobtainable as we reach adulthood, is real.

Standing in the Amazon as the sun goes down, listening to the nighttime jungle come alive as the stars come out, is something that you can't explain but just have to experience.



And that experience, that jungle dream, is something for which I will be forever grateful. The jungle, I love to say, is feeling like home.

Melissa Petrich
University of San Diego
Peru Spring '16

For details and how to apply, visit: cat.fieldstudies.org/peru



TANZANIA

SEMESTER PROGRAM

SEMESTER PROGRAM DATES

Spring 2017: January 30 – May 10

Fall 2017: August 28 – December 6



Wildlife Management Studies

THE ENVIRONMENTAL CONTEXT

Changing land use practices and socioeconomic shifts occurring among the Maasai, Iraqw, and other ethnic groups are influencing the current conservation and rural development practices in the Maasai steppe of Tanzania. The traditional nomadic, pastoral lifestyles of the Maasai and other groups maintained the integrity of open landscapes that serve as critical migration corridors and dispersal areas for wide-ranging wildlife species, such as elephant, wildebeest, and zebra. Today, however, the changing lifestyles—from nomadic pastoralism to a more sedentary, agro-pastoralism—pose a challenge to the long-term conservation of wildlife and other natural resources. Permanent homesteads, land subdivision, and extensive agriculture exert more pressure on the region's natural resources, including water, productive rangelands, and wildlife populations.

Increasing competition for land and other scarce resources in this semiarid region has ecological, social, and economic costs, including the fragmentation of critical wildlife dispersal areas, blockage of wildlife migratory routes, changes in land use practices, disparities in land ownership, and human-wildlife conflict. With climate change also causing shifts in hydrology and habitat, protected areas—such as national parks and community wildlife sanctuaries—no longer provide a safe haven for wildlife. Habitat destruction, poorly planned tourist activities, and poaching endanger biodiversity and threaten ecotourism activities, which are important sources of revenue for the government and local communities in Tanzania.

SFS, in collaboration with stakeholders and local communities, strives to identify and assess the drivers of habitat degradation and land use change, as well as the implications for wildlife conservation and local and regional economies. Through our long-term research plan, students participate in evaluating and promoting the management of wildlife and other natural resources, which contributes to longstanding conservation efforts, promotes local communities' livelihood needs, and helps to reduce conflict between humans and wildlife.



“At first, we watched the Maasai sing and dance, and were soon invited to join in. We helped build a hut using cow dung as plaster, learned to start fires with only wood and grass, and tried our hands at spear throwing. It was the experience of a lifetime!

— Maddy Jackson

University of Minnesota Twin Cities
Tanzania Fall '15

THE SFS CENTER FOR WILDLIFE MANAGEMENT STUDIES

Students live at Moyo Hill Camp (MHC) in Tanzania's Tarangire-Manyara ecosystem between Lake Manyara National Park and the famous Ngorongoro Conservation Area, a UNESCO World Heritage Site. This wonderfully scenic area is world-renowned for its beauty, geography, history, and wildlife. MHC is a fenced facility nestled among maize plantations and other crop fields. Students reside among the native acacia and fig trees, and birdsong fills the air in the morning. The camp consists of multiple buildings including an administrative block; a chumba, which serves as an eating and social activity center; a classroom and library; and a computer room. MHC is part of the small community of Rhotia where students can enjoy daily interaction with neighbors. Walking, jogging, soccer, and socializing outside of the camp round out daily life at MHC.





OUR CURRICULUM AND RESEARCH

Northern Tanzania is a hub of wildlife tourism. Home to world-famous national parks such as Tarangire, Lake Manyara, Kilimanjaro, Serengeti, and the Ngorongoro Conservation Area, this remarkably scenic area is the center of tourism in Tanzania. It has also been the home of the Maasai, Iraqw, and other ethnic groups for centuries.

The availability and quality of habitat and resources for wildlife and livestock on the Maasai steppe are diminishing; however, there are many opportunities for effective conservation, natural resource management, and rural development. SFS' field station is surrounded by wildlife using diverse migration corridors and seasonal dispersal areas. The Maasai, and now settlers from other ethnic communities, depend on these same areas as communal grazing grounds for livestock and for growing food. As a result, they often face economic hardship due to crop damage from migrating or marauding wildlife, loss of livestock due to predation, and resource depletion and competition. Agricultural expansion, pollution, and climate disruption threaten the already strained water supply and the health of people, livestock, and wildlife alike.

The program explores the human elements of these complex conservation issues. Our curriculum and research focus on how changes in land use and resource availability in the Tarangire-Manyara ecosystem can be managed to foster the well-being of local communities while safeguarding and promoting biodiversity conservation. Students learn about socioeconomic and environmental policy, drivers and implications of demographic change, and land reform for wildlife conservation and rural development. Students hear lectures by park wardens, wildlife veterinarians, and field researchers. They also interview community members from various ethnic backgrounds about challenges they face due to changing land uses, impact and adaptation to climate change, and increasing competition for natural resources.

Students take multiday camping expeditions to Tarangire and Serengeti National Parks. Serengeti is a UNESCO World Heritage Site whose name is derived from a Swahili word meaning "endless plains." During these expeditions, students study the park's diverse fauna—from endemic birds to bellowing hippos—with a particular emphasis on large mammal ecology and protected area management. During game drives and field activities, students may observe elephants, lions, giraffes, cheetahs, jaguars, hyenas, rhinoceroses, and even African wild dogs, one of the most endangered mammals in the world. Students practice a variety of field exercises in wildlife conservation and management: observing predator-prey interactions; surveying bird and ungulate populations; evaluating species' habitat preferences and use; and assessing tourists' wildlife viewing patterns.

COURSES

Semester students are registered in five academic courses accredited through the University of Minnesota:

Course No.	Name	Credits
SFS 3020	Environmental Policy and Socioeconomic Values	04
SFS 3710	Techniques in Wildlife Management	04
SFS 3720	Wildlife Ecology	04
SFS 4910	Directed Research	04
SFS 2060	Introduction to Swahili Language and East African Tribal Communities	02

Please see page 48 for course descriptions

Program Highlights

- Multiday field expedition and camping trip to Serengeti National Park, studying large mammal ecology, wildlife migrations, and tourist behavior in the park
- Multiday trip to Tarangire National Park and surrounding areas for field exercises on wildlife population counting, lion ecology and behavior, conservation models, and human-wildlife conflicts
- Visits to cultural *manyatta* (settlements), an opportunity to glimpse Maasai and Iraqw cultures: traditional ceremonies, demonstrations of fire-making, and dances by Maasai *morans* (warriors)

Field Experiences

- Explore Lake Manyara National Park to study techniques for identification of large African mammals, baboon ecology, and threats to wetlands from tourism, land use changes, and local resource use
- Meet the Hadzabe tribe, a hunter-gatherer community of Lake Eyasi, and evaluate the ecological and sociocultural impacts of cultural tourism in Tanzania
- Visit Ngorongoro Conservation Area to learn about the role and challenges of multiple use conservation model, which include communities in conservation and management of natural resources
- Attend lectures by park rangers, government representatives, village elders, and scientists from local research organizations on a range of topics in wildlife conservation and management
- Take a day trip to Burunge Wildlife Management Area to study the benefits and challenges of community-based management of wildlife
- Explore Olduvai Gorge, one of the most important paleoanthropological sites in the world, learning about human evolution and the geologic history of the region
- Develop field research skills including habitat assessment and mapping, species identification, research design, data collection, natural resource valuation methods, social surveys, wildlife census techniques, GIS, transect and patch sampling, animal behavior observations, scientific writing and oral presentation



Directed Research Project Examples

- Uncover local community strategies for coping with variation in water availability
- Assess local attitudes and awareness about wildlife conservation among the Iraqw and Maasai communities
- Analyze the influence of ecological and social factors on the distribution of elephants
- Examine livelihood and socioeconomic indicators among wildlife-conserving communities
- Compare the effectiveness of wildlife conservation strategies between areas of differing protection levels
- Study the importance of habitat quality and heterogeneity on wildlife sanctuary viability
- Understand the role of government in human-wildlife conflict resolution
- Assess the impact of, and coping strategies for, climate change in rural communities

SFS at Work

While SFS students come away with countless memories, new perspectives, skills, and friends, they also leave something of value behind. Our ongoing research and close ties with community stakeholders allow students to make contributions including:

- Assessing the biodiversity and role of tourism in rural community development
- Evaluating the status of Buger community forest to understand the challenges and opportunities for joint forest management
- Working with local communities to assess human-wildlife conflicts and provide the best strategies for conflict mitigation
- Assessing the abundance and distribution of large mammalian species and habitat characterization for Manyara Ranch Conservancy to establish long-term trends and advise on best range management options
- Assessing rangeland condition in multiple-use area of Ngorongoro to provide information on range management options

Get Involved with the Community

Students at the Center for Wildlife Management Studies in Tanzania have a special opportunity to see the intricate and complex connection between wildlife conservation and rural livelihoods. SFS faculty and staff have intimate knowledge of the challenges of conservation in Tanzania.

Local community members and government officials play an important role in guiding the Center's research strategy. With the results of our research, we offer data and recommendations to inform decision makers. SFS works collaboratively with our stakeholders to help monitor and manage habitat degradation and land use changes while bolstering tourism and finding balance between economic and conservation goals.

Students often enjoy soccer games, church services, and other events with community members. Additionally, students participate in community volunteer projects and social activities such as:

- Visits to local markets and neighboring homesteads for traditional celebrations; a lecture on culture and artifacts; and conducting interviews for research work
- A visit and stay with Iraqw communities
- Community service work in local schools
- Presentations of research findings to community stakeholders



“Some of my favorite moments of the Serengeti expedition were when we were late getting back to the campsite

(due to watching lions play, admiring leopards in trees, taking pictures of baby warthogs) and zooming along the dusty roads, watching the African sunset color the whole sky. Not a word was said, but the look of pure wonder, happiness and contentment was universal. When we finally got back to the campsite, a friend simply said: “I think this was the best day of my life.” The stars that night were the

clearest and biggest I have ever seen. The night sky was so enchanting, making you feel so small and insignificant, but happy, in the best way possible.

Sophie Moore

Dickinson College
Tanzania Fall '15



For details and how to apply, visit: cat.fieldstudies.org/eastafrica



TANZANIA

SUMMER PROGRAM

SUMMER 2017 PROGRAM DATES

Session I: June 5 – July 5

Session II: July 10 – August 9



Wildlife Management Studies

Northern Tanzania, home of world-famous national parks such as Tarangire, Lake Manyara, Kilimanjaro, Serengeti, Arusha, and the Ngorongoro Conservation Area, offers a tightly packed hub for wildlife conservation and tourism opportunities amid a growing human population and development activities. This magnificent setting on the Maasai steppe is our classroom. Expeditions to the national parks and other protected areas offer students significant opportunities to experience hands-on learning about environmental issues and a suite of strategies for resolving them.

Both summer sessions take a multidisciplinary approach to introduce the complex realities of balancing ecological, economic, and sociocultural factors in sustainable wildlife conservation and management studies. Students learn many perspectives on wildlife management and conservation from SFS faculty and guest lecturers who have extensive field experience and knowledge of the area.

Our classroom extends into national parks and community wildlife management areas across northern Tanzania. The program also offers a wide range of opportunities for students to interact with the local communities.

SESSION I: WILDLIFE MANAGEMENT AND CONSERVATION

Students learn about the complexities of sustainable wildlife conservation in the Tarangire-Manyara ecosystem of northern Tanzania. The course combines concepts and principles of ecology, natural resource management, and socioeconomics, all of which are components of effective and sustainable wildlife conservation. In this course, students develop field skills to explore the ecology, social organization, and behavior of common large African mammals. Central to this first summer session is the understanding and evaluation of protected areas management in the region.

Field Experiences

- Observe wildlife in parks and protected areas which may include Lake Manyara National Park, Tarangire National Park, Ngorongoro Conservation Area, and Serengeti National Park
- Learn methods of conserving wildlife both inside and outside protected areas amid a rapidly changing socioeconomic and political environment
- Examine constraints to the conservation of wildlife among resource-poor rural populations and identify key aspects of human-wildlife conflicts

SESSION II: TECHNIQUES FOR WILDLIFE FIELD RESEARCH

In this second session, students learn a suite of field research techniques and methods for studying wildlife ecology and assessing management policies and conservation practices in Tanzania. The focus is on the Tarangire-Manyara ecosystem, where students learn foundational field skills in observation and evaluation of wildlife. They pursue interactive methods for assessing local community attitudes and behaviors toward conservation efforts, and apply these techniques to advance long-term research goals at our Center. Students gain an understanding of sound scientific principles and practices that can be used in other global environmental contexts.

Field Experiences

- Observe wildlife in parks and protected areas which may include Lake Manyara National Park, Tarangire National Park, Ngorongoro Conservation Area, and Serengeti National Park
- Practice field techniques in national parks, community wildlife management areas, and in communal land outside protected areas
- Learn field skills including species identification, sampling and data analysis methods for flora and fauna, large mammal behavioral study methods, remote and on-ground sensing and spatial mapping, social survey design and interviewing skills, and communication skills

SUMMER COMBINED: SESSIONS I + II

This program offers two four-credit courses that may be taken individually or back-to-back for an introduction to community wildlife management and the field research methods routinely used to assess wildlife ecology. Students participating in both sessions receive a \$1,000 discount.

For details and how to apply, visit: cat.fieldstudies.org/eastafrica

COURSES

Summer students are registered in one or two academic courses accredited through the University of Minnesota:

Course No.	Name	Credits
SFS 3500	Wildlife Management and Conservation	04
SFS 3570	Techniques for Wildlife Field Research	04

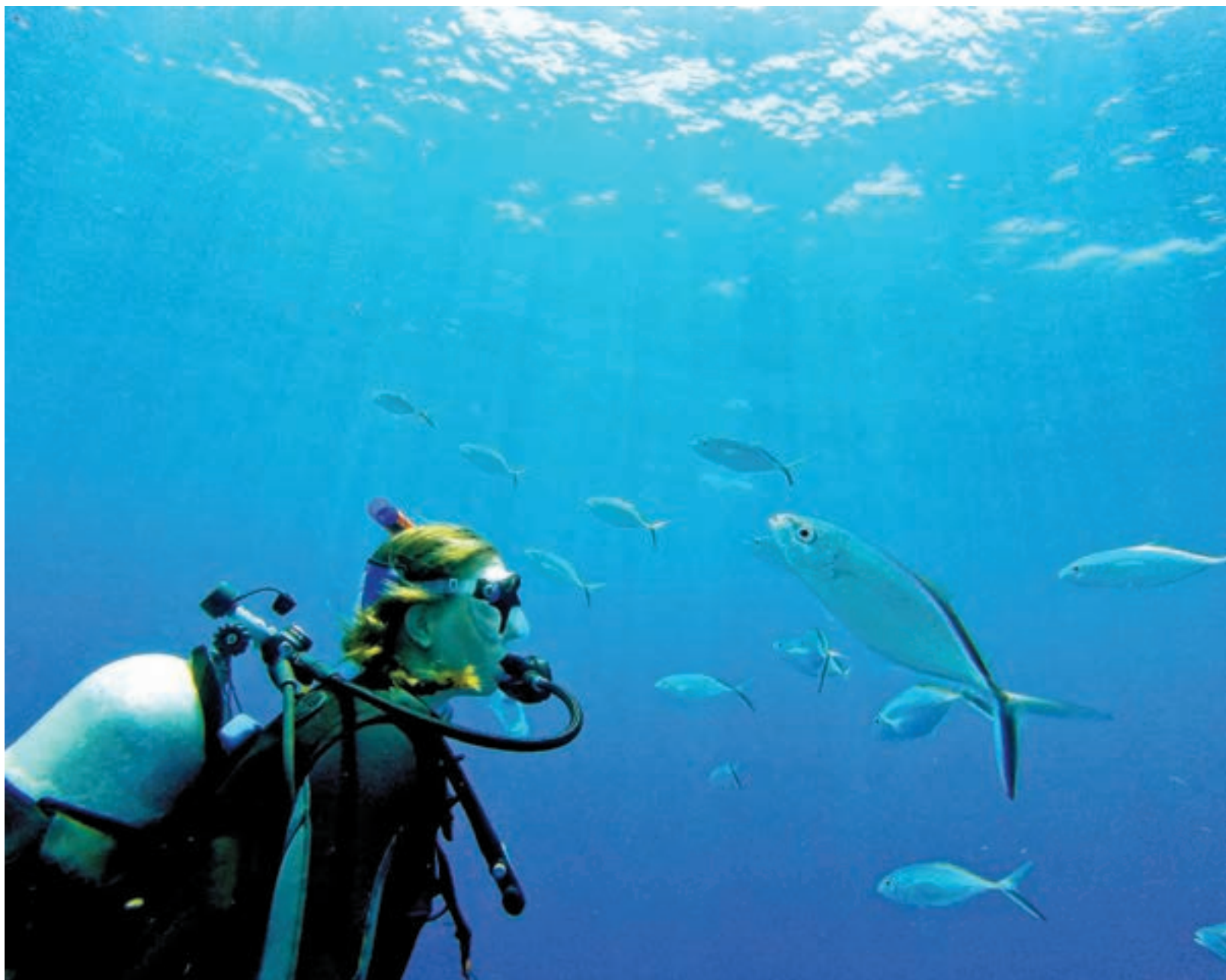
Please see page 51 for course descriptions



“This was one of the most amazing experiences I have ever had. It has been incredible to experience so many types of East African landscapes, animals, and cultures. This has definitely been a program that has changed my life, and I will never forget the things I’ve learned and the people I’ve met.

— Amanda Borkowski

University of Wisconsin-Madison
Tanzania Summer '15



TURKS & CAICOS ISLANDS

SEMESTER PROGRAM

SEMESTER PROGRAM DATES

Spring 2017: January 30 – May 10

Fall 2017: August 28 – December 6



Marine Resource Studies

THE ENVIRONMENTAL CONTEXT

For the tourists who flock here, the Turks and Caicos Islands (TCI)—which lie at the southeastern end of the Bahama Archipelago—are a diving and angling paradise. The clear waters are considered among the world's top 10 diving destinations, where vibrant coral reefs, a dramatic sea wall, and a deep ocean trench sustain a stunning diversity of sea life. The charismatic fauna include more than 300 species of fish, many elasmobranchs such as the spotted eagle ray and lemon shark, as well as sea turtles and humpback whales. Colorful and cryptic biota is abundant in the warm waters just steps from our Center. Nearby seagrass beds, mangroves, sandy shoals, and reefs lend a patchwork appearance to the miles of shallow blue waters that surround the Islands. But beneath the turquoise waters, a delicate ecosystem is threatened.

This diverse marine environment supports the TCI economy through fisheries and tourism. The beauty and ecosystem functions of island, coastal, and ocean habitats are critical for maintaining the value of these industries. The country has an extensive network of 34 established protected areas to promote the sustainability of natural and historic resources, with four marine protected areas in close proximity to our field station on the island of South Caicos. However, insufficient environmental stewardship and underutilized local ecological knowledge hinder management of marine resources and therefore the effectiveness of these protected areas. Increasing demand for fisheries resources, coastal development, and the meteorological and biophysical impacts of climate change put enormous pressures on marine and coastal ecosystems and on island-based livelihoods.

Without quantitative and qualitative scientific assessments, better facilitated community management, and collaborative environmental education, the existence of many of these ecosystems and resources is threatened. SFS plays a critical role in supporting the TCI fishers, island residents, and environmental authorities through collaborative research and knowledge exchange. Together we are working to implement positive change in the social, cultural, and economic spheres, as well as to support and mitigate impacts on the coastal and marine ecosystems.



“I had forgotten how much you can learn by getting your hands dirty. When we put our knowledge into practice, we expose ourselves to the ocean and we retain much more of the information presented to us. I had forgotten how much fun learning can be.

— Erin Lyons
University of Virginia
TCI Spring '16



THE SFS CENTER FOR MARINE RESOURCE STUDIES

The Center, located just steps from a crystal clear ocean laboratory, is adjacent to Cockburn Harbour, a town of about 1,200 residents. Our field station sits 40 feet above the water, looking directly out to sea. Within a three-mile radius are coral reefs, uninhabited cays, mangroves, seagrass beds, and carbonate platform flats offering abundant snorkel and dive sites. The facilities include a dining area, kitchen, classroom, computer room, pool, and veranda with spectacular island and ocean views. Students share living quarters in two residence wings. We are fully equipped for marine operations with access to docks, motorboats, an air compressor, and plenty of tanks and weights for scuba diving.



OUR CURRICULUM AND RESEARCH

With most local residents dependent upon marine resources for their livelihoods, and increasing resource demand by tourists, finding viable options for managing fisheries and conserving marine biodiversity is crucial.

Snorkeling and scuba diving in the waters surrounding South Caicos, students learn field research and monitoring techniques to identify and assess the health of a wide range of marine organisms and habitats. Students learn to identify and observe the behavior of marine species, assess coastal and marine habitats, quantify fisheries resources, and analyze implications of fishery policies. TCI has an extensive network of 34 protected areas, but its effectiveness is still not fully understood. With the Admiral Cockburn Land and Sea National Park and East Harbour Lobster and Conch Reserve at their doorstep, students evaluate the concept and practice of marine protected areas (MPAs) as a resource management tool.

In the community, students consider the challenges of assessing the rights and needs of local stakeholders and reconciling those with conservation goals. Fisheries management and market engagement require considered analysis of the costs and benefits of species protection, fishing techniques, and market dynamics, all in the context of global and national markets and policies. Assessing the feasibility and ecological viability of resource management and habitat conservation options, including their associated socioeconomic implications, brings students face-to-face with the real-life dilemmas that challenge governmental regulators and the residents of South Caicos.

The growing tourism industry in TCI is increasing the demand for reef fish on restaurant menus. Local fishers on South Caicos recognize this market, and commercial sale of select reef fish species is rapidly increasing. In addition to “no-take” MPAs, TCI has recently established size and other restrictions on several commercially important species. The impact of these new policies will be reflected in our research efforts. Through field observation, exercises, and research, students learn the concepts and skills needed to understand marine ecosystems and island community dynamics.

Program Highlights

- Learn about tropical marine ecology, evaluate fisheries management and policies, and practice field research skills in one of the most pristine marine habitats in the tropical Western Atlantic
- Scuba dive and snorkel for fish, coral, seagrass, and mangrove identification exercises
- Take an excursion to neighboring Providenciales, Middle Caicos, and North Caicos: tour aquaculture operations and desalination plants; explore the caves and bat colonies of Middle Caicos; discover the tropical dry forests of North Caicos; absorb local ecological knowledge of bush medicines and foods; study the rich cultural history of the territory

Field Experiences

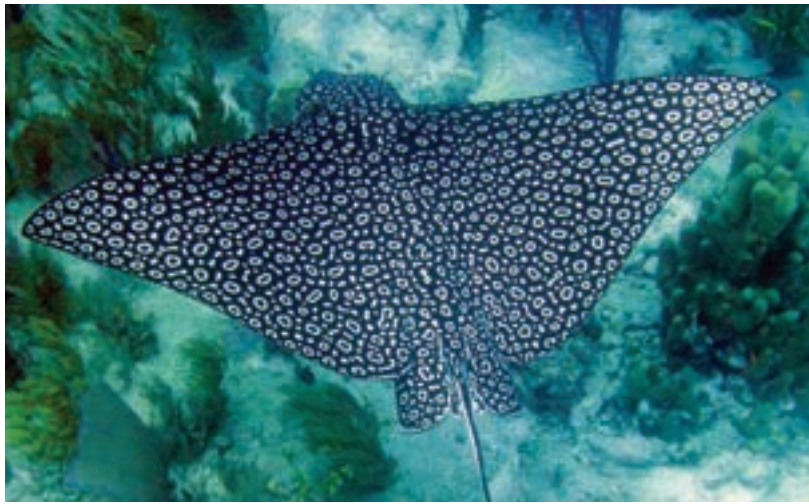
- Study ecosystem function and anthropogenic impacts on marine environments
- Examine habitat enhancement and restoration practices
- Evaluate the abundance of queen conch inside and outside of MPAs, and interpret how the data reflects protected area effectiveness
- Attend lectures by Department of the Environment and Maritime Affairs (DEMA) officials on the government’s fisheries regulations and enforcement
- Learn to collect data relating to the health of coral colonies through an in-water coral bleaching exercise
- Participate in a site tour from a local tourism developer and take part in a discussion on plans for constructing residences and a resort
- Tag and collect morphological data on sharks and sea turtles to gain an understanding of population dynamics, contributing to the management and conservation of these species
- Explore methods for determining costs and values associated with using marine resources and produce an economic valuation report
- Visit local seafood processing plants and participate in discussions with operators
- Develop field research skills including marine species identification and behavioral observations, biodiversity assessment, survey design and interviewing techniques, field research ethics, stakeholder facilitation techniques, data management and analysis, scientific writing and oral presentation, snorkel and scuba skills, and habitat assessment and mapping

COURSES

Semester students are registered in four academic courses accredited through the University of Minnesota:

Course No.	Name	Credits
SFS 3020	Environmental Policy and Socioeconomic Values	04
SFS 3730	Tropical Marine Ecology	04
SFS 3740	Principles of Resource Management	04
SFS 4910	Directed Research	04

Please see page 48 for course descriptions



Directed Research Project Examples

- Conduct a population size assessment of potential commercial finfish species around South Caicos
- Assess ecological and social impacts of climate change and ocean acidification
- Examine the density and distribution of invasive lionfish
- Study the ecological and socioeconomic impacts of marine debris
- Examine coral reef ecology, including growth, survival, and recruitment
- Describe residents' environmental ethic through photographs
- Analyze the interactions between mangrove and seagrass faunal communities
- Assess local livelihood strategies and human capital, including perceptions of tourism and fishing industries
- Explore seasonal differences in migratory and resident bird populations
- Evaluate conch population structure and regulation compliance
- Uncover the impact of youth empowerment through marine-oriented citizen science
- Examine elasmobranch ecology

SFS at Work

While SFS students come away with countless memories, new perspectives, skills, and friends, they also leave something of value behind. Our ongoing research and close ties with community stakeholders allow students to make contributions including:

- Lobster, conch, and finfish stock assessments, providing important information and allowing government agencies to establish sustainable fishing rules and guidelines
- Natural resource workshop with DEMA to provide TCI government workers with training on coral reefs, lobster biology, marine fishes, turtles, and sharks
- Working with DEMA and local businesses to develop a protocol for coral reef monitoring and queen conch distribution
- Applying baseline and longitudinal data to examine reef health trends, species interactions, and impacts of coral diseases

Get Involved with the Community

The community of South Caicos has hosted SFS students for more than 20 years. During that time, staff and students have integrated into the small community on multiple levels. We are dedicated to helping the community conserve its natural resources and develop sustainably.

Students become involved with the community, learning about Caribbean culture and island society. Community activities may include:

- Providing swimming and snorkeling lessons for local children
- Interacting with local families to better understand new cultures through the Friendship Family Program
- Hosting "Sea Day" at the Center to introduce local students to the marine environment
- Reading, tutoring, and other volunteer projects at the local library and grade school
- Collaborating with local youths and NGOs to conduct beach cleanups to increase environmental awareness
- Presentation of student research to disseminate findings to the local community

PADI SCUBA Certification

Because scuba diving is a valuable skill for students who are interested in pursuing a career or future studies in field research of marine ecosystems, the Center offers PADI Open Water Diver certification to semester students. Certification takes place during the first two weeks of the program. The course, taught by the Center's Dive Safety Officer and assisted by PADI Divemasters, introduces students to diving and the environment where they will be learning and researching for the next several months. PADI Advanced Open Water Diver certification is also offered to interested students during the semester.

Note: It is not necessary to use SCUBA to participate in the program; many students choose to snorkel only. Divers and snorkelers must bring their own SCUBA and snorkeling equipment, and the certification courses are offered at an additional cost. Weights and tanks are provided on-site at no cost. Please contact the SFS Admissions Office if you have any questions.



We snorkel and dive, trying to catch a glimpse of any and every organism we could possibly imagine.

We have watched spotted eagle rays jump out of the water, and nurse sharks sleep under crevices. We have watched barracudas change color when stalking their prey and spiny lobsters scurry across the ocean floor at night. We have learned how to play dominoes and pool the way the locals do and we have tasted the island specials—from conch fritters at Daryl's to red snapper at our center. Every day we

wake up in hopes of an adventure, and every night we fall asleep knowing we are getting a one-of-a-kind experience.



Nicole Graziano

University of St. Thomas
TCI Spring '16

For details and how to apply, visit: cat.fieldstudies.org/tci



TURKS & CAICOS ISLANDS

SUMMER PROGRAM

SUMMER 2017 PROGRAM DATES

Session I: June 5 – July 5

Session II: July 10 – August 9



Marine Resource Studies

The turquoise waters of the Turks and Caicos Islands (TCI) provide the perfect laboratory for marine studies. The relatively healthy marine and coastal ecosystems support much of the community on the island of South Caicos, with fisheries providing the primary source of livelihood. The environment is changing, however, as pollution, climate change, ocean acidification, and the unsustainable extraction of precious marine resources, coupled with growing tourism, threaten the island's fragile ecosystems. Depletion of key resources would have a dramatic impact on the social systems of South Caicos by putting pressure on food security and employment prospects.

Developing sustainable fisheries and tourism is essential if this resource-dependent coastal community is to thrive. The community appreciates the challenge of balancing economic development with environmental conservation. Understanding the ecology of key fisheries species and their habitats is the foundation for achieving this balance through resource management and conservation.

SESSION I: TROPICAL MARINE ECOSYSTEMS: MONITORING & MANAGEMENT

Students explore the ecological and socioeconomic aspects of various tropical marine ecosystems, learning how to assess and maintain their health. This includes understanding key factors, such as the need to conserve biodiversity and critical habitats; the nature of sustainable management for important fisheries species, such as queen conch and spiny lobster; and the importance of ensuring that environmental management objectives take into account community livelihood goals. Students also consider how climate change and ocean acidification may impact TCI's marine ecosystems. The course helps prepare students to conduct marine research while working with local clients and stakeholders.

SESSION II: APPLIED MARINE RESEARCH TECHNIQUES

This course enables students to apply the scientific process in a field research project that addresses a local issue related to the management of tropical marine environments in TCI. Students learn how to develop a scientific approach to identify risks to the health of coral reefs, seagrass beds, and mangrove stands that surround the island. These risks include both local phenomena such as overfishing and increased coastal development, as well as global issues such as climate change and ocean acidification.

Field Experiences in Both Sessions

The spectacular reefs, turquoise waters, and island community of South Caicos serve as the laboratories for studies and field work. Research sites, field exercises, and excursions in these summer courses include:

- Exploring coral reefs, fringe and island mangrove ecosystems, and extensive seagrass meadows
- Touring current coastal development projects and seafood processing plants
- Attending skills workshops on topics such as stakeholder engagement and science communication
- Examining anthropogenic impacts to nearshore ecosystems
- Valuing ecosystems of TCI for coastal planning decisions

SUMMER COMBINED: SESSIONS I + II

This summer program offers two four-credit courses that may be taken individually or in combination to provide a thorough introduction to tropical marine ecology and environmental management, as well as field research techniques for addressing conservation questions. Students participating in both sessions receive a \$1,000 discount.

PADI SCUBA Certification

The Center for Marine Resource Studies offers PADI Open Water Diver certification to Session I students. The course is taught by the Center's Dive Safety Officer and assisted by PADI Divemasters. The PADI Advanced Open Water Diver course is offered to certified divers during Session II.

Note: It is not necessary to use SCUBA to participate in the program; many students choose to snorkel only. Divers and snorkelers must bring their own SCUBA and snorkeling equipment, and the certification courses are offered at an additional cost. Weights and tanks are provided on-site at no cost. Please contact the SFS Admissions Office if you have any questions.

For details and how to apply, visit: cat.fieldstudies.org/tci

COURSES

Summer students are registered in one or two academic courses accredited through the University of Minnesota:

Course No.	Name	Credits
SFS 3530	Tropical Marine Ecosystems: Monitoring and Management	04
SFS 3560	Applied Marine Research Techniques	04

Please see page 51 for course descriptions



“We will all remember experiences such as spotting five Caribbean reef sharks when diving to 80 feet, a Hawksbill sea turtle spotted with a flashlight during a night snorkel, or the southern stingray we swam over that was buried in the sand.

— Nicole Clark

Delaware Valley University
TCI Summer '15

Semester Course Descriptions



AUSTRALIA

SFS 3690 RAINFOREST ECOLOGY introduces structure and function of tropical rainforests including floral and faunal components. In this course, students explore the ecological processes that maintain biodiversity and the evolutionary processes that generate that biodiversity. We examine the dynamic relationships between plants and animals and how those processes have influenced or are influenced by the current landscape. On a larger scale, we investigate tropical vegetation patterns along climatic gradients and discuss mechanisms for preserving and restoring tropical ecosystems.

SFS 3700 PRINCIPLES OF FOREST MANAGEMENT

presents the ecological and analytical tools used in the management of terrestrial, living resources. Students use examples from the tropics to learn the theories that are the foundation for land management, and in particular forest management, worldwide. Students are also introduced to field methods in forest mensuration, and these skills are used to monitor forest health as a case study in natural resource management performance. Students apply their knowledge by participating in long-term research projects that assess the environmental impacts of resource development and monitor the progress and success of restoration and rehabilitation efforts in areas suffering from chronic human-induced disturbances.

SFS 3020 ENVIRONMENTAL POLICY AND

SOCIOECONOMIC VALUES provides insight into the broad social context surrounding natural resources to determine effective approaches to resource management. Students explore the sociocultural context of resource management including: hierarchies and power structures; formal and informal decision-making processes; value systems relevant to natural resources, including religious factors and environmental ethics; past and present uses of natural resources; economic factors (local, regional, external); ownership patterns; attitudes and other factors that effect change and their historical basis; and legal basis for enforcement of environmental policy. Students are also introduced to major constituencies that effect conservation (NGO conservation groups, economic interests, etc.) and their underlying philosophies.

SFS 4910 DIRECTED RESEARCH prepares students to distinguish hidden assumptions in scientific approaches and separate fact from interpretation, cause from correlation, and advocacy from objectivity. Students learn specific tools including: experimental design; field techniques; basic descriptive statistics; and parametric and non-parametric quantitative analysis. Emphasis is placed on succinct scientific writing, graphic and tabular presentation of results, and effective delivery of oral presentations.

BHUTAN

SFS 3040 POLITICAL AND SOCIOECONOMIC DIMENSIONS

OF ENVIRONMENT focuses on the dynamics among people, society, and environment. We explore this dynamic through the interdisciplinary lens of political ecology, examining the political, economic, and social factors of environmental issues and changes. The course provides a conceptual framework for understanding how nature-society interactions—such as agriculture, natural resource management, biodiversity conservation, and rural development—shape both the natural landscape and the social and economic conditions in Bhutan. Students also gain the practical skills and tools to critically examine and assess the human-environment nexus in the field.

SFS 3060 MOUNTAIN ECOLOGY provides a theoretical and practical understanding of the ecology of the Eastern Himalaya region. Students explore the physical features influencing mountain ecosystems, including the geology and hydrology, elevation, climate, and weather. The course highlights the unique characteristics of the flora and fauna found in these ecosystems, and the threats to these species. Students are exposed to an array of ecosystems—some in natural states, some heavily modified by people. Rivers, forests, and farmland are examined in various locations and along different altitude gradients, showcasing the ecological diversity within this small mountain state.

SFS 3050 LAND USE, NATURAL RESOURCES, AND

CONSERVATION considers the suite of natural resources that are tied to both local livelihoods and the national economy—including arable soils, water, timber, non-timber forest products, and grasslands. Students study the livestock and agriculture systems of Bhutan, both historical and current, and understand why and how these are changing, and what the implications are for household economies, the environment, and national issues. Students consider the important topic of food security, at both the household and national levels. By integrating field and classroom approaches, students explore the science behind current local and global issues in natural resource management, food production, biodiversity, and climate change.

SFS 2010 RELIGION AND CULTURE OF BHUTAN allows students to develop a conceptual and practical understanding of religious principles that underlie Bhutanese attitudes and approaches to environment. Students learn the basic principles of Buddhism and other religions practiced in the region and look for religion in the landscape and in society. Students look at religion and environment, culture and environment, and Bhutanese attitudes toward environment, and get some language training in Dzongkha.

SFS 4910 DIRECTED RESEARCH prepares students to distinguish hidden assumptions in scientific approaches and separate fact from interpretation, cause from correlation, and advocacy from objectivity. Students learn specific tools including: experimental design; field techniques; basic descriptive statistics; and parametric and non-parametric quantitative analysis. Emphasis is placed on succinct scientific writing, graphic and tabular presentation of results, and effective delivery of oral presentations.

CAMBODIA

SFS 3810 ECOSYSTEMS AND LIVELIHOODS

focuses on the human landscape that envelops the natural ecosystems of the Lower Mekong Basin. We examine the intersection of natural and physical systems with the livelihood strategies employed by fishers, farmers, and merchants in the Mekong Basin. Students investigate the high levels of dependence upon natural resources by local populations and the critical threats to the ecology of the region. Students discover the primary drivers of change in local livelihood strategies and analyze attempts by international and national actors to find a sustainable balance between human needs and preserving biodiversity.

SFS 3820 ENVIRONMENTAL ETHICS AND DEVELOPMENT

takes a pragmatic approach to environmental ethics, looking, through a variety of thematic scenarios, at how decisions relating to the environment can be made through an applied ethical lens. Following an introduction to the foundations of environmental ethics and the cultural context of Cambodia, we explore ethical problems that are pertinent to environmental studies. In particular, students in this course examine contemporary environmental dilemmas and topics as they affect Cambodia and Vietnam and the rapid development of these countries. Students study environmental ethics in relation to economic growth and development, and consider the purpose of nature and humans' role in managing it while still encouraging responsible development.

SFS 3800 CONSERVATION SCIENCE AND PRACTICE

introduces the concepts, tools, and incentives to effect conservation of the environment and natural resources. The field of conservation is focused on protecting biological diversity—including ecosystems, species, and genetic diversity—by promoting processes, both ecological and social, that support biodiversity. The course focuses on five core themes: what biodiversity is; why biodiversity is important; threats to biodiversity; strategies for conservation; and the concept of sustainability. We explore the practical aspects of conservation using local case studies, considering the array of conservation strategies in the region, and using this lens to evaluate global concerns on a local scale.

SFS 2080 LANGUAGE AND CULTURE OF CAMBODIA

contains two distinct but related modules: society and culture of Cambodia, and Khmer language. This course provides a basic introduction to spoken and written Khmer as well as the history and culture of Southeast Asia. The Khmer language module offers listening, oral, and limited written practice of the Khmer language at a beginner/basic level of proficiency to increase students' communication and comprehension skills. The sociocultural model helps students develop a more refined understanding of Cambodian and Vietnamese cultures while learning about the rich history of the region. Both modules are designed to help students immerse into regional culture and work more effectively in their Directed Research efforts.



SFS 4910 DIRECTED RESEARCH prepares students to distinguish hidden assumptions in scientific approaches and separate fact from interpretation, cause from correlation, and advocacy from objectivity. Students learn specific tools including: experimental design; field techniques; basic descriptive statistics; and parametric and non-parametric quantitative analysis. Emphasis is placed on succinct scientific writing, graphic and tabular presentation of results, and effective delivery of oral presentations.

COSTA RICA

SFS 3770 TROPICAL ECOLOGY AND SUSTAINABLE DEVELOPMENT examines the ecological impact of human activity, especially agriculture, in a tropical country. Students study the agro-ecology of important crops, with emphasis on biodiversity as the source of production means and materials. Students identify renewable and nonrenewable resources and examine their historical use. We 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). Students examine options for alternative resources use, land restoration, and preservation from ecological, sociopolitical, and economic viewpoints, and use basic field techniques and measurements to examine the efficacy of different options.

SFS 3740 PRINCIPLES OF RESOURCE MANAGEMENT is designed to examine the connection between society and natural resources, and how application of management tools can lead to biodiversity conservation and sustainable livelihoods. This course introduces underlying concepts and practical tools used in addressing complex environmental problems, including protected area planning and management, guidelines for ecologically sustainable development, and environmental impact assessment. Students examine local case studies using the theory and practice learned in this course.

SFS 3820 ENVIRONMENTAL ETHICS AND DEVELOPMENT addresses the intersection of the human and environmental sides of sustainable development in Costa Rica. Linking human rights to sustainability is an emerging field that combines the important dimensions of economic and social rights with the environmental underpinnings of sustainability. We use a multidisciplinary methodology to cover themes of local and global social and environmental policies, valuing of and access to ecosystem services, development aid, agrarian reform, indigenous rights and local livelihoods, and climate change. Students examine the roles of local people, government, and local and international non-governmental actors in the implementation of sustainable development models. Students also review specific local case studies to explore the empowerment of local people and their reaction to local and non-local proposals for sustainable development.



SFS 2050 LANGUAGE, CULTURE, AND SOCIETY OF COSTA RICA contains two distinct but integrated modules. The Spanish language module offers listening, oral, and written practice of the Spanish language at beginner, intermediate, and advanced levels of proficiency. Students engage in oral and written grammar and vocabulary exercises, and develop Spanish language skills and tools required for their research projects. The sociocultural module helps students to develop a more refined understanding of Costa Rican culture and the various communities with which we work. Students participate in lectures, field exercises, and other activities including a homestay—all of which teach them strategies and skills for working with people in a community-based research context and help them to assist with community extension projects.

SFS 4910 DIRECTED RESEARCH prepares students to distinguish hidden assumptions in scientific approaches and separate fact from interpretation, cause from correlation, and advocacy from objectivity. Students learn specific tools including: experimental design; field techniques; basic descriptive statistics; and parametric and non-parametric quantitative analysis. Emphasis is placed on succinct scientific writing, graphic and tabular presentation of results, and effective delivery of oral presentations.

PANAMA

SFS 3790 TROPICAL COASTAL ECOLOGY introduces students to the ecology of coastal and marine ecosystems. Students learn to identify the major groups of dominant species in these habitats and understand the complexity of ecosystem functions in a delicate island-based marine context. The concept of island biogeography helps to frame the examination of the status of tropical island systems, especially those prone to perturbations related to climate change. Students conduct field exercises in many coastal habitats including reefs, mangroves, intertidal zones, grass beds, and estuaries.

SFS 3740 PRINCIPLES OF RESOURCE MANAGEMENT examines terrestrial ecology and land-management principles and practices including timber and non-timber forest products. Students examine land use and land cover change—especially in regard to increasing pastureland and plantation land under cultivation (mostly banana) in close proximity to the ocean and important watershed habitats. Students also investigate how climate change is affecting natural resources and livelihoods on land, sea, and in forests.

SFS 3020 ENVIRONMENTAL POLICY AND SOCIOECONOMIC VALUES provides a critical look at the livelihood strategies of island residents, the land use and environmental regulations in place, and actual or recommended responses by society (including government, civil society, and individuals) aimed at mitigating pressures and restoring balance in the environment. Students gain an understanding of the local perceptions of conservation of natural resources and the pressure points between development and preservation. Students measure and examine the economic importance of tourism along with the habitat degradation due to tourism. Gauging environmental awareness and literacy of tourists helps students to understand their impact on the future of endangered island ecosystems that will be put under continuous pressure with the climbing number of visitors.

SFS 2070 LANGUAGE, CULTURE, AND SOCIETY OF PANAMA contains two distinct but integrated modules.

The Spanish language module offers listening, oral, and written practice of the Spanish language at beginner, intermediate, and advanced levels of proficiency. Students engage in oral and written grammar and vocabulary exercises, and develop Spanish language skills and tools required for their research projects. The sociocultural module helps students to develop a more refined understanding of Panamanian culture and the various communities with which we work. Students participate in lectures, field exercises, and other activities—all of which teach them strategies and skills for working with people in a community-based research context and help them to assist with community extension projects.

SFS 4910 DIRECTED RESEARCH prepares students to distinguish hidden assumptions in scientific approaches and separate fact from interpretation, cause from correlation, and advocacy from objectivity. Students learn specific tools including: experimental design; field techniques; basic descriptive statistics; and parametric and non-parametric quantitative analysis. Emphasis is placed on succinct scientific writing, graphic and tabular presentation of results, and effective delivery of oral presentations.

PERU

SFS 3830 TROPICAL ECOLOGY OF THE ANDES-AMAZON examines biodiversity from multiple scales, including region, landscape, ecosystem, community, species, and genes. Students learn to: identify and characterize a variety of the diverse flora and fauna in the Andes-Amazon region, understand the patterns and processes that support this diversity, and appreciate the importance of biodiversity to people. Students examine the fundamental principles of tropical ecology through the study of a diverse mosaic of ecosystems, habitats, and species along elevational gradients, successional gradients, and geomorphic patterns.

SFS 3840 POLITICAL ECOLOGY OF DEVELOPING LANDSCAPES focuses on human interactions with and impacts on local natural systems, and vice versa. We consider these interactions through the interdisciplinary lens of political ecology, examining the political, economic, social, and historical factors of environmental issues and changes. The course provides the conceptual and practical skills and tools to critically examine and assess the human-environment nexus by exploring distinct cultures and socioeconomic systems from the upper Andes to the Amazon basin. We also consider the theories and ethics of sustainable and unsustainable development, and the need to view these issues in ways that are inclusive and just.



SFS 3800 CONSERVATION SCIENCE AND PRACTICE

introduces the concepts, tools, and incentives to effect conservation of the environment and natural resources. The field of conservation is focused on protecting biological diversity—including ecosystems, species, and genetic diversity—by promoting processes, both ecological and social, that support biodiversity. The course focuses on five core themes: what biodiversity is; why biodiversity is important; threats to biodiversity; strategies for conservation; and the concept of sustainability. We explore the practical aspects of conservation using local case studies, considering the array of conservation strategies in the region and using this lens to evaluate global concerns on a local scale.

SFS 2090 LANGUAGE, CULTURE, AND SOCIETY OF PERU

provides two integrated modules: Spanish language instruction, and Peruvian society and culture. The language module offers listening, oral, and written practice of Spanish to increase students' communication and comprehension skills. The sociocultural module is designed to help students gain experience in the culture and therefore become more adept at working effectively in their community-based Directed Research efforts. Both modules emphasize the understanding of, and direct interaction with, the local communities with which the Center works. This exposure to culture and language is reviewed and processed through lectures, field exercises, community outreach, and classroom discussion.

SFS 4910 DIRECTED RESEARCH prepares students to distinguish hidden assumptions in scientific approaches and separate fact from interpretation, cause from correlation, and advocacy from objectivity. Students learn specific tools including: experimental design; field techniques; basic descriptive statistics; and parametric and non-parametric quantitative analysis. Emphasis is placed on succinct scientific writing, graphic and tabular presentation of results, and effective delivery of oral presentations.

TANZANIA

SFS 3710 TECHNIQUES IN WILDLIFE MANAGEMENT

introduces students to the questions, principles, and tools used by resource managers in Tanzania's savanna ecosystem. Students study habitat assessment, plant and animal identification, associations and distributions, and other approaches to evaluating ecosystems. Students examine the behavioral, physiological, and social responses of animals to a changing environment. The course introduces field and laboratory techniques for monitoring ungulate populations and optimizing management practices, as well as addressing decision-making processes on which wildlife management programs are based.

SFS 3720 WILDLIFE ECOLOGY presents students with the information and conceptual background necessary to understand the underlying ecological principles of Tanzania's savanna ecosystem. We focus on the fundamental processes and interrelationships between the biotic and abiotic environment. We begin with basic ecological principles, setting them against the background of Tanzania. Students examine the factors underlying distributions, population biology, and behavioral ecology, along with competition and predation, using African examples. Students discuss theoretical models of different basic ecological principles and then debate their applicability or constraints based on observations made in the field.

SFS 3020 ENVIRONMENTAL POLICY AND SOCIOECONOMIC VALUES

provides insight into the broad social context surrounding natural resources to determine effective approaches to resource management. Students explore the sociocultural context of resource management including: hierarchies and power structures; formal and informal decision-making processes; value systems relevant to natural resources, including religious factors and environmental ethics; past and present uses of natural resources; economic factors (local, regional, external); ownership patterns; attitudes and other factors that effect change and their historical basis; and legal basis for enforcement of environmental policy. Students are also introduced to major constituencies that effect conservation (NGO conservation groups, economic interests, etc.) and their underlying philosophies.

SFS 2060 INTRODUCTION TO SWAHILI LANGUAGE AND EAST AFRICAN TRIBAL COMMUNITIES

contains two distinct but integrated modules. The Swahili language module offers listening, oral, and written practice of the Swahili language, at a basic level of proficiency, to increase students' communication and comprehension skills. Much of the Maasai population does not speak Swahili, but it is the national language in Tanzania; this phenomenon will be explained in the second course module. The sociocultural aspects of Tanzanian tribes module emphasizes understanding of, and direct contact and interaction with, the native communities with which SFS works, primarily the Maasai. This exposure to culture and language is reviewed and processed through lectures, field exercises, and classroom discussion. The sociocultural module is designed to help students engage in the culture and be therefore more adept at working effectively in their Directed Research efforts.

SFS 4910 DIRECTED RESEARCH prepares students to distinguish hidden assumptions in scientific approaches and separate fact from interpretation, cause from correlation, and advocacy from objectivity. Students learn specific tools including: experimental design; field techniques; basic descriptive statistics; and parametric and non-parametric quantitative analysis. Emphasis is placed on succinct scientific writing, graphic and tabular presentation of results, and effective delivery of oral presentations.

TURKS & CAICOS ISLANDS

SFS 3730 TROPICAL MARINE ECOLOGY discusses the interactions that determine the distribution and abundance patterns of tropical marine organisms, with emphasis on the ecology of nearshore areas. Students explore basic principles of ecology and gain an understanding of the sea as a habitat for life. We discuss physical, chemical, and geological oceanography. Students examine major groups of dominant marine organisms of the region, and major nearshore marine habitats—along with their associated biotic communities—are observed in the field. We emphasize coral reef ecosystems to illustrate basic concepts. Students also discuss applications to the management of indigenous marine resources.

SFS 3740 PRINCIPLES OF RESOURCE MANAGEMENT is designed to examine the connection between society and natural resources, and how application of management tools can lead to biodiversity conservation and sustainable livelihoods. This course introduces underlying concepts and practical tools used in addressing complex environmental problems, including protected area planning and management, guidelines for ecologically sustainable development, and environmental impact assessment. Students examine local case studies using the theory and practice learned in this course.

SFS 3020 ENVIRONMENTAL POLICY AND SOCIOECONOMIC VALUES

provides insight into the broad social context surrounding natural resources to determine effective approaches to resource management. Students explore the sociocultural context of resource management including: hierarchies and power structures; formal and informal decision-making processes; value systems relevant to natural resources, including religious factors and environmental ethics; past and present uses of natural resources; economic factors (local, regional, external); ownership patterns; attitudes and other factors that effect change and their historical basis; and legal basis for enforcement of environmental policy. Students are also introduced to major constituencies that effect conservation (NGO conservation groups, economic interests, etc.) and their underlying philosophies.

SFS 4910 DIRECTED RESEARCH prepares students to distinguish hidden assumptions in scientific approaches and separate fact from interpretation, cause from correlation, and advocacy from objectivity. Students learn specific tools including: experimental design; field techniques; basic descriptive statistics; and parametric and non-parametric quantitative analysis. Emphasis is placed on succinct scientific writing, graphic and tabular presentation of results, and effective delivery of oral presentations.



Summer Course Descriptions

AUSTRALIA & NEW ZEALAND

SFS 3540 RAINFOREST MANAGEMENT STUDIES IN AUSTRALIA & NEW ZEALAND (SESSION I) compares and contrasts the ecological, geographic, social, economic, and historical factors that have shaped natural resource management in Australia and New Zealand. Students gain an understanding of the drivers of species extinctions and current conservation problems including management of endangered species. In both countries, students examine the influence of fragmentation on abiotic and biotic attributes of forest communities during field exercises, and identify management techniques with regard to biological systems, national boundaries, and political structures.

SFS 3550 TECHNIQUES FOR RAINFOREST RESEARCH IN AUSTRALIA (SESSION II) includes a wide range of hands-on field activities and lectures that concentrate on developing management recommendations for reforestation practices on the Tablelands of Australia. We explore the ecological roles, environmental services, and economic benefits of tropical rainforests, including their role in the health of downstream ecosystems like the Great Barrier Reef. Students examine the structure and function of Australian tropical rainforests and the roles that humans have played, and are playing, in current forest dynamics. We examine reforestation applications on the Tablelands: the goals, techniques, successes, and failures. Finally, we develop and maintain an actual rainforest restoration project.

BHUTAN

SFS 3580 EASTERN HIMALAYAN FORESTS AND RURAL LIVELIHOODS is an interdisciplinary, field-based course where students get to know a country in a region that is recognized worldwide for its dramatic mountain landscapes and rich flora and fauna. We travel in Bhutan, learning about how environmental issues and rural development goals intersect. Trekking across valleys and ridges and through villages, students gain an intimate knowledge of the local environments and rural livelihoods. Students develop skills in assessing environmental problems, defining research questions, conducting field research, and communicating results. They gain an appreciation of the complexity of identifying and addressing conservation issues in a rapidly developing region.

COSTA RICA

SFS 3520 SUSTAINING TROPICAL ECOSYSTEMS: BIODIVERSITY, CONSERVATION, AND DEVELOPMENT (SESSION I) provides students with an introduction to the practical field skills and topical knowledge necessary to understand, develop, and participate in community and tropical ecosystem-based research projects. Students examine the ecological, economic, and natural resource management issues that surround protected areas and tourism management, parks and people relations, and biodiversity assessment and protection, with the intent of exploring sustainable development and management strategies.

SFS 4930 APPLIED RESEARCH TECHNIQUES AND STRATEGIES TOWARD SUSTAINABILITY IN COSTA RICA (SESSION II) provides students the opportunity to apply the scientific process in a field research project that addresses a local environmental issue. Students' exposure to several parks and protected areas helps them design a field research project related to sustainable development and tourism that contributes to the strategic research plan of the Center. Participants collect, manage, and analyze data, and communicate research results to our local stakeholders.

PANAMA

SFS 3000 TOURISM AND ISLAND SYSTEMS: ASSESSMENT OF SUSTAINABLE PRACTICES (SESSION I) introduces students to the marine and terrestrial ecosystems of Bocas del Toro and the challenges presented by a growing reliance on tourism for economic development in this part of the Caribbean. Students evaluate the impact of tourism on the natural environment and engage with local stakeholders to determine how the tourist industry affects—positively or negatively—social, cultural, and political dynamics within the archipelago. Sustainable practice is a major lens of inquiry during this course. Students will assess the balance between the conservation of the region's natural resources and economic opportunities for local communities.

TANZANIA

SFS 3500 WILDLIFE MANAGEMENT AND CONSERVATION (SESSION I) exposes students to wildlife management practices and the complex issues surrounding sustainable wildlife conservation in the Tarangire-Manyara ecosystem of Tanzania. Students explore a vast array of concepts and principles in ecology, natural resource management, and socioeconomics, which are central to effective and sustainable wildlife conservation.

SFS 3570 TECHNIQUES FOR WILDLIFE FIELD RESEARCH (SESSION II) exposes students to a suite of wildlife field techniques and methods routinely used to assess wildlife ecology and management policies and practices in Tanzania, with specific application to the Tarangire-Manyara ecosystem conservation areas. The focus of the course is multidisciplinary and reflects the complex realities of balancing ecological, economic, and sociocultural factors in sustainable wildlife conservation and management studies. Students learn foundational skills in observation and evaluation of wildlife, as well as interactive methods used for assessing local community attitudes and behaviors toward conservation efforts, and they apply these techniques to advance long-term research goals at the Center.

TURKS & CAICOS ISLANDS

SFS 3530 TROPICAL MARINE ECOSYSTEMS: MONITORING AND MANAGEMENT (SESSION I) is an interdisciplinary course that highlights key aspects of environmental assessment and management of tropical marine ecosystems. In addition, students explore sustainable development strategies for the Turks and Caicos Islands that are successful on a local and global scale. Students gain knowledge of subtropical marine ecosystem function and connectivity, and begin to understand the most pressing challenges at the intersection of marine conservation and economic development. Students learn how to engage in management of local fisheries and coastal development and how to respond to the global phenomena of climate change and ocean acidification.

SFS 3560 APPLIED MARINE RESEARCH TECHNIQUES (SESSION II) provides students with the opportunity to apply the scientific process in a field research project addressing a local issue related to the management of tropical marine environments. This course prepares students to develop scientific approaches to identify key problems affecting the health of coral reefs, seagrass beds, and mangrove forests that surround the island. Students learn to implement the scientific research process while contributing to a growing body of research that informs local marine conservation and resource management decisions.

YOUR SUMMER WITH SFS

Any Session I course (Bhutan excluded) can be paired with any Session II course. Participating in two summer sessions (either single country or multi-country) will broaden and enhance your learning experience. Please contact SFS Admissions with questions about pairing summer sessions in different countries. Students participating in two summer sessions receive a \$1,000 discount.

Admissions: Getting Started

When to Apply

The School for Field Studies (SFS) reviews applications on a rolling basis and students may apply up to one year in advance. While there is no application deadline, students should apply early to ensure admission to their first choice program and check with their home institutions regarding school-specific study abroad application deadlines.

Before You Apply

Due to the field-based nature of our programs, the SFS academic experience is very different from that of your home school and other study abroad programs. Before applying, be sure to read about the SFS program model and learning objectives, and review all of the information related to your program of interest.

Academic Credit

Students come from more than 175 colleges to attend SFS programs each year and most are able to transfer credit for their participation. The final decision regarding credit and grade transfer rests with your home institution. Check with your academic or study abroad advisor and registrar's office before applying to learn how your SFS coursework will be applicable for credit in your degree program.

SFS students receive academic credit in one of two ways: (1) Students from non-affiliate schools receive transcripts from the University of Minnesota, the School of Record for SFS programs; (2) Students from SFS Affiliate institutions usually receive credit directly from their home schools. Participants receive official transcripts approximately four weeks after the conclusion of the program.

Visit cat.fieldstudies.org/advisors/partners for an up-to-date listing of Affiliate institutions.

Important Things to Know

- You must be at least 18 years of age to participate in an SFS program.
- You must be in good academic and disciplinary standing on your home campus.
- We recommend that students complete one semester of college prior to the start of the program, but gap-year students are welcome to apply, provided they fulfill the prerequisites.
- Recent college graduates are welcome to apply.

Course Prerequisites

- Semester: One college-level ecology, biology, or environmental studies/science course (or related coursework, as assessed by SFS) with a grade of C or better must be completed prior to the start of an SFS semester program.
- Summer: No course prerequisites.
- For SFS semester programs in Costa Rica, Panama, and Peru, your program experience will be enhanced if you have at least one semester of college-level Spanish (or three years of high school Spanish).
- Students are encouraged, but not required, to have taken coursework in statistics, anthropology, international development, and economics.

How to Apply

Application items can be submitted in any order and do not need to be submitted at the same time.

- **SFS APPLICATION FOR ADMISSION** to be completed online or by downloading the application PDF from our website
- **NON-REFUNDABLE APPLICATION FEE OF \$50** to be paid by credit card or check made payable to The School for Field Studies
- **SFS ACADEMIC REFERENCE FORM** to be completed by a teacher, professor, or academic advisor who is well acquainted with your current academic performance
- **SFS CHARACTER REFERENCE FORM** to be completed by someone who knows you well, such as another academic advisor, job supervisor, volunteer advisor, athletic coach, etc. It is not appropriate for this reference to be completed by a relative, peer, or family friend.
- **CURRENT OFFICIAL TRANSCRIPTS** from all schools attended. It is not necessary for college students to submit high school transcripts after a full academic year of college coursework has been completed.
- **PARTICIPATION APPROVAL FORM** to be completed by your study abroad advisor or appropriate authority on campus
- **FINANCIAL AID APPLICATION** to be completed and submitted along with the program application if you would like to be considered for SFS need-based financial aid. Instructions and information about aid can be found on page 53 of this catalog and at cat.fieldstudies.org

We encourage you to apply online. If you do submit print application materials, please send them to:

The School for Field Studies Admissions
100 Cummings Center, Suite 534-G
Beverly, MA 01915-6239



After You Apply

Once we receive your application, you may check the status of your application materials by logging in to your SFS account to view your Admissions Checklist. If your application is incomplete, it is your responsibility to send any remaining materials as we cannot begin the application review process until all materials are received. Once your application is complete, we will contact qualified candidates to schedule a short phone interview. Admissions decisions are generally available within one week of your scheduled phone interview.

Medical Approval

To ensure that you will be able to meet the physical challenges of SFS programs without undue risk to yourself or others, your ability to participate is contingent upon receiving medical approval from the SFS Safety Department. You may be disqualified from participating on medical grounds. All students must have medical insurance that covers them in-country for the duration of the program.

Dietary Restrictions

All dietary restrictions (e.g. vegetarian, vegan, gluten-free, etc.) require approval by the SFS Safety Department. SFS is able to accommodate most dietary needs, but variety of food may be limited due to local availability, cultural practice, and cost. Students requesting medically-necessary dietary restrictions should contact the SFS Safety Department.

Learning or Physical Accommodations

If you are requesting accommodations, please notify SFS in writing within 10 business days of acceptance. For physical accommodations, please contact the SFS Safety Department. For learning accommodations, please contact the SFS Office of Academic Affairs. Because of the limitations inherent in international field stations, the level of accessibility, services, and accommodations to which you may have access at your home campus may not be available.

Non-discrimination Policy

SFS is an equal opportunity institution. SFS 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 SFS. SFS 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 and loan programs, and other School-administered programs.

Questions?

Email us at admissions@fieldstudies.org

Call us at **800-989-4418**

Chat with us at cat.fieldstudies.org

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Tuition, Financial Aid, and Scholarships

The benefits of an SFS program will last a lifetime, but paying for it—much like paying for college—may seem daunting, confusing, or just plain impossible at first. This is why SFS works closely with you and your home school to understand and meet your financial needs. SFS awards over \$450,000 in financial aid each year, and you are automatically considered for more than 12 scholarships, grants, and loans when you submit an SFS Financial Aid Application. Don't let finances deter you from applying to an SFS program!

SFS Aid and Home School Aid

Many applicants receive aid through their home institutions or other outside sources, so check with your financial aid office to see what aid may apply to an SFS program. You may also look into applying for additional funds, including loans, through your home school prior to applying for SFS aid. In addition to the possibility of transferring institutional aid from your home school, your school should be able to process a Stafford Loan or other federal sources of support to help pay for your SFS program. You may qualify for SFS assistance even if you are not receiving aid from your home school.



How to Apply for Financial Aid

All students accepted to SFS are eligible for and encouraged to apply for financial aid. **If you would like to apply for SFS aid, you must submit your aid application with your SFS program application.** SFS awards need-based aid to 90% of students who apply!

To download the SFS Financial Aid Application, visit: cat.fieldstudies.org/admissions/aid

Scholarships, Grants, and Loans

Visit our website for complete descriptions of SFS need-based scholarships.

SFS General Scholarship

SFS strives to eliminate or reduce the gap between what a student pays on his or her home campus and the cost of studying abroad.

Pell Grant Match Award

SFS matches Federal Pell Grant funding for semester students who use their Pell Grant to help pay for an SFS program.

Trailblazer Grant

Awarded to students attending the Bhutan, Cambodia or Peru semester programs

Andreas Family Scholarship

Available to students attending U.S. public colleges and universities

Diversity Scholarship*

To broaden participation of minorities, first-generation college students, and underrepresented groups in study abroad

Heritage Scholarship*

Available for students with a cultural and/or ancestral connection to the country in which they plan to study abroad with SFS

Stephen F. Lee Memorial Scholarship

Supports students attending SFS marine programs

Heather Jo Leibowitz Memorial Scholarship

Supports students attending SFS' Tanzania program. Preference is given to students who demonstrate a commitment, as Heather Jo did, to making a difference in the lives of resource-dependent communities in Tanzania.

McKee Scholarship

Awarded to students with financial need

Tozer Scholarship

Awarded to students with financial need

Fountain Scholarship

Awarded to students who grew up in an urban environment

Roy A. Hunt Foundation Scholarship

Awarded to students with financial need

Travel Grant

Designed to help students offset the cost of travel

Zero-Interest Loan

Created through the generosity of the Merck Family Foundation. Semester loans must be repaid within two years and summer loans within one year of program completion.

Low-Interest Loan

Designed to assist semester students in bridging the gap between their financial resources and total program cost. This loan is set at a competitive market rate with manageable repayment terms.

**An additional personal statement is required to be considered for this scholarship.*

SEMESTER COSTS FALL 2016 – SPRING 2017

Program	Tuition	Room & Board	Total Program Cost
Australia	\$17,675	\$5,280	\$22,955
Bhutan	\$20,000	\$6,995	\$26,995
Cambodia	\$16,950	\$5,000	\$21,950
Costa Rica	\$16,950	\$5,000	\$21,950
Panama	\$16,950	\$5,000	\$21,950
Peru	\$16,950	\$5,000	\$21,950
Tanzania	\$17,810	\$5,040	\$22,850
Turks & Caicos Islands	\$18,270	\$5,580	\$23,850

SUMMER COSTS 2017

Program	Tuition	Room & Board	Total Program Cost
Australia	\$4,550	\$1,800	\$6,350
Australia/New Zealand	\$4,650	\$2,300	\$6,950
Bhutan (6 weeks)	\$6,280	\$3,715	\$9,995
Costa Rica	\$4,500	\$1,450	\$5,950
Panama	\$4,500	\$1,450	\$5,950
Tanzania	\$5,090	\$2,395	\$7,485
Turks & Caicos Islands	\$4,850	\$1,500	\$6,350

What's Included:

- Pre-departure advising services from an SFS Admissions Counselor
- Visa and travel coordination
- Accommodations at the field station
- Meals and snacks
- On-site orientation
- Field excursions and expeditions, including park entrance and research fees, and program-related ground transportation
- 24-hour support and emergency assistance from on-site residential staff
- Emergency medical evacuation and repatriation insurance
- Official transcript with 16-18 credits for semester programs, or 4-8 credits for summer programs

For complete course budgets, including out-of-pocket expenses, please visit cat.fieldstudies.org

Deposits and Tuition

The program commitment deposit payment is nonrefundable. When students are accepted to an SFS program, they are required to submit a nonrefundable program commitment deposit of \$250 for summer programs or \$500 for semester programs within 10 business days of acceptance. This payment goes toward tuition and is not an additional fee. Please see our website for complete information about our billing deadlines and tuition refund policies.

The Fall 2017, Spring 2018 and Summer 2018 program costs will be released in early March 2017 on www.fieldstudies.org/admissions/costs.



100 Cummings Center, Suite 534-G
Beverly, MA 01915-6239 USA



P 800.989.4418
F 978.922.3835

admissions@fieldstudies.org
cat.fieldstudies.org



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