

Coastal Ecology and Natural Resource Management Seminar

ENVI-3000 (4 credits)

Tanzania: Zanzibar - Coastal Ecology and Natural Resource Management

This syllabus is representative of a typical semester. Because courses develop and change over time to take advantage of unique learning opportunities, actual course content varies from semester to semester.

Course Description

The Coastal Ecology and Natural Resource Management Seminar is an interdisciplinary course that examines coastal ecosystems and natural resource management in Zanzibar and the proximal mainland coast of Tanzania. Lectures, discussions, and activities engage the natural and social sciences. In the course, students study ecology, coastal marine environments, coastal forests, and the culture, human life-ways, and human-environment challenges in Zanzibar. Through five complimentary modules - delivered by in-country faculty, researchers, and custodians - students achieve a comprehensive familiarity with coastal ecology and the management of natural resources in the cosmopolitan world of East Africa and the western Indian Ocean.

Course Learning Outcomes

Upon completion of the course, students will be able to:

- Know “nature” as a complex concept;
- Know ecology and natural resource management as critical practices;
- Demonstrate familiarity with coastal marine environments and forests in Zanzibar and Tanzania, and key cases;
- Demonstrate mastery of the basic natural history, biology, and ecology of select plants, invertebrates, fish, mammals, and other life in Zanzibar and the western Indian Ocean;
- Comprehend present challenges to environments, species, and human communities in coastal Tanzania;
- Show an in-depth understanding of nature preservation, natural resource management, and human sustainability in the region.

Language of Instruction

This course is taught in English. Students will be exposed to vocabulary related to course

content as well as the nuances of coastal ecology, conservation, and human life-ways through in-country expert lectures and field visits in a wide range of venues and regional locales.

Instructional Methods

SIT's teaching and learning philosophy is grounded in the experiential learning theory developed by Kolb (1984; 2015) and informed by other scholars, such as Dewey, Piaget, and Lewin. Experiential learning theory recognizes that learning is an active process that is not confined to the formal curriculum; "knowledge is created through the transformation of experience" (Kolb, 2015, p. 49). Learning involves both content and process. Learning is holistic and happens through various life experiences upon which students draw to generate new ways of knowing and being. Learning involves a community and is a lifelong endeavor. Learning is transformational. The suggested four part cycle of *a concrete experience, reflective observation, abstract conceptualization, and active experimentation* embedded in the experiential learning model is not always linear. The stages of taking part in a shared experience, reflecting on the experience by describing and interpreting it, challenging assumptions and beliefs to generate new knowledge, and ultimately applying new knowledge, awareness, skills, and attitudes in a variety of situations and contexts are important for students to engage so that they are empowered to be lifelong learners.

Required Texts

There are no required text books but there are required readings. See the Course Schedule (below). Referenced books and articles are available from the in-country program library and/or through SIT's electronic library database.

Assignments and Evaluation

This course employs discussions, readings, field activities, and assignments to help students learn about coastal ecology and natural resource management. The instructor evaluates student assignments and participation based on timeliness, completeness, seriousness of purpose, and, when relevant, the demonstration of cooperative teamwork among group members. The evaluation of assignments further accounts for their clarity of organization, accurate background, supportive data, appropriate analysis, coherence and depth of argument, and the quality of written, visual, and/or oral presentations.

Assignment Descriptions and Grading

Brief summaries of all graded course activities appear below. Elaborated descriptions of all graded course activities and rubrics appear in the Program Academic Handbook which is distributed to students on arrival in Zanzibar.

1) Participation in Discussions and Readings (10%)

- Attendance - promptness to class and positive presence in class.
- Active Listening - paying attention in class and during field excursions, asking appropriate questions, showing interest and enthusiasm, entertaining contradictory perspectives, and taking notes.
- Involvement in Class Discussions - either in small or large groups, sharing knowledge. This means challenging yourself to speak up if you usually do not, and also means

allowing others to speak if you are a person who tends to dominate class discussions.

- Group Accountability - positive participation in the group during field excursions and classes; not keeping others waiting.
- Displaying Respect - culturally appropriate interaction with hosts, SIT program staff, SIT lecturers, and communities.

2) Coastal Species Assignment (10%)

Each student is assigned two species from Zanzibar (one plant and one animal). The student makes a 3-minute oral presentation about each species when that species is spotted during the semester. The content of the presentation includes the following characteristics: scientific name, geographical range, coastal niche and needs, physical description, life-cycle, typical behaviors, predators and pests, commonly associated species, human uses, and IUCN status. Students also submit a scientific drawing of each species.

3) Jozani Forest Paper (15%)

During a 3-day visit to Jozani National Park, groups of two to three students collect data about animals and plants. Based on the collected data, each student group composes a 5-page paper that addresses either the behavior and demography of Zanzibar red colobus monkeys or the traits and biodiversity of mangrove forests.

4) Jozani Forest Paper Presentation (5%)

Based on a 3-day visit to Jozani National Park and the data collected, each student group delivers a 20-minute visual and oral presentation (using PowerPoint) that addresses the behavior and demography of Zanzibar red colobus monkeys or the traits and biodiversity of mangrove forests. The presentation is followed by a 10-minute question/answer session from the student group, Academic Director, program staff, and program partners at the national park.

5) Coral Reef Conservation Plan Paper (20%)

Groups of two to three students make observations and collect data (e.g., about human pollution, profuse sea urchins, and fish biodiversity) on one protected, one partially protected, and one unprotected coral reef. Each student group employs the collected data to compose a 6-page paper that 1) compares and contrasts reef health on the different reefs and 2) develops a management plan to further protect reef health at these locations.

6) Coral Reef Conservation Plan Presentation (10%)

Based on observations and data collected on one protected, one partially protected, and one unprotected coral reef, each student group delivers a 20-minute visual and oral presentation (using PowerPoint) that 1) compares and contrasts reef health on the different reefs and 2) develops a management plan to further protect reef health at these locations. The presentation is followed by a 10-minute question/answer session from the student group, Academic Director, program staff, and program partners.

7) Final Exam (30%)

Each student takes a 2-hour final exam that addresses coastal ecology and natural resource

management in the Zanzibar Archipelago and proximal areas. The exam is a mixture of the following types of questions: multiple choice, fill-in-the-blank, short answer, short essay (two paragraphs), and long essay (four to five paragraphs).

Attendance and Participation

Due to the nature of SIT Study Abroad programs, and the importance of student and instructor contributions in each and every class session, attendance at all classes and for all program excursions is required. Criteria for evaluation of student performance include attendance and participation in program activities. Students must fully participate in all program components and courses. Students may not voluntarily opt out of required program activities. Valid reasons for absence – such as illness – must be discussed with the Academic Director or other designated staff person. Absences impact academic performance, may impact grades, and could result in dismissal from the program.

Late Assignments

SIT Study Abroad programs integrate traditional classroom lectures and discussion with field-based experiences, site visits, and debriefs. The curriculum is designed to build on itself and progress to the culmination (projects, ISP, case studies, internship, etc.). It is critical that students complete assignments in a timely manner to continue to benefit from the sequences in assignments, reflections and experiences throughout the program.

Example: Students may request a justified extension for one paper/assignment during the semester. Requests must be made in writing and at least 12 hours before the posted due date and time. If reason for request is accepted, an extension of up to one week may be granted at that time. Any further requests for extensions will not be granted. Students who fail to submit the assignment within the extension period will receive an 'F' for the assignment.

Grading Scale

94-100%	A
90-93%	A-
87-89%	B+
84-86%	B
80-83%	B-
77-79%	C+
74-76%	C
70-73%	C-
67-69%	D+
64-66%	D
below 64	F

Program Expectations

- Show up prepared. Be on time, have your readings completed and points in mind for discussion or clarification. Complying with these elements raises the level of class discussion for everyone.

- Have assignments completed on schedule, printed, and done accordingly to the specified requirements. This will help ensure that your assignments are returned in a timely manner.
- Ask questions in class. Engage the lecturer. These are often very busy professionals who are doing us an honor by coming to speak.
- Comply with academic integrity policies (no plagiarism or cheating, nothing unethical).
- Respect differences of opinion (e.g., those of classmates, lecturers, and local constituents engaged with site visits). You are not expected to agree with everything you hear, but you are expected to listen across difference and consider other perspectives with respect.
- Storing Your Work: Keep several copies of your work as back up and keep one copy accessible to you through an online forum, such as an attachment in your email or cloud-based storage. This way your work will always be available to despite technical issues. Lost files, deleted drives, or computer crashes are not excuses for late, missing work.
- Personal Technology Use: Personal computers (but not cell phones) can be used for taking notes and other class activities. Off-task usage is not acceptable. You may be marked as absent for habitually using unapproved devices for something other than classroom tasks.
- Classroom recording policy: To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student's own private use.

SIT Policies and Resources

Please refer to the [SIT Study Abroad Handbook](#) and the [Policies](#) section of the SIT website for all academic and student affairs policies. Students are accountable for complying with all published policies. Of particular relevance to this course are the policies regarding: academic integrity, Family Educational Rights and Privacy Act (FERPA), research and ethics in field study and internships, late assignments, academic status, academic appeals, diversity and disability, sexual harassment and misconduct, and the student code of conduct.

Please refer to the SIT Study Abroad Handbook and SIT website for information on important resources and services provided through our central administration in Vermont, such as [Library resources and research support](#), [Disability Services](#), [Counseling Services](#), [Title IX information](#), and [Equity, Diversity, and Inclusion](#) resources.

Course Schedule

This course takes the form of topical modules that incorporate student activities and assignments.

**Please be aware that topics and excursions may vary to take advantage of any emerging events, to accommodate changes in our lecturers' availability, and to respect any changes that would affect student safety. Students will be notified if this occurs*

Module I: Ecology, and Historical and Social Context of Zanzibar

This ten-day module introduces key concepts of ecology and the defining background traits of Zanzibar and its people. Students engage “nature” as a multifaceted concept understood somewhat differently by scientists, different publics, and the state. Field trips and discussions introduce Zanzibar’s ecosystems and the politics, religion, and life-ways of its people. This module helps students to grasp the intellectual and social context, human practices, and institutions relevant to ecological study and natural resource management in East Africa and the western Indian Ocean.

- Escobar, A. (1998). Whose Knowledge, Whose Nature? *Journal of Political Ecology*, 5.
- Kueffer, C., & Kinney, K. (2017). What is the Importance of Islands to Environmental Conservation? *Environmental Conservation*, 44.
- Prendergast, M., Rouby, H., Punnwong, P., Marchant, R., Crowther, A., Kourampas, N., Shipton, C., Walsh, M., Lambeck, K., and Boivin, N. (2016). Continental Island Formation and the Archaeology of Defaunation on Zanzibar, Eastern Africa. *PLoS ONE*, 11.
- Sheriff, A. (2010). *Dhow Cultures of the Indian Ocean: Cosmopolitanism, Commerce and Islam*. Columbia University Press.
- Walley, C. (2010). *Rough Waters: Nature and Development in an East African Marine Park*. Princeton University Press.

Module II: Coastal Marine Environments in Tanzania-Zanzibar

This three-week module emphasizes the region’s physical oceanography, marine environments, and key plants and animals. Field trips on Unguja, Mafia, and Chumbe islands and to Zanzibar’s fish market reinforce classroom learning. Presentations by regional experts and faculty at the Institute for Marine Sciences in Stone Town introduce the intertidal zone, sea grass beds, and coral reefs. Activities highlight the characteristics and behaviors of select animal species - corals and other invertebrates, bony fish, dolphins, sharks, and sea turtles - and the various anthropogenic threats posed to marine ecosystems in Zanzibar.

- Kiilu, B., Kaunda-Arara, B., Oddenyo, R., Thoya, P., & Njiru, J. (2019). Spatial Distribution, Seasonal Abundance and Exploitation Status of Shark Species in Kenyan Coastal Waters. *African Journal of Marine Science*, 41.
- McClanahan, C., Sheppard, C., & Obura, D. (Eds.). (2000). *Coral Reefs of the Indian Ocean: Their Ecology and Conservation*. Oxford University Press.
- Nesbitt, K., & Richmond, M. (2015). A Preliminary Assessment of the Status and Habitat Preference of the Grouper (Serranidae) Population of Chumbe Island Coral Park, Zanzibar, Tanzania. *Western Indian Ocean Journal of Marine Science*, 14.
- Reyment, R. (2008). A Review of the Post-mortem Dispersal of Cephalopod Shells. *Palaeontologia Electronica*, 11.
- Richmond, M. (2002). *A Field Guide to the Seashores of Eastern Africa and the Western Indian Ocean Islands*. SAREC.
- Roman, J., & McCarthy, J. (2010). The Whale Pump: Marine Mammals Enhance Primary Productivity in a Coastal Basin. *PLoS ONE*, 5.

- Unsworth, R. (2018). A Changing Climate for Seagrass Conservation. *Current Biology*, 28.

Module III: Coastal Forests in Tanzania-Zanzibar

This module emphasizes the region's coastal forests and key plants and animals. Field trips on Unguja and Misali islands and in Dar es Salaam reinforce classroom learning.

Presentations by custodians at Jozani-Chwaka Bay National Park, park rangers at Misali Island Marine Park, and faculty at the University of Dar es Salaam introduce coastal forests, especially mangrove forests. Lectures on diurnal and nocturnal wildlife highlight the characteristics and behaviors of the Red Colobus monkey (*Procolobus kirkii*) and robber crab (*Birgus latro*). Group discussions engage the various threats posed to forest ecosystems.

- Davenport, T., Fakhri, S., Kimiti, S., Kleine, L., Foley, L., & De Luca, D. (2017). Zanzibar's Endemic Red Colobus *Procolobus kirkii*: first Systematic and Total Assessment of Population, Demography and Distribution. *Oryx*, 53.
- Drew, M., Harzsch, S., Stensmyr, M., Erland, S., & Hansson, B. (2010). A Review of the Biology and Ecology of the Robber Crab, *Birgus latro* (Linnaeus, 1767) (Anomura: Coenobitidae). *Zoologischer Anzeiger*, 249.
- Hogarth, P. (2007). *The Biology of Mangroves*. Oxford University Press.
- Kamel, S., & Mrosovsky, N. (2006). Deforestation: Risk of Sex Ratio Distortion in Hawksbill Sea Turtles. *Ecological Applications*, 16.
- Rödder, D., Hawlitschek, O., & Glaw, F. (2010). Environmental Niche Plasticity of the Endemic Gecko *Phelsuma parkeri* Loveridge 1941 from Pemba Island, Tanzania: A Case Study of Extinction Risk on Flat Islands by Climate Change. *Tropical Zoology*, 23.
- Walsh, M. (2007). Island Subsistence: Hunting, Trapping and the Translocation of Wildlife in the Western Indian Ocean. *Azania*, 2.

Module IV: Rural and Urban Ecological Challenges and Solutions in Tanzania-Zanzibar

This module provides a critical introduction to the relationship between human communities and regional environments. In Dar es Salaam and on Pemba Island, lectures and excursions led by regional experts and custodians address rural and urban environmental challenges and solution strategies. Cases from coastal Tanzania address a range of issues: climate change, habitat destruction, biodiversity loss, human-wildlife conflict, invasive species, water pollution, solid waste disposal, the unequal distribution of resources, food insecurity, strip mining, urban sprawl, and the spread of human and domestic animal diseases. This module also examines how specific challenges are being addressed and how they might be resolved.

- Basha, A. (2008). Zanzibar National Forest Resources Management Plan, 2008-20. Unpublished Report.
- Colbert-Sangree, N., & Suter, J. (2015). Community Based Fishery Management within the Menai Bay Conservation Area: A Survey of the Resource User. *Marine Policy*, 60.
- Douglass, K., Walz, J., Morales, E., Marcus, R., Myers, G., & Pollini, J. (2018). Historical Perspectives on Contemporary Human-Environment Dynamics in

Southeast Africa. *Conservation Biology*, 33.

- Houck, M. (2010). In Livable Cities is Preservation of the Wild. In Douglass, I., Goode, D., Houck, M., & Wang, R. (Eds.). *The Routledge Handbook of Urban Ecology*. Routledge.
- Kombo, Y. (2010). Zanzibar Biodiversity, Climate Change, and the Energy Crisis. Unpublished Report.
- Walsh, M. (2009). The Use of Wild and Cultivated Plants as Famine Foods on Pemba Island, Zanzibar. *Etude Océan Indien*, 42.
- Yu, R., & Packard, D. (2012). Assessing the Viability of Desalination for Rural Water Supply: A Case Study of Chwaka, Zanzibar. *Cross-Cultural Communication*, 8.

Module V: Complexities of Conservation and Natural Resource Management in Tanzania-Zanzibar

This module introduces students to the complexities of conservation and natural resource management in Zanzibar. Field trips to parks on Mafia, Chumbe, and Misali islands and at Mikumi National Park on the mainland of Tanzania engage national conservation efforts and private ecotourism ventures. Students consider the complexities and outcomes of case studies in natural resource management from multiple standpoints, including those of African communities. Students further learn about and discuss laws, the role of scientists, and the inner workings and politics of park development in East Africa and the Indian Ocean.

- Buys, A. (2018). China, Japan, India and the East Africa Blue Economy. *Policy Insights*, 61.
- Darling, E., et al. (2019). Socio-environmental Drivers Inform Strategic Management of Coral Reefs in the Anthropocene. *Nature Ecology and Evolution*, 3.
- Myers, G. (2016). *Urban Environments in Africa*. Policy Press.
- Walley, C. (2010). *Rough Waters: Nature and Development in an East African Marine Park*. Princeton University Press.
- Walsh, M., & Goldman, H. (2012). Chasing Leopards: Science, Witchcraft, and the Politics of Conservation in Zanzibar. *Journal of Eastern African Studies*, 6.