

Climate Change and its Impacts in the Tropics ENVI-3000 (3 credits)

Tanzania: Climate Change and Sustainability from Zanzibar Mount to Kilimanjaro (Summer)

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

Climate change and its impacts in the Tropics is an interdisciplinary course that addresses climate change and its social and natural impacts in East Africa. During the summer semester, the program visits three areas: The Zanzibar Archipelago, the Usambara Mountains, and Mount Kilimanjaro, and the Ngorongoro Conservation Area and surrounding communities (i.e., Hadzabe or Maasai). Activities, discussions, and lectures engage the natural and social sciences. In this course, students study ecology and the societies of coastal and northern Tanzania. The program emphasizes climate change, its human impacts, and national and local solutions to this critical global issue. Through four complimentary modules, delivered by in-country faculty, researchers, and environmental custodians, students achieve familiarity with climate change and the complexities of management solutions in East Africa.

Learning Outcomes

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

- Understand climate change as a complex concept;
- Understand ecology, the science of climate change, and resource management as critical practices;
- Master the basic signatures of climate change;
- Demonstrate familiarity with the ecology and natural history of key marine and terrestrial environments in Tanzania;
- Comprehend present climate change challenges and solutions for environments, species, and human communities in Tanzania; and
- Show an in-depth understanding of human sustainability and resource management in the region.

Language of Instruction

This course is taught in English, but students will be exposed to vocabulary related to course content as well as the nuances of economic change and development through in-country expert lectures and field visits in a wide range of venues and regional locales.

Instructional Methods

Excursions, lectures, readings, and reflexive discussions through students presentation help them to learn about ecology, climate change, and sustainability in Tanzania. The academic director evaluates student participation and assignments based on timeliness, completeness, quality of research, 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 presentation.

Required Texts

[APA format.

List any books/major texts and then additional chapters and articles as assigned. List more specifically in the Course Schedule section.

Sample Text:

Arkadie & Mallon. 2012. *Viet Nam: A Transition Tiger*. Canberra: ANU E Press.

Masina, P. Pietro. 2006. *Vietnam's Development Strategies*. NY: Routledge.

Additional readings and articles as assigned.]

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Assignments and Evaluation

Assignment Descriptions and Grading Criteria

1) Climate change and Communities (CCC) Group Presentation (25%)

Presentation from the students in study teams focusing on the key themes of the assigned readings. The presentation should be divided into two main parts; (i) A brief summary, brief study area description, methods used in data collection and data analysis of each of the assigned readings and (ii) assigned readings key themes detailing indicators of climate change (both specific to marine ecosystems, and the general ones cutting across the ecosystems and those emanate from the dependent local communities), climate impacts on the respective ecosystem and the dependent local communities, their adaptations/responses and finally providing own or group reflection of the assigned readings discourse on climate change indicators, impacts, adaptation, and responses experiences in Tanzania (coastal communities and marine environments/human communities and terrestrial environments) to that of your home.

2) CCC Annotated Bibliography Sets (40%) (2 at 20% ea.)

While a particular group of students presents the assigned readings on a specified climate change issue, ecosystem, and community for respective module, the rest of the students, using the same readings, will compose an annotated bibliography from the first two readings from the pool of the assigned readings plus additional information from previous discussions and presentations by faculty members, talks/discussions with communities and experts. All

annotated bibliographies should be submitted to Oliver.Nyakunga@sit.edu before the group presentation (see the attached samples in the appendixes).

3) Portfolio (30%)

The assignment enables students to reflect on a wide range of experiences encountered during the excursions and issues addressed in various forums during the program. Specifically, the assignment focuses on discourses around climate change as complex concept and its impacts in marine and terrestrial environments, human sustainability and resource management, and climate change challenges and local and national solutions for environments, species, and human communities in Tanzania as they interplay with the local community and your host family. Drawing knowledge and the understandings from the readings, academic excursions, lecture presentations or talks, focus group discussions or talks held with your homestay and the local community, formal and informal discussions; interpreting this and consolidating it into a coherent and integrated report of what you have learned and experienced during the six weeks in Tanzania.

5) Participation (10%)

For participation, an "A" grade refers to full attendance, punctuality, attentive listening and active engagement in all discussions, field activity, individual assignment, presentation, discussion, and other activities. It also means polite and respectful behavior as it pertains to both the host culture and the group. This means not talking to each other during a presentation, not looking at your phone, taking notes and looking interested and attentive, not bored! The level, frequency, and quality of the students' participation is monitored throughout the semester and taken into account in assigning your participation grade.

Assessment

CCC Presentation	25%
CCC Annotated Bibliography	40%
Sets (20% ea.)	
Portfolio	30%
Participation	10%

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 (classmates', lecturers, local constituents engaged with on the 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.

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

**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 1: Ecology, Climate Change, and Society in Tanzania (Zanzibar Archipelago)

This one week-module introduces key concepts of nature, climate dynamics, climate change, sustainability, and the traits of Tanzanian communities and ecosystems. Students engage “nature” as a multifaceted concept understood somewhat differently by scientists, different publics, and the state. Short field trips and discussions introduce Tanzania’s environments and the lifeways of its diverse people. To fully conceptualize the intended concepts of this module, it takes place in different sites of the orientation week and throughout the six weeks of the program. The module integrates background readings, site visits, participant observation, game drives and guided walks accompanied by staff and /or local experts to explore and fully capture the intellectual concepts, social context, and human practices relevant to ecological study, climate change, and resource management in Tanzania and wider East Africa. During this module, students also have a series of structured lecture presentations and discussions with the faculty from various institutions and NGOs both from Zanzibar and Tanzania Mainland.

Readings:

- Anonymous. 2010. *Acting on Climate Change for Sustainable Development in Africa*. Africa Development Forum. (excerpts)
- Ghosh, A. 2016. *The Great Derangement: Climate Change and the Unthinkable*. U. of Chicago Press.
- Maslin, M. 2014. *Climate Change*. Oxford U. Press. (excerpts)
- Shemsanga, C. 2010. “The Cost of Climate Change in Tanzania.” *Journal of American Science*.
- Walley, C. 2010. “Where there is No Nature.” In *Rough Waters: Nature and Development in an East African Marine Park*. Princeton U. Press.

Module 2: Sustainability and Climate Change Impacts on Coastal Communities and Marine Environments (Zanzibar Archipelago)

This two week-module addresses the marine ecosystem and climate change. Time in Zanzibar highlights the complexities of marine conservation and natural resource management, particularly among communities dependent on the ocean for their livelihood. The group

discusses mangrove forests, sea grass beds, and coral reefs, for instance at Chumbe Coral Park, recently partially bleached due to higher sea surface temperatures. From multiple management standpoints - those of the government, scientists, and local communities - students consider the complexities of climate change mitigation strategies. Lastly, the group wrestles with climate change policies and the inner workings of climate politics in the western Indian Ocean.

Readings:

- Braje, T., *et al.* 2017. "Humans and Island Environments: Archaeology, Historical Ecology and Anthropogenic Island Ecosystems." *Environmental Conservation*.
- Deutsche Welle. n.d. *Zanzibar: Sustainable Marine Economy*. (video)
- Kombo, Y. n.d. "Zanzibar Biodiversity, Climate Change, and the Energy Crisis." Unpublished Report.
- McClanahan, C., *et al.*, eds. 2000. *Coral Reefs of the Indian Ocean: Their Ecology and Conservation*. Oxford. (excerpts)
- Walley, C. 2010. *Rough Waters: Nature and Development in an East African Marine Park*. Princeton U. Press. (excerpts)
- Walsh, M. 2009. "The Use of Wild and Cultivated Plants as Famine Foods on Pemba Island, Zanzibar," *Etude Océan Indien* 42-43. (excerpts)

Module 3: Sustainability and Climate Change Impacts on Farmers and Forests (Amani NR, Usambara Mountains and Mt. Kilimanjaro)

This one-week module emphasizes the influences of climate change on forests and farmers in the Eastern Arc Mountains of northeastern Tanzania. Students travel to the picturesque East and West Usambara Mountains to study climate refugia, the diverse endemic plants and animals of highland forests, and, most importantly, the impacts of recent climate change on the environments and the productivity of Shambaa farmers. Presentations by NGOs and activities with community members examine indigenous solutions to manage and mitigate the impacts of climate change on the highland ecosystem. Of particular interest is a partnership with the Forest Conservation Group on integrated approaches to climate adaptation.

Readings:

- Harrison, S., and R. Noss. 2017. "Endemism Hotspots are linked to Stable Climatic Refugia." *Annals of Botany* 119.
- Kaganzi, K. R., Cuni-Sanchez, A., Mcharazo, F., Martin, E. H., Marchant, R. A., & Thorn, J. P. (2021). Local perceptions of climate change and adaptation responses from two mountain regions in Tanzania. *Land*, 10(10), 999.
- Mwalusepo, S., Massawe, E. S., Affognon, H. D., Okuku, G. O., Kingori, S., Mburu, D. M., ... & Ru, B. P. L. (2015). Smallholder farmers' perspectives on climatic variability and adaptation

strategies in East Africa: the case of mount Kilimanjaro in Tanzania, Taita and Machakos Hills in Kenya. *Earth Science & Climatic Change*, 6(10), 01-09.

Burgess, N. 2007. "The Biological Importance of the Eastern Arc Mountains of Tanzania and Kenya." *Biological Conservation* 134.

Recommended readings:

Said, M., Komakech, H. C., Munishi, L. K., & Muzuka, A. N. N. (2019). Evidence of climate change impacts on water, food and energy resources around Kilimanjaro, Tanzania. *Regional Environmental Change*, 19, 2521-2534.

Conte, C. 2004. *Highland Sanctuary: Environmental History in Tanzania's Usambara Mountains*. Ohio U. Press.

Module 4: Sustainability and Climate Change Impacts on Herders, Wildlife, Hunter-Gatherer and Maasai Communities (Ngorongoro Conservation Area and surrounding areas)

This one week-module engages climate change and its impacts on the pastoralists, wildlife, and grasslands of northern Tanzania. Students travel to Ngorongoro Conservation Area - including a visit to Ngorongoro Crater - to identify and investigate the impacts of recent climate change on plant communities, migrating wildlife (such as wildebeests and zebras), and the livelihoods of the Maasai, who live in villages and keep cattle, camels, donkeys, and small stock. Presentations by park rangers and state officials introduce the impacts of climate change and promote state and park solutions for sustainability, approaches that often favor the government and international tourism at the expense of rural Tanzanians.

Readings:

Mwakaje, A. G. (2013). The impact of climate change and variability on agro-pastoralists' economy in Tanzania. *Environmental Economics*, (4, Iss. 1), 30-38.

Kupika, O. L., Gandiwa, E., Kativu, S. & Nhamo, G. (2017). „Impacts of Climate Change and Climate Variability on Wildlife Resources”. In *Southern Africa: Experience from Selected Protected Areas in Zimbabwe*. Additional information is available at the end of the chapter. <http://dx.doi.org/10.5772/intechopen.70470>

Bedelian, C., and J. Ogutu. 2016. *Trade-offs for Climate-Resilient Pastoral Livelihoods in Wildlife Conservancies in the Mara Ecosystem, Kenya*. Overseas Development Institute.

Kimaro, E. G., Mor, S. M., & Toribio, J. A. L. (2018). Climate change perception and impacts on cattle production in pastoral communities of northern Tanzania. *Pastoralism*, 8, 1-16.

Galvin, K., et al. 2015. "Transitions in the Ngorongoro Conservation Area: The Story of Land Use, Human Well-being, and Conservation." In *Serengeti IV: Sustaining Biodiversity in a Coupled Human-Natural System*. U. of Chicago Press.

Recommended readings

Gichohi, H., et al. 1996. "Savanna Ecosystems." In *East African Ecosystems and Their Conservation*. Oxford U. Press.

Shetler, J. 2007. *Imagining Serengeti: A History of Landscape Memory*. Ohio U. Press. (excerpts)

Sinclair, A., et al., eds. 2008. *Serengeti III: Human Impacts on Ecosystem Dynamics*. U. of Chicago Press. (excerpts)

Module 5: Critical Reflections on Climate Change and Sustainability (Mount Kilimanjaro and Arusha)

This one week-module offers students an opportunity to critically reflect on the impacts of climate change in Tanzania, East Africa, and the tropics, in general. As a case study, students consider the climate change debate surrounding the melting glaciers on Mount Kilimanjaro and, moreover, the implementation of sustainable solutions to mitigate its effects on Chagga communities. Students further consider and address the roles and responsibilities of stakeholders in this particular climate change debate: international organizations, state government, parks, NGOs, local communities, scientists, and tourists.