

<b>Course Title:</b>	<b>Biodiversity Conservation in East Africa.</b>
<b>Instructor(s):</b>	Dr. Stephen C. Lougheed, <a href="mailto:steve.lougheed@queensu.ca">steve.lougheed@queensu.ca</a>
<b>Dates:</b>	June 6 <sup>th</sup> – June 21 <sup>st</sup> 2020. (Dates may shift slightly to obtain best airfare prices)
<b>Location:</b>	Various sites throughout Kenya potentially including Lake Naivasha, Masai Mara National Reserve, and Mount Kenya
<b>Cost:</b>	Approximately \$4,950 (Deposit of \$350.00, balance due in month before departure to allow us to cover advance costs of travel and board). This price includes airfare, and all local transportation, and room and board in Kenya – including a dedicated Kenyan staff who will travel with us for the duration. We will seek a group rate on airfare to try to bring down costs. Does not include home university tuition.
<b>Prerequisites:</b>	University course in general biology. Additional course(s) in ecology and biostatistics an asset.
<b>Enrolment:</b>	20.
<b>Course Description (brief):</b>	This course provides students with an introduction to field ecology, biodiversity and conservation in East Africa. Seminars, class discussions, guest lectures, and field exercises provide overviews of the scientific method and field research techniques, the geological and natural history of the area and its biota, an introduction to different habitats and techniques for assessment of biological diversity, an assessment of traditional and emerging land uses and their impacts on ecosystems, and an analysis of contemporary conservation issues, particularly those related to competing land uses, to the expansion of the tourism sector, and to the development aspirations of community stakeholders. Groups of students will undertake field research focused on a major issue in conservation (e.g. human-wildlife conflict, conservation reserve design). We will visit at least 3 locations, potentially including Nairobi National Park, Mount Kenya, Lake Naivasha, and Masai Mara or Amboseli. Each field site serves as a focus for group research projects designed in consultation with the instructor. Class fieldwork provides introductions to some of the typical, rare and endemic flora and fauna of the region. We will undertake many local excursions including 'game drives' to see some of the characteristic savannah and forest fauna. We also will have opportunities to visit local communities engaged in biodiversity conservation, and to visit local universities to learn about local projects and academics in East Africa.
<b>Evaluation:</b>	<ol style="list-style-type: none"> <li>1) Moderated debate focused on a major wildlife issue (10%)</li> <li>2) Review of journal article from the peer-reviewed literature (10%)</li> <li>3) Field book including habitat, species descriptions, insights from visits to field sites and communities &amp; all field data (20%)</li> <li>4) Paper focused on a major issue in conservation relevant to East Africa combining field data from group projects, observations from guest lectures, and field visits, and literature review (40%)</li> <li>5) Participation in class discussions &amp; field activities (10%)</li> <li>6) Blog entries (alternating groups of students write daily entries for a course blog describing field activities and observations; e.g. <a href="https://kenya2019.sclougheed.ca">https://kenya2019.sclougheed.ca</a> or <a href="https://kenya2018.sclougheed.ca">https://kenya2018.sclougheed.ca</a>) (10%)</li> </ol>

## An Average Day – What to Expect

(a) Daily timeline	Activities vary depending on locale. Here is an example of a day in Masai Mara. Arise at 7:00 am. Breakfast 7:30. 8:30am-10:00am bird hike. 10:00-noon. Game drive. Noon-1:00pm lunch. 1:00-2:30pm free time to work on field books, blog entries and debate. 2:30-4:00 field exercise quantifying local habitat structure. 4:00-6:00pm lecture and class discussion/debrief on local conservation issues. 6:00-7:00pm dinner. 7:00-8:30pm guest lecture on bush meat trade and poaching in East Africa.
(b) Work habitat & Physical exertion	Some field sites that we will visit have rough and steep terrain. We will undertake various hikes and field exercises. While we should be out of the rainy season, sometimes rains do occur and can make conditions very muddy. Temperatures can soar to well above 30 degrees making hiking more arduous. We will avoid the hottest parts of the day and carry lots of water (see below).
(c) Common activities	Much of our work (obviously) will be outdoors and we will do a lot of hiking to explore local habitats and diversity. Terrain can be quite rugged and some hikes might be quite arduous (e.g. vertical climbs of 100s of metres). Hikes in the mountains can be up quite steep grades. We do this slowly and with lots of rests. Temperatures in some cases can exceed 30°C. Without precautions one could get heat stroke. We have participants carry lots of water, and wear sunscreen, wide-brimmed hats, and hiking boots. We also will do some game drives and in these instances must stay in the trucks because of the presence of large predators. Truck travel can sometimes take many hours between locales, although we will stop for snacks and washroom breaks.
(d) Weather, dehydration, & biting insects	Weather is likely to be quite hot and during the day from the upper 20s to the mid30s. Nights in the highlands can be somewhat cool and damp. We will undoubtedly experience intense sun most days. Dehydration can be a risk on longer hikes or during more arduous activities. There will be some biting insects but because this is not the rainy season we do not expect them to be particularly bad.
(e) Toxic/poisonous, wildlife/ plants	<p><b>Hazard:</b> Wild animals. <b>Risk:</b> We will be doing some camping and doing game drives in various parks including Nairobi National Park and Masai Mara. There are obviously many large species that can cause grievous injury and even death including large carnivores (e.g. lions, crocodiles), and large herbivores (elephants, hippos). Hippos and baboons cause many human injuries. <b>Plan:</b> When travelling in game reserves and parks, we will stay within the vehicles. When camping we will stay within the guarded confines of our compound. We will carry a satellite phone at all times should an emergency occur. We also carry a first aid kit should minor issues arise that require stopgap medical treatment until we can evacuate.</p> <p><b>Hazard:</b> Bee and other insect stings. <b>Risk:</b> Bees and wasps and other stinging or biting invertebrates of East Africa, will not have been experienced by North American travelers who have never traveled to this region (i.e. may exhibit allergic reaction despite not showing such sensitivities to North American taxa). The outcome of a sting or bite might span local swelling to anaphylaxis that if left untreated could result in death. <b>Plan:</b> Stay on trails and avoid disturbing sites with potential nests. We will carry Benadryl at all times and will treat immediately from minor incidents. If stung and symptoms of anaphylactic shock appear, immediate treatment and evacuation if needed (satellite phone with us at all times).</p> <p><b>Hazard:</b> Extreme sun, heat and humidity. <b>Risk:</b> We will be at or near the equator in Kenya and at times in areas not only with intense sun, but also intense heat. Although June through August are the coolest months in for example Masai Mara, there remains the possibility of excessive heat, insolation and humidity, with attendant risks for severe sunburns, heat exhaustion, and dehydration. If ignored or unrecognized, may in extreme circumstances lead to death. <b>Plan:</b> Wearing large-brimmed hats, light clothing and high SPF sunscreen. Drinking often and carrying water bottles on all hikes. Avoiding excessive activity in hottest part of the day.</p> <p><b>Hazard:</b> Typhoid. <b>Risk:</b> Typhoid fever is a food borne illnesses caused by one species of Salmonella bacteria. <i>Salmonella</i> bacteria are often a cause of food poisoning. Onset of typhoid fever is normally gradual, with fever, malaise, chills, headache, and generalized muscle and joint aches. Infection may also cause the spleen to enlarge, the white blood cell count to drop, and small rose-coloured spots to develop on the trunk. Diarrhea occurs infrequently. Vomiting may occur late in the first week following infection, but is usually not severe. Can cause fatality if untreated. Typhoid can be contracted through either contaminated food or water in Kenya. The US Centers for Disease Control and Prevention recommends this vaccine for most travelers, especially if you are staying with friends or relatives, visiting smaller cities</p>

or rural areas, or if you are an adventurous eater. **Plan:** Our food will be provided by a trusted company with whom we have worked previously (Bunduz) or by reputable restaurants associated with hotels; these are hygienic and suited to international travelers and researchers. Food should be thoroughly cooked and served hot, fruits and vegetables peeled by the traveler personally, and beverages and ice that are made from boiled or chlorinated water or that are carbonated are usually safe (see also water potability). Typhoid fever can be effectively treated using antibiotics. The usual case-fatality rate of 10% can be reduced to < 1% if prompt antibiotic treatment is given. The typhoid vaccine can mitigate these risks. Should anyone show symptoms they will be evacuated immediately to a local hospital.

**Hazard:** Rabies. **Risk:** Rabies can be found in dogs, bats, and other mammals in Kenya, so the Centers for Disease Control and Prevention recommends this vaccine for "... travelers involved in outdoor and other activities (such as camping, hiking, biking, adventure travel, and caving) that put them at risk for animal bites. People who will be working with or around animals (such as veterinarians, wildlife professionals, and researchers). People who are taking long trips or moving to Kenya Children, because they tend to play with animals, might not report bites, and are more likely to have animal bites on their head and neck. Rabies is sometimes borne by bats (which we may trap) or feral dogs. Caused by a viral infection of animals that can be transmitted to humans. It is caused by a virus of the Rhabdoviridae family, which attacks the central nervous system and eventually affects the brain. The virus is usually found in the saliva of an infected animal. Rabies is almost always fatal once symptoms occur. **Plan:** Vaccination is recommended only for those at high risk for animal bites, such as veterinarians and animal handlers, and for long-term travellers who may have frequent contact with animals and may not have access to medical care. Course participants are at low risk. If someone elects to have the expensive vaccine, the complete pre-exposure series consists of three doses of vaccine injected into the deltoid muscle on days 0, 7, and 21 or 28. Side-effects may include pain at the injection site, headache, nausea, abdominal pain, muscle aches, dizziness, or allergic reactions. Any mammal bite or scratch will be thoroughly cleaned with large amounts of soap and water and local health authorities contacted immediately for possible post-exposure treatment, whether or not the person has been immunized against rabies. We carry a satellite phone at all times in case of emergency.

**Hazard:** Insect-borne diseases. **Risk:** Malaria is present in all areas (including game parks) at altitudes and other insect-borne diseases are common. **Plan:** All diseases: We will work to minimize insect bites by remaining in screened areas when possible (recognizing that this is an outdoor based field course), wearing light clothing with full-length sleeves, and using DEET based insect repellent (30% recommended). Malaria: Local Plasmodium species are resistant to chloroquine. Malaria species present are: *P. falciparum* >85%, *P. vivax* 5%–10%, *P. ovale* rare. Recommended chemoprophylaxis for malaria in Kenya: Atovaquone-proguanil, doxycycline, or mefloquine. If symptoms arise – immediate evacuation to appropriate medical facilities (satellite phone is available to call ahead). For dengue from the CDC: "There is no specific medication for treatment of a dengue infection. Persons who think they have dengue should use analgesics (pain relievers) with acetaminophen and avoid those containing ibuprofen, Naproxen, aspirin or aspirin containing drugs. They should also rest, drink plenty of fluids to prevent dehydration, avoid mosquito bites while febrile and consult a physician. As with dengue, there is no specific medication for *Dengue Haemorrhagic Fever* (DHF). If a clinical diagnosis is made early, a health care provider can effectively treat DHF using fluid replacement therapy. Adequately management of DHF generally requires hospitalization." *Leishmaniasis:* No vaccines or drugs to prevent infections by Leishmania parasites. From the World Health Organization: "In visceral leishmaniasis, diagnosis is made by combining clinical signs with parasitological, or serological tests (such as rapid diagnostic tests). In cutaneous and mucocutaneous leishmaniasis serological tests have limited value and clinical manifestation with parasitological tests confirms the diagnosis. The treatment of leishmaniasis depends on several factors including type of disease, concomitant pathologies, parasite species and geographic location. Leishmaniasis is a treatable and curable disease, which requires an immunocompetent system because medicines will not get rid of the parasite from the body, thus the risk of relapse if immunosuppression occurs. All patients diagnosed as with visceral leishmaniasis require prompt and complete treatment." *West Nile.* From the CDC: "No vaccine or specific antiviral treatments for West Nile virus infection are available. Over-the-counter pain relievers can be used to reduce fever and relieve some symptoms. In severe cases, patients often need to be hospitalized to receive supportive treatment, such as intravenous fluids, pain medication, and nursing care." *Zika:* From the CDC "Because Zika virus is primarily spread by mosquitoes, CDC recommends that travelers to Kenya protect themselves from mosquito bites. The mosquitoes that spread Zika usually do not live at elevations above 6,500 feet (2,000

	<p>meters) because of environmental conditions. Travelers whose itineraries are limited to areas above this elevation are at minimal risk of getting Zika from a mosquito. Generally the best way for travellers to prevent infection is to protect themselves from sand fly bites using appropriate protective clothing and repellent. Because Zika can be sexually transmitted use of a condom is recommended.</p>
(f) Sleeping, washroom & laundry facilities	<p>Students typically will stay in communal dorms or hotel rooms with beds. Bedding may be provided. For field camps tents will be provided as well as foam pads, but students should bring sleeping bags rate to zero. We will not have access to washing machines and students should bring a small amount of clothes detergent so that they may do hand washing. Typically we will have access to flush toilets and showers. However, in field camps, we will use 'field toilets' (e.g. holes in the ground with perhaps some amenities for privacy) and field showers.</p>
(g) Meal plans & food allergies	<p>Typically food will be provided by an excursion company that we have worked with many times before, with occasional restaurant visits or opportunities to purchase snacks on the road. Most food needs can be accommodated although for some who have severe food allergies our camp kitchen may not easily be able to accommodate them.</p>
(h) Non-academic responsibilities	<p>Students are responsible for keeping their sleeping and communal areas clean, for assisting with packing up the trucks, for putting up and taking down tents when needed, caring for field equipment and books, and bussing their dishes at the end of each meal.</p>
(i) Degree of isolation	<p>We will always have vehicles in case we need to evacuate. The instructor will carry a large field first aid kit, and bring a satellite phone with him. Cell signal is generally quite good but may be spotty at some sites. Internet, even when available, is usually frustratingly slow and sometimes simply unusable. In most cases, even when we are physically isolated there are small villages or park offices within a short drive.</p>
(j) Alcohol & drugs	<p>Alcohol consumption is discouraged at field stations. There will be some opportunities at local restaurants for responsible consumption of alcoholic beverages. Marijuana is illegal in Kenya. I am told that Kenyan prisons are not for the faint of heart.</p>
(k) Vaccinations/ Insurances	<p>All students should have up-to-date routine vaccinations, including tetanus. Typhoid and hepatitis vaccinations are strongly recommended. Proof of a yellow fever vaccination is required. Malaria prophylaxis is mandatory, and you must decide on which drug to use in consultation with your doctor or medical professional. Rabies vaccines should not be necessary. We will purchase travel medical insurance for all participants.</p>
(l) Social Situations	<p>We will be together for two weeks, living in close quarters most of the time, and working together on group projects and field exercises. We will also work closely with employees of a Kenyan excursion company and enjoy insights from Kenyan students and lecturers. We work to create a safe and respectful environment for all despite differences in personality, background, and culture, and expect this of our students. Many parts of Kenya are culturally conservative and apparel must respect this – with no bare shoulders or midriffs, and skirts and pants that extend past the knees.</p>
(m) Final comments	<p>I have been teaching of field courses in Kenya since the 1990s and it is one of my favourite places in the world - culturally and with respect to its biota. While it has had challenges with such things as poverty, political unrest, and poaching, it is also a wonderfully diverse and welcoming country. Most of the students who have taken courses here consider them to be the pinnacle of their undergraduate careers and in many instances, life changing.</p>