EARTHWATCH INSTITUTE

EARTHWATCH 2017

ELEPHANTS AND SUSTAINABLE AGRICULTURE IN KENYA

DEAR EARTHWATCHER,

Welcome to the Elephants and Sustainable Agriculture in Kenya expedition! We have a dynamic, interesting, and knowledgeable team of Kenyan and US based researchers and field staff. We operate in a wildlife corridor between Tsavo East and Tsavo West National Parks. The mix of grassland, savanna, Acacia-Commiphora dryland forest and several seasonal rivers and water pans in this region create a vital habitat for an amazing assemblage of wildlife. Juxtaposed in this biodiverse region is a growing human population reliant upon its natural resources and agriculture for livelihood, sustenance, and income.

African elephants are an important ecological and economic force in this region. Elephants create and maintain critical resources for other species, thus befitting their moniker as ecosystem engineers. Elephants also serve as an appealing attraction for tourism, which brings revenue from more developed countries to this area. However, they are a wide-ranging species and the ever-expanding human settlements and agriculture continues to constrict their ranges and block their migration paths, resulting in perennial human-elephant conflicts. This conflict is pronounced when elephants raid farms and destroy crops, putting rural farmers' lives and livelihoods in jeopardy.

Our project strives to improve these farmers' livelihoods and find harmony between them and the wildlife with which they share this ecosystem. We aspire to do this mainly by seeking ways of averting or reducing human-elephant conflicts and implementing climate-smart agricultural practices. As a core member of our team, you will facilitate in actualizing this harmony. We are fortunate to have Wildlife Works as a partner in our Earthwatch project. Wildlife Works has been conserving biodiversity in this ecosystem for nearly 20 years, more recently by tapping into the carbon markets through reducing land use-based greenhouse gas emissions under the UNFCCC's REDD+ scheme. Thus, you will be living and working within an exciting, avant-garde environment conservation initiative that strives to achieve the noble, elusive goal of truly mutually-beneficial and sustainable coexistence of humans and wildlife.

We trust you are equal to this challenge, and look forward to welcoming you to Kenya and Tsavo, the land of the red elephants.

Karibuni sana!!

Bruce Schulte
Mwangi Githiru
Urbanus Mutwiwa
Earthwatch Scientists

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ELEPHANTS AND SUSTAINABLE AGRICULTURE IN KENYA

EARTHWATCH SCIENTISTS

Bruce A Schulte, Western Kentucky University

Mwangi Githiru, Wildlife Works

Urbanus Mutwiwa, Jomo Kenyatta University of Agriculture and Technology

RESEARCH SITE

Kasigau Corridor REDD+ Project Area and the Tsavo Conservation Area, SE Kenya

EXPEDITION DATES

Team 1: Jun. 17–30, 2017

Team 2: Jul. 2–15, 2017

Team 3: Aug. 16–29, 2017

Team 4: Sep. 1–14, 2017

Team 5: Oct. 16–29, 2017

Team 6: Nov. 1–14, 2017

TRIP PLANNER

ELEPHANTS AND SUSTAINABLE AGRICULTURE IN KENYA

TRIP PLANNER

IMMEDIATELY

- ❑ Make sure you understand and agree to Earthwatch's **Terms and Conditions** and the **Participant Code of Conduct.**
- ❑ If you plan to purchase additional travel insurance, note that some policies require purchase when your expedition is booked.

90 DAYS PRIOR TO EXPEDITION

- ❑ Log in at **earthwatch.org** to complete your volunteer forms.
- ❑ Pay any outstanding balance for your expedition.
- ❑ Book travel arrangements (see the Travel Planning section for details).
- ❑ If traveling internationally, make sure your passport is current and, if necessary, obtain a visa for your destination country.

60 DAYS PRIOR TO EXPEDITION

- ❑ Make sure you have all the necessary vaccinations for your project site.
- ❑ Review the Packing Checklist to make sure you have all the clothing, personal supplies and equipment needed.

30 DAYS PRIOR TO EXPEDITION

- ❑ Leave the Earthwatch 24-hour helpline number with a relative or friend.
- ❑ Leave copies of your passport, visa, and airline tickets with a relative or friend.

Read this expedition briefing thoroughly. It provides the most accurate information available at the time of your Earthwatch scientist's project planning, and will likely answer any questions you have about the project. However, please also keep in mind that research requires improvisation, and you may need to be flexible. Research plans evolve in response to new findings, as well as to unpredictable factors such as weather, equipment failure,and travel challenges. To enjoy your expedition to the fullest, remember to expect the unexpected, be tolerant of repetitive tasks, and try to find humor in difficult situations. If there are any major changes in the research plan or field logistics, Earthwatch will make every effort to keep you well informed before you go into the field.

THE RESEARCH

ELEPHANTS AND SUSTAINABLE AGRICULTURE IN KENYA

THE STORY

The African elephant (*Loxodanta africana*), the largest land mammal on earth, is a majestic flagship species for conservation in Africa, and has a vital role as an "ecosystem engineer," (which simply means that it creates and maintains critical habitats for other species). It is a wide-ranging species that covers vast tracts of land every year in search of food, water and mating partners. This inevitably puts it on a collision path with humans in competition for limited space and natural resources. Indeed, in many parts of sub-Saharan Africa, elephants sometimes eat or damage farmers' crops and property, resulting in human-elephant conflict or "HEC" (Hoare, 1999; Naughton et al., 1999; Osborn and Parker, 2003; Mackenzie and Ahabyona 2012). This situation is actively playing out in the Tsavo Conservation Area, southeast Kenya, which is why it was selected as the setting for testing the ideas presented in this Earthwatch project.

By the year 2050, humans will need to increase agricultural production by 70 percent to meet the demands of a growing population (Godfray et al. 2010; Alexandratos and Bruinsma 2012). Besides, climate change—manifested through extreme and often unpredictable weather events—poses additional threats to agriculture production in many parts of the world, including sub-Saharan Africa. Achieving this increase in production in the midst of today's rapidly changing climate is unlikely without transforming agricultural practices. In some parts of the world, scientists have begun to implement Climate-Smart Agriculture (or CSA), which involves reducing pesticide and herbicide use, planting new crops or crop varieties that are more resilient to a changing climate, agroforestry, and improving soil, land, and water management systems. These methods not only help to protect farmers' livelihoods, they also promote biodiversity and have important associated conservation benefits.

In this project, we employ an interdisciplinary approach to help find a way in which wildlife conservation and rural farmer livelihoods can both thrive in this dryland ecosystem in the face of growing human needs and a changing climate. In addition to promoting sustainable agriculture, this project will test the effect of various "repellents" on elephants, in an effort to keep them away from farmers' crop fields. Scientists have found that simple repellents such as chili peppers and beehives (which have the added benefit of producing a useable product such as peppers or honey) may help to deter elephants from entering crop fields (Parker and Osborn 2006; King et al. 2009). This study will examine some of these and other methods to reduce crop raiding and ensure that humans and elephants can peacefully coexist in this delicate ecosystem.

RESEARCH AIMS

This is a multidisciplinary project that sets to explore pragmatic means by which the harmonious coexistence of elephants and people can be achieved in the face of growing populations and a changing climate. Through Climate-Smart Agriculture, a combination of traditional and cutting-edge practices that simultaneously enhance biodiversity conservation and farm productivity will be trialled and, when successful, promoted. Climate-Smart Agriculture will involve a combination of a broad array of tactics and easily-accessible technology, including reduction in pesticide or herbicide use, integrated pest management approaches, agroforestry, new crops, crop varieties and cropping systems, and soil, land, and water management systems. These practices are deemed vital for enhancing resilience of farms to climate change shocks, as well as increasing biodiversity across the landscapes thereby delivering on multiple functions. A major outcome of the project is therefore to establish productive and sustainable farming systems that will have tangible biodiversity benefits, mainly through habitat creation and a reduction in conflicts.

Ultimately, the project hopes to enhance the conservation of elephants and other wide-ranging species (especially large carnivores) by reducing the pressure to convert the dryland forest on this critical wildlife corridor into farmland. Additionally, the project is a mitigation and adaptation measure for these rural farmers who depend on rainfed agriculture against climate change, thereby building resilience into their livelihoods. Given the prevalence of these dual problems—climate change and human-elephant conflicts—in Kenya and other parts of sub-Saharan Africa, the results from this study will also be shared with local, national and international stakeholders, so they can help inform broader agriculture and human-wildlife conflict policies and actions.

HOW YOU WILL HELP

As an Earthwatch volunteer, you will be mainly involved in three broad activities: wildlife surveys (within ranches), habitat monitoring (inside and outside ranches) and farm-based monitoring (outside ranches).

For wildlife surveys, you will be largely undertaking road transects (mainly counting large mammals and birds), conducting behavioral observations of elephants, and building an elephant identification database based on mugshots of as many elephants/ elephant groups encountered as possible; thus, you will remain within ranches and on the vehicle most of the time.

For habitat monitoring, you will be primarily measuring trees in the agricultural landscape and measuring the impact of elephants on natural vegetation around waterholes. For tree monitoring, vehicles will bring your team close to the area with tagged trees and you work in a group in that area, always near the vehicle, before driving to the next area. Similarly, for the waterhole monitoring, the vehicle will bring you to the waterhole and you'll walk along the 1km transect radiating from the waterhole into the dryland forest sampling trees on plots every 200m. You will be always accompanied by a Wildlife Works ranger and experienced field staff.

For the farm-based monitoring, again, the vehicle will bring you to the farm or the closest point possible. In this case, there might be some walking to get to some farms (typically less than a couple of kilometers from the drop off point at most), as well as walking around the farm undertaking various activities. Main activities will include making a detailed description of the crops on the farm, any deterrents in-place for repelling wildlife, setting up and checking camera traps, and during the harvesting season, estimating crop yields. You might also be involved in taking soil samples for analyses of organic matter content, to help check whether Climate-smart Agriculture does indeed help with carbon sequestration in the long-term. For this, you will be accompanied by local field staff as well as Kenyan members of the volunteer teams for ease of communication and to avert misunderstandings.

Some of the regular activities that will take place on all (or almost all) volunteer teams include:

(1) Biodiversity and habitat surveys

a. Road transects counting large mammals and birds
b. Building the elephant identification database, and taking behavioral observations of specific elephant groups
c. Vegetation monitoring along transects radiating from waterholes

(2) Monitoring of large, indigenous trees in the agricultural matrix (Remote Sensing/GIS involved)

a. Making observations of their use by various taxa
b. Plant richness around the large indigenous trees
c. Inspecting them for damage by elephants
d. Checking on trees protected by wire and expanding the number of trees so protected

(3) Farm-based surveys

a. Taking various farm/crop-related measurements
b. Collecting and processing photographic records from camera traps
c. Soil sampling
d. Volunteers may also have an opportunity to assist with annual household surveys involving administering a questionnaire that addresses various key livelihood components that help determine socio-economic status of the households (quality of life), including food security and income diversification, as well as assessing potential conflicts with elephants (and other wildlife).

DAILY LIFE IN THE FIELD

PLANS FOR YOUR TEAM

DAILY ACTIVITIES

We envision volunteers being involved in data collection in the field for about 6-8 hours per day inclusive of travel times, with another 1-2 hours possible for other activities in the camp including training, training evaluation, data inspection, and data entry/cleaning. It is worth emphasising that transit time to study locations will involve drives through the ranch with many opportunities for wildlife sightings. Additionally, there will be time for enjoying wildlife as part of the overall experience, time conversing with staff and local people, and the unavoidable time waiting for elephants!

ITINERARY & DAILY SCHEDULE

TYPICAL RANCH (WILDLIFE / WATERHOLE TRANSECTS) DAY:

6:00–7:00 a.m.: Breakfast & Briefing

7:00 a.m.–12:00 p.m.: Fieldwork (including travel back to camp)

12:00 p.m. –2:00 p.m.: Lunch & Rest (often back at camp)

2:00–3:30 p.m.: Data entry, Briefings, Lectures, Films etc.

3:30–6:00 p.m.: Fieldwork (including travel back to camp)

7:00–10:00 p.m.: Dinner & Downtime

TYPICAL COMMUNITY (ON-FARM / LARGE TREES) DAY:

6:00–7:00 a.m.: Breakfast & Briefing

7:00 a.m.–12:00 p.m.: Fieldwork

12:00–1:30 p.m.: Lunch & Rest (on-site)

1:**30–4:30 p.m.:** Fieldwork (including travel back to camp)

4:30–6:00 p.m.: Data entry, Briefings, Lectures, Films etc.

7:00–10:00 p.m.: Dinner & Downtime

ACCOMMODATIONS AND FOOD

ABOUT YOUR HOME IN THE FIELD

SLEEPING

Accommodation will be provided at Kivuli Camp. Kivuli Camp is located at the heart of Rukinga Wildlife Sanctuary, one of the seven ranches that constitute the Tsavo Conservancy and the first ranch to be certified on the REDD+ carbon scheme. Volunteers will stay in dormitory rooms at the camp. These thatched huts contain four wild wood bunk beds with bedding and mosquito netting provided; bedding is changed for you periodically. Each room will have a maximum of two people sharing.

BATHROOM

There are communal flushing toilets and showers when using the Dormitory Bandas (separate for ladies and gents); there is generally no hot water at Kivuli Camp, but given the warm weather a cooler shower is a welcomed refresher!"

ELECTRICITY

There is no regular electricity at Kivuli Camp. Power is through a combination of generator and solar. It is recommended that you leave electrical equipment that requires a lot of energy (like hair dryers) at home to help conserve energy, or only use them when the generator is on. The generator is typically on briefly in the morning for about 2 hours and for about 4-5 hours in the evening.

INTERNET AND COMMUNICATIONS

There is phone connectivity at the Camp, but it can be sporadic. There is limited internet access on Kivuli Camp, which is largely restricted to connection via mobile phones in select spots across the camp. However, there is more reliable internet (using Vsat technology) at the neighboring Wildlife Works Research Camp (200m away across an airstrip), which the volunteers and researchers will be welcome to use during their free time for essential communication. Heavy streaming can slow the internet and is not permitted as the internet is also used for work by Wildlife Works employees.

FACILITIES AND AMENITIES

The Camp's setting affords you utmost privacy and tranquillity; all you hear at night is the sound of the wild: elephants, hyenas, nightjars, plovers and the occasional lion; morning is announced by a swell of bird calls. You will also experience the real African bush, and explore the fauna and flora up close whilst on bush walks or enjoy the beautiful sunset on top of one of the hills on the ranch. There is also a football (soccer) pitch where you can unwind after work with a kickaround (it can get very competitive out there!)

DISTANCE TO THE FIELD SITE

For both the activities within the ranch and on farms, the maximum distance any team will have to travel from the camp is about 30km (ca 20 mi). Most farms, large trees, transects and waterholes will be about 10–20km away. However, actual travel times will depend on both the wildlife encountered along the way and the terrain; average speeds in this terrain rarely reach 40km/hr (25mi/hr).

FOOD AND WATER

There are dedicated cooks and service providers at Kivuli Camp. The volunteers might be asked to assist in basic activities such as bringing their plates back to the kitchen and tidying up. When doing community work or wildlife research in areas that renders it difficult to return for lunch, snacks and lunch bags will be prepared for the volunteers and lunch will be eaten in the field.

It is generally not recommended to eat at very local restaurants without advice from the local field staff or Kenyan volunteers. You can however eat out in Voi during your recreational time, and the field staff will be more than happy to guide you about the best places to go.

TYPICAL MEALS

BREAKFAST:	Tea, Coffee, Milk, Hot chocolate, Bread (with jam and butter), Cereals, Eggs, Yoghurt, Sausages, Pancakes, Assorted fruits
LUNCHES AND DINNERS:	Rice, Pasta, Potatoes, Chapati, Ugali (typical food akin to thick porridge made from maize flour), Meat (Beef, Mutton, Chicken and occasional Fish), Lentils, Beans, Peas, Cow-peas, Cabbage, Kale, Spinach, French beans, Carrots, Capsicum, Tomatoes, Onions, in-season including Mango, Oranges, Avocado, Bananas, Passion fruit, Watermelon
BEVERAGES:	For drinking, there are several dispensers around camp dispensing treated water bought from licensed and certified companies in Kenya.

SPECIAL DIETARY REQUIREMENTS

Please alert Earthwatch to any special dietary requirements (e.g., diabetes, lactose intolerance, nut or other food allergies, vegetarian or vegan diets) as soon as possible, and note them in the space provided on your volunteer forms. The camp can accommodate special diets, such as vegetarian and gluten-free as long as they are informed in advance. Vegan diets are hard to accommodate.

TRAVEL TIPS

SUGGESTIONS FOR THE ROAD

Your drive from Nairobi to Rukinga will be a fairly pleasant 7–8 hour road-trip in total, in which you'll be introduced to many different habitats in Kenya, from a relatively high altitude in Nairobi (at 1800m, or close to 6000 ft a.s.l.) to about 600m (c2000ft) a.s.l. at Voi. There might be some wildlife as you leave Nairobi and after the likely lunch spot at Mtito Andei, as well as numerous small towns and centres.

YOUR DESTINATION

LANGUAGE: Swahili, English

TIME ZONE: This timezone does not apply the Daylight Saving Time (DST) scheme—it uses standard time throughout the year. The offset to Universal Time (UTC, GMT or Zulu) is +3:00 hours.

ELECTRICITY/POWER: Electrical sockets (outlets) in Kenya usually supply electricity at between 220 and 240 volts AC. The standard frequency is 50 Hz. The power sockets that are used are of "Type G" or British BS-1363 type. If your appliance's plug doesn't match the shape of these sockets, you will need a travel plug adapter in order to plug in. Travel plug adapters simply change the shape of your appliance's plug to match whatever type of socket you need to plug into. They are NOT converters. If the standard voltage in your country is in the range of 100V-127V (as in the US, Canada and most South American countries), you may need a power (voltage) converter. To be sure, check the label on the appliance. If it states 'INPUT: 100-240V, 50/60 Hz', it can be used in all countries of the world, e.g., chargers for tablets/laptops, photo cameras, cell phones, toothbrushes.

MONEY MATTERS

LOCAL CURRENCY: Kenyan Shillings

PERSONAL FUNDS: It is recommended to convert the equivalent of about 200–300 USD to Kenyan Shillings before you arrive for personal expenditures and spending money. If you plan to stay in Nairobi for extra days, you may need a bit more.

PASSPORTS AND VISAS

Passport and visa requirements are subject to change. Check with your travel advisor, embassy or consulate in your home country for requirements specific to your circumstances. Generally, passports must be valid for at least six months from the date of entry and a return ticket is required.

CITIZENSHIP	PASSPORT REQUIRED?	VISA REQUIRED?
United States	Yes	Yes
United Kingdom	Yes	Yes
Europe	Yes	Yes*
Australia	Yes	Yes
Japan	Yes	Yes

*Nationals of Cyprus exempt

If a visa is required, participants should apply for a TOURIST visa. Please note that obtaining a visa can take weeks or even months. We strongly recommend using a visa agency, which can both expedite and simplify the process.

As of July 1, 2015 you can apply for a Kenyan visa on the eCitizen website. The electronic system is now fully in place, but it will still be possible to purchase a visa upon arrival at the airport in Nairobi for $50. Volunteers can use either method to acquire their visa.

CONTACT INFORMATION

You may be required to list the following contact information on your visa application and immigration form, or if your luggage does not make it to baggage claim at your destination:

Kivuli Camp
Rukinga Wildlife Sanctuary
P.O. Box 310-80300
Voi, KENYA
T: +254 (0)719 159671
E: **bookings@tsavoconservancy.com**

PROJECT CONDITIONS

THE FIELD ENVIRONMENT

The information below is as accurate as possible, but conditions are subject to change.

The Tsavo ecosystem is located southeast of Kenya and is classified as an Arid-and-semi-arid Land (ASAL). It is hot during the day, and although it cools off at night, it typically remains above 20°C/68°F. The climate does not vary very much throughout the year, apart from cooling off slightly in July–August. Although, there are two rainy seasons, one between October and December and the other from March to May, rainfall is erratic and low and natural permanent water sources are very limited. There are three major vegetation types in the Tsavo ecosystem: Mixed Acacia- Commiphora woodlands, open grassland/savannas, and riparian/riverine vegetation.

GENERAL CONDITIONS

HUMIDITY: 40% to 90 %
TEMPERATURE RANGE: 68°F–100°F(20°C–38°C)
ALTITUDE: 656–3281 ft (200m to 1000m a.s.l.)
ANNUAL RAINFALL: 7.8–31.5 in (200mm to 800mm)

The physical demands of the work could be described as 3–7 on a scale of 10, being higher for on-farm related activities. The work will consist of some long days (early mornings and late evenings), working in hot sun, driving around bumpy terrain, walking up and down farms, construction of fences for beehives or chili pepper, and some digging for soil sampling. None of this should be too much for a modestly fit individual, and with the right preparation (e.g., re-hydration, sun screen, clothing and footwear).

ESSENTIAL ELIGIBILITY REQUIREMENTS

All participants must be able to:

- Follow verbal and/or visual instructions independently or with the assistance of a companion
- Carry personal daily supplies such as water, cameras, cameras traps, binoculars and other small field equipment
- Enjoy being outdoors all day in all types of weather, including rain, heat, and humidity, in the potential presence of insects, snakes, and other wild animals
- Hike up to one kilometer per day over uneven terrain while carrying about 5-10kg of equipment
- Collect data (images, samples, etc.) and search for animal signs (scat, tracks) on the ground while moving over uneven terrain and steering clear of obstacles such as animal holes and sharp branches
- Get low enough to the ground for extended periods of time to measure plants, collect samples, and access camera traps
- Get up into and down out of a four-wheel-drive vehicle, minibus, or car and ride seated with seatbelt fastened
- Ride, seated, for extended periods (up to three hours a day) in a four-wheel-drive vehicle in tight quarters. Much of the research will be conducted from the project vehicles, with the exception of the lion kill-site work
- Be alert and ready to take evasive action (running quickly, returning to the project vehicle, lying flat on the ground, depending on the situation) if the guard/ranger advises it (e.g. if there is dangerous wildlife close by)

POTENTIAL HAZARDS

ELEPHANTS AND SUSTAINABLE AGRICULTURE IN KENYA

HAZARD TYPE	ASSOCIATED RISKS AND PRECAUTIONS
Climate/ Weather	Dehydration, heat exhaustion, sunburn, and other heat-related illnesses can occur, but you can protect yourself by drinking sufficient water, wearing high-SPF sunscreen, and wearing appropriate clothing and hats. Dehydration from sweating can be a problem; please bring your own water bottles that you can easily carry and refill them with water and/or electrolyte-replacing packets.
Transport	Teams may encounter several road hazards, including large trucks, potholes, livestock and wildlife, rain/mud, dust, and/or poorly maintained tarmac or dirt/gravel (corrugated) roads. Only qualified drivers will transport volunteers in project vehicles. You must wear your seatbelt and always stay seated when vehicles are in motion. Volunteers are not permitted to drive.
Terrain	The terrain of the Tsavo ecosystem is mostly flat and undulating with acacia and Commiphora trees, various types of grasses, dirt and rock, with uneven areas. There are sometimes fields or paths on the farmland.
Behavior on agricultural land	Wear modest clothing and appropriate footwear, including hiking boots with ankle support, while conducting research on farmland. You will walk and work in only designated areas after receiving permission to do so. Avoid stepping on crops, and maintain awareness of your surroundings at all times. Your team will be instructed on appropriate behavior within the ranches. It is advised to always ask permission before taking photographs, and enter areas that are prescribed research areas only. Do not enter any private land or buildings that are not part of the research activities.
Wildlife—large mammals	Once in the field, you will be briefed on the necessary precautions associated with living and working in the midst of a wilderness area, particularly when walking in the open bush. You will receive a practical demonstration of bush ethics and safety during the safety briefing at the start of the expedition. Abide by the "go" and "no go" areas and never go anywhere alone. Remain alert while in the field and follow all instructions related to field communication, following distance, the use of hand-held radios, and responding to wildlife in close proximity. You must heed staff instructions and adhere to project rules and protocols at all times. The major large mammal threats will be in the form of elephants, buffaloes and big cats.
Wildlife—snakes	Kenya is home to many snake species, including both venomous and non-venomous snakes. The majority are non-venomous, but the main poisonous species of concern are black and green mambas, spitting cobras (brown, black-necked, and red spitting cobras; forest, Egyptian cobra), puff adders, and boomslang. You should watch where you walk; avoid reaching into the grass without seeing where your hand is being placed; check dark, moist, cool areas; be careful unfolding materials or equipment that has been stored and always heed staff instructions. Wear appropriate closed toed footwear in the field at all times.
Insects	Stinging and biting insects, such as ticks, bees, scorpions and mosquitoes are present in the region. Insect-borne diseases, such as chloroquine resistant malaria, Dengue, African tick fever, Rift Valley fever, filariasis, leishmaniasis, onchocerciasis (river blindness), African sleeping sickness, and yellow fever are also present. Speak with your physician about malarial prophylaxis prior to fielding. If you have allergies to insect bites, bring appropriate medications (e.g. antihistamines, or at least two Epi-pens if your allergy is severe). Take precautions to avoid bites/stings by wearing appropriate clothing (long sleeves and long pants), and using mosquito nets and insect repellant.
Personal	There is security at the Rukinga Wildlife Sanctuary project site, but avoid areas designated as off limits by project field staff.In Nairobi, as in many large cities, robbery and violent crime are serious issues. It is wise to take sensible precautions: travel through the city in pairs or groups, avoid displays of money or valuables, take taxis, and avoid traveling alone, especially when going out at night. Terrorism is also an ongoing threat in Kenya; bomb attacks have occurred in Nairobi and the Mombasa region in 2013 and 2015. Exercise caution and always be vigilant especially in major cities, and avoid travel near border regions with Somalia, South Sudan, and Ethiopia.
Diseases	Diseases found in Kenya are hepatitis, rabies, HIV/AIDS, polio, tuberculosis, meningitis, measles, cholera, plague, typhoid, malaria, dengue fever, filariasis, leishmaniasis, onchocerciasis, African tick bite fever, trypanosomiasis, schistosomiasis, and tuberculosis. Traveler's diarrhea also affects many international travelers. You can decrease your risk of many diseases by avoiding mosquito bites, practicing good hygiene, and drinking only potable, bottled or filtered water when appropriate. Please see the CDC (cdc.gov) or WHO (who.int) websites for more information on these conditions and how to avoid them or consult with a travel doctor. If you feel ill once you return from your trip, make sure you inform your doctor that you have recently returned from a tropical region.

SAFETY

HEALTH INFORMATION

PROJECT VACCINATIONS

REQUIRED: If traveling from countries or region where yellow fever is endemic, you must have a certificate of vaccination.

RECOMMENDED FOR HEALTH REASONS: Typhoid, Hepatitis A, Hepatitis B, Rabies

EMERGENCIES IN THE FIELD

For emergency assistance in the field, please contact Earthwatch's 24-hour emergency hotline number on the last page of this briefing. Earthwatch is available to assist you 24 hours a day, 7 days a week; someone is always on call to respond to messages that come into our live answering service.

IMMUNIZATIONS

Please be sure your routine immunizations are up-to-date (for example: diphtheria, pertussis, tetanus, polio, measles, mumps, rubella and varicella). Medical decisions are the responsibility of each volunteer and his or her doctor, and the following are recommendations only. Visit the Healix Travel Oracle website through the "Travel Assistance and Advice" page in your Earthwatch portal, **cdc.gov** or **who.int** for guidance on immunizations.

EXPEDITION PACKING LIST

WHAT TO BRING

EXPEDITION PACKING CHECKLIST

GENERAL

- ❑ This expedition briefing
- ❑ Your travel plans, rendezvous details, and Earthwatch's emergency contact information
- ❑ Photocopies of your passport, flight itinerary, and credit cards in case the originals are lost or stolen; the copies should be packed separately from the original documents
- ❑ Passport and/or visa (if necessary)
- ❑ Certification of vaccination (if necessary)
- ❑ Documentation for travel by minors (if necessary)

CLOTHING/FOOTWEAR FOR FIELDWORK

- ❑ Earthwatch T-shirt
- ❑ Dull, earth-toned colors (i.e. khaki or dark green) are required for all field clothing
- ❑ Lightweight, quick-drying, long-sleeved shirts (earth-toned)
- ❑ Lightweight trousers (earth-toned)
- ❑ Warm clothes for cool evenings and mornings (light sweater/jumper/fleece, warm jackets, and/or thermals)
- ❑ Wind-breaker and perhaps a light scarf for early mornings and late afternoons on the back of the open game drive vehicles
- ❑ T-shirts
- ❑ Shorts
- ❑ Well worn-in, comfortable, sturdy hiking boots with ankle support (do NOT bring brand new boots)
- ❑ Socks
- ❑ Light rain wear (poncho or coat)
- ❑ Hat with wide brim to protect against sun

CLOTHING/FOOTWEAR FOR LEISURE

- ❑ Two sets of clothing to keep clean for end of expedition and for the recreation day
- ❑ Sandals to wear around camp
- ❑ Comfortable closed toe shoes for evenings in camp

FIELD SUPPLIES

- ❑ Small daypack
- ❑ Insect repellent
- ❑ Water bottle(s) able to hold at least two liters
- ❑ A pair of binoculars (10 x 42 recommended) for wildlife viewing and for use during fieldwork
- ❑ Flashlight/torch or headlamp with extra batteries and extra bulb
- ❑ Mechanical/click pencils for data recording
- ❑ One 20-pack or one 24-pack of AA batteries for the GPS units, preferably Duracell or other leading brand

BEDDING AND BATHING

NOTE: Mattress, fitted sheets, and pillows will be provided by the project

- ❑ Sheet bag (optional, but useful)
- ❑ Towel

PERSONAL SUPPLIES

- ❑ Personal toiletries (biodegradable soaps and shampoos are encouraged)
- ❑ Antibacterial wipes or lotion (good for cleaning hands while in the field)
- ❑ Personal first aid kit (e.g., anti-diarrhea pills, antibiotics, antiseptic, itch-relief, pain reliever, bandages, blister covers, etc.) and medications
- ❑ Spending money
- ❑ Sunscreen lotion with SPF 30 or higher

EXPEDITION PACKING CHECKLIST

OPTIONAL ITEMS

- ❑ Travel guide
- ❑ Adaptor if your electronic equipment requires charging
- ❑ Mosquito net
- ❑ Pocket knife (be sure to pack in checked luggage)
- ❑ Musical instrument
- ❑ Sunglasses (these should not be worn during the transect as they may impair your ability to spot the animals)
- ❑ Swimsuit for recreational time
- ❑ Favorite snack foods
- ❑ Gifts for the school (e.g. calculators, science kits, DVD players, simple stationery, educational games, toys, books, atlases, teaching aids, etc.)
- ❑ Gatorade or similar energy drink mix
- ❑ Extra batteries for the GPS units make a great donation to the project and are much appreciated—batteries are expensive in Africa
- ❑ Camera, film or memory card(s), extra camera battery
- ❑ Hardware for sharing digital photographs at the end of the expedition
- ❑ Dry bag or plastic sealable bags (e.g. Ziploc) to protect equipment like cameras from dust, humidity, and water
- ❑ Books, games, art supplies, etc. for free time
- ❑ Earplugs for light sleepers

NOTE: Do not bring more luggage than you can carry and handle on your own. If traveling by air and checking your luggage, we advise you to pack an extra set of field clothing and personal essentials in your carry-on bag in case your luggage is lost or delayed.

PROJECT STAFF

YOUR RESOURCES IN THE FIELD

DR. BRUCE SCHULTE is the Department Head of Biology and Professor at Western Kentucky University. Bruce is studying human livelihoods, biodiversity, elephant behavior, and ecosystem functions in the Tsavo ecosystem in Kenya, in partnership with Wildlife Works. His efforts are helping to conserve the region and ensure that humans and wildlife maintain a mutually beneficial, sustainable relationship. He is from upstate New York and received his BSc in biology from the College of William and Mary. He obtained a MSc in marine biology from the University of Southern California and his doctorate from the State University of New York - College of Environmental Science and Forestry (SUNY-ESF). His doctoral work was on North American beaver, another ecosystem engineer. He has been studying elephants for over twenty years.

DR. MWANGI GITHIRU is the Director of Biodiversity and Social Monitoring at Wildlife Works, leading teams assessing environmental and social impacts of REDD+ projects in Africa. Prior to this, Mwangi worked for the Kenya Government in the Ministry of Science and Technology. He received his BSc. from Moi University (Wildlife Management), his MSc. from Kenyatta University (Animal Ecology) and D.Phil. from the University of Oxford (Conservation Biology) as a Rhodes Scholar, before completing a three-year post-doc at the University of Antwerp as a Marie Curie Fellow. He is also a Watson International Scholar of the Environment Fellow (Brown University), an Archbishop Tutu Leadership Programme Fellow and a Kinship Conservation Fellow. In addition to teaching in various universities and advising numerous student projects including formal supervision of several MSc and PhD theses, Mwangi has authored numerous publications spanning book chapters, technical reports, scholarly and popular articles on a wide array of environmental issues. Though mainly trained in ecology, he is very interested with issues at the intersection of science-policy-conservation-economics, across Government and non-governmental sectors, academia and the private sector.

DR. URBANUS N. MUTWIWA is a Senior Lecturer, Department of Biomechanical and Environmental Engineering, Jomo Kenyatta University of Agriculture and Technology. He holds a PhD and MSc in Horticultural Sciences (Dr. rer. Hort), specializing in Biosystems Engineering (Hannover University, Germany) and a BSc in Agricultural Engineering (JKUAT). He is registered with Engineers Board of Kenya and is a member of the Institution of Engineers of Kenya, Horticultural Association of Kenya as well as a registered Lead Expert EIA/EA with the National Environment Management Authority (Kenya). Dr. Mutwiwa lectures and supervises students both at undergraduate and postgraduate levels in agricultural structures, processing, and renewable energy. His research interests include controlled environment agriculture, value chain analysis, agro-processing and renewable energy systems. Dr. Mutwiwa has been working with communities to improve their household income and food security. Some of the projects he has been involved in include: Strengthening the Productivity and Competitive Position of Organized Smallholder Coffee Farmers in Kenya through the Implementation of a Quality Management Systems; strengthening the entrepreneurial skills of smallholder horticultural farmers (fresh beans and avocados value chains) in Central, Eastern and Rift Valley provinces. On climate change, he has been testing the usability of the Cool Farm Tool (CFT) to measure the carbon footprint of smallholder coffee cooperatives in Kenya. He has been involved in groups working on integrated watershed management in Kenya, Uganda and Tanzania. He has assessed the environmental impacts for projects in agro-processing and developed management plans to mitigate any negative impacts.

SIMON KASAINE is currently a research scientist at Wildlife Works Kenya, primarily assessing the social impacts of REDD+ projects in Kenya. Before moving back to Kenya from US, Kasaine worked as graduate assistant in Western Kentucky University (WKU) as caretaker of the Upper Green River Biological preserve in Kentucky and as graduate teaching assistant where he taught introductory biology labs for undergraduates. Previously also, he assisted graduate students from WKU in undertaking their academic fieldwork in Kenya. In Addition, he worked in hospitality industry as bar and restaurant manager at Base Camp, Maasai Mara Game Reserve. He earned his BSc. in Wildlife Management and Conservation from University of Nairobi and MSc. in Conservation Biology from Western Kentucky University, USA. His historical career path encompasses hospitality, biological and social.

MR. BERNARD AMAKOBE is a researcher at Wildlife Works [K] ltd in the Biodiversity and Social Monitoring department. He is tasked with overseeing transects for wildlife counts, managing camera traps for passive mammal monitoring and conducting ecological surveys on Mt. Kasigau through bird-banding to assess climate change and global warming. He at the same time doubles as the Coordinator of the Ringing Scheme of Eastern Africa. Previously, Amakobe worked with the National Museums of Kenya and Nature Kenya in various capacities as a technician on ornithological expeditions and Bird Activities Coordinator respectively. He is a holder of a Diploma in Natural Resource Management from Nairobi University, and through hard work and dedication, he graduated last year (2015) with a BSc. In Environment Natural Resource Management from Africa Nazarene University. He is currently an EDGE (Evolutionarily Distinct and Globally Endangered Species) Fellow, his focal species being the Secretarybird. The fellowship is facilitated by the Zoological Society of London (ZSL). His career cuts across conservation, biological research and also behavioural ecology. His main interests are conservation and restoration of rangeland ecosystems, bird conservation, eco-tourism (which he believes is a form of sustainable resource sharing) and writing of both popular and scientific papers.

MS. R. LYNN VON HAGEN is a MS student at Western Kentucky University (WKU) working with Dr. Bruce Schulte. Lynn has a BS in biology from Austin Peay State University in Tennessee. She has conducted research on the Louisiana water thrush and served as a wildlife care technician. She is a graduate teaching assistant at WKU. She is conducting her MS thesis research in conjunction with the goals of the Earthwatch project.

RECOMMENDED READING

YOUR RESOURCES AT HOME

RESOURCES

ARTICLES

- Chiyo PI, Moss CJ, Alberts SC. 2012. The influence of life history milestones and association networks on crop-raiding behavior in male African elephants. PLoS ONE 7(2): e31382. doi:10.1371/journal.pone.003138
- Derham KS, Henley MD, Schulte BA. 2016. Wire netting reduces African elephant (Loxodonta africana) impact to selected trees in South Africa. Koedoe, 58(1), a1327. **http://dx.doi. org/10.4102/koedoe. v58i1.1327**.
- Goodyear SE, Schulte BA. 2015. Habituation to auditory stimuli by captive African elephants (Loxodonta africana). Animal Behavior and Cognition 2, 292-312.
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- Ihwagi FW, Chira RM, Kironchi G, Vollrath F, Douglas-Hamilton I. 2012. Rainfall pattern and nutrient content influences on African elephants' debarking behaviour in Samburu and Buffalo Spring National Reserves, Kenya. African Journal of Ecology 50, 152-159.
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- Nasseri NA, McBrayer LA, Schulte BA. 2011. The impact of tree modification by African elephant (Loxodonta africana) on herpetofaunal species richness in northern Tanzania. African Journal of Ecology 49, 133-140. Note - Covered by BBC: **http://www.bbc.co.uk/news/science-environment-11607299**
- Pinter-Wollman N. 2012. Human-elephant conflict in Africa: The legal and political viability of translocations, wildlife corridors, and transfrontier parks for large mammal conservation. Journal of International Wildlife Law & Policy 15, 152-166.
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BOOKS

- Adams JS, McShane TO. 1997. The Myth of Wild Africa: Conservation without Illusion. University of California Press, Calif.
- Food and Agriculture Organization of the United Nations. 2013. Climate Smart Agriculture Sourcebook. (available online as a free download). See also: **https://ccafs.cgiar.org/climate-smart-agriculture-0#.V4PNmk0UWUk**
- Hume D, Murphree M (eds). 2001. African Wildlife & Livelihoods: The Promise and Performance of Community Conservation. Heinemann Press.
- Kangwana K. 1996. Study Elephants. African Wildlife Foundation Technical Handbook Series No. 7. African Wildlife Foundation (available as a pdf online).
- Mawere M. 2013. Environmental Conservation through Ubuntu and Other Emerging Perspectives. Langaa RPCIG, Cameroon.
- Moss CJ, Croze H, Lee PC. 2011. The Amboseli Elephant: A Long-Term Perspective on a Long-lived Mammal. University of Chicago Press, Chicago, USA.
- Nyasimi M, Amwata D, Hove L, Kinyangi J, Wamukoya G. 2014. Evidence of impact: Climate-smart agriculture in Africa. The Technical Centre for Agricultural and Rural Cooperation (CTA) and CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).
- Wilson EO. 2016. Half-Earth: Our Planet's Fight for Life. WW. Norton & Company, Inc. New York, NY.
- Wilson EO. 2003. The Future of Life. Vintage Press, Visalia, Calif.
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NOTE: The two Wilson books are similar.

RESOURCES

FIELD GUIDES

- Birnie A, Noad T. The Trees of Kenya: An Illustrated Field Guide. Zand Graphics, Kenya.
- Dharani N. 2006. Field Guide to Acacias of East Africa. Struik Publishers.
- Dharani N. 2011. Field Guide to Common Trees & Shrubs of East Africa. Struik Publishers.
- Estes, R. 1991. The Behavior Guide to African Mammals. Berkeley, CA: University of California Press. **NOTE**: Excellent for large mammal behavior.
- Lonely Planet Swahili Phrasebook, 5th edition. 2014. Lonely Planet.
- Sprawls S, Howell K, Drewes Rc. 2006. Reptiles and amphibians of East Africa. Princeton University Press.
- Stevenson T, Fanshawe J. 2002. Field guide to the Birds of East Africa. Princeton University Press.
- Withers MB, Hosking D. 2002. Wildlife of East Africa. Princeton University Press.
- Zimmerman DA. 1999. Birds of Kenya and Northern Tanzania. Princeton University Press.

PROJECT-RELATED WEBSITE

- **Elephant Managers Association** (http://elephantmanagers.com/)
- **FAO UN Climate Smart Agriculture** (http://www.fao.org/climate-smart-agriculture/en/)
- **International Elephant Foundation** (https://elephantconservation.org/)
- **USF&W African Elephant Conservation Fund** (https://www.fws.gov/international/wildlife-without-borders/african-elephant-conservation-fund.html)
- **Wildlife Works**: (http://www.wildlifeworks.com/)

EARTHWATCH SOCIAL MEDIA

- **FACEBOOK:** facebook.com/Earthwatch
- **TWITTER:** twitter.com/earthwatch_org
- **INSTAGRAM:** instagram.com/earthwatch
- **BLOG:** blog.earthwatch.org
- **YOUTUBE:** youtube.com/earthwatchinstitute

LITERATURE CITED

YOUR RESOURCES AT HOME

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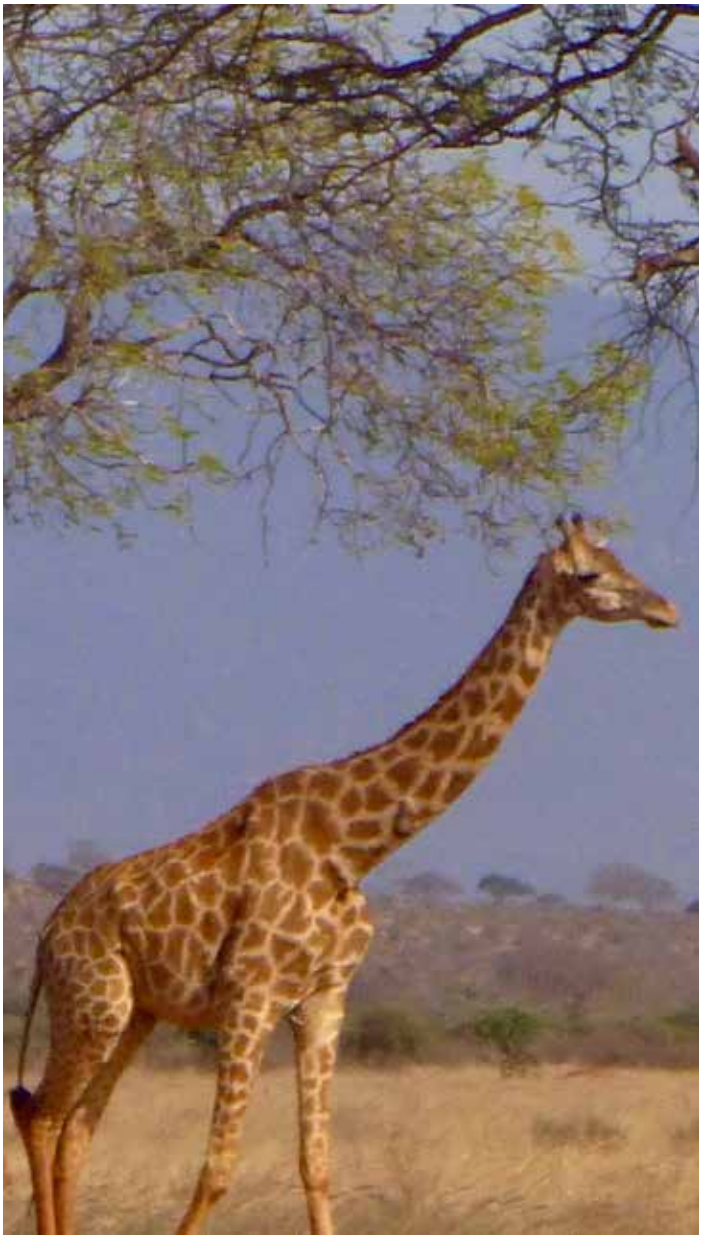
- Osborn FV, Parker GE. 2003. Towards an integrated approach for reducing the conflict between elephants and people: a review of current research. Oryx 37:1-5.
- Parker GE, Osborn FV. 2006. Investigating the potential for chilli Capsicum spp. to reduce human-wildlife conflict in Zimbabwe. Oryx 40:343-346.

EMERGENCY NUMBERS

AROUND-THE-CLOCK SUPPORT



EARTHWATCH'S 24-HOUR EMERGENCY HOTLINE

Call Earthwatch's 24-hour on-call duty officer in the U.S.:

+1 (978) 461.0081

+1 (800) 776.0188 (toll-free for calls placed from within the U.S.)

After business hours, leave a message with our living answering service. State that you have an emergency and give the name of your expedition, your name, the location from which you are calling, and if possible, a phone number where you can be reached. An Earthwatch staff member will respond to your call within one hour.

TRAVEL ASSISTANCE PROVIDER: HEALIX INTERNATIONAL

+44.20.3667.8991 (collect calls and reverse charges accepted)

U.S. TOLL FREE: +1.877.759.3917

U.K. FREE PHONE: 0.800.19.5180

E-MAIL: earthwatch@healix.com

You may contact Healix International at any time. They can assist in the event of a medicalor evacuation emergency or for routine medical and travel advice, such as advice on visas and vaccine requirements.

FOR VOLUNTEERS BOOKED THROUGH THE EARTHWATCH AUSTRALIA OFFICE:

Earthwatch Australia 24-Hour Emergency Helpline

+61.0.3.8508.5537

NOTES

MESSAGE FROM EARTHWATCH

DEAR EARTHWATCHER,

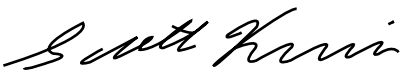
Thank you for joining this expedition! We greatly appreciate your decision to contribute to hands-on environmental science and conservation. It is volunteers like you who fuel our mission and inspire our work.

While at Earthwatch, I've had the opportunity to field on a few expeditions, most recently in Kenya with one of my daughters. Each expedition has touched me deeply, and made me proud to be able to roll up my sleeves alongside my fellow volunteers and contribute to such meaningful work.

As an Earthwatch volunteer, you have the opportunity to create positive change. And while you're out in the field working toward that change, we are committed to caring for your safety. Although risk is an inherent part of the environments in which we work, we've been providing volunteer field experiences with careful risk management and diligent planning for nearly 45 years. You're in good hands.

If you have questions as you prepare for your expedition, we encourage you to contact your Earthwatch office. Thank you for your support, and enjoy your expedition!

Sincerely,



Scott Kania
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