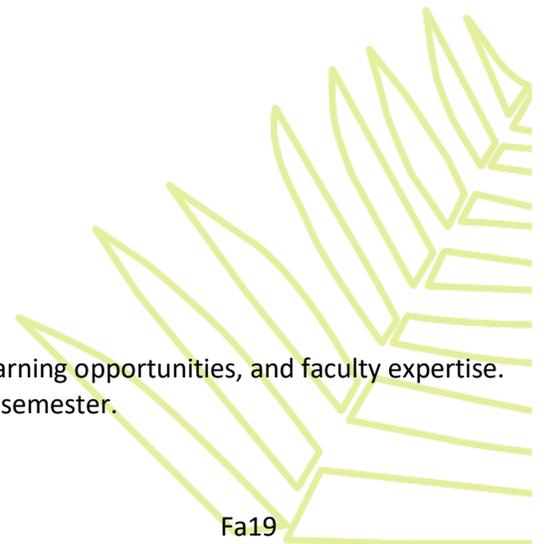# Wildlife Ecology
SFS 3720

Syllabus

The School for Field Studies (SFS)
Center for Wildlife Management Studies (CWMS)
Karatu, Tanzania

This syllabus may develop or change over time based on local conditions, learning opportunities, and faculty expertise.
Course content may vary from semester to semester.

COURSE CONTENT SUBJECT TO CHANGE

Please note that this is a copy of a recent syllabus. A final syllabus will be provided to students on the first day of academic programming.

SFS programs are different from other travel or study abroad programs. Each iteration of a program is unique and often cannot be implemented exactly as planned for a variety of reasons. There are factors which, although monitored closely, are beyond our control. For example:

- Changes in access to or expiration or change in terms of permits to the highly regulated and sensitive environments in which we work;

- Changes in social/political conditions or tenuous weather situations/natural disasters may require changes to sites or plans, often with little notice;

- Some aspects of programs depend on the current faculty team as well as the goodwill and generosity of individuals, communities, and institutions which lend support.

Please be advised that these or other variables may require changes before or during the program. Part of the SFS experience is adapting to changing conditions and overcoming the obstacles that may be present. In other words, the elephants are not always where we want them to be, so be flexible!

Course Overview

The main objectives of the Wildlife Ecology course is to provide students with background on the ecological concepts and principles of Savanna Ecosystems of East Africa that are necessary to the understanding of wildlife ecology and conservation of large mammals and other natural resources on the Maasai Steppe region of Tanzania and Kenya. Students have a chance to learn and apply in the field multiple techniques and approaches to studying wildlife, natural resources and ecological sampling techniques, including making observations in the field and inferring on wildlife behavioral, ecological and biological attributes. We will demonstrate the practical application and use of wildlife ecological concepts and techniques for enhanced and sustainable management of wildlife, plant and other non-biological resources. Aspects learned by students in this course are also applied to meet the needs and objectives of the Directed Research component of the program.

Learning Objectives

Through interactive learning and experiential activities, including lectures, field exercises, class discussions, and field lectures, this course exposes students to the following concepts and skills:

1) Ecological concepts and principles of savanna ecosystems of East Africa

2) Strategies and options to help mitigate degradation of natural resources, including wildlife and rangeland, in the Tarangire-Manyara ecosystem

3) Techniques and approaches to studying wildlife ecology, natural resources and ecosystems

Thematic Components and Research Direction

The grasslands of north eastern Tanzania (Maasai Steppes) comprise extensive areas of land, which is home to the Maasai community. The landscape has been used traditionally by the Maasai pastoral community to graze livestock on a communal basis, but this has rapidly changed in the last decades. There has been a steady shift in land use from purely pastoral to mixed agro-pastoral systems driven by multiple factors, including changing demographics, emerging economic opportunities, increasing tourism demands, and access to markets. Land use changes in the wildlife dispersal areas between protected areas compromises the ecological and environmental integrity and quality as habitats for a wide variety of wildlife species, especially large mammals like the African elephants, generally posing a serious challenge to conservation of biodiversity in this region. The current scenario in the region has generated some antagonism between the dual goals of local livelihoods and conservation.

The issues affecting and influencing wildlife conservation, local livelihoods and co-existence of humans and wildlife in the Maasai Steppe of Tanzania present a showcase for students and SFS faculty to explore the best strategy of promoting wildlife conservation whilst improving local livelihoods. We will use multiple learning approaches, including conducting research on specific issues that have a bearing on the drivers of changes in these biodiversity rich landscapes, and their impacts on local livelihoods, wildlife and other critical natural resources. The SFS-CWMS program is geared towards preparing students to answer the following case study question:

How can changes in land use and resource availability in the Maasai Steppe of Tanzania be managed in such a way as to foster the well-being of local communities whilst safeguarding and promoting biodiversity conservation?

3

Case Study Background in Tanzania: The Tarangire-Manyara Ecosystem

The Tarangire-Manyara Ecosystem (TME) is one of the key wildlife conservation areas in Tanzania, and part of the Northern tourist circuit including the famous parks of Serengeti, Ngorongoro, Lake Manyara, Tarangire, Arusha and Mt. Kilimanjaro. TME is estimated to comprise about 35,000 km^2. Tarangire and Manyara national parks are the core protected areas in the TME, exclusively designated for photographic tourism. Other forms of protected areas in TME include Wildlife Management Areas (WMA) managed by local communities for tourism investment, game control areas (GCAs) and game reserves (GRs) managed by the Wildlife Division in which consumptive utilization such as trophy hunting is allowed. Consumptive utilization is also allowed in open areas that fall under the village lands designated as hunting blocks. All protected areas in TME have porous boundaries, thus, wildlife migrate freely between protected areas and dispersal areas in community village land. This leads to high levels of human-wildlife interactions and the ensuing human-wildlife conflicts. For many decades, the primary inhabitants of TME have been pastoralist Maasai communities with low human population density. However, over the past three decades there has been a rapid increase in human population mainly due to immigration with consequent changes in land use leading to expansion of agriculture and human settlement. This has resulted into blockage of migratory wildlife routes (such as into Simanjiro plains and to Lake Manyara through Kwakuchinja Corridor) and habitat fragmentation, and has created more opportunities for human-wildlife conflicts. This poses increasing threat to environmental and wildlife conservation in the TME.

Tarangire/Lake Manyara ecosystem in the Maasai Steppes of northern Tanzania is also faced with multiple threats ranging from land use changes, tourism proliferation, human population increase and general ecological changes. The parks are renowned for their biodiversity in a relatively dry landscape, but their future is in jeopardy due to insularization. There are growing land use changes, such as large scale farming, unplanned settlements and increase in human population in the dispersal areas, migratory routes and corridors, which are necessary for the free movement of large mammalian species. Moreover, uncontrolled tourist activities and accommodation (such as camp sites and curio shops) around the parks create more insularization of the parks. Uncontrolled hunting of wildlife in the dispersal and game control areas outside the parks is prevalent, hence endangering critical wildlife species. Human-wildlife conflict is equally rampant, further compromising the future of wildlife conservation, local livelihoods and harmonious co-existence between locals and wildlife.

Other challenges in the TME include tourism impacts, ecological changes, rampant poaching of wildlife due to inadequate law enforcement, and overall wildlife population declines. Unplanned settlements and increase in human population lead to insularization of Tarangire and Manyara national parks. Unplanned development of tourist accommodation facilities (such as camp sites and lodges) around the parks, although benefiting the local communities, exert a high demand on water, reducing quantity of water discharge into lake Manyara, reducing water quality due to potential pollution from sewerage and domestic effluents. Poorly regulated hunting of wildlife in dispersal and game control areas outside the parks threaten populations of critical wildlife species. Expanding irrigation in nearby rice farms in Mto wa Mbu town, heavy siltation, pesticide application, pollution caused by erosion and depletion of vegetation due to farming in the highland catchment areas affect the ecology and biodiversity of Lake Manyara and the adjacent wetlands. This is compounded by an increase in the human population in the catchment areas. The ground water in Mto wa Mbu is close to the surface and therefore increasing population, unplanned settlement and pollution which arise from overflowing pit latrines further pollute

lake Manyara. This semester will provide a series of lectures and carefully designed research projects implemented by the students to explore these conservation issues in the TME through a multidisciplinary approach. Student projects will focus on providing baseline assessments, critical analysis and investigation with the aim of providing information to contribute towards sustainable environment and natural resource management, promote wildlife conservation and livelihood improvement for local communities.

Assessment

No.	Assessment Item	Value (%)
WE 11	Primate Behavior – Individual Paper	25
WE 07	Carnivore Ecology – Group Presentation	15
WE 18	Grey Crowned Crane Ecology – Group Essay	10
	WE Examination	50
	TOTAL	**100**

Grading Scheme

A	95.00 - 100.00%	B+	86.00 - 89.99%	C+	76.00 - 79.99%	D	60.00 - 69.99%
A-	90.00 - 94.99%	B	83.00 - 85.99%	C	73.00 - 75.99%	F	0.00 - 59.99%
		B-	80.00 - 82.99%	C-	70.00 - 72.99%		

General Reminders

This is the section to list policies on attendance, deadlines, and penalties for academic dishonesty. The policies stated in this section should be consistent across courses – there should never be multiple standards when dealing with things such as plagiarism or cheating. The General Reminders section should include the following statements (can be modified slightly by Center if needed but will need to be approved by the Deans):

Plagiarism – using the ideas or material of others without giving due credit – is cheating and will not be tolerated. A grade of zero will be assigned for anyone caught cheating or aiding another person to cheat either actively or passively.

Deadlines – Deadlines for written and oral assignments are instated to promote equity among students and to allow faculty ample time to review and return assignments before others are due. As such, deadlines are firm; extensions will only be considered under extreme circumstances. Late assignments will incur a penalty of 10% of your grade for each day you are late. After two days past the deadline assignments will not be accepted anymore. Assignments will be handed back to students after a one-week grading period.

Participation – Since we offer a program that is likely more intensive than you might be used to at your home institution, missing even one lecture can have a proportionally greater effect on your final grade

simply because there is little room to make up for lost time. Participation in all components of the course is mandatory, it is important that you are prompt for all activities, bring the necessary equipment for field exercises and class activities, and simply get involved.

Course Content

FEX: Field Exercise, **TL:** Travel Lecture, **GL:** Guest Lecture, **L:** Lecture, **O:** Orientation, **P**: Presentation

No.	Title and outline	Required Readings	Type	Hours
WE01	**Case study introduction**		OT / All	2.0
WE 02	**Wildlife Ecology in Human Dominated Areas** Understand the ecological relationships and dynamics within TME ecosystem: Dynamics of a human-coupled system.	Clark W. (2010) Principles of landscape ecology. Nat Edu Know 3:34	FL / OT	6.0
WE03	**Cheetah and Leopard Ecology** This lecture provides background to the different life-history traits and conservation challenges of these hunters. In addition, historical and recent events in population decline of cheetahs and current conservation efforts are the basis for discussions about potential conservation approaches in future.	Dobrynin P. *et al.* (2015) Genomic legacy of the African cheetah, *Acinonyx jubatus*. Gen Biol 16:277 Hayward et al. (2006) Prey preferences of the Leopard. J Zool 270:298-313	TL / OT	1.5
WE04	**Scientific Writing** Students will learn the principles of scientific paper writing as preparation to writing reports on field exercises and directed research during the semester and their future career.	Derntl M. (2014) Basics of research paper writing and publishing. Int J Tech Enh Lear, 6:105-123	L / OT	1.5
WE05	**Scientific presentation** Students will learn the principles of effective communication and oral presentation of their results. This lecture is about the structure of a presentation as well as the design of the slides and general rules for public speaking.	None	L / OT	1.0
WE06	**Wildlife Monitoring Tool** This tutorial lecture introduces the use of a multipurpose monitoring software	None	L / OT	3.0

No.	Title and outline	Required Readings	Type	Hours
	(CyberTracker) for a variety of data collections. Students will learn to create and to use their own monitoring database in the field.			
WE07 a	**Carnivore ecology and behavior observations** This field exercise will be undertaken over a period of several weeks and occasions during field visits to Tarangire NP, Lake Manyara NP, Ngorongoro Conservation Area and Serengeti National Park. The aim of the exercise is to i) provide students with opportunity for field observations of various species of large carnivores found in the wild and record observed interactions between carnivores and their prey, ii) undertake behavioral sampling of several carnivore species encountered within protected areas during field visits.	Readings for several aspects on carnivore observations available on lab computer.	FEX / OT	8
WE07 b	**Carnivore ecology and behavior presentations** Students will prepare presentations for a specific aspect of the carnivore observations conducted in the protected areas. Each presentation will be followed by a group discussion.	See WE07a	P / OT	2.5
WE08	**Hyena Ecology** Hyenas are known to play an important role in the ecosystem as they are the most abundant predators. This lecture highlights the extraordinary reproductive system and the complex social structure of spotted hyenas. The lecture will be given by an expert from the Ngorongoro Hyena Project.	Holekamp KE (2007) Social intelligence in the spotted hyena (*Crocuta crocuta*). Phil Trans R Soc B 362: 523–538	GL / Guest	1.5
WE09	**Reptile Ecology and Conservation** This lecture provides background to the ecology of reptiles and their physiological traits. Students will learn about the importance of reptiles in the ecosystem and we will discuss factors that affect the occurrence and distribution of this highly variable group with focus on their thermal	Lehtinen RM et al. (2003) Edge effects and extinction proneness in a herpetofauna from Madagascar. Biodiv Cons 12:1357-1370	L / OT	1.5

No.	Title and outline	Required Readings	Type	Hours
	biology.			
WE10	**Reptile Identification and Sampling Methods: Practice** This lecture introduces different sampling techniques for reptile assessments. The most common species will be presented and students will learn methods for monitoring different groups of reptiles. After the lecture, students will practice to find, capture and identify reptile species in the field (Buger community forest).	Spawls S et al. (2006) Pocket Guide to Reptiles and Amphibians of East Africa Spawls S et al. (2018) Field Guide to East African Reptiles	L/ FEX / OT	4.0
WE11 a	**Primate Behavior: Theory** This lecture gives and overview of the baboon's social structure and reproduction. Students will learn about the principles for behavioral observations of primates and different sampling methods. Based on the lecture, students will create their own datasheets for behavioral observations.	D Maestripieri (2012) Comparative Primate Psychology.	GL	1.5
WE11 b	**Primate Behavior: Practice** Students observe a group of baboons and take field notes. An ethogram will be used to describe specific behaviors. An individual report is required for the completion of this field exercise.	Altmann J (1974) Observational Study of Behavior: Sampling Methods. Behaviour 49:227-267 More literature is provided in the WE folder	FEX / Guest	4.0
WE12	**Nature Interpretation: Theory and Practice** Recording and interpreting animal signs in the field is important for various fields of research, anti-poaching and rangeland management. Students will learn to read animal tracks and to identify species by their dung piles (1h theory and 2.5h practice).	Chris and Tilde Stuart 1994. A field guide to the tracks and signs of Southern and East African Wildlife.	L, FEX / OT	3.5
WE13 a	**Elephant Ecology and Social System: Theory**	Owen-Smith N (2006) A scientific Perspective on the	L / OT	1.0

No.	Title and outline	Required Readings	Type	Hours
	Students gain insight in the behavioral ecology of the largest and most prominent African mammals. Learning how to identify individuals, aging and sexing in a group of elephants is the basis for own observations on group demography.	management of elephants in the Kruger National Park and elsewhere. SA J Sci 102: 389–394		
WE13 b	**Elephant Behavior: Practice** Students will conduct their own observations on elephant behavior in Tarangire National Park to understand the social structure and demography of elephant families/clades.	Owen-Smith N et al. (2006) A scientific Perspective on the management of elephants in the Kruger National Park and elsewhere. SA J Sci 102: 389–394	FEX / OT	4.0
WE14	**Wildebeest Ecology** The Serengeti is home to the world's largest population of wildebeest. Students will gain understanding of the migration patterns, the reproduction cycle and the demography of these herbivores. The lecture will be followed by a film on wildebeest ecology.	Estes and East (2009) Status of the wildebeest (*Connochaetes taurinus*) in the wild 1967-2005. *Wildlife Conservation Society* 37 Calabrese JM et al. (2018) "Male rutting calls synchronize reproduction in Serengeti wildebeest." *Sci Rep 8.1: 10202*	L / OT	1.5
WE15	**Ecology of Serengeti and Ngorongoro Lions** Gain an understanding of the ecology of lions in the Serengeti NP and the Ngorongoro Conservation area, focusing on pride dynamics and recent trends ion lion population in the area. The lecture will be given by an eminent lion ecologist in the area.	Hanby JP et al. (1995) Ecology, Demograph and behaviour of lions in two contrasting habitats: Ngorongoro Crater and the Serengeti Plains. In: Serengeti II. Dynamics, Management and Conservation of an Ecosystem. Sinclair ARE and Arcese P (eds). University of Chicago Press. USA. pp315-331	GL / BK	2.0
WE16	**African Nightlife** Students will learn about the ecology and physiology of various nocturnal and diurnal African mammals, reptiles, birds and invertebrates that can be found at a campsite near Tarangire NP at night.	Gaffin et al. (2012). Scorpion fluorescence and reaction to light. Anim Behav 83:429-436	FEX / OT	1.0
WE17	**Ecology of grey crowned cranes**	Fakarayi et al. (2016). Varying	L, JW	2.0

No.	Title and outline	Required Readings	Type	Hours
	In this lecture students will learn about the ecology of grey crowned cranes and their use as bio-indicators. It will also explore their population status and trend, threats to their conservation including the impact of Climate change, and conservation action	Land-Use Has an influence on Wattled and Grey Crowned Cranes' abundance and distribution in Driefontein Grasslands Important Bird Area, Zimbabwe. PLoS ONE 11(11): 1-14 Nsengimana, O. and Becker, M. (2017). Minimum population size and distribution of Grey Crowned Cranes in Rwanda. Aerial and ground Survey, pp 1-25		
WE18	**Ecology of the Amboseli Ecosystem and its influence on water resources, land-use and wildlife movement**: This lecture will examine the ecological characteristics of the ecosystem and their linkage to land use, water resources availability, wildlife movement and dispersal pattern	Croze and Lindsay (2011). Amboseli Ecosystem context: past and present; Chapter 2: pp11-28. In: The Amboseli elephants; a long-term perspective on a long-lived mammal (Edited by; Cynthia J. Moss, Harvey Croze and Phyllis C. Lee) Western et al. (2009). The impact of subdivision and sedentarization of pastoral lands on wildlife in an African Savanna ecosystem. Biological Conservation, 142:2538-2546	TL / JK	2.0
WE19	**Chyulu Hills watershed ecosystem services**: This lecture will introduce students to services and goods provided by watershed ecosystems including the Chyulu Hills. It will also examine the types and status of water sources associated with the hills, typology of watershed beneficiaries (water users), water economy, water discharge and abstraction, and threats to the hills hydrological services.	Kiringe et al. (2015). Water management tools in the Chyulu Hills Watershed. Report prepared for the African Wildlife Foundation (AWF) by Habitat Planners, Nairobi, Kenya de Groot et al. (2002). A typology for the classification, description and valuation of ecosystem functions, goods and services. Ecological Economics 41, 393–408	TL / JK	2.0

No.	Title and outline	Required Readings	Type	Hours
		Constanza et al. (1997). The value of the world's ecosystem services and natural capital. Nature, 387: 253-259 (Optional)		
WE20	**Vegetation sampling techniques:** **Plotless methods** This exercise will provide students with an opportunity to use how to collect vegetation data using some of the commonly used sampling methods. In this process, they will; learn and develop skills on how to design and conduct vegetation surveys, develop ability to synthesis and interpret vegetation data as well as acquire knowledge on use and application of vegetation sampling methods and techniques.	Kenneth F. Higgins et al. (1994). Vegetation sampling and measurement. In: Theodore, A. Bookhout (ed), Research and management techniques for wildlife and habitats. The Wildlife Society, Inc., Allen Press, Inc. Lawrence, Kansas. Pp567-591	FE, JK	3.0
		Total hours		**60.0**

Reading List

*Readings are listed in the order in which they appear in the above table.

Clark W. (2010) Principles of landscape ecology. Nat Edu Know 3:34

Dobrynin P. *et al.* (2015) Genomic legacy of the African cheetah, *Acinonyx jubatus*. Gen Biol 16:277

Derntl M. (2014) Basics of research paper writing and publishing. Int J Tech Enh Lear, 6:105-123

Higgins KF *et al.* (1994) Vegetation sampling and measurement. In: Bookhout TA (ed) Research and management techniques for wildlife and habitats. The Wildlife Society Inc., Allen Press Inc. Lawrence, Kansas. Pp567-591

Holekamp KE (2007) Social intelligence in the spotted hyena (*Crocuta crocuta*). Phil Trans R Soc B 362: 523–538

Lehtinen RM et al. (2003) Edge effects and extinction proneness in a herpetofauna from Madagascar. Biodiv Cons 12:1357-1370

Spawls S et al. (2006) Pocket Guide to Reptiles and Amphibians of East Africa

Spawls S et al. (2018) Field Guide to East African Reptiles

D Maestripieri (2012) Comparative Primate Psychology.

Altmann J (1974) Observational Study of Behavior: Sampling Methods. Behaviour 49:227-267

Chris and Tilde Stuart 1994. A field guide to the tracks and signs of Southern and East African Wildlife.

Owen-Smith N (2006) A scientific Perspective on the management of elephants in the Kruger National Park and elsewhere. SA J Sci 102: 389–394

Owen-Smith N et al. (2006) A scientific Perspective on the management of elephants in the Kruger National Park and elsewhere. SA J Sci 102: 389–394

Estes and East (2009) Status of the wildebeest (*Connochaetes taurinus*) in the wild 1967-2005. *Wildlife Conservation Society* 37

Hanby JP et al. (1995) Ecology, Demograph and behaviour of lions in two contrasting habitats: Ngorongoro Crater and the Serengeti Plains. In: Serengeti II. Dynamics, Management and Conservation of an Ecosystem. Sinclair ARE and Arcese P (eds). University of Chicago Press. USA. pp315-331

Dale A. Z, Donald A. T, and David J. P. 1996. Birds of Kenya and Northern Tanzania (Field Guide)

Croze and Lindsay (2011). Amboseli Ecosystem context: past and present; Chapter 2: pp11-28. In: The Amboseli elephants; a long-term perspective on a long-lived mammal (Edited by; Cynthia J. Moss, Harvey Croze and Phyllis C. Lee)

Western et al. (2009). The impact of subdivision and sedentarization of pastoral lands on wildlife in an African Savanna ecosystem. Biological Conservation, 142:2538-2546

Okello, M.M. and D'Amour, D.E. (2008). Agricultural expansion within Kimana electric fences and their implications to natural resources conservation around Amboseli. N. Park. Journal of Arid Environments. 72: 2179-2192

Kiringe et al. (2015). Water management tools in the Chyulu Hills Watershed. Report prepared for the African Wildlife Foundation (AWF) by Habitat Planners, Nairobi, Kenya

de Groot et al. (2002). A typology for the classification, description and valuation of ecosystem functions, goods and services. Ecological Economics 41, 393–408

Constanza et al. (1997). The value of the world's ecosystem services and natural capital. Nature, 387: 253-259 (Optional)