THE SCHOOL FOR FIELD STUDIES

Ecology and Conservation of Southeast Asian Elephants

Syllabus

The School for Field Studies (SFS)
Center for Environmental Justice and Mekong Ecologies
Siem Reap, Cambodia

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.

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Course Overview

This 4 week Special Topics program will focus on the ecology and conservation of the Asian elephant (*Elephas maximus*). Due to a drastic decrease in wild elephant populations, the reality of a world without these charismatic megafauna is becoming a likely possibility. In Asia this is primarily due to a booming human population and increased demand for space. Elephants are of great scientific interest due to their complex behaviors associated with intelligence and social interactions, forming deep family bonds and displaying empathy by recognizing and responding to another elephant's pain or problem and showing signs of grief after the loss of a family member. Saving the elephants requires improved scientific understanding of the species and the increasingly complex environment that they inhabit.

Elephants in Keo Seima Wildlife Sanctuary, Mondulkiri Province, Cambodia (Lloyd, 2017)

Asian elephants are an endangered species that occupy a range covering Bangladesh, Bhutan, India, Nepal, and Sri Lanka in South Asia; and Cambodia, Indonesia (Kalimantan and Sumatra), Lao PDR, Malaysia (Peninsular Malaysia and Sabah), Myanmar, Thailand, and Vietnam in South-east Asia; and China in East Asia. There are believed to be only 40,000 – 50,000 Asian elephants remaining (WWF, 2017), of which 15, 000 – 20, 000 are in captivity. Action plans and conservation strategies have been initiated by government institutions and non-government organizations throughout the Asian elephant range where targeting the interface between humans and elephants is a priority. Different solutions are needed for different areas and often these are continuously changing and evolving.

In Cambodia there are between 250-600 elephants remaining in the wild (IUCN Redlist, 2008). Elephants have long been a symbol of power and prestige as well as a symbol of tradition in Cambodia. From the Angkorian Empire to contemporary royal traditions, elephants have played a central ceremonial role. Elephants continue to play a role in traditional livelihoods of the indigenous Bunong peoples in Cambodia's highlands.

Recreation of Angkor Army on Campaign (Tom Chandler/ Monash University)

The two core populations of elephants in Cambodia are in the Cardamom Mountains Landscape in the South West and the Eastern Plains Landscape in Mondulkiri and Rattanakiri provinces. Some elephant herds in Cambodia are believed to traverse the borders of neighbouring Vietnam and Thailand, hence there are difficulties in accurate population estimates.

Figure 1: Map of Cambodia (Open Development Cambodia, 2017)

This course will be based predominantly in Mondulkiri Province with short periods of time being spent in both Siem Reap and Phnom Penh. Mondulkiri Province borders the provinces of Kratié to the west, Stung Treng to the northwest, Ratanakiri to the north and Vietnam to the east and south. Students will conduct field work in and around one of Cambodia's great protected areas - the Keo Seima Wildlife Sanctuary. The sanctuary is home to more than 60 species that are Globally Threatened, Near-threatened or Data Deficient by IUCN criteria. There are many different species of carnivore, including seven species of wild cat such as the Leopard Cat. The area is important for the conservation of primates, Asian elephants, wild cattle (Gaur and Banteng) and many species of birds.

Keo Seima is also home to Bunong indigenous communities, who have a strong link with their natural environment and have depended on the forest economically, culturally, and spiritually for many generations (WCS, 2017). Traditionally, the Bunong practice swidden agriculture and they have a long tradition of elephant keeping. However, there is a strong Bunong belief that breeding in captivity is bad luck and as there are very few elephants left in the wild in Cambodia, the tradition of elephant keeping is disappearing along with traditional knowledge of elephant medicines, ceremonies and folktales.

In addition to ecology and conservation, this course will include components on elephant welfare and management as well as the history of elephants in Asia, both in the wild and in captivity, with particular focus on Cambodia. Lectures will be followed by related fieldwork exercises on semi-captive elephants as well as visiting zones where wild elephants cross with local communities. Students will learn to identify elephant behaviours, as well as their foraging patterns and habitat preferences using both

quantitative and qualitative methods. Students will contribute to collecting valuable and informative data whilst directly observing elephants, using continuous and interval sampling. Elephant habitat use will be recorded indirectly based on signs such as footprints, dung and feeding signs which can help to distinguish elephant age, group composition and food-plant preferences. Semi-captive elephants provide an ideal and safe opportunity for students to get close enough to observe elephant behaviour and gather data that can contribute to our knowledge of their wild counterparts. Students will be trained in both quantitative and qualitative data collection techniques and learn suitable statistical analyses useful for life sciences research.

Dr Megan English undertaking elephant research with wild elephants in Borneo (Dianna Ismail, 2012)

Elephant Valley Project:

Students will spend much of the course based at the Elephant Valley Project located within and adjacent to Keo Seima Wildlife Sanctuary in Mondulkiri Province. The Elephant Valley Project, located 15 minutes away from the town of Sen Monorom, is run by the Elephant Livelihood Initiative Environment (E.L.I.E) whose aim is to 'improve the captive elephant's health and welfare situation by the development of an elephant sanctuary while providing province-wide veterinary care and associated social support programs for the Bunong people'. The Elephant Valley Project is an elephant sanctuary that cares for injured and overworked elephants in a landscape where they forage naturally and roam the surrounding grassy hilltops, lush evergreen and mixed deciduous forests. You will spend time each day with the skilled and professional Bunong elephant caretakers, known as mahouts, who are the core of the sanctuary and have a deep connection with their elephants. You will also join volunteers for meals and,

in your free time, you will have the opportunity to participate in scheduled volunteer activities. Read more about Elephant Valley Project here: http://www.elephantvalleyproject.org/evp-in-depth/.

An elephant at the Elephant Valley Project in Mondulkiri Province, Cambodia (Lloyd, 2017)

Learning Objectives

1. Gain in-depth knowledge about the issues facing wild and captive elephants throughout Asia with particular focus on elephants in Cambodia.
2. Develop skills for conducting rigorous scientific research using quantitative and qualitative methods:
    - Interview WCS staff working on the frontline of HEC
    - Assist in developing conflict mitigation strategies
    - Behavioural observations of social interactions and foraging
    - Health and welfare
    - Veterinary care and remedies for ailments
3. Understanding of Cambodia's highland ecosystems and Bunong traditional culture associated in particular with elephant interactions.
4. Gain confidence in both independent and group work activities and public speaking.

Assessment

Assessment Item	Value (%)
Ecosystem engineers assignment	20
Conservation strategies debate	20
Health and welfare quiz	10
Grant proposal elephant research	20
Grant proposal oral presentation	10
Fieldwork participation	10
Class participation	10
Total	**100**

Assessment Descriptions

Ecosystem engineers assignment: This assignment will be a 3 page report on the importance of elephants as ecosystem engineers. Habitat fragmentation and encroachment on elephant habitat by agricultural crops are the main causes of decline in wild elephant populations. As elephants require around 10% of their body weight of forage each day, they must traverse vast distances in order to meet these intake needs, sculpting the landscape as they do so. This is becoming increasingly challenging in a human dominated landscape matrix. Students will refer to their lecture material, readings and fieldwork on elephant plant selection and feed intake rates, and discuss the impact of elephants on an ecosystem. Questions will be provided for the students to address in their report.

Grant proposal human-elephant conflict: Students will work in groups to develop a grant proposal for the Disney Conservation Fund. Topics will involve either 1) scientific research on topics such as wild elephant ecology, behaviour or human-elephant conflict in Cambodia 2) Development of education programmes associated with wild elephant conservation and 3) Community engagement in conservation strategies.

Grant proposal oral presentation: Each group will give a 15 minute presentation of their research topic to an audience at The Elephant Valley Project, Mondulkiri.

Health and welfare quiz: This quiz will focus on elephant health and welfare in captivity. Elephants are not considered to be domesticated, even in captivity. Their ecological and biological needs are shaped by conditions experienced by their wild counterparts (Varma *et al*. 2008); as a result captive elephants can suffer from a variety of physical and psychological ailments. The quiz will be based on information from lecture material, readings and fieldwork experience and involve issues that elephants face in captive environments in Asia.

Debate: Students will participate in a debate on the topic of *elephant trophy hunting to support conservation efforts*. Although this is not common practice in Asia, it is a contentious issue that could either benefit wildlife and local communities or alternatively have a detrimental impact on species such as the elephant. Students will be divided to work in two groups to prepare several “arguments” to foster healthy respectful debate and clear expression of various outlooks and positions. The members of each team should work together to formulate arguments and supporting facts/ examples which strengthen

their side of the debate. Each member of each team will have the opportunity to voice the teams' arguments, in a specific order and four students will be adjudicators/judges of the debate.

Grading Scheme

A	95.00 – 100.00%	B+	86.00 – 89.99%	C+	76.00 – 79.99%	D	60.00 – 69.00%
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

Readings: You are expected to read and make notes on all the required articles/book chapters prior to each class. Making use of information from required readings will be part of the course assessments. All readings are available as PDFs on the Student Drive or from a common laptop. It is encouraged that 'optional readings' be reviewed by students. The reading list might be updated or changed during the course of the program and some readings that are initially listed as 'optional' may be changed to 'required'.

Plagiarism: Using the ideas and material of others, without giving due credit, is cheating and will not be tolerated. A grade of zero will be assigned if anyone is caught cheating or aiding another person to cheat actively or passively. All assignments unless specifically stated should be individual pieces of work.

Deadlines for written and oral assignments are not flexible due to the timing and nature of the program. It is important to respect deadlines to ensure that faculty is able to review and return assignments in a timely manner.

Assignments will be handed back to students after a one-week grading period. Late assignments will incur a 10% penalty for each day that they are late. No assignment will be accepted after three days.

Participation: Since we offer a program that is likely more intensive than you are 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 program is mandatory because your actions can significantly affect the experience you and your classmates have while at SFS. Therefore, it is important that you are prompt for all activities, bring the necessary equipment for field exercises and simply get involved.

Course Content

Where SR- Siem Reap, EVP – Elephant Valley Project, SM- Sen Monorom and PP- Phnom Penh

Lecture Title and Description	*Readings*	*Total Hours*
Cambodian History Overview (SR)		2
The Angkor Empire (SR) Explore the World Heritage site of Angkor guided by an expert in the history and culture of the great Angkorian Empire including the temples of Angkor Wat, Ta Prom and Bayon. You may also get the chance to visit an Angkorian elephant enclosure and marvel huge elephant gates and at the elaborate Elephant Terraces.		4
Introduction to Course (SR) This will cover what to expect from the course and fieldwork components and how your participation will contribute to improved knowledge of wild and captive elephants. Explanation of direct and indirect research Methodologies for wild and captive elephants as well as a brief Introduction about Mondulkiri and the Bunong people.		3
Evolution & Distribution (SR) We will discuss the worldwide distribution of elephants with specific focus on *Elephas maximus* and learn what kinds of habitat conditions and threats exist for extant populations.		1.5
EVP Introduction (EVP) You will be introduced to the manager of the sanctuary and given a briefing of the safety protocols in place. We will then go to the forest and meet the elephants and their caretakers, learning the history of each elephant prior to their being brought to EVP.		5
Ecology (EVP) Learn about elephant habitat use and their role as ecological engineers and keystone species in the various ecosystems that they occupy in Asia. Understand the challenges these megaherbivores face based on their resource requirements and foraging preferences due to human encroachment.	Ahamed (2015)	4
Welfare in Captivity (EVP) Learn the welfare issues (psychological and physical) faced by elephants in captivity. Understand the disturbing process of the traditional "Phajaan" training techniques commonly used throughout Asia.	Simpson *et al.* (2017). English *et al*. (2014).	2.5
Cognition (EVP) Learn about the complex cognitive abilities of elephants such as their long-term memory, ability to show empathy, self-recognition and mourning over the death of loved ones.	Plotnik *et al*. (2010) McComb *et al*. (2014)	1
Social Behaviour & communication (EVP) Learn about close family ties, social complexity and fission-fusion society of elephants and how characteristics of their strong individual	Pardo *et al*. (2019)	1.5

personalities affect how they interact with each other and their environment.		
Threats to Conservation (SM) Learn about the leading threats to Asian elephants including: habitat destruction and fragmentation, human-population growth, poaching from the wild for captivity and poaching for tusks and body parts.	Leimgruber *et al.* (2003).	2.5
Human-Elephant Conflict (SM) Learn about human-elephant conflict in Asian countries, particularly Cambodia, the impact of rapid human population growth and expansion leading to the destruction of elephant habitat and increasing conflict with people.	Webber *et al.* (2011) Mumby & Plotnik (2018)	4
Conservation Strategies (SM) Understand in-situ and ex-situ conservation strategies and how local government and non-government organisations are involved. Use of elephants as an "umbrella" species where not only the individual species can be protected but entire ecosystems that depend on them.	Fernando *et al*. (2012)	4
Anatomy and Physiology Learn about the anatomy and biology of elephants and how to conduct a thorough physical exam. Discuss unique blood cells and laboratory results of elephants.		4.5
Common Diseases and Parasites Overview of common diseases, infections, parasites and health conditions of elephants	Simpson *et al*., (2013)	4.5
Therapeutic Techniques Drug administration and techniques used to treat common problems in captive elephants		1.5
Elephants in Captivity You will spend the day learning what is involved in being an elephant keeper at the Phnom Tamao Wildlife Centre, a facility run by Wildlife Alliance. This will involve elephant care, feeding, cleaning and enrichment activities.		3
The Future (EVP) The final lecture on elephants will be reflect on what students have learnt, where there are knowledge gaps, and what the future holds for elephants if current trends continue. Possible solutions will be discussed.		4.5
Student Presentations (EVP)		2
Cultural Highlights In Phnom Penh you will have the chance to immerse in Cambodian history including visits to the Royal Palace and National Museum. You will also learn about Cambodia's recent troubled past and the Khmer Rouge. You will visit one of the prison sites known as S21.		4
Total Hours	**60**	

Reading List

Campos-Arceiz, A., & Blake, S. (2011). Megagardeners of the forest–the role of elephants in seed dispersal. *Acta Oecologica*, *37*(6), 542-553.

English, M., Kaplan, G., & Rogers, L. J. (2014). Is painting by elephants in zoos as enriching as we are led to believe? *PeerJ*, *2*, e471.

Fernando, P., Leimgruber, P., Prasad, T. & Pastorini, J. (2012). Problem-Elephant Translocation: Translocating the Problem and the Elephant? *PLOS One, 7*, e50917.

IUCN Redlist of threatened species (2008).
http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T7140A12828813.en

Leimgruber, P., Gagnon, J. B., Wemmer, C., Kelly, D. S., Songer, M. A., & Selig, E. R. (2003). Fragmentation of Asia's remaining wildlands: implications for Asian elephant conservation. In *Animal Conservation forum*, 6 (4), pp. 347-359. Cambridge University Press.

McComb, K., Shannon, G., Sayialel, K. N., & Moss, C. (2014). Elephants can determine ethnicity, gender, and age from acoustic cues in human voices. *Proceedings of the National Academy of Sciences*, *111*(14), 5433-5438.

Mumby, H.S. & Plotnik, J.M. (2018). Taking the elephants' perspective: Remembering elephant behavior, cognition and ecology in human-elephant conflict mitigation. *Frontiers in Ecology and Evolution,* 6:122.

Open Development Cambodia (2017).
https://opendevelopmentcambodia.net/map-explorer/.

Pardo, M.A., Poole,J.H., Stoeger, A.S., Wrege, P.H., O'Connell-Rodwell, C.E., Padmalal, U.K. & de Silva, S. (2019). Differences in combinational calls among the three elephant species cannot be explained by phylogeny. *Behavioural Ecology,* 1-12.

Plotnik, J. M., de Waal, F., Moore, D., & Reiss, D. (2010). Self-recognition in the Asian elephant and future directions for cognitive research with elephants in zoological settings. *Zoo biology*, *29*(2), 179-191.

Simpson, G., Zimmerman, R., Shashkina, E., Chen, L., Richard, M., Bradford, C. M., ... & Planet, P. (2017). Mycobacterium tuberculosis Infection among Asian Elephants in Captivity. *Emerging Infectious Diseases*, *23*(3), 513.

Webber, C. E., Sereivathana, T., Maltby, M. P., & Lee, P. C. (2011). Elephant crop-raiding and human–elephant conflict in Cambodia: crop selection and seasonal timings of raids. *Oryx*, *45*(2), 243-251.

Wildlife Conservation Society (2017).
https://cambodia.wcs.org/Saving-Wild-Places/Seima-Forest.aspx

Word Wildlife Fund (2017).
http://wwf.panda.org/what_we_do/endangered_species/elephants/asian_elephants/