



INTRODUCTION TO PRIMATE RESEARCH AND CONSERVATION

ONLINE ONLY

Course ID: ARCH 380I

June 14 – June 25, 2021

FIELD SCHOOL DIRECTORS:Vir

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INTRODUCTION

Due to the current COVID pandemic, the Borneo Nature Foundation offers a 10-day online course to introduce students to primate research and conservation. The course will be a mix of online lessons, practical exercises, and group discussions, all designed to immerse students in primatology.

Borneo Nature Foundation (BNF) is a not-for-profit conservation and research organisation that works to protect some of the most important areas of tropical rainforest in Borneo and safeguard their incredible wildlife. BNF's field programs include high-quality scientific research as a basis for protecting and managing tropical forests, with particular expertise in monitoring the distribution, population status, behaviour and ecology of Borneo's flagship primate species: the critically endangered Bornean orangutan (*Pongo pygmaeus*), the endangered Bornean white-bearded gibbon (*Hylobates albibarbis*) and the vulnerable red langur (*Presbytis rubicunda*) (status given according to the IUCN). Our wide-

ranging biodiversity and forestry research is used to make the case for conservation and demonstrate the harmful impacts of logging and forest conversion. BNF provides training and capacity building for local students, researchers and conservation-area managers, and works with a number of local partners to implement successful conservation projects.

The Borneo Nature Foundation (BNF) was established in 1999 and works to understand, protect and restore the Sebangau Forest and other important rainforests in Borneo, aiming to conserve their precious primate populations. The Sebangau tropical peat-swamp forest is the largest unfragmented area of forest remaining in Borneo's lowlands and supports globally-significant populations of endangered species, including the largest protected population of the Bornean orangutan and Bornean white-bearded gibbon. Its vast peat deposits cover an area of 6,000 km² and reach depths of 15m, making this one of the largest terrestrial carbon stores in the world.

BNF founders have studied orangutan population density in this area since 1995, orangutan behavioural ecology since 2003, gibbon population density and behavioural ecology since 2005, and red langur population density and behavioural ecology since 2009. Major BNF findings include:

1. Our discovery of the largest protected populations of the Bornean orang-utan and Bornean white-bearded gibbon
2. Documenting long-term ape population trends including a dramatic crash in orangutan population density following logging disturbance
3. Observing the first instances of topical self-medication recorded in orangutans, and revealing the energetic tightrope that orangutans here must traverse on a daily basis.

BNF's primate research activities are divided into two key areas:

Primate Behavioural Ecology

This area includes in-depth studies of Sebangau's primates: understanding their behaviour, ranging, diet, reproduction, social networks and responses to disturbance; and collecting a long-term record of their density and abundance. Numerous orangutan, gibbon and red langur individuals have been habituated to human presence and are followed on a regular basis during their daily activities. These results are used to discover more about the behaviour of some of our closest relatives, contributing to the study of primate evolution and supporting conservation planning in a multiple-use landscape.

Primate Population Monitoring

Our orangutan density research is the longest continuous study of its kind with results mapping a logging-induced crash and subsequent recovery once protected. This helps conservation management planning for this critically endangered species. Our gibbon and red langur population monitoring datasets are also some of the longest available and have provided valuable insights into how these species are managed across different landscapes.

ACADEMIC CREDIT UNITS & TRANSCRIPTS

Credit Units: Attending students will be awarded 2 semester credit units (equivalent to 3 quarter credit units) through our academic partner, Connecticut College. Connecticut College is a private, highly ranked liberal arts institution with a deep commitment to undergraduate education. Students will receive a letter grade for attending this field school (see grading assessment and matrix). Students are encouraged to discuss the transferability of credit units with faculty and registrars at their home institution prior to attending this field school.

Transcripts: An official copy of transcripts will be mailed to the permanent address listed by students on their online application. One more transcript may be sent to the student home institution at no cost. Additional transcripts may be ordered at any time through the National Student Clearinghouse: <http://bit.ly/2hvurkl>.

PREREQUISITES

There are no academic prerequisites for participation in this online course. All the course inductions and teaching will be carried out in English, so students must have a good working knowledge of the English language. Students will need regular access to a laptop or desktop computer with a web browser and video conferencing capabilities (i.e., a microphone, speakers, and a camera).

COURSE OBJECTIVES

This online primate course will introduce students to primate research and conservation, focusing on the behaviour, ecology, and conservation of three sympatric Bornean primate species: orangutans, gibbons and red langurs. Students will learn animal activity patterns, diets, ranges, social behaviour, and the challenges and potential solutions for primate conservation.

The course will be instructed by BNF directors who have a combined 20+ years of primate research experience in Borneo. Designed to immerse students into primatology, the curriculum includes a mix of online lessons, practical exercises, and group discussions. At the conclusion of the course, students will have gained an understanding of the complexities of primate conservation as well as key insights into the field of primatology.

LEARNING OUTCOMES

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

- Understand how and why primates behave the way they do, including in relation to activity patterns, diet, ranging and social behaviour;
- Understand the different techniques available to monitor primate populations, including the use of modern technology such as camera traps, and the advantages and shortcomings of using different methods for different purposes;
- Understand the issues threatening primate survival, how and why these impact primate species differently, and what needs to be done to mitigate these threats;
- Apply scientific principles to all aspects of the study of primates and their environment, from conception, to implementation and interpretation;

By the end of the course, participants will have developed a detailed understanding of primate behavioural ecology, acquired training on various primate study techniques, and gained an understanding of the complexities relating to contemporary primate conservation. Participants will also learn the skills needed to create and implement a primate research project. This knowledge and the experiences gained during this 10 day period will offer a window into a career as a primatologist.

GRADING MATRIX

Student performance will be assessed by the field school director, based on the following weightings:

- 25%:** Attend and actively participates at each scheduled day, including all lectures and group discussions.
- 50%:** Student maintains a notebook and records lessons learned, insights gained and reflections related to assigned reading and lectures, as well as considerations of wider implications of topics covered in the course. This to be done through daily diary entries and written answers to assigned short essay questions. This must be submitted at the end of the course together with a brief 1-2-page report that summarizes and highlights key findings and lessons learned.
- 25%:** Design a primate behaviour study project, present to the group and write learning outcomes in the course notebook

COURSE SCHEDULE

	Activity	TIME PST	PRACTICAL ASPECT FOR STUDENTS
June 14	Lecture 1. Introductory Lecture about BNF and Introduction to the course	0900-1030	Take notes on the lecture for their research diary
	COFFEE	1030-1100	
	Lecture 2. Presentation about Primate Taxonomy and introduction to Sebangau Primates	1100-1230	Take notes on the lecture for their research diary
	LUNCH/DINNER	1230-1330	
	Student independent study	1330-1600	Read 3 papers (provided by BNF) for group discussion in seminar Zoom rooms
June 15	Lecture 3 - Introduction to camera traps and phenology/habitat monitoring	0900-1030	Take notes on the lecture for their research diary
	COFFEE	1030-1100	
	Seminars to discuss 3 papers which were read the previous day.	1100-1300	Participate in the seminar, ask questions, take notes for research diary
	LUNCH/DINNER	1300-1400	
	Student independent study	1400-1600	Introductory Forest Walk and GPS/Compass Navigation Game. Using Wildeverse Game. Use journal notes from the game to complete research diary

June 16	Lecture 4 - Methods of surveying primates: transects, nest counts, call triangulation, drones, passive acoustic monitoring and camera traps	0900-1030	Take notes on the lecture for their research diary
	COFFEE	1030-1100	
	Lecture 5: Gibbon triangulation presentation	1100-1230	Take notes on the lecture for their research diary
	LUNCH/DINNER	1230-1330	
	Student independent study	1400-1600	Identify animals from BNF camera trap photos (BNF to supply from real time cameras). Write identifications in the research diaries. Make Gibbon triangulation maps using data provided by BNF
June 17	Lecture 6 - study methods, activity budgets, diet and energetics, social behaviour, reproduction and development (orangutans)	0900-1030	Take notes on the lecture for their research diary
	COFFEE	1030-1100	
	Lecture 7 - Introduction to BNF primate behavioural ecology data collection to include inter-observer reliability, complete explanation of BNF primate datasheets, difference between sampling on different types of groups vs. individuals	1100-1300	Take notes on the lecture for their research diary
	LUNCH/DINNER	1300-1400	
	Student independent study Lecture 6 - study methods, activity budgets, diet and energetics, social behaviour, reproduction and development (orangutans)	1400-1600	Orangutan behaviour video analysis
June 18	Lecture 8 - study methods, activity budgets, diet and energetics, social behaviour, reproduction and development (gibbons and red langurs).	0900-1030	Take notes on the lecture for their research diary
	COFFEE	1030-1100	
	Practical - ethograms and datasheets: how to design these and use them.	1100-1300	Students work in small groups to design datasheets for studying primates with help of BNF staff
	LUNCH/DINNER	1300-1400	
	Student independent study	1400-1600	Gibbon and Red Langur behaviour video analysis
June 21	Lecture 9-Conservation (Threats)	0900-1030	Take notes on the lecture for their research diary
	COFFEE	1030-1100	
	Lecture 10- Conservation (Solutions)	1100-1300	Take notes on the lecture for their research diary

	LUNCH/DINNER	1300-1400	
	Student independent study	1400-1600	Search online for different conservation campaigns (conservation actions and/or conservation education) and describe one in the research diary (primate specific) and explain why they think it is a good campaign for primate conservation
June 22	Students meet individually or in groups to discuss mini-project options	0900-1300	Students will be offered 20mins 1-1 session with BNF staff. When not in a session they need to be reading around the topic they want to undertake as a mini-project
	LUNCH/DINNER	1300-1400	
	Student independent study	1400-1600	Students work in small groups to design datasheets for mini-projects
June 23	Student mini-projects	0900-1600	Students work independently to carry out a mini-project based on what they have learned either in their local area, using BNF data, observing primates live online etc.
June 24	Student mini-projects	0900-1600	Students work independently to carry out a mini-project based on what they have learned either in their local area, using BNF data, observing primates live online etc.
June 25	Practical: Finish mini project work-present to others, complete individual reports, evaluations	0900-1600	Students complete research diaries and course evaluations.
Students submit research diaries online through secure website no later than the following Monday (but can be submitted on the last Friday)			

REQUIRED READINGS

PDF files of all mandatory readings will be provided to enrolled students via a shared Dropbox folder.

1. Altmann J (1974) Observational study of behaviour: sampling methods. *Behaviour* 49:227–265.
2. Askew, J.A. and Morrogh-Bernard, H.C., 2016. Acoustic Characteristics of Long Calls Produced by Male Orang-Utans (*Pongo pygmaeus wurmbii*): Advertising Individual Identity, Context, and Travel Direction. *Folia Primatologica*, 87(5), pp.305-319.
3. Atmoko, S.U., Setia, T.M., Goossens, B., James, S.S., Knott, C.D., Morrogh-Bernard, H.C., Van Schaik, C.P. and Van Noordwijk, M.A., 2009. Orangutan mating behavior and strategies. *Orangutans: Geographic variation in behavioral ecology and conservation*, pp.235-244.
4. Carne C, Semple S, Morrogh-Bernard H, Zuberbühler K, Lehmann J (2014) The Risk of Disease to Great Apes: Simulating Disease Spread in Orang-Utan (*Pongo pygmaeus wurmbii*) and Chimpanzee (*Pan troglodytes schweinfurthii*) Association Networks. *PLoS One* 9:1–8
5. Cheyne SM (2007) Effects of Meteorology, Astronomical Variables, Location and Human Disturbance on the Singing Apes: *Hylobates albibarbis*. *Am J Primatol* 40:1–7
6. Cheyne SM, Thompson CJH, Chivers DJ (2013) Travel adaptations of gibbons *Hylobates albibarbis* (Primates: Hylobatidae) in a degraded secondary forest, Indonesia. *J Threat Taxa* 5:3963–3968

7. Cheyne SM, Gilhooly LJ, Hamard MC, Höing A, Houlihan PR, Kursani, Loken B, Phillips A, Rayadin Y, Capilla BR, Rowland D, Sastramidjaja WJ, Spehar S, Thompson CJ., Zrust M (2016) Population mapping of gibbons in Kalimantan, Indonesia: Correlates of gibbon density and vegetation across the species' range. *Endanger Species Res* 30(1): 133-143
8. Delgado, R. A. (2006). Sexual selection in the loud calls of male primates: Signal content and function. *International Journal of Primatology* 27(1): 5-25. DOI: 10.1007/s10764-005-9001-4.
9. Ehlers-Smith DA, Husson SJ, Ehlers Smith YC, Harrison ME (2013) Feeding ecology of red langurs in Sebangau tropical peat-swamp forest, Indonesian Borneo: extreme granivory in a non-masting forest. *Am J Primatol* 75:848–859
10. Harrison ME, Morrogh-Bernard HC, Chivers DJ (2010) Orangutan Energetics and the Influence of Fruit Availability in the Nonmasting Peat-swamp Forest of Sebangau, Indonesian Borneo. *Int J Primatol* 31:585–607
11. Husson, S.J., Morrogh-Bernard, H., Santiano, Purwanto, A., Harsanto, F., et al.. 2015. Status of apes: Long-term temporal trends in ape populations in 4 case studies: Bornean orangutans in the Sabangau peat-swamp forest. In: *State of the Apes: Industrial Agriculture and Ape Conservation*, Arcus Foundation.
12. Morrogh-Bernard, H.C., Husson, S.J., Harsanto, F.A. and Chivers, D.J., 2014. Fine-scale habitat use by orang-utans in a disturbed peat swamp forest, Central Kalimantan, and implications for conservation management. *Folia Primatologica*, 85(3), pp.135-153.
13. Morrogh-Bernard, H.C., Morf, N.V., Chivers, D.J. and Krützen, M., 2011. Dispersal patterns of orang-utans (*Pongo* spp.) in a Bornean peat-swamp forest. *International Journal of Primatology*, 32(2), pp.362-376.
14. Morrogh-Bernard, H.C., Husson, S.J., Knott, C.D., Wich, S.A., van Schaik, C.P., van Noordwijk, M.A., Lackman-Ancrenaz, I., Marshall, A.J., Kanamori, T., Kuze, N. and bin Sakong, R., 2009. Orangutan activity budgets and diet. *Orangutans: Geographic variation in behavioral ecology and conservation*, pp.119-133.
15. van Schaik, C. P. (1999). The socioecology of fission-fusion sociality in orangutans. *Primates* 40(1): 69-86.
16. van Schaik, C. P., M. Ancrenaz, G. Borgen, B. M. F. Galdikas, C. D. Knott, I. Singleton, A. Suzuki, S. S. Utami and M. Merrill (2003). Orangutan cultures and the evolution of material culture. *Science* 299: 102-105.
17. van Schaik, C. P., R. O. Deaner and M. Y. Merrill (1999). The conditions for tool use in primates: Implications for the evolution of material culture. *Journal of Human Evolution* 36: 719-741.
18. Spillmann B, Noordwijk MA van, Willems EP, Setia TM, Wipfli U, Schaik CP van (2015) Validation of an acoustic location system to monitor Bornean orangutan (*Pongo pygmaeus wurmbii*) long calls. *Am J Primatol* 77:767–776
19. Utami, S. S., B. Goossens, M. W. Bruford, J. R. de Ruiter and J. A. R. A. M. van Hooff (2002). Male bimaturism and reproductive success in Sumatran orangutans. *Behavioral Ecology* 13(5): 643-652.

RECOMMENDED READINGS

1. Ancrenaz M, Sollmann R, Ambu L, Bernard H, et al. (2014) Coming down from the trees: Is terrestrial activity in Bornean orangutans natural or disturbance driven? *Sci Rep* 4:1–5.
2. Cheyne SM, Sastramidjaja WJ, Muhahir, Rayadin Y, Macdonald DW (2016) Mammalian communities as indicators of disturbance across Indonesian Borneo. *Glob Ecol Conserv* 7: 157-173
3. Delgado, R. A. J. (2007). Geographic variation in the long calls of male orangutans (*Pongo* spp.). *Ethology* 113: 487-498. doi: 10.1111/j.1439-0310.2007.01345.x.

4. Ehlers-Smith DA, Ehlers Smith YC (2013) Population Density of Red Langurs in Sebangau Tropical Peat-Swamp Forest, Central Kalimantan, Indonesia. *Am J Primatol* 75:837–847
5. Estrada A, Garber PA, Mittermeier RA, Wich S, et al. (2018) Primates in peril: the significance of Brazil, Madagascar, Indonesia and the Democratic Republic of the Congo for global primate conservation. *PeerJ* 6:e4869
6. Goossens, B., J. M. Setchell, S. S. James, M. Funk, L. Chikhi, A. Abulani, M. Ancrenaz, I. Lackman-Ancrenaz and M. W. Bruford (2006). Philopatry and reproductive success in Bornean orangutans (*Pongo pygmaeus*). *Molecular Ecology* 15: 2577-2588.
7. Harrison, M. E. and D. J. Chivers (2007). The orang-utan mating system and the unflanged male: A product of declining food availability during the late Miocene and Pliocene? *Journal of Human Evolution* 52: 275-293. doi: 10.1016/j.jhevol.2006.09.005.
8. Harrison, M. E. and A. J. Marshall (2011). Strategies for the use of fallback foods in apes. *International Journal of Primatology* 32: 531-565. DOI: 10.1007/s10764-010-9487-2.
9. Harrison, M. E., E. R. Vogel, H. Morrogh-Bernard and M. A. van Noordwijk (2009). Methods for calculating activity budgets compared: a case study using orangutans. *American Journal of Primatology* 71(4): 353-358. DOI: 10.1002/ajp.20655.
10. Husson, S. J., S. A. Wich, A. J. Marshall, R. D. Dennis, M. Ancrenaz, R. Brassey, M. Gumal, A. J. Hearn, E. Meijaard, T. Simorangkir and I. Singleton (2009). Orangutan distribution, density, abundance and impacts of disturbance. In: S. A. Wich, S. S. Utami Atmoko, T. Mitra Setia and C. P. van Schaik (Eds). *Orangutans: Geographic Variation in Behavioral Ecology and Conservation*. Oxford University Press, Oxford, 77-96.
11. Kappeler, P. M. and C. P. van Schaik (2002). Evolution of primate social systems. *International Journal of Primatology* 23(4): 707-740.
12. Leighton, M. (1993). Modelling dietary selectivity by Bornean orangutans: Evidence of multiple criteria in fruit selection. *International Journal of Primatology* 14(2): 257-313.
13. Marshall, A. J., L. Beaudrot and H. U. Wittmer (2014). Responses of primates and other frugivorous vertebrates to plant resource variability over space and time at Gunung Palung National Park. *International Journal of Primatology* 35(6): 1178-1201. DOI: 10.1007/s10764-014-9774-4.
14. Marshall, A. J. and S. A. Wich (2013). Characterization of primate environments through assessment of plant phenology. In: E. J. Sterling, N. Bynum and M. E. Blair (Eds). *Primate Ecology and Conservation: A Handbook of Techniques*. Oxford University Press, Oxford, 103-127.
15. Marshall, A. J. and R. W. Wrangham (2007). Evolutionary consequences of fallback foods. *International Journal of Primatology* 28(6): 1219-1235. DOI: 10.1007/s10764-007-9218-5.
16. McConkey, K. R. (2018). Seed dispersal by primates in Asian habitats: From species, to communities, to conservation. *International Journal of Primatology*. DOI: 10.1007/s10764-017-0013-7.
17. McConkey, K. R., F. Aldy, A. Ario and D. J. Chivers (2002). Selection of fruit by gibbons (*Hylobates muelleri* x *agilis*) in the rain forests of Central Borneo. *International Journal of Primatology* 23(1): 123-145.
18. Meijaard E, Abram NK, Wells JA, Pellier AS, Ancrenaz M, Gaveau DLA, Runting RK, Mengersen K (2013) People's Perceptions about the Importance of Forests on Borneo. *PLoS One* 8
19. Morrogh-Bernard, H.C., Foitová, I., Yeen, Z., Wilkin, P., De Martin, R., Rárová, L., Doležal, K., Nurcahyo, W. and Olšanský, M., 2017. Self-medication by orang-utans (*Pongo pygmaeus*) using bioactive properties of *Dracaena cantleyi*. *Scientific reports*, 7(1), p.16653.
20. Morrogh-Bernard H, Husson S, Page SE, Rieley JO (2003) Population status of the Bornean orang-utan (*Pongo pygmaeus*) in the Sebangau peat swamp forest, Central Kalimantan, Indonesia. *Biol Conserv* 110:141–152

21. van Noordwijk, M. A. and C. P. van Schaik (2005). Development of ecological competence in Sumatran orangutans. *American Journal of Physical Anthropology* 127: 79-94.
22. van Noordwijk, M. A., E. P. Willems, S. S. Utami Atmoko, C. W. Kuzawa and C. P. van Schaik (2013). Multi-year lactation and its consequences in Bornean orangutans (*Pongo pygmaeus wurmbii*). *Behavioral Ecology and Sociobiology* 67: 805-814. DOI: 10.1007/s00265-013-1504-y.
23. van Schaik, C. P. (1983). Why are diurnal primates living in groups? *Behaviour* 87: 120-144.
24. van Schaik, C. P. (2002). Fragility of traditions: The disturbance hypothesis for the loss of local traditions in orangutans. *International Journal of Primatology* 23(3): 527-538.
25. van Schaik, C. P., J. W. Terborgh and S. J. Wright (1993). The phenology of tropical forests: Adaptive significance and consequences for primary consumers. *Annual Review of Ecology and Systematics* 24: 353-377.
26. Setchell JM, Curtis DJ (2011) *Field and Laboratory Methods in Primatology: A Practical Guide*, 2nd edn. Cambridge University Press, Cambridge, UK
27. Spehar SN, Sheil D, Harrison T, Louys J, Ancrenaz M, Marshall AJ, Wich SA, Bruford MW, Meijaard E (2018) Orangutans venture out of the rainforest and into the Anthropocene. *Sci Adv* 4
28. Vogel, E. R., S. E. Alavi, S. S. Utami-Atmoko, M. A. van Noordwijk, T. D. Bransford, W. M. Erb, A. Zulfa, F. Sulistyono, W. R. Farida and J. M. Rothman (2016). Nutritional ecology of wild Bornean orangutans (*Pongo pygmaeus wurmbii*) in a peat swamp habitat: Effects of age, sex, and season. *American Journal of Primatology* 79(4): 1-20. DOI: 10.1002/ajp.22618.
29. Whiten, A., J. Goodall, W. C. McGrew, T. Nishida, V. Reynolds, Y. Sugiyama, C. E. G. Tutin, R. W. Wrangham and C. Boesch (1999). Cultures in chimpanzees. *Nature* 399: 682-685.
30. Whiten, A. and C. P. van Schaik (2007). The evolution of animal 'cultures' and social intelligence. *Philosophical Transactions of the Royal Society of London B* 362: 603-620. doi:10.1098/rstb.2006.1998.