

PROJECT DETAILS
Project Title
The Importance of Micro-Climate Refuges for Mammal Responses to Climate Change and Human Disturbance
Project Summary
<p>Climate change and deforestation of tropical rainforests are threatening the livelihoods of millions of people as these globally important ecosystems provide food and medicines, store carbon, influence global climate, provide water supplies, and have high biodiversity. Because tropical animals are adapted to the relatively stable tropical climate they are disproportionately sensitive to climate change. Still, most climate change research occurs in temperate zones. In particular, more information is needed on how tropical animals may use micro-climatic refuges within a forest to avoid harsh climatic conditions and manage exposure to biting insect and parasites (which prefer hot wet places). We have the unique opportunity to determine the role micro-refuges play in buffering primates against climate change at a well-studied UNESCO World Heritage site in Indonesia and identify how the availability of micro-refuges changes as a result of human disturbance. Specifically, the project links new approaches and developments in micro-climate research and drone image recording and analysing techniques to determine (1) how primates select micro-habitats (height, exposure) to manage thermal regulation and minimise exposure to biting insects and parasites; and (2) how the availability of the required micro-habitats is affected by human influences. The project is timely because we are at the brink of a global extinction crisis but scientists are still struggling to predict how species will respond to climate change and human disturbance. In addition, starting this project now means it can fully benefit from the establishment of a Bournemouth University-led international network of micro-climate specialists (Leverhulme International Networking Grant 2017 to P. Gillingham et al.). This ensures that the project is connected to similar projects across the globe and will have an international audience during the network's workshops to improve methods and share findings on the newest emerging theories and techniques.</p> <p>Outcomes and methods</p> <p>O1. Unique knowledge of behavioural flexibility and development of methods for measuring micro-climate refuges that will transform future predictive modelling of species' responses to climate change.</p> <p>M1. Behaviour will be recorded for the critically endangered apes <i>Symphalangus syndactylus</i> (siamang) and <i>Pongo abelii</i> (orang-utan) using point and focal sampling in our established site Sikundur, Sumatra, Indonesia. Detailed forest structural data is available from ongoing projects. Presence of insects and micro-climate will be measured vertically and horizontally in the forest according to exposure, moisture, and temperatures using traps and climate data loggers (some are already employed).</p> <p>O2. An analytical tool to assess micro-climate variation in relation to disturbance and recovery history in tropical forests allowing conservationists to plan forest management to ensure sufficient micro-climate refuges for primate survival.</p> <p>M2. The LEAP team (Marie Curie fellow Alexander et al. 2017 & in prep.) developed analytical methods for characterising forest types and quality based on drone imagery that is available for the site. Vocal recordings and nest counts are used to measure densities in relation to forest structure across five sites varying in degree of disturbance (plantation, clear felling, selective logging) and whether recovery was natural or trees were planted over 5-30 year time scales.</p> <p>The project builds on previous work initiated by currently ongoing MRes, PhD and postdoc projects of <i>LEAP: Landscape Ecology and Primatology</i> (http://go-leap.wixsite.com/home).</p>
Academic Impact
Bioclimate models are widely used to predict species' responses to climate change but fail to yield accurate predictions partly because many species flexibly adapt by optimising use of micro-refuges which shield them from harsh climatic conditions (e.g. caused by heterogeneous topography and vegetation structure) and from associated

biting insects (disease vectors) and parasites. Micro-refuges are missed entirely by coarse-scale bioclimate models so this project will develop methods of measuring micro-refuge availability in a forest based on drone imagery. This allows the project to take simple bioclimate models a few steps further by including behavioural flexibility of animals into the system and to not just link behaviours to micro-climate but also to density of parasites and biting insects. Outputs will include at least four high-impact scientific publications (some joint with other LEAP members) as well as new methods and open access data sets that others, including other LEAP team members, will use for their bioclimate modelling and behavioural ecology work.

Societal Impact

Carbon sequestering is identified as an essential climate change mitigation strategy in UNEP's REDD+ programmes and tropical forests store disproportional amounts of carbon. Primates are essential seed-dispersers for the most carbon-rich trees making primate survival of global importance. Our multi-stakeholder network includes: specialists in behavioural ecology, entomology, parasitology, and bioclimate modelling; international conservationists of charities PanEco and Yayasan Ecosistem Lestari, Leuser Conservation Forum, HaKA, and conservationdrones.com; and the members of LEAP and the micro-climate network. To ensure local Indonesian impact of our work there is active participation of Indonesian academics, students, villagers, fieldworkers, and conservation activists. This multi-stakeholder engagement gives direct links to local conservation management as well as global conservation agenda setters in UNEP and IUCN. The Leuser Ecosystem, where our work occurs, is the last stronghold for critically endangered Sumatran orang-utans, elephants, rhinos, tigers, and primates. Research progress is publically shared on LEAP's externally facing facebook page and website and twitter account.

Training Opportunities

The Postgraduate Researcher (PGR) will become a well-rounded unique inter-disciplinary scientist who is able to proceed in a range of fields or thrive in the inter-face between climate change science, ecology, and conservation biology. The multi-disciplinary supervisory team, the international LEAP-team, and the newly established international micro-climate network provide a unique inspiring learning environment that gives the PGR access to workshops and networking opportunities at the highest level as well as being part of a thriving research community at BU (with weekly science meetings). The PGR will gain essential fieldwork experience to ensure career opportunities in tropical ecosystem research. By joining several Leverhulme-funded micro-climate workshops the PGR will participate at agenda-setting discussions on guidelines, field methods, and research directions. The PGR will receive training in recording primate behaviour & densities, vegetation features, climatological data, and insect and parasite prevalence within the challenging settings of a tropical rainforest as required depending on the student's experience. As part of the thriving LEAP group at BU, the PGR may co-supervise UG, PGT, and MRes students to improve people management and teaching skills, enhancing their employability. BU's leading position in quantitative ecological methods will help ensure that the PGR develops essential state-of-the-art analytical skills. PGRs are strongly encouraged to attend scientific conferences.

Bournemouth University is an equal opportunities employer. We hold an institutional bronze Athena Swan award for our work supporting women in STEM subjects and the department of Life and Environmental Sciences is in the process of applying for a departmental award. Bournemouth University also holds Disability Two Ticks status and works closely with DisabledGo as well as having signed the Mindful Employer charter and Time to Change Employer pledge.

SUPERVISORY TEAM

First Supervisor	Dr Amanda Korstjens
Additional Supervisors	Dr Phillipa Gillingham Dr Andrew Whittington Dr Demetra Andreou Dr Abdullah Abdullah from Indonesia and Matt Nowak from the Sumatran Orangutan Conservation Programme are involved as local supervisors.
Recent publications by supervisors relevant to this	Alexander, C., Korstjens , A.H. and Hill, R., 2016. Structural attributes of individual trees for identifying homogeneous patches in a tropical rainforest.

project	<p><i>International Journal of Applied Earth Observation & Geoinformation</i>, 55, 68-72.</p> <p>Britton, J.R. and Andreou, D., 2016. Parasitism as a Driver of Trophic Niche Specialisation. <i>Trends in Parasitology</i>, 32 (6), 437-445.</p> <p>Al-Shorbaji, F.N., Gozlan, R.E., Roche, B., Britton, J.R. and Andreou, D., 2015. The alternate role of direct and environmental transmission in fungal infectious disease in wildlife: threats for biodiversity conservation. <i>Nature Scientific Reports</i>, 5, 10368.</p> <p>Korstjens, A. H. (in press). The effect of climate change on the distribution of <i>Colobus</i> and <i>Cercopithecus</i> monkeys. In: Behie, A. M., et al. (eds). <i>Primate Research and Conservation in the Anthropocene</i>. Cambridge: CUP.</p> <p>Korstjens, A. H. and Hillyer, A., (2016). Chapter 11: Primates and climate change: a review of current knowledge. In: Wich, S.A. and Marshall, A. J. (eds). <i>An Introduction to Primate Conservation</i>. Oxford: Oxford University Press.</p> <p>Suggitt AJ, Gillingham PK, et al. (2011) Habitat microclimates drive fine-scale variation in extreme temperatures. <i>Oikos</i> 120, 1-8.</p> <p>Thomas, C. D., Gillingham PK et al. (2012) Protected areas facilitate species' range expansions. <i>PNAS</i> 109, 14063–14068.</p>
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INFORMAL ENQUIRIES
To discuss this opportunity further, please contact Amanda Korstjens via email: akorstjens@bournemouth.ac.uk
ELIGIBILITY CRITERIA
<p>Studentship candidates must demonstrate outstanding academic potential with preferably a 1st class honours degree and/or a Master's degree with distinction or equivalent Grade Point Average. An IELTS (Academic) score of 6.5 minimum (with a minimum 5.5 in each component) is essential for candidates for whom English is not their first language. In addition to satisfying basic entry criteria, BU will look closely at the qualities, skills and background of each candidate and what they can bring to their chosen research project in order to ensure successful completion.</p> <p>Additional Eligibility</p> <p>The ideal candidate has field research skills and experience in the tropics, GIS skills, and quantitative ecological analyses skills and a master's degree in a related field is desired.</p>
HOW TO APPLY
Please complete the online application form by 26th April 2017 09:00 am . Further information on the application process can be found at: www.bournemouth.ac.uk/studentships