PROJECT TITLE: Forest of tomorrow: understanding how logging and drought impact the regeneration of tropical rainforests

DTP Research Theme(s): Living World, Changing Planet

Lead institution: University of Bristol

Lead supervisor: Dr Tommaso Jucker, University of Bristol, School of Biological Sciences

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Project keywords: tropical forest ecology, soil ecology, forest restoration, land-use change, plant traits, climate change

Project Background

More than half of the world’s remaining tropical forests are classified as degraded, having been impacted by human activities such as logging, mining and agricultural expansion. If allowed to recover, these degraded tropical ecosystems have huge potential to sequester carbon from the atmosphere and safeguard biodiversity. But their fate remains largely uncertain. By disturbing soils and changing local microclimatic conditions such as temperature, humidity and light, logging and habitat fragmentation profoundly alter the environment in which tree seedlings germinate and grow. This has big implications for which tree species are able to survive and make it to the canopy, which in turn will influence the structure, composition and function of these ecosystems for decades. To complicate matters further, forest degradation is also expected to exacerbate the effects of extreme weather events. For instance, tree seedlings growing in already warmer and drier logged forests may well be pushed beyond their ecophysiological limits during droughts associated with El Niño events, which are predicted to increase in frequency and intensity due to global climate change. Consequently, understanding how logging and drought interact to affect seedling regeneration in tropical forests is critical if we are to forecast what these ecosystems will look like in the future.

Project Aims and Methods

The overarching aim of this project is to shed new light on how logging and drought impact the regeneration of tropical rainforests. Working in Malaysian Borneo, the candidate will use a combination of field experiments and long-term observational data to address a number of key questions about the resilience of human-modified tropical rainforests to climate change:
• How do tree seedling responses to drought vary between logged and old-growth forests?
• What plant characteristics best predict the ability of tree seedlings to cope with both logging and drought?
• How do soil microorganisms (particularly fungi) mediate tree seedling responses to drought and how does logging affect these belowground communities?

Within the broader remit of the project, prospective candidates will be encouraged to take an active role in shaping the exact direction and nature of the research to best suit their skills and interests. The project will leverage data and infrastructure from several recent NERC-funded projects in the region led by members of the supervisory team. The student will therefore be embedded in larger collaborative network of researchers based in the UK and beyond. This will allow them to draw on a wider range of expertise and will help fast-track the development of their own research network.

**Candidate requirements**

The ideal candidate will have:

- A BSc and/or MSc degree in biology, geography or physical sciences, preferably relating to plant sciences and ecology.
- Be willing to coordinate and undertake prolonged fieldwork campaigns in tropical forests.
- Have or demonstrate the eagerness to learn strong analytical and computational skills.

**Training**

This project will involve extended periods of fieldwork in tropical forests in Borneo together with an experienced research team. Depending on the exact questions which the student will decide to focus their project on, training will include measuring plant growth and functional traits, soil eDNA sequencing and bioinformatics, as well as statistical modelling.

**Background reading and references**


**Useful links**

For all project-related enquiries please contact Tommaso Jucker by email at: t.jucker@bristol.ac.uk
http://www.bristol.ac.uk/biology/courses/postgraduate/
https://www.selvalab.org/

NERC GW4+ DTP Website:
For more information about the NERC GW4+ Doctoral Training Partnership please visit
https://www.nercgw4plus.ac.uk/

Bristol NERC GW4+ DTP Prospectus:
http://www.bristol.ac.uk/study/postgraduate/2021/doctoral/phd-great-western-four-dtp/

How to apply to the University of Bristol:
http://www.bristol.ac.uk/study/postgraduate/apply/

The application deadline is Friday 8 January 2021 at 2359 GMT. Interviews will take place during the period 8th to 19th February 2021.

**General Enquiries:**
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