Citizen science to improve water provisioning and landscape management in the 'water towers' of East Africa

Supervisors: Prof. Mariana Rufino and Prof John Quinton (Lancaster University, UK), Prof. Lutz Breuer (Justus Liebig University Giessen, Germany), Dr Paolo Cerutti (CIFOR, Kenya)

Why is this project interesting?

Montane forest ecosystems deliver valuable ecosystem services including food, feed, fiber, bioenergy and water. These services are necessary for the livelihoods of communities living in neighboring areas and urban centres. In Kenya and Uganda these forested mountains are referred to as 'water towers.' The Mau Forest Complex is the main water source for 12 rivers that feed into lakes Victoria, Natron and Turkana. The Mt Elgon forest, shared by Uganda and Kenya, is also a very important water catchment, with rivers draining into Lakes Turkana Victoria. Both water towers face intense pressures. Deforestation and conversion to other land uses, charcoal burning, encroachment for settlement, and poor land management have undermined the ability of these landscapes to provide critical ecosystem services. Measures aimed at halting deforestation, restoring tree cover have been instituted in the past decade by a broad range of stakeholders. The effectiveness of these measures in achieving sustainable landscape management has not been assessed. Because degradation of tropical forests and poor land management represent serious threats to water resources, setting up monitoring networks should be a priority for the management of the water towers. The rise of simple and affordable technologies provides new opportunities for data collection using citizen science. Limited research has been conducted to compare citizen science data with that obtained using conventional methods. Citizen science offers an opportunity to integrate views from decision makers, encouraging more inclusive sorts of management. Citizen science can be used not only to fill data gaps, but also to work collaboratively with communities to generate relevant management-oriented knowledge.



This PhD project will test and implement a citizen science approach as a low-cost strategy for monitoring water resources in two water towers of East Africa. This project will study the hydrological functioning of the Western and SW Mau and Mt Elgon, and how this is related to tree cover and land management. The research will support water resource use plans, developed by the communities and the institutions that are custodians of the forest and water resources.

Specifically, the project will address the following aims:
1) To explore different models for citizen science in water monitoring, with a special focus on erosion, sediment transport and nutrients export 2) to evaluate the effectiveness in citizen science-based monitoring in the Western and SW Mau and in Mt Elgon, compared to standard methods, 3) Evaluate landscape management options that improve water provisioning.

What's in it for you?

Become an expert in landscape analysis of agricultural and forest systems. You will conduct applied research producing robust scientific evidence urgently needed to support environmental policies in developing countries. You will collect biophysical data that describes landscapes and agricultural production systems in the tropics, and learn how to analyze, interpret, publish and communicate your research to broad audiences. You will become networked with leading scientists in this discipline, and have the opportunity to interact with policy makers at different levels. You will be exposed to and learn from expertise in social sciences. You will be well-placed to enter the job market at the end of your studies. You will join an exciting research environment. You will benefit from the research training programmes offered by the Faculty of Science and Technology at Lancaster University, by being part of the large and vibrant multidisciplinary Lancaster Environment Centre, and by becoming a part of the active tropical environmental research conducted at the Centre. You will conduct field work in East Africa, and learn from your supervisors based at Justus Liebig University of Giessen and at the Centre for International Forestry Research (CIFOR).

Who should apply?

We are seeking applications from excellent graduates with a Master's degree. You should have a strong background in the Soils, Hydrology, and Environmental Sciences. You must have demonstrable potential for creative, high-quality PhD research. Ability to link theory to practical work and statistical knowledge will be important. Programming skills (R, Matlab or Python) and knowledge of GIS are required. Relevant practical research experience required.

The small print

Studentship funding: Full studentship (stipend (£14,296 [tax free] and tuition fees) for 3 years. Excellent candidates from Kenya and Uganda are highly encouraged to apply.

Academic Requirements: Master's degree in Soil and Water, Geography, Environmental or Earth Sciences.

Deadline for applications: Midnight CET 28 February 2017

Provisional Interview Date: First week of March

Start Date: as soon as possible

For further information or informal discussion about the position, please send your CV and an email to Prof. Mariana Rufino (m.rufino1@lancaster.ac.uk) .

Application process: Please upload a completed application form (download from http://www.lancaster.ac.uk/media/lancaster-university/content-assets/documents/lec/pg/LEC_Funded_PhD_Application_Form.docx) outlining your background and suitability for this project and a CV at LEC Postgraduate Research Applications, http://www.lancaster.ac.uk/lec/graduate-school/phd/apply-online/.

You also require two references, please send the reference form (download from http://www.lancaster.ac.uk/media/lancaster-university/content-assets/documents/lec/pg/LEC_Funded_PhD_Reference_Form.docx) to your two referees and ask them to email it to Andy Harrod (lec.pg@lancaster.ac.uk), Postgraduate Research (PGR) Co-ordinator, Lancaster Environment Centre by the deadline.

Due to the limited time between the closing date and the interview date, it is essential that you ensure references are submitted by the closing date or as soon as possible.

Further reading

Website of the project http://www.cifor.org/new-cifor-project-engaging-citizen-scientists-secure-fresh-water-kenya/