

Our latest newsletter comes in the midst of a number of challenges, most notably that of coronavirus. We have all been disrupted by this pandemic, and some much more so than others. We hope that all the Centre members, and their families, are doing well at this difficult time.

In the midst of the current situation, work has been going on across the Centre. This newsletter provides a brief update of some of the activities. We intend that this newsletter will be produced on a bi-monthly basis from now on, to ensure that we are all kept informed of opportunities and activities. We rely on your contributions for this purpose, and we ask you to send in brief information on any announcements you would like to communicate.

Ongoing projects and future opportunities

NERC Future of Treescapes Programme

The call for the NERC Treescapes programme is imminent. Jaboury sent an outline of ideas for discussion to CSFL members on 6 February, with an invitation to register your interest to participate in developing a proposal. As yet, we have only heard from very few of you, and therefore invite you once again to let us know (by email to Jaboury) if you want to be part of the team that develops a proposal.

Scottish Parliament Citizens' Jury

The Centre undertook a review of current Scottish Government policies and mechanisms relating to land use in response to a set of recommendation that emerged from a Citizens' Jury that was held in July 2019. This comprehensive review highlighted the potential opportunities, as well as barriers, that currently exist to align land use actions to perceived needs emerging from the Citizens' Jury. The review is currently with Scottish Parliament, with the expectation that it will be used to inform the discussions of governmental committees on climate change and land use.

Renewable Energy and Low Carbon Options

The Centre continues to be involved in the discussions on land-based options for mitigating the university's GHG emissions through the Renewable Energy and Low Carbon Options initiative that is being led by the University's Department for Social Responsibility and Sustainability. A number of models have been discussed and we are in the process of evaluating alternative options that involve land management and woodland planting in one form or another. The primary objective is to mitigate the University's greenhouse gas emissions, with additional objectives being to use the projects for teaching and research, and for delivering co-benefits such as biodiversity and other ecosystem services. We have recently been engaging external partners to explore the degree of interest in a partnership agreement through which we can access land to undertake activities that sequester and store carbon.

Edinburgh Environment and Development Network (EEDN)

The Edinburgh Environment and Development Network (EEDN) was initiated by Dr Clare Barnes and Dr Sam Staddon in early 2018 in order to bring together academics and practitioners working on issues of environment and development from around Edinburgh.

The network aims to promote discussion around topics of interest, a sharing of knowledge and experience, a greater awareness of each other's work, potential to collaborate on proposals and projects, and just a chance to get to know each other. They normally meet once a month (except in

the summer; June-August) for discussions on topics introduced by members of the network, with facilitation aimed at sharing expertise and experiences amongst all those present.

Sessions take place on Thursdays 16:00-17:30 at ECCI (edinburghcentre.org), with refreshments provided. For details on past sessions, please go to <https://www.ed.ac.uk/sustainable-forests-landscapes/edinburgh-environment-development-network>

The network welcomes all new members and all ideas for topics and formats for meetings, so please do get in touch if you'd like to join or share your ideas: Sam Staddon (sam.staddon@ed.ac.uk) and Clare Barnes (c.barnes@ed.ac.uk).

New funding and grant awards

Dr Gary Watmough has been awarded a **DataLab/Unicef Data for Children Collaborative Grant** to look at child access to health services and how this is related to multidimensional childhood poverty. This is a collaboration between GeoSciences, Informatics and Education at UoE, and Unicef. This has a 6 month RA position attached which will be advertised soon; it will be a remote sensing post to create a national land cover map using sentinel-2 or landsat data for a selected country and subsequently building cost surfaces.

Gary also has a **GCRF Theme Development Fund** grant to look at developing long-term relationships with the Okavango Research Institute. They are currently planning a stakeholder Theory of Change workshops to be held in Maun. The focus is to explore community based natural resource management and how this could help reduce human-wildlife conflicts and improve livelihoods and wellbeing of local communities.

Climate-KIC: Landscapes as Carbon Sinks

Prof Jaboury Ghazoul secured the second phase of the **Climate-KIC Landscapes as Carbon Sinks** project. This EIT funded 'Deep Demonstration' project is exploring how systems level changes can be envisioned and tested by which to deliver net-zero carbon in Scotland through land-based actions. More information on this project, and an invitation to participate, is given below.

CSFL is entering the second phase of the initiative that aims to transform Scotland's landscapes from carbon sources to carbon sinks. [Landscapes as Carbon Sinks](#) is working towards designing a systemic transformation of the land use sectors to make the whole of Scotland a net carbon sink, building on the target of the Government of Scotland of becoming carbon neutral by 2045. The initiative brings together research, policy development, business innovation, access to financial investment, and land management expertise to co-design and deliver low-carbon economies and landscapes.

The project is a collaboration between CSFL, ECCI, Climate-KIC, and a number of European and Scottish partners. Partners in Scotland include those tasked with delivering change in the land sector, including the Scottish Government and the Land Commission, as well as a range of public and private organisations. The initiative brings together the research expertise of CSFL and ECCI's focus on the low carbon economy.

The project aims to develop a systems perspective on what changes need to be made to address climate change and deliver carbon neutrality. Our immediate goals are to work with partner organisations to explore future options, identify key challenges, and elaborate potential levers for change, with a view to implementing pilot projects in coming years.

The project's exploratory phase kicked off with a workshop organised by CSFL in late 2019, in which stakeholders across rural and land based sectors gathered to design the objectives, activities, and implementation plans for the project in 2020 and beyond.

The project is being managed by Hester Robertson, and we encourage all those interested in being involved with this project to contact Hester directly on hester.robertson@ed.ac.uk.

PACY: Predicting African Cocoa Yield - NERC, 2020-21. Project PI: Mathew Williams

Seventy percent of the world cocoa production is produced by small holders in West Africa. However, yields are low and at risk from climate change, pests and diseases and many cocoa farming families live around or below the international poverty line. Major changes are needed to develop a sustainable supply chain.

Being able to accurately predict cocoa yields and production will be one such change. Currently, accurate production forecasts are only available to a handful of large multinational cocoa companies and brokers, who run their proprietary forecasting programmes, based on physical monitoring of hundreds of cocoa farms. All other actors in the cocoa industry lack a reliable source of information about the expected harvest. However, such forecasts are essential to support planning and adaptation across the supply chain. They are also essential to price formation, which is determined in futures markets, which rely on participants' expectations of future harvests. Currently, information is asymmetrical in the market, favouring the few big players. Here we aim to use a demonstrated technology to generate accurate forecasting models at a fraction of the cost of the proprietary systems, making them affordable for a broad audience in the cocoa industry and hence contributing to the democratisation of the cocoa sector. We will combine a range of data sources now available over long periods (20-40 years) with machine learning and models to generate a forecast tool. We will use time series mapping of critical determinants of yield, including rainfall, leaf area index, and surface soil moisture. We also have regional and national yield data. There is strong evidence of climate (soil moisture) impacts on yield, but little information on the critical thresholds in drought stress effects. Here we use process modelling to link plant production to soil moisture through the rooting zone. The output from this research will form the scientific basis on which commercial providers can offer products and services to end-users in the cocoa industry. Once proven for cocoa, the approach can be replicated in a range of other crops, from grains to tropical commodities to vegetable oils.

Courses, MSc programmes, PhD opportunities

Dr Gary Watmough is taking over as programme director for **MSc Environmental Sustainability** in August 2020 and is currently developing the programme for next academic year. He would welcome suggestions on organisations, companies etc. across Scotland that would be interested in offering ideas for dissertations and guest lectures.

Meetings and workshops

In February 2020, **Prof Mathew Williams** attended the **Climate System Services Partnership Brazil annual meeting** at the UK Met Office in Exeter. In this partnership, we are supporting the Met Office and INPE, the Brazilian Space Research Institute, to understand and predict carbon cycling and land use change across Brazil in the past two decades, and to make better predictions of how Brazilian biomass and carbon will respond to forecast climate change.

For more details, please have a look at the CSFL blog.

https://blogs.ed.ac.uk/forest_ed/2020/03/12/understanding-the-amazon-rainforest-through-a-uk-brazil-science-partnership/

Dr Sam Staddon presented at the recent [Multiple Values of Nature Symposium](#) of the **British Ecological Society (BES)**, in Bristol on 2/3 March. Her presentation drew on on-going research in the Cairngorms, Scotland, and was entitled **"Conservation's all about having a blether and getting people on board": Exploring the role of people, place and past as sites for conservation values and actions**. She has since been invited to submit a paper to a Special Feature of the [Journal of People and Nature](#) focused on the Symposium. This will be a co-authored paper with other workshop participants entitled 'The Value of Listening and Listening for Values in Nature Conservation'.

Making Interdisciplinarity Work in Environmental Change Research

Workshop jointly organised by: Centre for Sustainable Forests and Landscapes, University of Edinburgh & Environment, Natural Resources and Climate Change Study Group of the Development Studies Association (DSA).

Convenors: Clare Barnes & Sam Staddon (UoE) and Fiona Nunan (DSA/University of Birmingham); with amazing support from Nataša Honeybone (CSFL)

The workshop took place in ECCI on 20th and 21st February 2020 and brought together 50 researchers from across the UK and further afield – Sweden, Kenya, India and Nepal. Participants came from a wide range of disciplines (ecology, conservation, social sciences, anthropology, geography, development studies, economics, agriculture, engineering, art, creative writing), researching across the globe, and representing a range of seniority and experience. The Keynote was provided by Professor Kate Schreckenber (KCL) and interactive sessions were led by colleagues at the University of Edinburgh (Roger Jeffery, Gary Watmough, Annie Yang, Ellie Wood, Kirsten Campbell) including from GCRF research (Eliane Reid, Dave Bell) and research support (Catherine Burns, Isobel Marr), as well as beyond (UKRI, ATREE (India), Stockholm Resilience Centre).

There was huge interest in continuing the conversations started at the workshop to take ideas forward and new networks have emerged from the workshop. COVID-19 has delayed dissemination from the workshop for now, but outputs will emerge in due course and will be available through the CSFL webpages.

Workshop Themes

1. How do interdisciplinary teams create a common problem understanding and research approach across disciplines? And how do they convey this in research proposals?
2. How can relationships be built within interdisciplinary teams? This includes paying attention to the intersections of discipline, seniority, Global North/South, gender and other power dynamics, as well as to the time taken to develop constructive collaborations.
3. How can interdisciplinary teams work together to create 'impact'? What do we consider to be the impacts of interdisciplinary research projects?
4. Building on points 1-3, what lessons are there for funding applications and wider institutional structures?

Recent publications

Dr Sophie Flack-Prain led a study on how the capacity of Amazon forests to sequester carbon is threatened by climate-change-induced shifts in precipitation patterns. She combined a process model with observational data from seven intensively studied forest plots along an Amazon drought stress gradient. Variation in leaf area index was the key controller of changing photosynthesis along the gradient, more important than changes in photosynthetic capacity, or changes to temperature

and radiation. These results emphasise the importance of monitoring variations and changes in LAI across the Amazon to understand its carbon sink:

Flack-Prain, S., P Meir, Y Malhi, TL Smallman and M Williams (2019). The Importance of Physiological, Structural and Trait Responses to Drought Stress in Driving Spatial and Temporal Variation in GPP across Amazon Forests. *Biogeosciences*, in press

Prof Mathew Williams is a member of the European Space Agency mission advisory group for BIOMASS, ESA's first forest mission. This paper describes the mission in detail, with launch planned for 2022 and satellite construction costing >£300M. The data from this mission will be used by Centre scientists to map and analyse changes in forest cover, biomass and C cycling. Critically, this mission will provide insights into biomass change in the densest equatorial forests, for the first time:

Quegan, S., Le Toan, T., Chave, J., Dall, J., Exbrayat, J.-F., Minh, D. H. T., Lomas, M., D'Alessandro, M. M., Paillou, P., Papathanassiou, K., Rocca, F., Saatchi, S., Scipal, K., Shugart, H., Smallman, T. L., Soja, M. J., Tebaldini, S., Ulander, L., Villard, L., and Williams, M (2019). The European Space Agency BIOMASS mission: Measuring forest above-ground biomass from space, *Remote Sensing of the Environment*, 227, 44-60, <https://doi.org/10.1016/j.rse.2019.03.032>.

Dr Steve Hancock co-authored the NASA GEDI mission paper (a satellite lidar for measuring forest structure and biomass)

<https://www.sciencedirect.com/science/article/pii/S2666017220300018>

Steve also co-wrote a paper on testing how GEDI data can help us to map bird species distributions:

<https://iopscience.iop.org/article/10.1088/1748-9326/ab80ee/meta>

Prof Jaboury Ghazoul published two papers from his recent work in Borneo, one on impacts of forest loss on biodiversity, and the other on the ecology of dipterocarp forest.

Ocampo-Peñuela, N., Garcia-Ulloa, J., Kornecki, I., Philipson, C.D., and Ghazoul, J. (2020) Lasting impacts of four decades of forest loss on frugivorous vertebrates in Borneo. *Frontiers in Forests and Global Change*, in press.

Tito de Moraes, C.M.D., Kettle, C.J., Philipson, C., Maycock, C.R., Burslem, D.F.R.P., Khoo, E., and Ghazoul, J. (2020) Exploring the role of genetic diversity and relatedness in tree seedling growth and mortality: a multi-species study in a Bornean rain forest. *Journal of Ecology*, in press.