

Project title: Combining Nature-based Solutions to Enhance Carbon Dioxide Removal

Ref: OP2428

Keywords: Carbon Dioxide Removal, Climate Change Mitigation, Nature-based Solutions

One Planet Research Theme:

Climate & Climate Change | Earth System Processes | Anthropocene | Environmental Informatics

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Key Research Gaps and Questions:

1. Do combinations of nature-based solutions stimulate greater Carbon Dioxide Removal (CDR) than single innovations alone?
2. What are the potential co-benefits that are derived from combining different nature-based solutions?



Project Description: The UNFCCC Global Stocktake (2023) and UK Committee on Climate Change Progress Report (2023) have highlighted that we are failing to meet our Net Zero targets, compromising attempts to keep global temperatures below the 1.5 °C threshold agreed by the Paris Agreement. It is therefore critical that we rapidly scale-up implementation of CDR to mitigate or reverse the effects of climate change. Several nature-based climate solutions (NbS) have the potential for gigaton-scale CDR because of growing acceptance by stakeholders (e.g. conservation agriculture, agroforestry) or ease of implementation due to their similarity to existing management practices (e.g. enhanced rock weathering). Combining CDR innovations (e.g. enhanced weathering x agroforestry; enhanced weathering x conservation agriculture) could theoretically lead to additive or synergistic effects, leading to greater CDR than use of single innovations alone. However, we currently lack the evidence-base to predict the effects of combined innovations, given that current research focuses on use of single innovations alone. This PhD project we will leverage the research investment and infrastructure at the Newcastle University Farms and UNDO Ltd's network of field trials across the UK on CDR innovations such as enhanced rock weathering, conservation agriculture and agroforestry to explore if these promising CDR innovations could be combined to enhance CDR from agriculture and land use. This project will also evaluate the wider impacts of combining these innovations on key ecosystem services such as yield, soil organic matter content, soil health or regulation of non-CO2 greenhouse gases. These potential co-benefits are potentially important for gaining wider stakeholder acceptance, given that they influence ecosystem services that affect stakeholders' livelihoods (e.g. yield) or ecosystem services rewarded by UK farm subsidy schemes (e.g. Sustainable Farming Incentive, Environmental Land Management scheme).

Prerequisites:

BSc in Environmental Science, Ecology, Physical Geography, or other allied degree.

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