

Project title: *Identifying hotspots of riparian invasive species colonisation and spread*

(Ref: OP2169)

Keywords: *invasive species, freshwater, plants, remote sensing*

One Planet Research Theme:

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

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Key Research Gaps and Questions:

Invasive species management in river catchments is hindered by prolific reinvasion. Identifying hotspots of colonisation can aid targeted control and prevent further spread throughout a catchment. Seasonal sediment deposition is believed to act as a reservoir for viable invader propagules, creating sites for colonisation, but this is yet to be studied at a catchment relevant scale.

1) What is the role of sediment deposition in the dispersal of invasive plant species? 2) Can satellite and UAV remote sensing be used to rapidly identify sediment deposits following large flood events to target management of invasive plants?



River invaded by Himalayan balsam

Project Description: Biological invasions are one of the top 5 threats to biodiversity worldwide. Freshwater biodiversity is declining at a faster rate than terrestrial and marine systems and are particularly vulnerable to invasion by non-native species, being heavily modified by humans. As our climate changes, the UK is faced with wetter winters and dryer summers, including increased frequency and duration of flood events over winter. Rivers act as conduits for dispersal of species which can be amplified during climate induced changes to flood events. These flood events carry large amounts of sediment which can act as a propagule source of invasive non-native plants, as well as providing new habitat for colonisation. New satellite and drone technologies have the potential to monitor such events at catchment scale. In combination with field and experimental data, remote observations can support the development of predictive models. In order to efficiently manage biological invasions in freshwater systems, identifying sources of initial colonisation and establishment is critical. This project aims to 1) identify the role of sediment deposition, caused by climate induced changes to flood events, as hotspots for invasion along rivers, and 2) incorporate remote sensing techniques to identify sediment deposits in order to target management before spread. We will identify river catchments invaded by Himalayan balsam, Japanese knotweed and Giant hogweed. Post-event satellite data will be identified and algorithms developed to map winter sediment depositions. Field surveys will be conducted to assess the abundance of invasion along rivers which vary in their flood duration and frequency. Sediment samples post-winter flooding will be grown in polytunnels to assess propagule pressure (amount of viable reproductive fragments and seeds), as development of plant communities at deposition sites are mapped using UAVs and supported by field observations. We will then test the viability of remote sensing to locate sediment deposits post winter flooding for targeted management to prevent reinvasion.

Prerequisites: Motivation to learn analytical software, ability to work in the field

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