



Postdoctoral position on meta-ecosystem dynamics in drying river networks, 18 months in a highly-collaborative European project

Context

River networks are among the world's most biodiverse ecosystems and provide essential ecosystem services to societies. Ecologically, they form aquatic continuums embedded into terrestrial matrices and are considered as meta-ecosystems, i.e. a set of sub-ecosystems linked by lateral (terrestrial to aquatic), vertical (from the surface to the subsurface) and longitudinal (from upstream to downstream) flows of organisms and resources. However, climate change and humans' growing water needs are causing these river networks to dry up around the world. Although the effects of river channel drying have been studied intensively at local scale in the past decade, little is known about its effect on the entire river network. Yet, as an agent of fragmentation of the aquatic continuum, drying disrupts fluxes of resources and organisms in all 3 dimensions. But how this alters aquatic biodiversity, functional integrity and the ecosystem services at the river network scale remain poorly understood. Consequently, the management of river networks in the Anthropocene era may be ineffective.

A multidisciplinary consortium coordinated by INRAE of 25 experts from 11 countries (in Europe and South America, as well as China and the United States) – will explore for a four-year period how the drying effects of climate change alter the biodiversity, functional integrity and ecosystem services of drying river networks. The aim of the DRYvER (Securing biodiversity, functional integrity and ecosystem services in DRYing riVER networks, www.dryver.eu, @DRYVER_2020) is to collect, analyse and model data from nine case studies in Europe and South America to create a novel global meta-system approach that incorporates hydrology, socio-economics, ecology and biogeochemistry. Another goal of DRYvER is to develop strategies, tools and recommendations for adaptive management of river networks. Working in collaboration with resource managers and citizens, the DRYvER team plans to co-develop new strategies to mitigate and adapt to the effects of climate change on these networks by integrating quantitative and qualitative perspectives, including nature-based solutions with a strong socio-economic and legislative component. DRYvER's findings, which should be available in 2024, will contribute to meeting the objectives of the Paris agreement and put Europe at the forefront of climate change research.

Objectives

This postdoctoral project aims at developing a spatially-explicit, dynamic meta-ecosystem model for drying river networks that is capable to reflect spatio-temporal patterns of biodiversity as well as river network-derived detrital organic matter resources, which in concert drive ecosystem functions and pivotal ecosystem services. The candidate will develop the model conceptually, in interaction with the other on-going efforts in DRYvER. Such model will integrate i. the hydrology and associated fragmentation by drying, ii. flows of carbon resources (particulate and dissolved) and their retention and processing by physical factors, iii. information about resource inputs constrained by phenology, and iv. functional diversity as a biotic driver including patterns of biodiversity in river networks and potential dynamic output from metacommunity dynamics. This will evidently result in a conceptual meta-ecosystem model that is able to account for movement of matter (as resource) as well as organisms (as dispersal), as drivers of ecosystem processes in a spatially explicit and dynamic way. This state-

of-the-art meta-ecosystem model will serve several purposes: First, it will encapsulate all the knowledge available in the DRYVER consortium and beyond. Second, it will serve as the platform to include the new empirical knowledge generated during DRYvER.

DRYvER also wants to apply the meta-ecosystem model at the European scale, leveraging both the conceptual framework developed and the new empirical information collected during DRYvER. This up-scaling exercise is going to be the focus of a future 1.5 years post-doc position offered by the Catalan Institute for Water Research (ICRA, Spain), which may be considered as a continuation of the tasks described for the position at INRAE.

Requirements

The successful applicant will be based at INRAE, Lyon, France, in the [EcoFlowS](#) team. He/she will develop the conceptual model, in interaction with ICRA and other colleagues involved I DRYvER, and in a very collaborative and friendly environment. The monthly salary (net) is in the range € 2 to 2.4 KEuros depending on experience. The position is available for 18 months and should start in spring 2021. A Ph.D in ecology is required at the time of appointment. Applicants must have a solid background in ecology, including theoretical ecology, a strong experience in ecological modelling and statistical analysis. Experience with Bayesian modelling techniques is not a requirement, but will be considered during evaluation of candidates. Excellent oral and written communication skills will be preferred.

Application

To apply, please send by email a cover letter stating your research accomplishments and interests, curriculum vitae, representative publications, and the names and contact information for three references to Dr. Thibault Datry (thibault.datry@inrae.fr). Review of applications will begin in January 2021 and continue until the position is filled.