Position:

Postdoctoral research fellow (CDD)

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Ecole nationale des travaux publics de l'Etat

(ENTPE)

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Job title:	Anticipating Biological Succession in Rehabilitation of Long-Term Operated Nature-Based Solutions for Stormwater Treatment in Different Climate Zones (Anticipation de la succession biologique dans la réhabilitation de solutions naturelles à long terme pour le traitement des eaux pluviales dans différentes zones climatiques)
Host laboratory:	LEHNA-IAPHY
Location:	Vaulx-en-Velin (69), France
Duration:	18 months (start date possible between April and November 2025)
Type of contract:	Fixed term (CDD)
Salary:	2899 € to 3828 € (gross salary) depending on professional experience
Contact:	Katharina Tondera, professor at LEHNA-IAPHY, katharina.tondera@entpe.fr

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1-Context and challenges

The IAPHY team (Impact of Developments and Pollutants on Hydrosystems), located on the ENTPE campus in Vaulx-en-Velin (69), is one of the six research teams within the Mixed Research Unit (UMR) 5023, LEHNA (Laboratory of Ecology of Natural and Anthropized Hydrosystems). It comprises a total of 70 permanent staff based on the Doua campus and the ENTPE campus. Its main research focus is the analysis and understanding of the influence of global changes on ecosystem services in hydrosystems. The three overarching transversal axes mobilized are (i) biotic interactions and global changes, (ii) stress and adaptations to global changes, and (iii) eco-hydrology at interfaces, from ecological processes to ecosystem services. Research is organized into themes corresponding to the research scopes of its six teams: (i) BAH (Biodiversity and Plasticity in Hydrosystems), which identifies the ecological and evolutionary mechanisms governing the biodiversity and functioning of river hydrosystems; (ii) EVZH (Plant Ecology and Wetland Zones), which studies adaptive and functional responses of plant communities in wetland areas to environmental constraints; (iii) E3S (Ecology, Evolution, Underground Ecosystems), which focuses on identifying factors and connections shaping the evolution, dynamics, and role of biodiversity in underground ecosystems; (iv) E2C (Ecophysiology, Behavior, Conservation), which investigates how natural and anthropogenic changes in the environment influence

ecological, behavioral, and physiological processes contributing to biodiversity conservation; (v) IAPHY, and finally, (vi) BMPT (Biogeography and Macroecology in Deep Time) to characterize the patterns, rhythms, and modalities of biodiversity variations at different spatiotemporal scales.

The scientific field of the IAPHY team falls within the broader scope of Environmental Sciences and focuses on assessing the impact of developments, in a broad sense, and chemical pollutants on continental aquatic environments and ecosystems. The research and teaching activities of the IAPHY team intersect the concerns of the INEE (National Institute for Ecological and Environmental Sciences) of CNRS and the land development and management missions under the Ministry of Ecological Transition (MTE). The team's work is centered on understanding the role of developments, pollutants, and other stresses resulting from human activities on biotic and abiotic processes within continental hydrosystems. This aims to identify high-risk situations and characterize the resilience of these ecosystems. The scientific project aligns with the broader study of the effects of anthropogenic pressures (developments and pollutant emissions) on fluxes (water, sediments, nutrients, and pollutants) and their impacts on hydrosystems and their ecological functions.

In this context, ENTPE is recruiting a postdoctoral research fellow, hosted at IAPHY.

2-Missions

The position is funded through the research project "Anticipating Biological Succession in Rehabilitation of Long-Term Operated Nature-Based Solutions for Stormwater Treatment in Different Climate Zones" (BioReStorm) financed under the BiodivNBS scheme. The work proposed within this projects aims at the scientific objectives (i) identifying the contribution of fungal and bacterial communities to a successful plant establishment under the demanding conditions of stormwater NbS (nutrient scarcity, pollutant and hydraulic shock loads, extended drought periods) under different climatic conditions (impact of rainfall patterns, climate zones, etc.), (ii) evaluating the impact of long-term operation on biodiversity development and natural succession of plants and microbial communities of full-scale stormwater NBS in different climate zones, (iii) determining the impact of long-term operation and the extent to which plant community changes over time and space on hydraulic and treatment (mal-)function of stormwater NBS compared to shortcomings of initial design, implementation and/or maintenance, and (iv) optimising rehabilitation and initial design concepts of stormwater NBS based on biological succession as observed under long-term operation, and implement rehabilitation measures into guidelines, in collaboration with relevant stakeholders.

Activities within the project will be the setup and running of microcosm experiments at the greenhouse platform of the University of Lyon 1 to test different conditions of stormwater NBS at small scale as well as field sampling, sample preparation for diverse analyses, determination fungal and bacterial functional groups after metabarcoding analyses of soil and plant roots. Plant growth will be characterised through the measurements of functional traits and physiological traits. To investigate the potential links between the chemistry of substrate, organic and inorganic pollutants, the structure of the microbial communities and the services provided by the plants, microcosm experiments with several target plant species will be coupled with long-term data sets and supplementary investigations on plant biodiversity and water quality in situ at urban infrastructure sites for stormwater management. The candidate will work closely with the PhD student recruited for this project.

3-Expected profile

- A PhD degree in environmental science or engineering, microbiology, botany or related fields.
- Very good knowledge in microbiology (molecular analysis) and data assimilation.
- Experience in processing and analysing large volume of data.
- Good programming skills in high-level programming language (Python or R)
- Good communication and writing skills, fluency in English.
- Knowledge of the French language is helpful, but not mandatory.
- Willingness to work in an interdisciplinary research environment

4-Application procedure

If you require further information on the position please contact Prof. Katharina Tondera. Application must be sent to Prof. Katharina Tondera by February 1st, 2025, and should include an application letter describing your interests and their relevance to this position, a CV, and the names and contact information of two references. The anticipated starting date for the position is on agreement (between April and November 2025).