Postdoctoral research fellow position

Ecole nationale des ponts et chaussées – Leesu (France)

Resilience of nature based urban stormwater management solutions to climate extremes

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Host laboratory : École nationale des ponts et chaussées, Institut polytechnique de Paris (https://ecoledesponts.fr/)
Leesu (https://www.leesu.fr/)

Location : Marne la Vallée, France (Paris conurbation)

Duration : 12 months (start date : as soon as possible, possible extension on other research projects in urban hydrology)

Type of contract : fixed term (CDD)

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Background

Leesu (https://www.leesu.fr/) develops interdisciplinary research on water in the city. Its objective, in line with the challenge of making cities sustainable and resilient to global changes, is to gain a better understanding of water and contaminants flows and fate in urban environments, and to develop innovative concepts for water and soil management. The research is based on in situ and/or controlled laboratory observations, and their interpretation in order to produce quantitative and predictive models. Leesu coordinates since 1994 the OPUR observatory of urban hydrology, a long-term research project and a means for structuring scientific expertise in the Paris metropolitan area.

The postdoctoral position is part of the European project GreenStorm (https://arceau-idf.fr/projets/greenstorm). GreenStorm focuses on nature-based solutions for urban stormwater management (NBSsw) and addresses the question of their implementation, performance and resilience for current and future climate extremes. It emphasizes the hydrological and thermal benefits of these devices as well as the stress suffered by vegetation during extreme events in 5 European cities. The project aims also to assess the acceptability of these solutions and the conditions for their diffusion. The project proposes to identify effective, resilient designs accepted by all, but also the levers to promote their implementation on a city scale and maximize the associated benefits.

Research activities

The applicant will contribute to the workpackage 2 of the GreenStorm project, which targets local scale assessment of a range of NBSsw solutions. He/she will be in charge of two main project tasks:

- WP2a : construction and analysis of a NBSsw monitoring database accross Europe. This task builds on the hydrological monitoring datasets already available among project partners for a range of NBSsw, under contrasted climates. The postdoc will be in charge of finalizing data and metadata collection, sharing them in an open science repository and writing a data paper. He/she will also analyse previous publications associated with these datasets and summarize current knowledge regarding NBSsw performance. If deemed relevant, additional analyses of

the dataset could be considered to further refine the comparison between solutions and climates.

- WP2b: climate extremes simulation in SenseCity, for a raingarden and a stormwater tree. Sense-City is an experimental facility (https://sense-city.ifsttar.fr/en/), comprising a 400 m2 urban district model equipped with multiple sensors and over which a moveable climate chamber can be applied during short time periods to simulate different climate conditions (based on temperatures, humidity or radiation control). The model district represents a canyon street including three NBSsw types with different vegetation layers : stormwater trees, rain garden and lawn. The scientific questions associated with this task are twofold : how representative of real life conditions are such simulations in a closed chamber (in terms of climatic variables like solar radiation, wind, humidity, PET) ? What are the hydrologic (evapotranspiration, soil water content) and ecophysiologic responses of NBSsw to the simulated climate extremes? A first climate extreme scenario has been developed and implemented over a 10 days period in 2024. A second experiment is planned in June 2025. The postdoc will be in charge of proposing a second scenario (building on the experience gained from the 2024 experiment) and supervising its implementation in 2025, contributing to data acquisition, analysing data from both experiments and writing the associated project deliverable.

Expected profile

PhD degree
Double background in urban hydrology and plant physiology
Good knowledge of data acquisition and treatment
Good English writing capacities
Abilities to work in a team

Application procedure

Send CV + application letter by email to marie-christine.gromaire@enpc.fr and martin.seidl@enpc.fr