Postdoc in Mapping and Modelling the Functionality of Green Infrastructure

Postdoc position at Department for Architecture, University of Pretoria, South Africa. The programme in Landscape Architecture under the Integrative Green Infrastructure Planning Project funded by DANIDA advertises a 24-month full-time postdoc position.

This position is available for a postdoc interested in mapping and modeling multifunctionality of Green Infrastructure (GI) by working with GIS analysis and high-resolution satellite-based Earth observations (remote sensing) verified and qualified by ground-truthing. On the ground assessment of GI multifunctionality includes identification of the presence, role, and importance of native plant species in the local urban ecology and functioning together with the project team and local experts. In this position, the incumbent will explore the ecological importance of GI functionality in marginalised areas in the urban context of the City of Tshwane and surrounds. The ideal applicant would have a PhD related to one of the following fields: ecology, urban ecology, spatial geography, environmental science or landscape architecture.

The postdoc will be based at the Department of Architecture at the University of Pretoria, South Africa (SA), where the project is led by Dr Ida Breed. This position forms part of the DANIDA award entitled: Integrative Green Infrastructure Planning *(GRIP).*

The greater GRIP project will be led by Prof Jens-Christian Svenning from Aarhus University, Denmark. The GRIP project is structured in four interrelated Work Packages (WPs) in which joined activities, including fieldwork and capacity building, will take place. You will be part of a diverse research environment and embedded in a network of national and international collaborators (researchers, students and private and public sector consultants). Joint fieldwork will take place four times during the project period (three times in CoT and one time in CoA) along with joint project workshops facilitating coordination, collaboration and exchange of expertise, as well as dissemination of results at the final stage of the project period.

Research area and project description:
The project 'Integrative Green Infrastructure Planning (GRIP)' aims to complement an existing collaboration on sustainable cities between City of Aarhus, Denmark and City of Tshwane (Pretoria) in South Africa by adding a strong research component. In close connection with urban planners from both cities, GRIP aims to facilitate a strategic transformation of the social and urban landscape in City of Tshwane (CoT) through guidelines inspired by City of Aarhus (CoA) for improved planning and management of green infrastructure (such as public parks, green ways, community gardens and conservation areas). In contrast to 'grey' (man-made) infrastructure approaches, 'green' infrastructure promotes multifunctionality, which means that the same area of land can perform several functions at the same time and thereby offer multiple benefits through infrastructural and ecosystem services. For instance, green infrastructure supports environmental and human health, including biodiversity habitat, flood and heat island control, and sense of place, which affects physical and psychological well-being. The research project will provide new in-depth knowledge on opportunities for multiple ecological and social benefits of green infrastructure, as well as integrate governance and justice perspectives, and develop concrete landscape design proposals to improve green infrastructure access, functioning and socio-economic opportunities. Together with urban planners from Aarhus and Tshwane, private partners and students, the main research partners in Denmark (Aarhus University) and in South Africa (University of Pretoria) will co-create this knowledge and strengthen research capacities through exchange of technological, ecological, socio-political, and

planning expertise. The long-term objective is that the GRIP research will facilitate an improved quality of life in urban communities in CoT by moving towards a more climate resilient, health promoting, biodiverse, and liveable city.

Focus: Mapping and modeling multifunctionality of GI
This work package (WP2) will be led by *Kristine Engemann Jensen,* from Aarhus University, Denmark with *this postdoc position (you) as the co-lead.* The WP2 aim is to adapt current best-practice GIS planning tools for modelling the multifunctionality of GI in the SA context to better guide decision makers. This includes scoring of parameters, such as physical accessibility to GI (e.g. for non-motorized transportation), physical and mental health benefits, vegetation structure and cover, biodiversity protection including wildlife co-existence through green corridors, and climate resilience with a focus on flooding control. WP2 will make use of the rapidly increasing possibilities in high-resolution satellite-based Earth observations (remote sensing) verified and qualified by ground-truthing. On the ground assessment of GI multifunctionality will also aim to identify the presence, role, and importance of native species in the local urban ecology and functioning. The first output of WP2 will be completing a data base of remote sensing images and municipal maps. The second output is constructing the GIS model that will use the data base as input and produce an estimate of the current level of multifunctionality for a GI. The third output is verification of the GIS model through ground-truthing with data collected in the field as rapid assessments covering vegetation structure and cover, species diversity, and access for local communities. This includes an environmental sensitivity map that considers GI at meso-scale on the ground, verified through local community and expert consultation. Together these outputs will produce the final and fourth output of WP2: a decision support tool to guide municipalities and urban developers towards multifunctionality and sustainable development with strategic protection of sensitive GI. This output will feed into WP4 where ecological corridors (for biodiversity) and greenways (for people) are respectively identified and proposed based on the data of WP2 and WP3. Joint fieldwork and basic ground-truthing, by researchers, Master's and Honour's students, will be supported by local species experts where necessary. The AU team and the UP team will participate in joint GIS modelling and of joint fieldwork. Private partners will also devote time.

Conditions of Award

- The fellowship is only available to candidates with nationalities from a developing or a transition country.
- The fellowship is only available to individuals who have achieved the doctoral degree within the past five years, if more time has lapsed a clear motivation must be provided.
- The fellowship is only available to individuals who are under 40 years of age, unless a clear motivation can be provided.
- The successful candidate needs to be approved by the University of Pretoria, Department of Research and Innovation.
- The successful candidate will be required to register as a Postdoctoral Research Fellow at the University of Pretoria.
- The successful candidate will be required to comply with the university's approved policies, procedures and practices for the postdoctoral sector.

Value and tenure
The value of the Postdoctoral Research Fellowship is between R250,000 and R350, 000 per annum based on the seniority of the candidate. The seniority is determined by the time spent actively doing research and the publication record of the candidate.

The tenure of the fellowship is two years (starting 2021). Renewal for 2022 will be contingent on satisfactory academic progress.
The fellowship does not include any benefits.
The fellowship is compliant with the SARS policies/rules and is therefore exempt from taxation.

Place of employment
The place of employment is the University of Pretoria, Department of Architecture, Programme in Landscape Architecture, Building Sciences, Hatfield Campus, Hatfield 0028, Pretoria, South Africa. You will be part of GRIP – Integrated Green Infrastructure Research Project.

Contact information
Any further questions about the position can be directed to Dr Ida Breed at ida.breed@up.ac.za

Application Process
To apply, send 1) a letter of application that explicitly identify your relevant education, skills and experience to the position, 2) a CV including a complete list of publications and/or conference presentations, a statement of future research plans and information about research activities, and verified information on previous teaching experience (if any). 3) copies of academic transcripts, 4) a copy of the relevant thesis (if no publications have emerged from this work yet), and 5) two letters of reference (with names and contact details) of academics who have taught, supervised or worked alongside the applicant.

Applications (by email) should be sent to:
Dr Ida Breed, Department of Architecture, University of Pretoria, South Africa,
ida.breed@up.ac.za
BY NO LATER THAN 28 February 2021

Qualifications
We are looking for a candidate with a PhD in ecology, biology, landscape architecture or spatial geography or a related field where there has been a strong research background in ecology or physical geography. Experience with Green Infrastructure planning for improved ecosystem services would be an advantage.
We look for the following specific qualifications:

- Proven capabilities in handling and analysing geospatial data, notably in GIS. Handling and analyses of remotely sensed data is an advantage.
- Strong knowledge of programming languages (e.g., R, Python)
- Excellent knowledge in statistical analyses and modelling, machine learning, prioritisation algorithms, data wrangling, visualization & communication.
- Proven capabilities in ecological fieldwork and the ground assessment of GI
- Ability to synthesize and conceptualize on a theoretical and empirical basis. Proven skills with systematic reviews are an advantage.
- Proven ability to publish in key journals within the field
- Good collaboration skills across different groups of employees.
- Proven ability of good communication and writing skills in English.

Selection process
Selection of eligible candidates will be made by the project leaders. Applications that are incomplete, late or inappropriate will be disqualified. The University of Pretoria reserves the right to: disqualify ineligible, incomplete, inappropriate and/or late applications, and to change the conditions of award or to make no awards at all. Once the recruitment process is completed a final letter of rejection is sent to the deselected applicants.

All interested candidates are encouraged to apply, regardless of their personal background. Research activities will be evaluated in relation to actual research time. Thus, we encourage applicants to specify periods of leave without research activities, in order to be able to subtract these periods from the span of the scientific career during the evaluation of scientific productivity.

Further information
Interviews (expected): medio March
Start date: 1st of April, or thereafter (latest August 2021)