Bio-geomorphodynamic modelling of coastal wetlands

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Company: KU Leuven

Location: Leuven

Category: life-physical-and-social-science

We are looking for one PostDoc for the duration of 18 months (1.5 years). The PostDoc should have a background in hydraulics, sediment transport, environmental engineering, or a closely related field with a keen interest in coastal sediment transport and its numerical modelling. Due to the short duration of the project, experience in hydrodynamic- and morphological modelling is required (ideally sing the TELEMAC model-suite). The Postdoc will be working at the KU Leuven (campus Arenberg), in collaboration with Belgian as well as Chinese partners, on further developing an existing bio-geomorphic model by incorporating an avian (bird) module and large-scale sediment transport processes interacting with vegetation. The resulting tool will subsequently be used to develop guidelines to optimize the design of wetlands as NbS. Due to the interdisciplinarity of the project, the candidate should be highly motivated to combine existing data and modelling.

Please submit any thesis, report or other publication demonstrating your experience in numerical modelling of (complex) fluid flow problems (preferably with TELEMAC).

Proven experience in scientific programming of numerical methods (in particular within the TELEMAC suite codes) is a strong asset.

Coastal wetlands are increasingly put forward as so-called Nature-based-Solutions (NbS) reducing the need of hard engineering solutions in coastal management. However, thus far there are no consistent frameworks in place able to predict the development of coastal resilience and biodiversity of NbS. Thus, limiting possibilities to optimize their design for specific target ecosystem functions.

This project will develop a numerical modelling tool (in TELEMAC-GAIA) to understand how

large-scale processes influence the development and resilience of wetland morphology and how wetland morphological development drives biodiversity. You will focus on the impact of large-scale driving forces such as the coastal sediment budget driven by tides and storms on wetland development (including vegetation) and resilience and predict bio-morphological wetland development and habitat suitability for birds (wetland, migratory and overwintering) over engineering time scales of half a century. Reference sites providing calibration and validation data have been selected at the Belgian coast and the Yangtze estuary, China.

The Sediment Mechanics Research Unit of the Hydraulics & Geotechnics Section of the Dept. of Civil Engineering is specialized in developing new physics-based process models to improve the prediction of numerical models for hydrodynamic and bio-geomorphodynamic applications in water resources engineering, including the interaction with living organisms (vegetation, benthic species, plankton, etc.). These models are used a.o. for studies on climate resilience of coastal areas and the design of nature-based solutions.The WADER (Wetland Avian bioDiversity & climatE Resilience) project applies state-of-the art knowledge of bio-geomorphodynamics to improve our ability to predict avian biodiversity and climate resilience in coastal wetlands, using birds as indicators for evaluating the ecological status of a wetland. The project falls under the Belgium-China cooperation in the domain of science and technology, bilaterally funded by BELSPO (Belgium) and MOST (China). The WADER project team consists of a multi-disciplinary Belgium-Chinese consortium investigating how we can improve predictions in wetland ecosystem functions (i.e. biodiversity and resilience) and implications for optimization in design of NbS. The consortium consists on the Chinese side of Hohai University, Tianjin University, Institute of Subtropical Agroecology, Chinese Academy of Sciences, and on the Belgian side of KU Leuven, Royal Belgian Institute of Natural Sciences, Research Institute Nature and Forest and Flanders Hydraulics.

We offer an open, stimulating and multi-disciplinary research environment.

The candidate will start with a 1-year contract that is extendable (after evaluation) by 0.5 years to a total of 1.5 years.

The candidate should have obtained excellent results in his/her bachelor, master and PhD training. Proficiency in English is required. During the PostDoc project, the candidate is expected to contribute to teaching assignments (e.g. practical supervision) and supervision of master thesis students. The candidate should be prepared to take up responsibilities with respect to management of the research laboratories.

The salary and appointment terms are consistent with the general rules at Leuven

University. Further general information on working at KU Leuven is found under https://www.kuleuven.be/personeel/jobsite/en/working-at-kuleuven/working-at-kuleuven.

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