PH.D. “FEEDBACK BETWEEN SEABED DYNAMICS AND SMART WATERWAYS” AT THE UNIVERSITY OF TWENTE

This Ph.D. vacancy concerns one of three Ph.D. positions within the SMARTSEA project, funded by mainly the TKI-Maritime Programme of the Science and Technology Foundation STW of the Netherlands Organisation for Scientific Research NWO. The overall title of the SMARTSEA project is “Safe navigation by optimizing seabed monitoring and waterway maintenance using fundamental knowledge of seabed dynamics”.

For safe navigation, seabed dynamics are a major concern, especially in shallow seas with dynamic bedforms in near-critical depths for shipping. However, the natural dynamics of marine bedforms in relation to environmental conditions are not yet understood. Waterways to the harbours of e.g. Amsterdam and Rotterdam at the Dutch coast are dredged to guarantee a safe passage for large vessels. To date, the interaction between dredging and seabed dynamics remains to be investigated. This knowledge will lead to smart monitoring and maintenance strategies.

In three subprojects, we aim to generate essential knowledge on (i) the influence of storms and wind waves on sand-wave dynamics, (ii) the feedback among waterway morphodynamics, maintenance operation and the surrounding marine environment (this vacancy) and (iii) how to combine these processes in a risk-based hydrographic resurvey policy. Next to these challenges, the project’s overall innovation lies in the step we make towards a probabilistic approach in bathymetric surveying, waterway maintenance and, hence, safe navigation. The first two Ph.D. positions are at the University of Twente, the latter at Delft University of Technology. The three subprojects are designed to form a synergy and will rely on personal collaboration.

**Job description**

This Ph.D. project focusses on the interaction between natural seabed dynamics and human interventions, such as the dredging of harbour approach channels in the Dutch part of the North Sea. The overall aim of this project is to come to optimized guidelines for monitoring of the approach zones and maintenance of shipping channels to the Dutch ports of Amsterdam and Rotterdam, based on the scientific understanding of seabed behaviour. The research will be empirically based, using time series of existing echo-soundings, dredging data and hydrodynamic and geological data to develop a quantitative analysis of seabed behaviour. The applicability of this research is high.

The objectives in this Ph.D. research are:

- to explain the spatial variation in natural seabed dynamics (e.g. the behaviour of sand waves and megaripples) based on empirical findings, in relation to local conditions such as tidal currents, sediment properties and wave regimes,
- to develop an automated method for the quantified analysis of dynamic trends of seabed recovery between dredging events,
- to investigate the feedback mechanisms between dredging in the fairways and both the natural dynamics of seabeds in the surrounding areas and the recovery of seabeds in the harbour approach areas at the Dutch coast. This step combines data analysis and model results from Delft3D and/or from sand-wave modelling in subproject (i), and
- to investigate the effects of various types of maintenance strategies, using data and modelling.

Collaboration with Ph.D.’s from the two other subprojects on sand wave modelling and policy science, also involves Delft University of Technology. The SMARTSEA project is additionally funded by the Hydrographic Office of the Royal Netherlands Navy (Ministry of Defence), Rijkswaterstaat (Ministry of
Infrastructure and the Environment), the Dutch research institute Deltares and Advanced Consultancy Romke Bijker. A user group of externals has been formed to further warrant the applicability of the outcomes of this research.

Education and teaching will also be part of the PhD position at UT.

Your profile
You graduated for your M.Sc. in the subjects Geosciences (e.g. Physical Geography, Geophysics), Civil Engineering or a closely related discipline. Students who expect to graduate before September 2014 are also invited to apply. Preferably, you have a background in or affinity with Marine Systems, (sea)bed morphodynamics and/or sedimentary processes. You have a good capacity for conceptual thought and a command of basic academic skills, such as scientific reasoning and research design. We seek an enthusiastic, keen and independent researcher with a strongly analytical mind. You are meticulous in your work, in both quantitative analyses and writing. You have experience with the analysis of field data and particularly with large data sets. Experience with Java, Matlab and ArcGIS are to your advantage. For completing a PhD, you need to be goal-driven and be sufficiently perseverant. You are conscientious in time management and organising your own work. Since you become part of a project team, we look for a team player with a spirit of collaboration. We welcome candidates with strong communication skills who like to present their work at conferences and (project) meetings. Furthermore, an excellent comprehension of English, both in writing and speaking, is required. Some comprehension of the Dutch language and teaching experience are beneficial.

Working environment at the University of Twente & Deltares and its teams
The Ph.D. will be executed at WEM, part of the Twente Water Centre, University of Twente, in Enschede, Netherlands. The research will be part-time carried out at the research institute Deltares in Utrecht, Netherlands. Your Ph.D. supervisor (promotor) will be Prof. dr Suzanne J.M.H. Hulscher (UT). Your daily supervisor will be dr Thaiënne A.G.P. van Dijk, who is affiliated to both the UT and Deltares.

Within the UT, under the Faculty of Engineering Technology (CTW), you will be part of the Water Engineering and Management (WEM) group, a team of approximately 50 academics and Ph.D.’s in the topics of marine, coastal and river systems, sedimentary processes, water footprint and policy studies. The group hosts many (international) fellow Ph.D.’s. For more information on the WEM group, see http://www.utwente.nl/ctw/en/research/research/chair_wem/.

Deltares is a Dutch, independent institute for applied research in the fields of water, subsurface and infrastructure. Within the Unit Subsurface and Groundwater Systems (BGS), the Department of Applied Geology and Geophysics (TGG) is a collaborative group of 25 professionals in (marine) geology, seismology and sedimentary systems. We carry out international research projects in three major themes: sedimentary dynamics (e.g. fluvial, coastal, estuary and marine); near surface geophysics (on- and offshore) and field measurements of the subsurface (from fibre optics to remote sensing). See also http://www.deltares.nl/en/working-for.

Both institutes offer an informal, dynamic and challenging working environment. You will be part of a team of researchers, advisors and model developers that work in close collaboration. Your personal development is important to us. Therefore, we offer excellent educational opportunities during your Ph.D..

Our offer
We offer a 4-year position as a Ph.D. candidate at the University of Twente (UT). After the first year’s appraisal, it will be decided whether the 4 years can be completed, depending on the quality of the candidate and the progress of the research. In accordance with the Collective Labour Agreement for Dutch Universities, a Ph.D. salary starts at € 2083 gross per month in the first year and extends to a maximum of € 2664 gross per month in the fourth year at full-time employment (38hrs/week). In addition, the University of Twente offers attractive fringe benefits.

Application and further information
Your application should comprise a letter of motivation, a curriculum vitae, a list with grades of courses attended, contact information of 2 referees and – if applicable – a list of publications. Applications should be sent online before Sunday the 8th of June 2014, 14:00 hrs Dutch time. (NB. in the online application form choose Research area: Innovation and Governance (IGS).) The intended starting date is the 1st of November 2014.

For more information on the PhD track at the UT - WEM department, please visit http://www.utwente.nl/ctw/wem/research/PhD_at_WEM/. Additional information about this specific vacancy may be obtained from dr Thaiënne van Dijk, t.a.g.p.vandijk@utwente.nl.