

# **Natural Systems for Wastewater Treatment and Reuse: Technology Adaptations and Implementation in Developing Countries (NATSYS)**

## **Announcement**

1 PhD position available at UNESCO-IHE Institute for Water Education, The Netherlands, in cooperation with Universidad del Valle, Colombia

Recently, an interdisciplinary research project was approved by the UNESCO-IHE Partnership Research Fund (UPaRF) which is a joint initiative of UNESCO-IHE (The Netherlands), Universidad del Valle (Colombia), Birzeit University (Palestine) and King Abdullah University of Science and Technology (Saudi Arabia). The title of the project is "*Natural Systems for Wastewater Treatment and Reuse: Technology Adaptations and Implementation in Developing Countries (NATSYS)*". Within NATSYS, there is a vacancy for a PhD student.

### **The NATSYS project**

Natural wastewater treatment systems like soil aquifer treatment (SAT) and constructed wetlands (CW) are robust barriers, can remove multiple contaminants, minimise the use of chemicals, use relatively less energy and have a small carbon footprint. Natural treatment systems rely on natural processes comprising different physical, chemical and biological removal mechanisms and combinations thereof for improvement in water quality.

These systems have been applied for wastewater treatment and reuse in different parts of the world. They are very appropriate for developing countries and countries in transition and at the same time equally applicable in developed countries. The suitability and performance of such natural treatment systems, however, depend on source water quality, process conditions applied, hydrogeological conditions and water quality goals to be achieved.

It is expected that with further improvement of these systems and especially by synthesizing suitable hybrids or integrates of SAT and CW, a comprehensive system for wastewater treatment and reuse can be developed which can be applied for treatment of different types of wastewater, at different-scales and in different regions of the world.

NATSYS aims to analyse the knowledge gaps and investigate and contrast the treatment capability of these two main soil- and vegetation-based natural systems for wastewater treatment (SAT and CW) and their combinations (hybrid natural treatment system) for the removal of different contaminants (organics, pathogens, nutrients and micropollutants) under different water quality (primary effluent, advanced primary effluent, secondary effluent and grey water) and climatic zones (arid and tropic).

## Description of PhD project - Constructed Wetlands

The PhD study on Constructed Wetlands will investigate the applicability and suitability of different combinations of CWs and of CW “add-ons” such as low-level aeration, electroflocculation, fill and-draw pumping, etc., for reducing the area demand (so-called Intensified CW) while at the same time maintaining excellent treatment performance, a low carbon footprint and an effluent that is suitable for various reuse purposes. Higher loading-per-area rates will facilitate eventual coupling of CW and SAT. Special focus areas will be phosphorus removal and elimination of micropollutants.

This study will be supervised by dr. Diederik Rousseau, dr. Hans van Bruggen and Prof. Piet Lens (all UNESCO-IHE), and Prof. Miguel Peña (Universidad del Valle). More information can be obtained from dr. Diederik Rousseau ([d.rousseau@unesco-ihe.org](mailto:d.rousseau@unesco-ihe.org)).

### The following applies to this PhD-position:

- The study will be carried out in a so-called **sandwich construction** with different phases at UNESCO-IHE in the Netherlands and **lab and field research at Universidad del Valle in Colombia** (with regular contacts with the local and Dutch supervisors).
- Starting date: January 1, 2010 for 4 years.
- The candidate should meet the following criteria:
  - **Master of Science degree** in a discipline relevant to the topic (e.g.: water resources and environmental management; hydrology and water resources; environmental science; agricultural sciences)
  - The applicant must demonstrate a strong interest and experience in conducting research, including field work
  - The applicant should be willing to co-supervise MSc research projects
  - **The applicant must be fluent in both English and Spanish** (written and oral)
  - Preference is given to candidates from developing countries
  - Work experience in relevant fields of studies is highly desirable

### Applications

Applications, including a motivation letter, a copy of your MSc diploma, a curriculum vitae and the names and contact details of three contactable referees, should be sent by email to dr. Diederik Rousseau ([d.rousseau@unesco-ihe.org](mailto:d.rousseau@unesco-ihe.org)) before 18 December 2009. We intend to contact short-listed candidates on or before 15 January 2010.