

The Research Group
Ecology and Biodiversity

has the honour to invite you to the public defence of the PhD thesis of

Moa Megersa GUTA

to obtain the degree of Doctor of Sciences

Title of the PhD thesis:

Development of nature-based drinking water treatment derived from indigenous knowledge systems for its sustainable use

Promotors:

Prof. Dr. Ludwig Triest
Dr. Abebe Beyene (Jimma Univ.)

The defence will take place on

Friday 21st April 2017 at 16:00h

in Auditorium D.2.01 at the Campus
Humanities, Sciences and Engineering of the
Vrije Universiteit Brussel, Pleinlaan 2 - 1050
Elsene, and will be followed by a reception.

Members of the jury:

Prof. Dr. Nico Koedam (chairman)
Dr. Iris Stiers (secretary)
Prof. Dr. Martine Leermakers
Prof. Dr. Ilse Smets (KUL)
Prof. Dr. ir. Diederik Rousseau (UG)

Curriculum vitae

Moa Megersa Guta was born in 1986 in Nekemte (Ethiopia). In 2010, he obtained his MSc in Botanical Sciences at Addis Ababa University. He is a lecturer at the Department of Madawalabu University (Ethiopia) and performed research on water treatment. He started his PhD in Jimma University and continued with an Erasmus Mundus Action II scholarship (CARIBU) at the Biology department of VUB. He has published 5 scientific papers in International journals. He presented at the European Conference of Tropical Ecology

Abstract of the PhD research

Water is one of the overarching cores of sustainable development for the survival of local communities. However, the challenges of obtaining safe water in a sustainable way make it still an unfinished task especially in developing countries where turbid surface water is collected. The rationale of this doctoral thesis is based on the idea that in order to ensure safe drinking water in a sustainable way, indigenous local ecological knowledge of water treatment from nature-based materials needs to be integrated with a scientific approach through efficient reduction of surface water turbidity and avoiding microbial contamination.

Indigenous water treatment knowledge systems were studied in Ethiopia through an ethnobotanical based approach and were followed by experimental studies for optimization. From the surveys, four candidate plants were identified: *Maerua subcordata*, *Moringa stenopetala*, *Sansevieria ehrenbergii*, and *Sansevieria forskaliana*. The grinded powder from plant parts was utilized to imitate the traditional method used by local communities. Crude extraction or purified active components were used in different conditions (pH, temperature and turbidity levels) to obtain the best coagulation method from plantspecies to be used as water treatment agents. The extracts from tubers of *Maerua subcordata* or seeds of *Moringa stenopetala* resulted in lowest turbidity levelsbut were not effective disinfectants. Therefore, we tested a simultaneous treatment of coagulation for turbidity removal efficiency and of solar disinfection (SODIS) to produce potable water free of disease-causing microorganisms.

This approach that unites indigenous knowledge, nature based materials and standardized experiments, can be scaled-up to household level to produce adequate and safe drinking water.