

UNIVERSITY OF MACAU  
FACULTY OF SCIENCE AND TECHNOLOGY  
DEPARTMENT of  
CIVIL AND ENVIRONMENTAL ENGINEERING

**" Soil-plant-water-interactions: Challenges with  
respect to slope remediation and agriculture "**

by

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**Date: 22/12/2016 (THURSDAY)**

**Time: 10:00AM – 11:00AM**

**Venue: E11 – 1043**

## Abstract

The presence of vegetation in the upper layer of vadose zone results in complex moisture dynamics (soil-root-water interaction) due to the combined effects of transpiration and soil water evaporation. Unsaturated soil-root composite hydraulic properties, transpiration and soil water evaporation and effect of plant parameters (i.e., leaf area index (LAI), root length density (RLD) and root area index (RAI)) on soil property are keys for understanding this complex moisture dynamics. Previous studies have not collectively discussed these plant parameters and unsaturated soil properties to understand moisture dynamics in the vadose zone. The gaps between unsaturated parameters and plants parameters are discussed in the context of agricultural field and bioengineered slopes (a type of slope remediation). In the presentation, critical review will be presented to discuss hydraulic properties of soil-root composite (water retention curve, hydraulic conductivity) with respect to soil composition, soil density and cracked soil. Influences of plant parameters, such as LAI, RLD and RAI on boundary conditions will be discussed. The efficacy of soil-root composite water retention curve (SRCWRC) incorporation in the field of agriculture as well as geotechnical engineering (i.e., for bioengineered slope stability analysis) will be demonstrated. Also, recent developments about use of visual techniques for estimating soil parameters would be discussed.

## Biography



Dr Ankit Garg is currently an Assistant Professor in Department of Civil Engineering at the Indian Institute of Technology (IIT), Guwahati, India. He is also a World Bank Monitoring Consultant for infrastructure projects in Assam, India. His background is Civil and Environmental Engineering (PhD, The Hong Kong University of Science and Technology). His research focuses on investigation of fundamental unsaturated hydraulic properties of soil with vegetation and plant physical root and leaf characteristics, such as transpiration reduction function, root distribution, root area index and leaf area index. He has identified plant relation with unsaturated soil properties for two species *Schefflera heptaphylla* and *Cynodon dactylon*. He has been

recently involved in working on identifying visual techniques for estimating soil moisture and vegetation cover (collaboration with faculties from design). His work has been published in around 24 journals including inter-disciplinary journals such as “Journal of plant nutrition and soil science”, “Catena”, “Hydrological Processes”, “Ecological Engineering”. He was invited to deliver seminars at various universities in UK, Germany, Japan, China, Thailand, Malaysia, and Taiwan. He was also invited as visiting scientist at University of Leeds for collaboration in green infrastructure.

***ALL ARE WELCOME!***