

To ensure dedication and focus, involvement should be limited to one or max. two topics per researcher

#### **MUWAREC TOPIC 4:**

## **HYDROLOGICAL AND HYDROCHEMICAL CHARACTERIZATION OF SOIL WATER INFILTRATION ON SMALL CATCHMENTS OF TROPICAL FOREST**

### **1. Background and Objective**

Soil hydraulic properties are important for water flow-related studies. They are fundamental studies involving water balances, irrigation, movement of pollutants, and more generally, transport processes occurring in surface soil. In tropical country, the rapidly increasing exploitation of the hydrological and mineral resources and accelerated urbanization and industrialization of these lands makes gathering of reliable basic environmental information an imperative necessity. Catchments of all size classes from a few square kilometers to million km<sup>2</sup> can be found forming a very complex hydrographical network. Mostly, small catchments of the tropics are valleys of headwaters of big streams situated in mountainous areas. Simultaneous research on small catchments may contribute to tackling some of the main environmental problems of tropical country, yielding complementary information that would be difficult to obtain exclusively through large catchment studies. An interdisciplinary approach will give a comprehensive view of the complex interactions among different environmental parameters of the catchments. Furthermore, the results of the studies conducted on the perturbation-sensitive small catchments will be applicable further downstream to resist adverse effects of improper land-use and management practices.

### **2. Work and Publications ( select 5 only), if any**

Selected related publications are listed below:

- 1) Mukhlisin, M., and Taha, M. R., 2008, Effect of Antecedent Rainfall on Slope Stability at a Hill slope of Weathered Granitic Soil, International Conference on Slopes, Kuala Lumpur Malaysia, p 291- 304, November 4-6, 2008
- 2) Yulinah Trihadiningrum, Y., Basri, H., Mukhlisin, M., Listiyanawati, D., and Ain, N., 2008, Phytotechnology, a nature-based approach for sustainable water sanitation and conservation, The 3<sup>rd</sup> WEPA International Forum on Water Environmental Governance in Asia, Kuala Lumpur Malaysia, p 46-53, October 23-24, 2008.
- 3) Mukhlisin, M., Kosugi, K., Satofuka, Y., and Mizuyama, T. 2006. Effects of Soil Porosity on Slope Stability and Debris Flow Runout at a Weathered Granitic Hillslope. *Vadoze Zone Journal*. 5:283-295
- 4) Mukhlisin, M. 2006. Comparison study of annual flood discharge on some catchment area in Indonesia. National Conference on Civil Engineering participation on sustainability of catchment area maintenance. p. 63-66. UNS Surakarta, February 25, 2006.

### **3. Brief Long Term Methodology and Way Forward**

Recent studies have emphasized the importance of understanding the processes that control the chemical weathering rate in soil profiles, to fill these gaps between the rates derived from laboratory experiments and the geochemical mass balances of natural systems. However, there is still limited information linking the results of soil-profile-scale studies with catchment-scale comparative studies. The objective of this study is:

- to understand the water infiltration and redistribution process on soil and surface flow based on Hydrological and Hydrochemical observations,
- to investigate some of the most critical environmental forestry problems at present;
- to evaluate stream water chemistry as an output from the forest ecosystem;

## MUWAREC RESEARCH PROPOSAL *(Format: 1-2 pages only, single spacing, font aerial narrow size 11)*

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- to assess common constrains of small catchments studies in tropical forest and
- to make recommendation based on issuing of the establishment and maintenance of forest ecosystems.