Landslide and Debris Flow Systems:

Prediction, Control and Reclamation

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Overview

A landslide disaster occurs somewhere in the world almost every day. Landslides are ubiquitous in mountainous regions, where they are both major hazards and commonplace landforms. Learning to live with landslides and debris flows is, therefore, an important skill for all those involved in environmental management in mountains. Landslide prediction and management is tackled by many branches of the applied sciences including geography, geology, geotechnics, geophysics, as well as by the insurance and construction industries and those concerned with development and planning at every level of state and local government. However, much of this work conceives landslides as single, discrete, predictable events. Such 'lowland thinking' is ill equipped to deal with steep, unstable, mountainous environments like those of the Himalaya, where many landslides and debris flows are recurrent, chronic, events that occur less as discrete units than as swarms numbering in the hundreds. Exploring the less predictable 'crowd behaviour' of landslides requires new approaches that share much with the prediction of earthquakes and volcanic eruptions and that involve geostatistics, geoinformatics and geosystems thinking. Approaching landslide research through systems thinking introduces a more holistic vision and a different agenda from that of conventional practice in engineering, geology and geography. Landslides, debris flows and the hillslopes where they form are open systems that exchange mass and entropy with their environment. Relatively few are the single events conceived by textbooks. Most evolve and fade away across an extended period. Initially, all self-create as (entropy dissipating) evolving systems in response to particular triggers. "Chronic" landslides and debris flows self-sustain and evolve through several seasons becoming better integrated and more independent of environmental control, while most others accumulate entropy and so devolve to extinction. Ultimately, whatever event is their trigger, landslides exist because of the energy inputs from tectonic uplift and undercutting by erosion or engineering and all hillslope systems, including landslides, operate to eliminate this "relief energy" (as it is conventionally called).

This course explores the different characteristics of the trigger events that initiate landslide and debris flow activity and the systems processes that determine their size and longevity. It considers the means for the prediction and control of landslide-prone zones, such as new mountain highways. It looks at the role of natural (landslide ecology) processes and, remembering that in mountain areas like the Himalaya most agriculture is conducted on former landslide deposits, it explores the applied sciences of landslide stabilization and reclamation, Finally, it considers methods of hazard mitigation and avoidance, including the management of recurrent long-runout landslides and debris flows.

Modules	**A : 5 lectures, field study, tutorial and workshop, assignments: March 07 - March 08, 2017** **B : 5 lectures, field study, tutorial and workshop, assignments: March 09 - March 10, 2017** **C : Group discussion, final session & examination: March 11, 2017.** **Number of participants for the course will be limited to fifty.**
You Should Attend If…	▪ you are a UG/PG Student or Research Scholar or Faculty of Geology, Geography, Botany, Environmental Sciences, Geoinformatics, etc. of a University/IIT/NIT/College, etc. ▪ you are a scientist or government official or community leader from NGO's, etc. ▪ you are a government official from PWD/Disaster Management/Geology & Mining/Planning & Coordination/Soil & Water Conservation/Meteorology/Urban Planning, etc.
Fees	The participation fees for the course is as follows: **Participants from abroad: US $300** **Industry/ Research Organizations/ Government Departments: Rs. 10000/-** **Academic Institutions: Students - Rs. 2000, Research Scholars - Rs. 5000, Faculty - Rs 10000/-** The above fee includes all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility. Food, travel and accommodation charges will be borne by the participants.

The Faculty

Prof. Martin Haigh is the Emeritus Professor of Geography, Oxford Brookes University, United Kingdom. Formerly he was (Vice) President of the World Association for Soil and water Conservation. Prof. Martin Haigh is Co-Founder of the UNESCO recognized "International Association for Headwater Control and co-organiser of 7 of its international conferences. He is a UK National teaching Fellow and a senior Fellow of the Higher Education Academy, UK. Martin's current work includes technical research in landslide prediction and control. Environmental Education for a Sustainable Future, and landscape reconstruction and hazard management in mining and mountain areas.

Prof. G. T. Thong is a Professor of Geology, Nagaland University, Kohima Campus, Meriema, India. His areas of interest include sedimentology and landslides. He has completed some major research projects funded by the Space Applications Center (ISRO) and Department of Science & Technology, Govt. of India. He is Former Dean, Research, Development and Consultancy (RDC), Nagaland University.

Prof. M. S. Rawat is a geomorphologist and has been working in the Himalaya for the last more than 30 years. His scientific achievements are in the field of geomorphological and hydrological processes. He has implemented some R & D projects sponsored by DST, CSIR and G.B. Pant Institute of Himalayan Environment and Development, Govt. of India. Presently, he is Professor and Head of the Department of Geography under School of Sciences, Nagaland (Central) University, Lumami- 798627, Zunheboto, Nagaland.

Venue

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Course Coordinators

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Register for the course at
http://www.gian.iitkgp.ac.in

Last date of Registration: 20th February 2017