

Pre-Symposium Tutorial on “Watershed Management in Mountainous Landscape”

December 5-6, 2016

Abstract

Watershed bears significance importance for ecological aesthetic and socio-economic perspectives. It is considered as basic natural resources conservation and development planning unit. Government of India (GOI) executing soil and water conservation planning through watershed management programmes in various states of the country. It is implementing Integrating Watershed Management Programmes (IWMP) project to restore the ecological balance by harnessing, conserving and developing degraded natural resources such as soil, vegetative cover and water. Geospatial technologies have emerged as vital tool in watershed characterization and resources potential assessment for watershed management at local to various regional scales. Quantification of surface runoff and soil nutrient loss at watershed scale is required for effective management of watershed. The advent of recent watershed models integrated with Geospatial technologies has ushered new dimensions in the watershed management. The tutorial on watershed management will make the participants to understand applications of Remote Sensing, GIS and GPS in watershed management in mountainous landscape. It will cover theory and hands on practical experience on watershed characterization, soil erosion process and various modeling approaches in soil erosion, surface runoff and soil nutrient loss within the watershed and at watershed scale. The uniqueness of the tutorial is to visit the watershed field observatory so as to acquaint with field instruments used in collecting various field data to understand watershed hydrology and validation of watershed modeling results.

The tutorial will be of two days. The first day (05 December, 2015) will be devoted to theory of soil erosion factors and process, deriving soil erosion factors using remote sensing and GIS, modeling soil erosion and surface runoff, understanding watershed hydrological processes. Practical exercises will also be conducted to understand soil erosion modeling required in watershed planning. On second day (06 December, 2015), a field visit will be conducted to appraise field experimentation in the watershed for collecting data required in calibration and validation of soil erosion and runoff models at watershed scale.

First day (05 December, 2015)

The first day of tutorial will comprise of six technical sessions where 05 sessions will be devoted to the theory and 02 sessions of practical exercises on soil erosion modeling. The Tutorial will start with an overview of concepts and issues of watershed

management for natural resources management in hilly and mountainous landscapes. It will also focus on the present and future development of geospatial technologies in the watershed management.

The second session will be on describing soil erosion factors and processes operating in the mountainous landscape. The third session will be discussing applications of remote sensing and GIS in modeling soil erosion and surface runoff in the hilly and mountainous landscapes. It will include deriving soil erosion factors using remote sensing and GIS, various erosion models including process based models, potential constraints of erosion models and watershed prioritization. The fourth session will be devoted for conducting practical exercises to assess soil erosion risk in the watershed using RUSLE 3D model.

The fifth session will discuss applications of digital terrain models (DTM) in watershed delineation and their characterization. It will include derivation of watershed characteristics, availability of DEMs and their salient features and computation of terrain parameters for soil erosion and runoff modeling of the watershed.

The sixth session will discuss mathematical description of physical process operating on hill slope erosion and surface runoff generation. It will include recent process models such as Water Erosion Prediction Project (WEPP), APEX, SWAT, AVSWAT for soil and nutrient loss at watershed scale and spatial prediction of surface runoff in the watershed. Calibration and validation of the models will also be discussed.

The seventh session will be focused to provide hands on experience of using physical process based model on soil erosion and surface runoff at the watershed scale. It will provide an exposure of WEPP and GeoWEPP models as research tools in understanding erosion process at hillslope and watershed scales.

Second Day (06 December, 2016)

The first session will discuss field instrumentation required for measuring soil erosion, sediment loss and surface runoff at the watershed scale. It will also cover the field instruments required for characterization soil hydrological properties and collecting weather data required for erosion and runoff modeling.

Thereafter, a field visit will be conducted to demonstrate a watershed field observatory set up by the Indian Institute of Remote Sensing (IIRS). The Watershed is located at Langha, 50 km. from Dehradun. The visit will provide unique opportunity to get acquainted with field instrumentation setup for measuring surface runoff using digital stage level recorder at the watershed, sediment sampler, digital rain gauge and automatic weather station (AWS) etc. It will also include demonstration of various field instruments such as soil auger, soil core sampler, double ring infiltrometer, Guelph

Infiltrameter for measuring infiltration rate and hydraulic conductivity, soil moisture probe, portable suspended solid analyser etc. used for characterizing soil hydrological properties and surface runoff.

A session will also be conducted on assessment of current soil erosion condition based on field indicators and use of high resolution satellite data in extracting erosion features the watershed. It will also demonstrate interpretation of remote sensing data and characterizing erosion severity required to calibration and validation of the models.

Outline of the Tutorial

Coordinator: Dr. Suresh Kumar	
Speakers/ Resource Persons: Dr. Suresh Kumar, Mr. George Justin K., Mr. Arpit Chouksey, Mr. Yogesh Ghotekar	
1.	Need and Issues of Watershed Management in Mountainous Landscape – An overview
2.	Soil Erosion Factors and Processes in watershed
3.	Geospatial Approach in Modeling of Soil Erosion Risk assessment in a Watershed of Mountainous Landscape
4.	Practical Exercise : Modeling Soil Erosion in watershed using RUSLE model integrated with GIS
5.	Digital Terrain Analysis for Watershed Delineation and Characterization
6.	Process based Modeling of Soil Erosion and Nutrient Loss at Watershed scale
7.	Practical Exercise : Process based Modeling of Soil Erosion and runoff using WEPP / SWAT Models
Date : 06 December, 2016	
1.	Field Instrumentation and Experimentation for Measurement of Soil Erosion and Surface Runoff at Watershed Scale
2.	(i). Field Visit : Instrumented Field Observatory for Watershed Management : Sitlarao Watershed (Dehradun) (ii). Field data collection and characterization of soil erosion factors (iii). Soil Erosion Assessment at field site in various land use / land cover.
3.	Open discussion on watershed management with participants

Organizer and Speaker(s)

	<p>Dr. Suresh Kumar currently working as Scientist – SG and Head, Agriculture and Soils Department at Indian Institute of Remote Sensing, ISRO, Department of Space, Dehradun. He has been instrumental in establishing watershed field observatory and instrumentation for soil erosion and runoff study at watershed scale at the Institute. Contributed significantly on soil erosion modeling research at field and watershed scale in the hilly and mountainous landscapes employing remote sensing and GIS. He has published more than 50 research papers in Journals and proceedings of National and International seminar / symposium. He obtained M.Sc.</p>
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	<p>degree in Agriculture (Soil Science) and Ph.D. in Soil Science from G.B. Pant University of Agriculture & Technology, Pantnagar.</p>
	<p>Mr. Arpit Chouksey is presently working as Scientist – SD in Water Resources Department at Indian Institute of Remote Sensing, ISRO, Department of Space, Dehradun, Uttarakhand. He graduated in Agricultural Engineering from JNKVV Jabalpur and did M. Tech. in Water Resources Engineering and Management from IIT Guwahati in year 2010. He is working in the field of Hillslope Hydrology, Distributed Hydrological Modeling and watershed experimental investigations</p>
	<p>Mr. Justin George K currently working as Scientist/Engineer – SC in Agriculture and Soils Department at Indian Institute of Remote Sensing, Govt. of India, Department of Space, Dehradun, Uttarakhand. He received his Bachelor's degree in Agriculture from Kerala Agricultural University and Master's degree in Soil Science and Agricultural Chemistry from Indian Agricultural Research Institute (IARI), New Delhi. He is currently working in digital soil mapping and soil erosion modeling in hilly watersheds.</p>
	<p>Mr. Yogesh Ghotekar working as Scientific Assistant in Agriculture and Soils Department at Indian Institute of Remote Sensing, Govt. of India, Department of Space, Dehradun. He did Master degree in Organic Chemistry with specialization in Analytical Chemistry from Pune University. He is involved in maintaining field instrumentation of watershed hydrology at the field site.</p>