



Integrated Watershed Management

Semester -IV: January - June 2021

Coordinator	Prof. Prakash C. Tiwari
Credits	100 Marks [4 Credits]*
Lecturers	Decided in Departmental Meeting
Level	M.A./M.Sc.
Host institution	Department of Geography, Faculty of Arts, Kumaun University, Nainital
Course duration	One Semester [January - June]

Summary

This one full semester course provides the Master level students of Geography the basic understanding of the significance and relevance Integrated Watershed Management in the management of natural resources in the mountain regions. It will present a comprehensive overview of the relevance and significance of Integrated Watershed Management approach for sustainable development of high mountain ecosystem in the era of global environmental changes, particularly climate change and environmental degradation with specific reference to Himalaya. It will also highlight the importance of watershed management in mainstreaming climate change adaptation and disaster risk reduction in mountain regions, particularly in developing countries. The course includes individual assignments.

Target Student Audiences

Semester - IV Students of M.A./M.Sc.

Prerequisites

Required Courses (or equivalents):

- Environmental Management
- Ecology
- Introduction to Computer Science or Information Technologies,
- Environmental Management

Aims and Objectives

This course has been designed with a view to help students in developing a comprehensive understanding and knowledge of the Integrated Watershed Management approach and its significance and rationale for sustainable mountain development in context of the Indian Himalayan Region. The main objectives of the revised course are: (i) to help students in understanding the significance of watershed approach in sustainable mountain development; (ii) to provide students with the state-of-art recent knowledge about the relevance of watershed approach in climate change adaptation and Disaster Risk Reduction mountains; (iii) to educate students about the rationale and importance of Trans-boundary Watershed Management in Himalaya; and (iv) to make students to understand upstream and downstream linkages in river-basin system

* *Note: Kumaun University has Mark System at all Levels*



General Learning Outcomes:

By the end of the course, successful students will:

- Understand the significance and importance of watershed management in mountains
- Comprehend the role of watershed management in addressing impacts of global environmental changes on mountains
- Gain adequate knowledge of watershed as ideal unit for integrated development planning in mountains
- Understand significance of watershed approach in integrating climate change adaptation and disaster management
- Develop comprehensive understanding of the role of watershed management in environmental governance
- Understand the approaches and techniques of Integrated Watershed Management

Overview of Sessions and Teaching Methods

The course will make most of interactive and self-reflective methods of teaching and learning including mainly lectures and presentations. It will start with an overview of watershed management approaches and their significance in the sustainable development of mountain regions. Subsequent sessions will combine interactive lecturing on different course components divided up into 5 Units, and individual assignments. The third part of the course is built around supervised preparation of short interdisciplinary dissertation by students.

Course Workload

The table below summarizes course workload distribution:

Activities	Learning outcomes	Assessment	Estimated workload (hours)
In-class activities			
Lectures and Presentations	Unit I - Concept of Watershed: Understanding Watershed; Concept; Watershed Perimeters; Characteristics and Functioning of Watershed	End Semester Written Examination	08
Lectures and Presentations	Unit II - Watershed Approach: Watershed Approach and its Rationale; Significance of Watershed Approach in Mountain Development	End Semester Written Examination	08
Lectures and Presentations	Unit III - Climate Change Adaptation and Disaster Management at Watershed Level: Mainstreaming Climate Change Adaptation and Disaster Risk Reduction in Integrated Watershed Management; Watershed Level Early Warning System for Flood Risk Mitigation	End Semester Written Examination	08
Lectures and Presentations	Unit IV - Trans-boundary Watershed Management in Himalaya: Upstream-	End Semester Written	08



	Downstream Linkages; Significance of Trans-boundary Watershed Governance	Examination	
Lectures and Presentations	Unit V - Integrated Watershed Management: Concept and Scope; Natural resource Management at Watershed Level; Participatory Watershed Management; Integrating Social and Economic Development in Watershed Management	End Semester Written Examination	08
Independent work			
- Individual Assignments	Ability to interpret data, and to use the concepts, tools, and methods for communicating information	Individual Presentations	20
Total			60

Grading

The students' performance will be based on the following:

- Written performance at the end Semester Written Examination 75%
- 25% based on the evaluation of 2 individual Assignments and attendance in classroom lectures

Course Schedule: Semester -IV: January - June 2021

Course Assignments

The Structure of Course Assignments will be as follows:

- The Course Teacher will set 5 detailed answer Questions one each from 5 Units.
- Each of the students will have answer 2 questions of his/her choice before the commencement of the Semester End Examinations.

Literature

- Centre for Science and Environment, New Delhi, The State of India's Environment-Citizens Report, Centre for Science and Environment. (CSF), New Delhi, 1982
- Valdiya, K.S.; Environmental Geology: Indian Context, T.M.H., New Delhi, 1987.
- Dassman, R.F.; Environmental Conservation, John Wiley & Sons, New York, 1976
- P. Wester, A. Mishra, A. Mukherji, A. B. Shrestha (eds), The Hindu Kush Himalaya Assessment: Mountains, Climate Change, Sustainability and People, Springer Nature Switzerland AG, Cham. pp., 2019
- http://www.kiran.nic.in/pdf/publications/Watershed_Development.pdf
- M.S.S. Rawat et al. (eds), Environment, Resources and Development of the Indian Himalaya, Transmedia Publication, Srinagar, Garhwal, Uttarakhand, India, 2018
- Velma Grover et al.(eds), Global Change and Mountains: Consequences, Responses and Opportunities, Science Publishers, CRS Press, Taylor and Francis, USA, 2015
- https://www.oas.org/cdm_train/courses/course1/Chapter%209-Integrated%20Watershed%20Management.pdf
- G. Rasul and M. Karki (eds) Policy Priorities for Sustainable Mountain Development, Kathmandu: International Center for Integrated Mountain Development, 2008
- Huddleston, B., Ataman, E. and d'Ostlanl, L. F., Towards a GIS-based analysis of mountain environments and populations, FAO, Rome, 2003
- ICIMOD, Mountains of the world: ecosystem Services in a Time of global and climate change: seizing opportunities meeting challenges Framework paper prepared for the Mountain Initiative of the Government of Nepal by ICIMOD and the Government of Nepal, Food and Agricultural





- Organization, Food Security in Mountains – High time for action. Brochure of the International Mountain Day 2008.
<http://www.mountaineering.ie/documentbank/uploads/IMD08%20brochure.pdf>
- Food and Agricultural Organization, International Year of the Mountains. Food and Agriculture Organisation of the United Nations, Rome, 2002.
- Food and Agricultural Organization, Land-water linkages in rural watersheds. Land and Water Bulletin 9. Food and Agriculture Organisation of the United Nations, Rome, 2002
- Martin J. Haigh, Headwater control: integrating land and livelihoods, paper presented at the International conference on Sustainable Development of Headwater Resources. United Nation's International University, Nairobi, Kenya, September, 2002.
- ICIMOD, Mountains of the World –Ecosystem Services in a Time of Global and Climate Change: Seizing Opportunities – Meeting Challenges. Framework paper prepared for the Mountain Initiative of the Government of Nepal by ICIMOD and the Government of Nepal, Ministry of Environment, 2010
- Messerli, B. and Ives, J. D. (eds), Mountains of the world – A global priority. A contribution to Chapter 13 of Agenda 21. New York: Parthenon, 2007
- <http://www.fao.org/tempref/docrep/fao/009/a0270e/A0270E08.pdf>

