

	P11: KUMAUN UNIVERSITY Nainital, Uttarakhand, India
	<i>Departments concerned with SUNRAISE-related topics:</i> <ul style="list-style-type: none">- Department of Geology- Department of Botany- Department of Forestry and Environmental Sciences
	<i>Contact person:</i> Prof. Dr. Prakash C. Tiwari (pctiwari@yahoo.com)

Kumaun University (KU) is, with approximately 100000 students, the largest university in the state of Uttarakhand (India). Founded in 1973, it comprises a complex of 2 campuses spread over the state, with faculties and research groups addressing a wide range of subject areas. Research covers the fields of arts, science, education, and law, among others. The university aims at becoming a dynamic community internationally recognised for their creativity, innovation and excellence in education, research and service. Particular emphasis is placed on the training of professionals and provision of research and services adapted to the needs of the territory.

Multiple disciplines of relevance in sustainability research are addressed in its multiple departments, among which the departments of geography/environmental sciences, geology, botany and forestry stand out. The establishment of all of them dates back to a few years after or, in some cases, to years prior to the founding of the university itself. This shows the institutions' commitment to sustainability research and training from its early stages. The research agenda of these departments includes sustainability relevant topics such as (summarised and shortened):

- Management of natural resources, with a specific focus on watersheds, water supply, food security, and forests;
- Vulnerability and risk assessment;
- Urban growth and land use change;
- Strategies for climate change adaptation;
- Quality of life and traditional knowledge of mountain communities; eco-tourism;
- Biodiversity assessment and conservation, forest ecology, plant ecology, valuation of ecosystem services, relationships between agriculture and natural vegetation;
- Palaeoclimatic investigations of palaeolakes and speleothems.

A wide range of methods is used for the exploration of these research areas, encompassing the usage of GIS and work with the communities, among others. This (see a more detailed research profile attached) reflects the capabilities and intentions of KU to conduct research and training activities adhering to SUNRAISE research priorities. Remarkably, the current research agenda visibly responds to national policy priorities in the sustainability field and, to a lesser extent,

international ones. The cooperation ties set up with institutions in Norway, the UK and France and active involvement in various international projects constitutes a proof of the latter. International cooperation is particularly encouraged by the university council in their search for international excellence in research. This context together with the inputs obtained through surveys/interviews with local stakeholders in India and KU's academic staff leads us to make the following recommendations on possible multidisciplinary areas of research that might additionally be considered in future research projects. Key subject areas for sustainability in international research and policy priorities are taken into account for the definition of the suggested research agenda items that might be added:

- Governance of the sustainability transformation of mountain regions, including both community-led and top-down processes (i.e. moving beyond the prevailing focus on technical and ecological aspects); governance tools and their efficacy for sustainable spatial planning;
- Dominant perceptions and vision building for a more sustainable management of natural resources; knowledge, vision and power plays in the integrative management of watershed, forests, biodiversity and urban areas;
- Interrelations among sustainable water management, urban management, biodiversity management, forest management and food production; way these interrelations can be promoted for a holistic sustainable planning;
- Climate change mitigation in mountain regions, including the science and management of carbon reduction and sequestration; way measures can be used for both climate change mitigation and adaptation, if properly planned, designed and maintained;
- Interaction climate change – land-use/land-cover change; analysis of the efficiency of alternative strategies for the attenuation of the negative impacts caused by both;
- Environmental and social impact of changes in the dominant economic activities in the Himalaya (e.g. from a subsistence to a tourism-led economy);

In general terms, increases in the practice-oriented components of the developed research and research training are recommended. This involves going beyond the currently prevailing emphasis on the evaluation of impacts, etc., and further opening up to the provision of tools and exploration and testing of sustainability alternatives being promising to respond to the prevailing challenges/problems. This kind of research becomes paramount in order to better support communities and decision-makers in the process of e.g. selection of strategies for sustainability. An important additional move might be the establishment of stronger means of collaboration with engaged actors in the administration. This might enable to mould research to the specific needs of decision makers in the sustainability field and, thus, increase the transferability of its outcomes in practice. With the same aim, work with the communities should continue and even be intensified, in order to better get an understanding of traditional knowledge of mountain populations and help them more sustainably plan their communities. The usage of citizen science approaches is particularly advisable, rather than just the conduction of questionnaires, interviews, etc. with stakeholders. Efforts for further coupling the research and education activities carried out in the departments of geography, geology, botany and forestry also constitutes a promising move.

Summary of the research profile:

SUNRAISE-RELEVANT RESEARCH TOPICS

1. Sustainable natural resource management in Himalayan mountains

KEY PERSONALITIES, POTENTIAL MASTER'S AND DOCTORAL SUPERVISORS

- Prof. Dr. Prakash C. Tiwari – *Research interests: Natural resource management; High mountain urbanisation; Climate change adaptation*
- Prof. Dr. B. S. Kotalia – *Research interests: Mountain geo-hydrology; Water resource management; Climate change*

CURRENT AND PAST PROJECTS

Project 1: "Joint Indo-Norwegian research and education on water-related changes in Himalaya"	<i>Funded by:</i> Norwegian Centre for International Cooperation in Education (SIU), Norway	<i>Project type:</i> research, education
	<i>Keywords:</i> Water management; Students participation; Joint fieldwork	
Project 2: "Urban Growth, Land-Use Change, and Growing Vulnerability in the Greater Himalaya Mountain Range Across India, Nepal, and Bhutan"	<i>Funded by:</i> National Aeronautics and Space Administration (NASA), USA	<i>Project type:</i> research
	<i>Keywords:</i> Land use changes; Urbanisation; Hazards; Remote sensing	
Project 3: "Pluri-scalar Approaches for Co-production of Pan-Asian Drought Assessment and Adaptive Resource Management in Uttarakhand Himalaya, in Collaboration with Newcastle University, U.K."	<i>Funded by:</i> U.K. Royal Society, U.K.	<i>Project type:</i> research
	<i>Keywords:</i> Drought; Climate change; Drought assessment; Water resource management	

Project 4: “Development of an Evidence-Based Climate Change Adaptation Toolkit to Help Improve Community Resilience to Climate Change Impacts in Uttarakhand, India”	<i>Funded by:</i> Asia Pacific Network for Global Change Research (APN), Kobe, Japan <i>Keywords:</i> Climatic extremes; Climate change adaptation; Vulnerability and risk assessment	<i>Project type:</i> research
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CURRENT AND RECENT PhD THESES

- Arifa Begum “A Geographical Study of Urban Growth and Quality of Life in the Himalayan Foothills of Kumaun” (2018 – ongoing)
- Dheeraj Pant “Climate Change and its Impact on Community Health in Betalghat Development Block, Kumaon Lesser Himalaya” (2017 – ongoing)
- Kevala Nand “Impact of Climate Change on Water Resources in Kujgad Watershed, Kumaun Himalaya” (2017 – ongoing)
- Manika Kweera “Sustainable Urban Development under Climate Change in the Lake Region of District Nainital, Uttarakhand” (2020 – ongoing)
- Manisha Pant “Climate Change and its Impact on Human Health in Mountainous and Foothill Regions of District Nainital, Uttarakhand” (2018 – ongoing)
- Mohan Singh “Impacts of Climate Change on Agriculture, Food Security and Rural Health in Balia Catchment, Kumaon Himalaya” (submitted) (2014 – 2020)
- Pooja Nainwal “Women's Perception, Responses and Adaptation to Climate Change in Ramgad Watershed, Kumaun Himalaya, Uttarakhand” (2018 – ongoing)
- Rahul Kumar “Impact of Climate Changes on Farming System and Food Security in Kujgad Watershed, Kumaon Himalaya” (2020 – ongoing)
- Ritika Vishnoi “Changes in Rainfall Pattern and its Impact on Food Security status in Ramgad Catchment of Kumaun Himalaya: A Community based Adaptation Strategy” (2013 – 2021)
- Vaseem Ahmad “Impact of Climate Change on Water Resources: A Case Study of Balia Catchment, District Nainital, Uttarakhand” (2017 – ongoing)

RESEARCH AMBITIONS IN RELATION TO SUNRAISE

1.	Development of further research activities in globally and locally high priority areas
2.	Moving ahead in education in globally and locally high priority areas

ENABLERS AND BARRIERS ENCOUNTERED FOR RESEARCH DEVELOPMENT

Enablers	Barriers
<ul style="list-style-type: none"> ➤ Internationally reputed, highly experienced, hardworking faculty ➤ Location of the University in the heart of Himalaya 	<ul style="list-style-type: none"> ➤ Shortage of financial resources ➤ Shortage of infrastructure ➤ Shortage of equipment

NATIONAL RESEARCH/ POLICY SUPPORTING RESEARCH DEVELOPMENT

1.	National Jal Jeevan Mission (National Water Mission)
2.	National Climate Change Action Plan
3.	National Mission on Sustaining Himalayan Ecosystem
4.	National Mission for the Himalayan Studies

CAPABILITY IMPROVEMENT TARGETED TO FULFIL THE ASPIRED RESEARCH GOALS

Improvements are desired in:

- Equipment
- Training for academic staff
- Access to international databases
- External experts support or PhD supervision
- Access to modern information technology and library resources

ENABLERS AND BARRIERS ENCOUNTERED FOR RESEARCH TRAINING

Enablers	Barriers
<ul style="list-style-type: none"> ➤ Internationally reputed, highly experienced, hardworking faculty ➤ Location of the University in the heart of Himalaya 	<ul style="list-style-type: none"> ➤ Shortage of financial resources ➤ Shortage of infrastructure ➤ Shortage of equipment