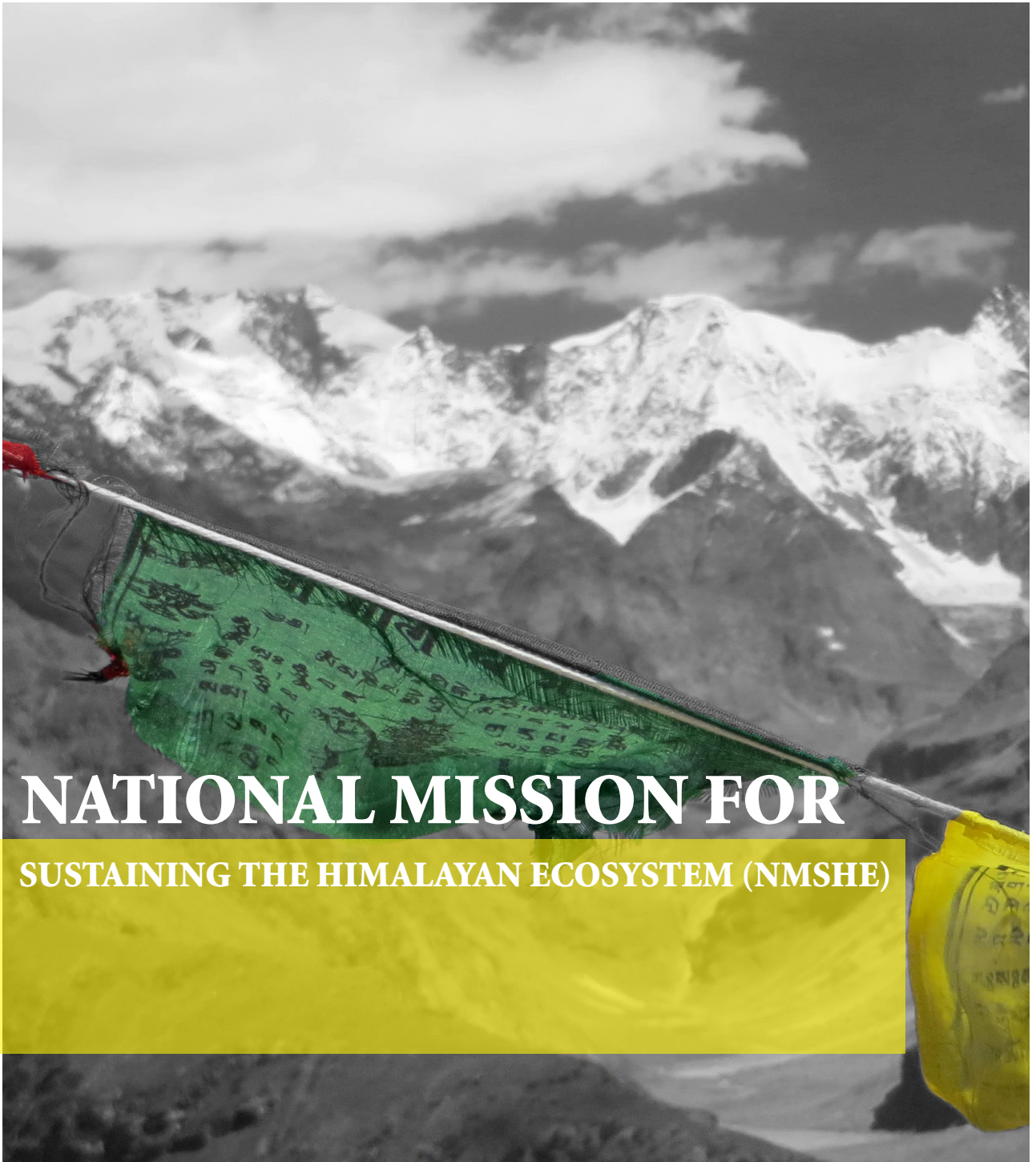




Department of Science & Technology
Ministry of Science & Technology
Government of India

NMSHE NATIONAL MISSION FOR
SUSTAINING THE HIMALAYAN
ECOSYSTEM



NATIONAL MISSION FOR SUSTAINING THE HIMALAYAN ECOSYSTEM (NMSHE)

March 2016

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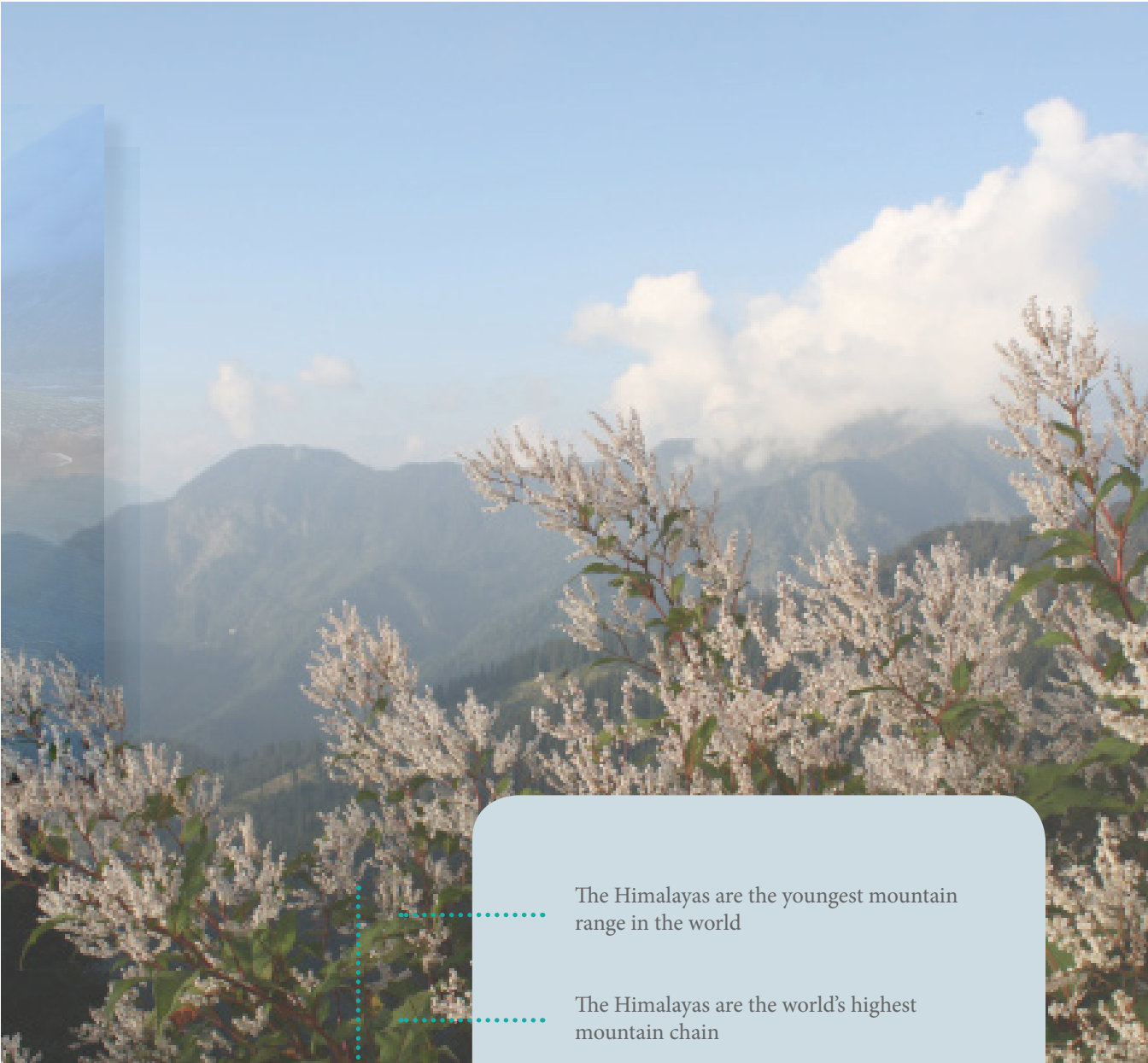


BACKGROUND

As awe-inspiring as the Himalayas may seem, they are also very fragile owing to their complex topography, climatology and tectonic activities. The vulnerability of the Himalayas is expected to only increase in the event of climate change. The Himalayas not only harbor forests and biodiversity but also regulate water flow for much of the country. The Himalayas are also a prime destination for spiritual and aesthetic upliftment. In the global climate change context, the Himalayas continue to be a region about which little is known in the scientific domain and remains understudied. This has made it difficult to understand the current situation and also to try and project what the future holds.

It was with this recognition that the National Mission for Sustaining the Himalayan Ecosystem (NMSHE) was launched as part of the eight missions under the National Action Plan on Climate Change (NAPCC). NMSHE is the only mission under NAPCC with a geographic focus, all the others being theme based. The Department of Science and Technology (DST), Ministry of Science and Technology is coordinating the implementation of NMSHE. NMSHE's action plan was approved by the Union Cabinet in 2014.

NMSHE is a multi-pronged, cross-cutting mission across various sectors. It contributes to the sustainable development of the country by enhancing the understanding of climate change.



FACTS ABOUT THE HIMALAYAS

The Himalayas are the youngest mountain range in the world

The Himalayas are the world's highest mountain chain

The Himalayan mountain range is home to nine of the ten highest peaks on earth

The Indian Himalayan Region covers approximately 5.3 lakh sq. km. area

The Indian Himalayan Region harbours about 1,740 medicinal plants



KEY DELIVERABLES UNDER NMSHE

The main goal of NMSHE is to assess scientifically the vulnerability of the Himalayan region to climate change in physical, biological and socio-cultural context. NMSHE also aims to build and support capacities at the central and state levels to assess climate change and formulate adequate response measures to the challenges in the Himalayan region.

NMSHE seeks to facilitate formulation of appropriate policy measures and time-bound action programme to sustain ecological resilience and ensure the continued provisions of key ecosystem services in the Himalayas. NMSHE intends to evolve suitable management and policy measures for sustaining and safeguarding the Himalayan ecosystem along with developing capacities at the national level to continuously assess its health status.

With these broader objectives and goals, the key deliverables of NMSHE are as follows:



Networking and strengthening of knowledge institutions

Start of new centres relevant to climate change in the existing institutions in Himalayan states-

- Training in areas relevant to the Himalayan ecosystem
- Training system for community-based organisations to relate lab findings to real fieldwork
- Training of technical experts EIA
- Capacity building programmes (training)

Development of Observational Network to monitor the health of the Himalayan ecosystem

Regional cooperation with neighbouring countries in Glaciology

Bi-annual advisories to Himalayan Sustainable Development Forum

Annual thematic status report

ACHIEVEMENTS AND ONGOING ACTIVITIES UNDER NMSHE



Some of the ongoing activities under NMSHE are listed below:

01

Task Forces for Thematic Research

02

Institutional and Human Capacity Building

03

Governance for Sustaining the Himalayan Ecosystem (G-SHE)

04

Inter-University Consortium on Cryosphere and Climate Change



05

Research on Glacial Lake Outburst Floods



06

States in IHR and Strengthening State Climate Change Cells



07

International and Regional Collaboration



08

Himalayan Sustainable Development Forum (HSDF)

01

TASK FORCES
FOR THEMATIC
RESEARCH



OBJECTIVES OF TASK FORCES

In order to address the various technical thematic issues in the Himalayas, NMSHE has set up six Task Forces with coordinating institutions for each one. The Task Forces will focus on applying knowledge in the larger societal context and knowledge synthesis for policy formulations related to adaptation actions in the Himalayas considering the development needs of the society. A major challenge before the Task Forces will be the development of a report on common framework for integrated risks and hazards and vulnerability assessment, which is particularly needed for the Himalayas.



Natural and Geological Wealth

To establish database and information system about geological resources (quaternary deposits, groundwater (springs including geothermal springs), mineral resources, glaciers and snow cover) and exogenic geological processes (mass movements including GLOF) along major valleys, to facilitate policy decision about the sustainable development of the Himalayan ecosystem taking into account the work of existing knowledge; to generate possible required data to fill the gaps in the information system about groundwater and mineral resources, mass movements and GLOF; to study changes in geological resources and processes (incidence of mass movements, groundwater availability, spring discharges and snow cover) under various climate change scenarios and to analyze consequential impacts on erosion and groundwater availability; and to assess the impact of mining on society and land degradation.

Partnering Institute: Wadia Institute of Himalayan Geology, Dehradun



Water, Ice, Snow, including Glaciers

To assess suitability of locations for new reservoirs that can be planned and existing reservoirs that can be used to store the altered water availability so as to utilize water in accordance with the demands; to assess how glacier mass varies with changes in parameters such as surface condition and climate; to prepare a database of perennial springs, groundwater resources, and evaluate the effects of climate change on groundwater system in the Himalayan region; to investigate the causes of ailments in the Himalayan lakes, with a focus on selected lakes of various origins and altitudes.

Partnering Institute: National Institute of Hydrology (NIH), Roorkee



Forest Resources and Plant Biodiversity

To record the phenological changes and understand the physiological and biochemical mechanisms used by plants growing under changing climatic conditions; to study composition of microorganisms (including mycorrhizae and endophytes) along with their activities for providing an insight into the survival strategies and the cope up mechanisms adapted by the microbial communities, particularly under the changing climate; to assess the impact of climate change on sensitive plant elements (e.g., Himalayan endemics, rare, endangered, threatened and RET species), particularly their availability and population dynamics. In addition, monitoring the changes in population of high-value plants (e.g., medicinal plants, wild edible plants, etc.) and their habitats has great relevance for sustenance of dependent communities.

Partnering Institute: GB Pant Institute of Himalayan Environment and Development (GBPIHED), Almora



Micro Flora and Fauna, Wildlife and Animal Population

To assess the consequences of changes in species communities; to develop holistic and futuristic approaches to conservation planning that integrate the entire gamut of levels of vulnerability, responses, adaptations and spatial patterns of shifting biodiversity; development of robust prediction of future changes and scientific management.

Partnering Institute: Wildlife Institute of India, Dehradun



Traditional Knowledge Systems

To document traditional knowledge of the communities inhabiting the Indian Himalayas in an integrated manner for conservation of the Himalayan ecosystem and well-being of humans; to develop 'Platform for Indigenous Knowledge Systems in the Himalayan region' that integrates the rich ethics behind traditional knowledge; to assist the formal decision support systems for sustainable development of the Indian Himalayan Region.

Partnering Institute: Jawaharlal Nehru University (JNU), Delhi



Himalayan Agriculture

To assess the vulnerability of Himalayan agriculture; to identify critical vulnerabilities of low input agricultural agro-ecosystems of the Indian Himalayas; to identify suitable measures which may be propagated within the Himalayan farming community.

Partnering Institute: Indian Council of Agricultural Research (ICAR), Delhi

02

INSTITUTIONAL AND HUMAN CAPACITY BUILDING



Capacity building is one of the primary aims of NMSHE. While on the one hand, NMSHE enhances capacities of glaciologists and ecosystem specialists, on the other hand, it is also facilitating capacity building at the state level for adaptation planning and implementation.

For the purpose of enhancing capacities of states for adaptation planning and implementation, a detailed multi-level programme has been developed and implemented in one Himalayan state. The training is structured into seven modules which are as follows:

Module 1: Focuses on development of a basic understanding of recent understanding of climate change at global, national and local levels and the ensuing impacts, vulnerability and adaptation needs for Himachal

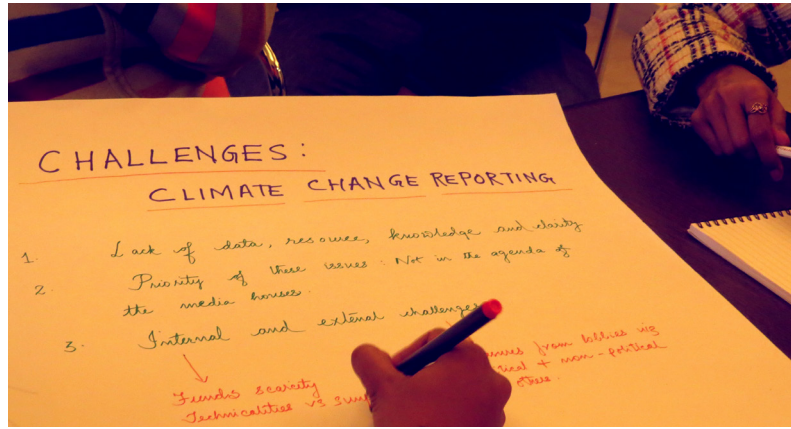
Module 2: Objective is to develop a basic understanding of need for interpreting climate data, different tools used for assessing climate impacts and its application for assessing climate change impacts in some selected sectors such as glacier, water, agriculture, forestry etc.

Module 3: The objective of this module is to enable participants to assess vulnerability to climate change of the systems under concern on the basis of which adaptation plans will be implemented

Module 4: This module aims to develop capacities to identify a range of adaptation options that can potentially help the region, country or sector adapt to climate change risks by avoiding, withstanding, or recovering from the risk

Module 5: This module is a guidance towards development of a monitoring and evaluation framework to ensure that the adaptation strategies being implemented are adequately addressing the identified vulnerabilities

Module 6: The objective of this module is to identify the capacity building needs and develop a comprehensive approach for augmenting capacities needed for integrating action on adaptation in



programmes and schemes

Module 7: This module aims to support designing of adaptation actions at local level where programmes and projects are being implemented in various sectors

Similarly, workshops have been organized for media persons. NMSHE fully acknowledges the traditional knowledge of the communities inhabiting the Himalayas and builds upon them with scientific robustness. Workshops will be organized for communities in the region for promoting traditional knowledge with scientific basis. Feedback will be collected from the communities on the performance of such interventions for further improvement of such suggested interventions.

Besides individual capacity building in glaciology, DST also endeavors to promote glaciology through enhanced institutional capacities. In this respect, NMSHE has supported the establishment of a National Center of Himalayan Glaciology (NCHG) at the Wadia Institute of Himalayan Geology (WIHG). DST is exploring opportunities for making this a full-fledged center catering to the needs of Himalayan glaciological research.

As described in the section on International and Regional Collaboration below, an Indo-Swiss Capacity Building Programme on Himalayan Glaciology was organized for two years with the aim to provide a pool of trained glaciologists for assessing and monitoring the Himalayan glaciers. The programme consisted of two levels and comprised both classroom teaching and field work.

03

GOVERNANCE FOR SUSTAINING THE HIMALAYAN ECOSYSTEM (G-SHE)

One of the key aspects under NMSHE is the component of Governance for Sustaining the Himalayan Ecosystem (G-SHE). This focuses on studies and activities oriented towards contributing to policy formulation for the Himalayan region to facilitate evolution of a policy environment which is conducive for climate-compatible sustainable development. For effective implementation of this component, DST is partnering with the Ministry of Environment, Forests and Climate Change (MoEF&CC).

04

INTER-UNIVERSITY CONSORTIUM ON CRYOSPHERE AND CLIMATE CHANGE

DST is supporting pan-Himalaya research and development projects. DST has supported the first-of-its-kind Inter-University Consortium on Cryosphere and Climate Change (IUCCC) with participation from four universities. The consortium is undertaking research on climate change impacts on the cryosphere across various Himalayan states. The study focuses on linkages between changes in glacier fields and their impacts on water availability to communities.

05

RESEARCH ON GLACIAL LAKE OUTBURST FLOODS

DST is supporting a research and development project on glacial lake outburst floods (GLOF) being conducted in Sikkim. Research is also being carried out in Sikkim, a state indicated to have glacial lakes which are particularly at risk from GLOF event. The glacial lake which is being studied is South Lhonak lake, which has been increasing in size continuously in the last few years. It is feared that a GLOF may cause devastation downstream. The lake is purely a glacial moraine dammed lake which is vulnerable in terms of GLOFs.

06

STATES IN IHR AND STRENGTHENING STATE CLIMATE CHANGE CELLS

NMSHE engages all the 12 states in the Himalayas in spirit of cooperative federalism for the purpose of strengthening their capacities for planning and implementation of climate change adaptation actions, undertaking vulnerability assessment and spreading awareness among the masses on climate change and its likely impacts. The Himalayan states include 10 hill states- Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura, Meghalaya, and two partial hill states, namely, Assam and West Bengal. In this respect, funds have already been provided to seven states, while proposals from the remaining five states are in various stages of development. Besides funds being provided under NMSHE, technical assistance is also being extended to the states. In this respect, in January 2015, representatives from various state governments attended a workshop organized under NMSHE. The workshop aimed at understanding the challenges and opportunities for adaptation planning and implementation in the Indian Himalayan Region; and enhancing the capacities of the state governments in the Himalayas for adaptation planning and implementation.

07

INTERNATIONAL AND REGIONAL COOPERATION

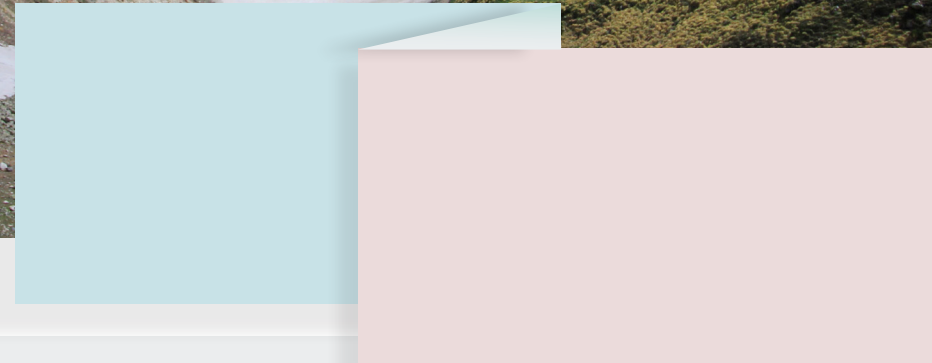
International and regional collaboration were always intended to be a strong pillar under NMSHE. As mentioned above, not much is known about the Himalayas in the scientific context. In order to fill up the gaps in knowledge and understanding about the Himalayas, international collaborations would be required for bringing in tools and techniques and also experiences from other similar regions. Under NMSHE, the Indo-Swiss Capacity Building Programme on Himalayan Glaciology has been successfully conducted during 2013 and 2014-15. The programme was jointly organized by DST with the Swiss Agency for Development and Cooperation (SDC) as part of its ongoing collaboration focusing on climate change adaptation in the Himalayas. The programme comprises advanced study of Himalayan glaciers and a three-week field work at an identified glacier in the Himalayas. The training is jointly conducted by experts from India and Switzerland and aims to strengthen capacities of Indian researchers and institutions in the field of glaciology. In doing so, it seeks to help them in their ongoing research and more broadly to contribute to the accelerated understanding of the scientific dimension of climate change in the Himalayas. The glaciology capacity building programme is part of the broader bilateral cooperation programme of the Indian Himalayas Climate Adaptation Programme (IHCAP) being implemented in India by SDC in partnership with DST. Under NMSHE, DST intends to further enhance its collaboration with SDC through IHCAP including that in collaborative research with the aim of conducting studies which respond to the needs and concerns of the communities dependent on the Himalayas. Further, DST is also exploring possibilities of collaborating with the International Center for Mountain Development, Kathmandu (ICIMOD) for unlocking synergies across the South Asia region.

08

HIMALAYAN SUSTAINABLE DEVELOPMENT FORUM

DST is also working towards establishment of the Himalayan Sustainable Development Forum (HSDF) as a platform for multi-stakeholder dialogues and sharing experiences and knowledge with GBPIHED as its secretariat. HSDF is based on recommendations of ‘Shimla Declaration on Sustainable Himalayan Development’ (Shimla, 30 October 2009). The Forum would be hosted by partner states from the Himalayan region on a rotational basis with GBPIHED as the technical secretariat. As envisaged, HSDF will develop advisories for states in the Himalayas and bi-annual advisories to Himalayan Sustainable Development Forum would be developed through State Councils of Climate Change for implementation. In this regard, the first set of advisories are under preparation, the process being led by GBPIHED under NMSHE. As part of HSDF, the first regional consultation has already been conducted.





PARTNERING INSTITUTES

- 104 research teams are being involved from more than 60 institutions.

Thematic Task Forces

Task Force 1: Natural and Geological Wealth

Wadia Institute of Himalayan Geology, Dehradun

Collaborating Institutes:

NIH: National Institute of Hydrology, Roorkee

IIRS: Indian Institute of Remote Sensing, Dehradun

CGWB: Central Ground Water Board, Faridabad

IBM: Indian Bureau of Mines, Nagpur

HNBG University: Hemwati Nandan Bahuguna Garhwal University, Srinagar (Garhwal)

Jammu University: Jammu

Kashmir University: Srinagar

Nagaland University: Kohima

GBPIHED: GB Pant Institute of Himalayan Environment and Development, Almora

CSWCRTI: Central Soil and Water Conservation Research and Training Institute, Dehradun

Task Force 2: Water, Ice, Snow including Glaciers

National Institute of Hydrology, (NIH) Roorkee

Collaborating Institutes:

BBMB: Bhakra Beas Management Board, Chandigarh

CGWB: Central Ground Water Authority, Faridabad

CSWCRTI: Central Soil and Water Conservation Research and Training Institute, Dehradun

CWC: Central Water Commission, New Delhi

CIFRI: Central Inland Fisheries Research Institute, Kolkata

JNU: Jawaharlal Nehru University, New Delhi

FRI: Forest Research Institute, Dehradun

FSI: Forest Survey of India, Dehradun

GBPIHED: GB Pant Institute of Himalayan Environment and Development, Almora

HNBGU: Hemwati Nandan Bahuguna Garhwal University, Srinagar (Garhwal)

IITG: Indian Institute of Technology, Guwahati

IMD: Indian Meteorological Department

IIRS: Indian Institute of Remote Sensing, Dehradun

IISc: Indian Institute of Science, Bangalore

IITB: Indian Institute of technology, Bombay

IITM: Indian Institute of Tropical Meteorology, Pune
Kashmir University: Srinagar
Kumaun University: Nainital
NCAOR: National Centre for Antarctic and Ocean research, Goa
NRSC: National Remote Sensing Center, Hyderabad
SASE: Snow and Avalanche Study Establishment, Chandigarh
SAC: Space Application Centre, Ahmadabad
State Centre on Climate Change, HP
Survey of India, Dehradun
WIHG: Wadia Institute of Himalayan Geology, Dehradun

Task Force 3: Forest Resources and Plant Diversity

GB Pant Institute of Himalayan Environment and Development (GBPIHED), Kosi-Katarmal, Almora

Collaborating Institutes:

GBPIHED at Kosi-Katarmal, Almora
GBPIHED Regional Units located at:
Kullu (Himachal Pradesh)
Srinagar-Garhwal (Uttarakhand)
Pangthang (Sikkim) and
Itanagar (Arunachal Pradesh)

Task Force 4: Micro Flora and Fauna and Wildlife and Animal Population

Wildlife Institute of India, Dehradun

Collaborating Institutes:

GBPIHED: GB Pant Institute of Himalayan Environment and Development (GBPIHED), Almora
IITM: Indian Institute of Tropical Meteorology, Pune
NBRI: National Botanical Research Institute, Lucknow
BSIP: Birbal Sahni Institute for Paleobotany, Lucknow
University of British Columbia, Canada

Task Force 5: Traditional Knowledge System

Jawaharlal Nehru University (JNU), New Delhi

Collaborating Institutes:

Technical Partners/Advisors ICAR, New Delhi
Vigyan Prasar, New Delhi, INSPIRE Network

Regional Working Partners

Western Himalaya

Kashmir Region- Kashmir University
DIHAR: Ladakh region- Defence Institute of High Altitude Research (DRDO), Leh
GBPIHED: Himachal region- GB Pant Institute of Himalayan Environment and Development, Himachal Unit, Mohal Kullu
IHBT: CSIR- Institute of Himalayan Bioresource Technology, Palampur
HFRI: Himalayan Forest Research Institute, Shimla Research Centre, Shimla
IARI: Indian Agriculture Research Institute, Kullu

Central Himalaya

GBPIHED: GB Pant Institute of Himalayan Environment and Development, Almora
Doon University, Dehradun
GBPAUT: Govind Ballabh Pant University Of Agriculture and Technology, Pantnagar
CHEA: Central Himalayan Environment Association, Nainital
VPKAS: Vivekananda Krishi Anusandhan Institute, Almora

Eastern Himalaya

GBPIHED: GB Pant Institute of Himalayan Environment and Development, Itanagar
NEHU: North Eastern Hill University, Shillong
SFRI: State Forest Research Institute, Itanagar

ICSSR-NERC: Indian Council of Social Science Research - North Eastern Regional Centre, Shillong
ICAR: Indian Council of Agricultural Research, Barapani, Meghalaya

Technical Partners/Advisors

ICAR: Indian Council of Agricultural Research, New Delhi
Vigyan Prasar
INSPIRE Network of Environment, New Delhi
INSPIRE Network, IIM Ahmedabad

Task Force 6: Himalayan Agriculture: ICAR, New Delhi

Coordination Cell: NRM Division ICAR, New Delhi

Collaborating Institutes:

North-East Indian Region

ICAR-Research Complex for North Eastern Hill, Umium, Barapani, Meghalaya (Lead Centre)
ICAR-RC-NEH: Regional Station for Tripura, Lambuchera
ICAR-RC-NEH: Regional Station for Mizoram, Kolasib
ICAR-RC-NEH: Regional Station for Nagaland, Medzipema
ICAR-RC-NEH: Regional Station for Manipur, Imphal
ICAR-RC-NEH: Regional Station for Arunachal Pradesh, Basar
ICAR-RC-NEH: Regional Station for Sikkim
NRCP: National Research Centre on Pig, Rani, Assam
NRCM: National Regional Centre on Mithun, Jharanapani, Medzipema
NRCY: National research Centre on Yak, Dirang, Arunachal Pradesh

Lower and Middle Himalayan Region (Lead centre CSWCRTI, Dehradun)

CSWCRTI: Central Soil and Water Conservation Research and Training Institute, Dehradun
CITH: Central Institute of Temperate Horticulture, Srinagar, Mukteshwar
DCFR: Directorate of Coldwater Fisheries, Bhimtal
CSWCRTI: Central Soil and Water Conservation Research and Training Institute, Regional Centre, Chandigarh
VPKAS: Vivekananda Parvatiya Krishi Anusandhan Sansthan, Almora
IVRI: Indian Veterinary Research Institute, Research Station, Mukteshwar
NRCAF: National Research Centre on Agroforestry, Jhansi

Cold Arid Himalayas (HQs: CAZRI, Regional Centre, Leh, Laddakh)

CAZRI: Central Arid Zone Research Institute, Research Centre, Leh, Laddakh
CITH: Central Institute of Temperate Horticulture, Srinagar/Mukteshwar
DCWF: Directorate of Coldwater Fisheries, Bhimtal
NRCA: National Research Centre on Agroforestry, Jhansi
NRCC: National Research Centre on Camel, Bikaner, Rajasthan
NRCY: National Research Centre on Yak, Dirang, Arunachal Pradesh

Capacity Building Programmes

Himalayan Environmental Studies and Conservation Organization (HESCO)
Indian Mountain Initiative (IMI)
Indian Institute of Technology (IIT), Delhi

Inter-University Consortium on Cryosphere and Climate Change (IUCCCC)

University of Jammu
Jawaharlal Nehru University
Sikkim University
University of Kashmir

State Climate Change Centres/Cells on Climate Change (SCCC-NMSHE)

Department of Environment, Ecology and Remote Sensing, J&K

Department of Environment, Science and Technology, Himachal Pradesh

State Climate Change Cell, Sikkim State Council of Science and Technology, Sikkim

Mizoram Council of Science, Technology and Environment Planning, Mizoram

Directorate of Environment, Department of Forests and Environment, Manipur

Department of Science, Technology and Environment, Government of Tripura

Forest and Environment Department, Meghalaya

International Cooperation

Swiss Agency of Development and Cooperation (SDC), Switzerland

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