Climate Change and the Mountain Ecosystem: National Mission for Sustaining the Himalayan Ecosystem in the Indian Himalayan Region

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Conserving Now, Preserving Future
The Himalayan Region

◆ A complex and interrelated ecology of planet earth
◆ One of the longest, loftiest and dynamic mountain chains on earth, spreading over a length of 2500 km covering eight countries and is a huge reservoir of resources – flora, fauna, water and fresh air.
◆ The most populated mountain system in the world
◆ Total Area: 4.3 million sq km (Approx.)
◆ Largest Bodies of Ice Outside Polar Caps 3735 sq km; eternal ice & snow (3250 cubic km fresh water)
◆ Himalayan Glaciers- 17 % of global Mountain Area
The Himalayan Region

Eight Countries - AFGHANISTAN, BANGLADESH, BHUTAN, CHINA, INDIA, MYANMAR, NEPAL and PAKISTAN

Nine large Asian river systems - The Indus, Ganges, Brahmaputra, Irrawaddy, Salween, Mekong, Tarim, Yangtse and Yellow River

1.5 Billion People depend on Himalaya for Water, Food and Energy
Eight Countries
Nine River Basins

1.5 billion people depend on ‘the water tower’

Himalayan glaciers are sources of freshwater reserves which provide headwaters for major river systems in Asia – a lifeline for almost half of humanity.
The Indian Himalayan Region

◆ The Indian Himalayan region (IHR) extends over an area of **594,427 sq. km** (18.15% of India) covering ten states fully and two states partially.

◆ The region supports **6.36% of India’s population** (2011 census). It is also considered a regulator of Indian monsoon.

◆ The average **forest cover** of the area is **38%**.

◆ The region contributes **63% to India’s water budget** with Brahmaputra basin contributing 34%, Ganga basin 25%, and Indus basin 4% to the total water.

◆ There is need to **build S&T capacity to study the complex processes linked to sustainable development** issues and challenges across all ecosystems and landscapes of the Himalaya.
Broad Objectives of NMSHE

◆ The primary objective of the mission is to build S&T Capacity to address sustenance of Himalayan ecosystem.

◆ To achieve above, the mission aims to -
  ◆ Understand the complex processes affecting Himalayan Eco system and evolve suitable management and policy measures for sustaining and safeguarding the Himalayan Eco system
  ◆ Assess the health status of the Himalayan ecosystem for policy-formulation functions
  ◆ Assist states in the Indian Himalayan Region (IHR) for implementation of actions selected for sustainable development
Major Programmes/Projects Launched under NMSHE

◆ A Centre of Glaciology at Wadia Institute of Himalayan Geology, Dehradun
◆ 6 Thematic Task Forces anchored around 6 lead institutions
◆ State CC Centres in 11 out of 12 Himalayan States
◆ Inter-University Consortium of 4 universities
◆ Indo-Swiss Capacity Building Programme in glaciology and related areas
Established in 2009 at Wadia Institute of Himalayan Geology with a cost of about 24 cr with the broad objective of Institutionalizing glaciological research in the country

The Centre has 18 employees which include 8 Scientists, 1 Technical officer, 2 Jr. Technical officers, 2 Technical Assistants, and 5 Research Scholars.

Some of the key outcomes of the Centre include;

- Installation of six Automatic Weather Stations (AWS); three Aethlometers; Laser Isotope Laboratory; Remote Sensing and GIS Lab.
- Continuous monitoring of 8 glaciers namely Gangotri, Dokriani, Chorabari, Companion, Dunagiri and Bagni, Pindari and Kafni
- Publication of 47 research papers (37 in peer-reviewed journals and 10 in non-SCI journals) with a total impact factor of 70.
- 9 Students enrolled/ awarded PhD degrees.
- Organised several workshops and brainstorming sessions
6 Thematic Task Forces Anchored Around Existing Lead R&D Institutions in the Himalayan Region

- 6 Thematic Task forces set up at 6 lead institutions working in the areas of Himalayan Ecosystem
- Task Forces scientifically support the NMSHE objectives to develop a national capacity to continuously assess the health status of the Himalayan ecosystem
- The Task Forces has engaged more than 100 research teams so far from more than 60 research and academic institutions spread across the IHR along with the state governments of the 12 Himalayan states.
## Institutions Leading 6 Thematic Task Forces

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<th><strong>Institution</strong></th>
<th><strong>Focus Area</strong></th>
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<tbody>
<tr>
<td>1</td>
<td>Wadia Institute of Himalayan Geology</td>
<td>Natural &amp; geological wealth</td>
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<td>2</td>
<td>National Institute of Hydrology</td>
<td>Water, ice, snow, including glaciers</td>
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<tr>
<td>3</td>
<td>Wildlife Institute of India</td>
<td>Micro flora &amp; fauna, wildlife &amp; animal population</td>
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<td>4</td>
<td>GB Pant National Institute of Himalayan Environment and Sustainable Development</td>
<td>Forest resources &amp; plant biodiversity</td>
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<td>5</td>
<td>Indian Council of Agriculture Research</td>
<td>Himalayan Agriculture</td>
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<tr>
<td>6</td>
<td>Jawaharlal Nehru University</td>
<td>Traditional Knowledge</td>
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Assigned Task to Thematic Task Forces

- Establishing Database
- Designing Monitoring systems
- Modeling and Simulation
- Vulnerability Assessment
- Adaptation policy Research
- Pilot Studies for Revalidation
State CC Cells in the Indian Himalayan Region

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<td>1</td>
<td>J&amp;K</td>
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<td>Mizoram</td>
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<td>Arunachal Pradesh</td>
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<td>Tripura</td>
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<td>5</td>
<td>Manipur</td>
<td>11</td>
<td>West Bengal</td>
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<tr>
<td>6</td>
<td>Meghalaya</td>
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Assigned Tasks to State CC Cells

◆ Vulnerability & Risk and Hazards Assessment at district and sub-district levels
◆ Development and implementation of training programmes
◆ Public Awareness Programmes and
◆ Institutional Capacity Building initiatives
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Vulnerability & Risk Assessment

Training of Stakeholders

Public Awareness

Institutional Capacity Building

Scoping Studies and development of a framework (led by IISc, Bangalore)

Development of Training Modules and Training of Trainers (led by NABCONS)

Media Workshops and Training (led by CMS)

Linkages with State and National level Institutions (TFs, National/State Insti, Univ)

Assistance Provided to State CC Cells (Supported by IHCAP/SDC)
Inter-University Consortium on Cryosphere and Climate Change (IUCCCC)

- A Consortium of 4 Universities
  - Jawaharlal Nehru University,
  - University of Kashmir;
  - University of Jammu and
  - Sikkim Central University

- IUCCCC aims to develop Cryosphere-Societal interactions
Indo-Swiss Capacity Building Programme in Glaciology

- As part of S&T Agreement between India and Switzerland, an Indo-Swiss bilateral programme was developed during 2012 with the main mandate to build capacity in the field of Glaciology & related areas in climate change.
- Under this programme, 55 students were trained by Indian and Swiss experts through a three level training programme.
- The second phase of the programme has been launched recently.
IHCAP Phase 2 (2016-19)

• Scaling up activities initiated in Phase 1:
  ▪ Multi level training on adaptation planning and implementation being organized in 12 Himalayan states
  ▪ Media workshops being organized in all 12 Himalayan states

• Concluding activities initiated in Phase 1:
  ▪ Glaciology programme institutionalized in curriculum of 2 Universities
  ▪ Development of fundable adaptation proposals for Kullu district based on assessment

• New/continuing activities under Phase 2:
  ▪ Development of a Common Framework for Vulnerability and Risk Assessment for the IHR
  ▪ Trainings on use of the Common Framework with all 12 Himalayan States
  ▪ Strengthening multi-stakeholder platforms for enhancing science-policy-practice connect
Locations of DST-CCP Programmes

Total No of programmes/Projects: **144**

Total no of institutions: **159**

Total no of scientists: **630**
NMSHE: Impacts and Benefits to the Society

- National Himalayan Health Status Report from 6 Task Forces will help assessing the health of IHR for initiating necessary scientific evidence based policy intervention for long term sustenance of Himalayan region.
- The Mission created a network of nearly 150 institutions and 250 scientists within and outside IHR
- Mission provided new indirect job opportunities to over 150 project personnel during last 3 years
- Mission developed human capacity in terms 32 PhD and PG students
- 48 Workshops were organized wherein over 1500 personnel were trained.
- State CC Centres conducted 40 training programmes wherein 5500 personnel trained
- Mission supported 15 national level events wherein over 500 participants benefited
New Programme for Building Human and Institutional Capacity in the Indian Himalayan Region

◆ 2 Centres of Excellence one each in Eastern and Western Himalayan region
◆ 4 Major R&D Programmes, 2 each in the Eastern and Western Himalayan region
◆ 2 National Network Programmes one each in the eastern and western region
◆ 2 Human Capacity Building programmes
Human and Institutional Capacity Building in CC for IHR: Research Opportunities and Challenges

◆ There are over **250 R&D and Academic institutions** in the IHR - 145 universities, 38 central Govt institutions and over 75 state level institutions.
◆ Over **1000 scientists** work in Himalayan ecosystem research areas
◆ There is need for developing **collaboration and resource sharing** mechanism between **Universities and National R&D Institutions**. Majority of Universities do not have requisite R&D infrastructure and resources. On the other hand, National R&D Institutions have shortage of research students.
◆ There is **weak linkage** between **IHR institutions** and **international best R&D institutions**.
Concluding Remarks

◆ National Mission for Sustaining the Himalayan Ecosystem has made considerable progress.

◆ A detailed Pan-Himalayan health status report is being brought out shortly covering aspects like glaciology, hydrology, meteorology, forestry, flora/fauna, agriculture and traditional knowledge system.

◆ State CC Centres in the Himalayan region are expected to bring out a sub-district level vulnerability and risk assessment.

◆ Efforts are being made to develop a framework for Regional cooperation in partnership with ICIMOD, Kathmandu.

◆ DST has built a strong partnership with Swiss Agency for Development and Cooperation (SDC) which will be strengthened in the future.

◆ An ambitious R&D programme comprising of Centres of Excellence, Major R&D Programmes and Network Programmes is being launched shortly for the Indian Himalayan Region.
Thanks !!