UNDERSTANDING THE SYNERGY BETWEEN NATIONAL MISSION FOR SUSTAINING THE HIMALAYAN ECOSYSTEM AND SAPCCs FROM HIMALAYAN STATES

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Agency for Development and Cooperation SDC

IHCAP Indian Himalayas Climate Adaptation Programme

सत्यमेव जयते

Climate Change Programme
Strategic Programs, Large Initiatives and Coordinated Action Enabler (SPLICE)
Department of Science and Technology
Ministry of Science & Technology
Government of India

About Indian Himalayas Climate Adaptation Programme (IHCAP)

(Strengthening Capacities on Climate Science and Adaptation in the Indian Himalayas)

IHCAP is a project under the Global Programme Climate Change (GPCC) of the Swiss Agency for Development and Cooperation (SDC), and is being implemented in partnership with the Department of Science and Technology, Government of India. The goal of the project is to strengthen the resilience of vulnerable communities, and to enhance the capacities of research institutions, communities and decision makers.

Objectives

- Strengthening capacities for adaptation planning and implementation in Himachal Pradesh through research, training and capacity building
- Scientific capacity building in the field of Glaciology and related areas
- Facilitating dialogues between Himalayan states and key stakeholders for mainstreaming climate change concerns into development planning

Production Team:

Author: Sunder Subramanian
Editors: Kirtiman Awasthi, Mustafa Ali Khan, Shirish Sinha (SDC), Akhilesh Gupta, Nisha Mendiratta (DST)
Copy Editing and Design: Shimpy Khurana

Published by Indian Himalayas Climate Adaptation Programme (IHCAP)

Copyright © IHCAP 2016. All Rights Reserved. Published in India

This publication or parts of it may not be reproduced, stored by means of any system or transmitted, in any form or by any medium, whether electronic, mechanical, photocopied, recorded or of any other type, without the prior permission of IHCAP.

This report is available in the electronic form at www.ihcap.in/resources

Cover Photo © Simon Allen/IHCAP

UNDERSTANDING THE SYNERGY BETWEEN NATIONAL MISSION FOR SUSTAINING THE HIMALAYAN ECOSYSTEM AND SAPCCs FROM HIMALAYAN STATES

Contents

Abbreviations/Acronyms 5

Executive Summary 11

Introduction 13
Background and the Context 13
The Indian Himalayan Region Context and NMSHE 17

Relevance of NMSHE to IHR States and their SAPCCs 25
NMSHE Introduction – IHR States Linkages 25
NMSHE Linkages in IHR SAPCCs 26

Key Discussion Points/Questions 47

List of tables

Table 1: Articulation of linkages in IHR SAPCCs to the National Missions 27

Table 2: Comparing NMSHE linkages in IHR SAPCCs 29

Table 3: Examples of articulation (explicit or implicit) for the primary and secondary objectives of NMSHE in IHR SAPCCs 31

List of Figures

Figure 1: Issues of balancing sustainable management of environmental resources with economic growth and equitable social development in IHR 21

List of Boxes

Box 1: National missions under NAPCC 16

ABBREVIATIONS/ACRONYMS

Acronym	Expanded Form
DBT	Department of Biotechnology
DoS	Department of Space
DSIR	Department of Scientific and Industrial Research
DST	Department of Science and Technology, Government of India
GoI	Government of India
GSI	Geological Survey of India
HP	Himachal Pradesh
IHCAP	Indian Himalayas Climate Adaptation Programme
IHR	Indian Himalayan Region
IMD	Indian Meteorological Department
JNNSM	Jawaharlal Nehru National Solar Mission
MEA	Ministry of External Affairs
MHA	Ministry of Home Affairs
MoA	Ministry of Agriculture
MoD	Ministry of Defence
MoEF&CC	Ministry of Environment, Forests & Climate Change
MoES	Ministry of Earth Sciences
MoWR	Ministry of Water Resources
NAPCC	National Action Plan for Climate Change
NGOs	Non-Governmental Organisations
NMEEE	National Mission for Enhanced Energy Efficiency
NMGI	National Mission for Green India
NMSA	National Mission for Sustainable Agriculture
NMSH	National Mission on Sustainable Habitat
NMSHE	National Mission for Sustaining the Himalayan Ecosystem
NMSKCC	National Mission on Strategic Knowledge on Climate Change
NWM	National Water Mission
SAPCC	State Action Plan on Climate Change
SoI	Survey of India
UNFCCC	United Nations Framework Convention on Climate Change

ABBREVIATIONS/ACRONYMS

Acronym	Expanded Form
J&K	Jammu and Kashmir
UK	Uttarakhand
HP	Himachal Pradesh
Skm	Sikkim
Asm	Assam
Meg	Meghalaya
Man	Manipur
Nag	Nagaland
Miz	Mizoram
ArP	Arunachal Pradesh
WB	West Bengal
Tri	Tripura

EXECUTIVE SUMMARY

The report examines the National Mission for Sustaining the Himalayan Ecosystem (NMSHE) in detail and explores its linkages with the Himalayan State Action Plans on Climate Change (SAPCCs). The report also seeks to answer a key question – *How much scope there is for the states in the Indian Himalayan Region (IHR) to leverage NMSHE?* It provides brief summaries of the extent to which the Himalayan SAPCCs articulate links to NMSHE. Analytical observations, key points and open questions are included as part of the report.

The report covers SAPCCs from IHR states- Jammu and Kashmir, Uttarakhand, Himachal Pradesh, Sikkim, Assam, Meghalaya, Nagaland, Mizoram, and Arunachal Pradesh. At the time of compilation, SAPCC of Tripura was unavailable, while only an executive summary of Manipur's SAPCC was available (the report uses the versions of SAPCCs currently available online- from state governments' websites and other websites).

IHCAP is a project under the Global Programme Climate Change (GPCC) of the Swiss Agency for Development and Cooperation (SDC), and is being implemented in partnership with the Department of Science and Technology, Government of India, which is implementing National Mission for Sustaining the Himalayan Ecosystem (NMSHE) and National Mission for Strategic Knowledge on Climate Change (NMSKCC).

The goal of the project is to strengthen the resilience of vulnerable communities, and to enhance the capacities of research institutions, communities and decision makers.

Objectives of the project include: Strengthening capacities for adaptation planning and implementation in Himachal Pradesh through research, training and capacity building; scientific capacity building in the field of Glaciology and related areas; and facilitating dialogues between Himalayan states and key stakeholders for mainstreaming climate change concerns into development planning.

Photo © Om Kumar/IHCAP

Mountain glaciers are the most visible sign of global climate change. Everybody can see their development and qualitatively understand the main processes involved: snowfall and melting as a result of weather conditions.

INTRODUCTION

BACKGROUND AND THE CONTEXT

Global Climate Change

Global climate change will have wide-ranging effects on the environment, and on socio-economic and related sectors, including water resources, agriculture and food security, human health, terrestrial ecosystems, biodiversity and coastal zones. Changes in rainfall pattern are likely to lead to either severe water shortages or flooding. Melting of glaciers can cause flooding and soil erosion. Rising temperatures will cause shifts in crop growing seasons, which will further affect food security, and changes in the distribution of disease vectors, putting more people at risk from diseases such as malaria and dengue fever. Temperature increases will potentially severely increase rates of extinction for many habitats and species (up to 30 percent with a 2°C rise in temperature). A rise in extreme events will have effects on health and lives, as well as associated environmental and economic impacts.

Taking into account the speed at which change is happening due to global temperature rise, it is urgent that the vulnerability of developing countries to climate change is reduced, their capacity to adapt is increased, and national adaptation plans are implemented.

Future vulnerability depends not only on climate change, but also on the type of development path that is pursued. Thus, adaptation should be implemented in the context of national and global sustainable development efforts. The international community is identifying resources, tools, and approaches to support this effort. Adapting to climate change entails adopting the right measures to reduce the negative effects of climate change, and to exploit the positive ones by making the appropriate adjustments and changes. There are many options and opportunities to adapt. These range from technological options such as increased sea defences or flood-proof houses on stilts, to behavioural changes at the individual level, such as reducing water use in times of drought, or using insecticide-sprayed mosquito nets. Other strategies include early warning systems for extreme events, better water management, improved risk management, various insurance options and biodiversity conservation.

The National Context, NAPCC and SAPCCs

India's economy and a majority of its population are highly dependent on climate-sensitive sectors such as agriculture, animal husbandry, fisheries, and tourism. Since climate change is expected to impact natural and human systems adversely by inducing changes in these systems, India can be considered highly vulnerable. In fact, climate change will only likely exacerbate India's already high physical exposure to climate-related disasters (65 percent of India is drought prone, 12 percent flood prone, and eight percent susceptible to cyclones). It will, as a consequence, impact livelihoods by disrupting social, cultural, economic, ecological systems, physical infrastructure, and human assets, accentuating health risks, and as such, posing severe risks to the development of the country.

Since climate change impacts are felt at multiple levels, from the global to the local, responses to climate change too need to be at multiple levels, calling for strategic interventions at local, sub-national, national, and global levels. At the global level, India's contribution to multilateral negotiations in the United Nations Framework Convention on Climate Change (UNFCCC) has been significant, and it continues to advocate for effective, cooperative, and equitable global approaches based on the principle of 'common but differentiated responsibilities and respective capabilities'. At the national level, India has developed the National Action Plan on Climate Change (NAPCC), 2008, which comprises eight national missions (see Box 1 below) at its core, addressing various sectoral aspects of climate change. NAPCC seeks to promote understanding of climate change,

adaptation, mitigation, energy efficiency and natural resource conservation while pursuing overall economic growth – i.e., measures that promote development objectives, and also result in co-benefits for addressing climate change.

Further, recognising that the impacts of climate change will vary across states, sectors, locations, and populations, and that different approaches will be needed to fit specific sub-national contexts and conditions, all Indian states have been asked to prepare the State Action Plans for Climate Change (SAPCCs) in line with NAPCC.

Photo © Mustafa Ali Khan/IHCAP

65 percent of India is drought prone, 12 percent flood prone, and eight percent susceptible to cyclones.

Box 1: National Missions under NAPCC

» **National Solar Mission** (renamed as Jawaharlal Nehru National Solar Mission) aims to promote the development and use of solar energy for power generation and other uses with the ultimate objective of making solar energy competitive with fossil-based energy options.

» **National Mission for Enhanced Energy Efficiency** recommends mandating specific energy consumption reduction in large energy consuming industries. It also recommends financing public-private participants to reduce energy consumption through demand side management programmes.

» **National Mission on Sustainable Habitat** aims to promote energy efficiency as a core component of urban planning. The plan calls for greater emphasis on urban waste management and recycling, including production of power from the waste.

» **National Water Mission** sets a goal of 20 percent improvement in water use efficiency through pricing and other measures.

» **National Mission for Sustaining the Himalayan Ecosystem** aims to conserve biodiversity, forest cover and other ecological values in the Himalayan region.

» **National Mission for a Green India** aims at increased forest/tree cover on five m ha of forest/non-forest lands and improved quality of forest cover on another five m ha (a total of 10 m ha), improved ecosystem services including biodiversity, hydrological services, and carbon sequestration as a result of treatment of 10 m ha.

» **National Mission for Sustainable Agriculture** aims to support climate adaptation in agriculture through the development of climate-resilient crops and appropriate agricultural practices.

» **National Mission on Strategic Knowledge for Climate Change** seeks to achieve a better understanding of climate science, impacts and challenges. It envisions improved climate modelling, and increased international collaboration to develop adaptation and mitigation technologies.

Photo © Mustafa Ali Khan/IHCAP

A global review places India, along with Bangladesh, as the two countries "facing the greatest risks to their populations, ecosystems and business environments as a result of climate vulnerability."

THE INDIAN HIMALAYAN REGION CONTEXT AND NMSHE

IHR Context

With high mountains, a monsoonal climate and glacier-fed rivers, as well as a long coastline and its tropical location, by sheer geography, India's exposure to the impacts of increasing climate variability and long-term climate change is high[1]. Social vulnerability is also enhanced due to high population and poverty, and a dependence on natural resources for livelihoods. Low levels of income, skills and access to resources point to both a development deficit as well as low adaptive capacity. Natural resources – especially water, agriculture and forests are already stressed by high populations and weak local[2] institutions. This lack of resilience compounds climate change impacts.

A national projection made under the Indian Network for Climate Change Assessment (INCCA) 'Climate Change and India: A 4X4

1 Not only is India characterized by high physical exposure to climate-related disasters (65% of the country is drought prone, 12% flood prone, and 8% susceptible to cyclones), but also its economy and the majority of its population are dependent on natural resources and climate-sensitive sectors (e.g. water resources, agriculture, forests, animal husbandry, fisheries, etc.). Numbers from http://www.ndmindia.nic.in/GoIUNDP/ReportPub/DM-Statu-%20Report.pdf

2 In this document, the term 'local' is used to connote Indian Himalayan state or sub-state levels contextually; likewise, the term 'regional' is used to connote the Indian Himalayan Region (IHR) broadly or the eastern/western Himalaya contextually

Assessment' in 2010 for the 2030s (on a 1970s baseline) projects significant climate changes and impacts – a rise in temperature by 1.7 - 2.0°C, small increases in precipitation, but with higher intensity, serious and recurrent flooding, and increasing drought events. Overall, per capita water availability will decline, and affect crop yields by up to 40 percent. Food and livelihood security, and the Himalayan region in particular, are at risk. This is borne out by micro-studies that suggest that climate change is underway in the Himalayas, and accelerating in the last two decades. A global review places India, along with Bangladesh, as the two countries "facing the greatest risks to their populations, ecosystems and business environments as a result of climate vulnerability[3]."

IHR stretches across states in the western and eastern Himalayas, and provides critical ecosystem services to communities in mountains and downstream plains. IHR covers vast areas, with about 17 percent of the region under permanent snow cover and glaciers, and about 30-40 percent under seasonal snow cover, forming a unique water reservoir. This feeds important perennial rivers that provide water for drinking, irrigation, and hydropower. Every year, about 1,200,000 million m^3 of water flows from the Himalayan rivers. IHR is home to nearly four percent of the country's population, and provides directly or indirectly for their livelihoods. The average land holdings is very small, less than one hectare per family. Most agriculture is of subsistence type, and depends on suitable climate for good yields. Animal husbandry is another source of income. Owing to the very small size of the land holdings, families rely heavily on natural fodder resources, including the forest areas, to feed their livestock. Economically vulnerable groups including the Scheduled Tribes and the Scheduled Castes have high dependence on forest resources for collection of fodder, medicinal plants, and firewood. These ecosystem services are highly climate sensitive, which makes the regional economy even more vulnerable.

The economy of IHR is predominantly rural, and highly dependent on climate-sensitive sectors like agri-horticulture and livestock. Therefore, variation in precipitation (both rainfall and snow) and temperature can significantly change soil moisture availability, plant phenology and their viable altitudinal range, and pest susceptibility. Eventually, these changes will impact growth, and yields in agriculture, horticulture and forest species. Rain-fed agriculture, horticulture and livestock are particularly impacted. An example is the falling apple yields, especially in the lower altitudinal ranges

3 The Climate Change Vulnerability Index (CCVI) evaluates 42 social, economic and environmental factors to assess national vulnerabilities across three core areas – exposure, sensitivity, and adaptive capacity. It is prepared by the British global risks analysis company Maplecroft.

in western Himalaya, such as in Himachal Pradesh (HP). Similarly, drying of natural springs together with increases in pests has impacted cardamom cultivation in eastern Himalaya, for example, in south Sikkim district.

The vulnerability of the Indian Himalayan Region is caused due to geological reasons, stress from increased population pressure, exploitation of natural resources, and other related challenges. These challenges are likely to be exacerbated due to the impact of climate change, which may adversely affect the Himalayan ecosystem through increased temperature, altered precipitation patterns, episodes of drought, and biotic influences. If average temperatures increase as predicted (increase in average temperatures, and variation in rainfall patterns have already been observed in the region), all aspects of human and natural life will be affected. Locally, people's ability to cope will be challenged. Further, changes in the Himalayas such as extreme rainfall events and glacier melt could affect the lives and livelihoods of about 1.3 billion people living in the river basins downstream. Irrigation, livestock, and rural drinking water supplies depend heavily on springs as sources. These are drying up and turning seasonal due to changes in the climate. On a broader regional level, a huge majority of Himalayan glaciers, the largest ice pack outside the poles, are retreating[4]. Yet, knowledge about the state of Himalayan glaciers and their evolution is still fragmentary. This is largely due to the remoteness of the Himalayan region, and the absence of any comprehensive data on the long-term series for glacier area, length or mass balance changes[5].

The Indian Himalayan Region over the last few years has seen a rapid increase in the incidence and the intensity of extreme weather events such as those witnessed in Uttarakhand (2013) and Jammu and Kashmir (2014). Deaths and morbidity associated with extreme climate variability are also likely to increase. Women and poor and marginalized communities in hilly regions with limited adaptive capacities are likely to be disproportionately affected. Women, it is seen, have a greater labour responsibility for fuel wood, fodder, water, as well as in agriculture. Historically, migration has been an important element of an adaptive livelihood strategy, which, while obtaining cash income, leads to women-headed households for much of the year. As such, livelihood activities in IHR have a disproportionate exposure to climate change, and a higher level of sensitivity. Mountains have smaller farms, which are mostly rain-fed and generate lower incomes and productivity. In such a scenario, adoption of commercial farming has provided significant

4 Snow and glaciers of the Himalayas, Report, Space Application Center, Ahmedabad, May 2011

5 T. Bolch, et al, The State and Fate of Himalayan Glaciers. Science, 20 April 2012, Vol. 336 no. 6079 pp. 310-314

cash income in rural areas. Agriculture and livestock are at high risk from rainfall variability and extreme events. Connectivity adds an additional component of risk. In addition, climate change can adversely impact infrastructure – for example, extreme weather events can cause landslides and damage roads, and critically impair connectivity, damage basic services installations such as water supply and drainage.

Many of the above climate change impacts are already becoming visible in IHR. While communities are coping with these rapid changes autonomously at individual and collective levels, the interactions between different sectors, climate and other stressors, and development, adaptation and mitigation are particularly complex in IHR. Comprehensive data and information is needed to assess the current situation, and to make reliable predictions that can be used as a basis for planning. Understanding these linkages and autonomous coping mechanisms can help identify areas of capacity building. At the same time, it will enhance climate resilience for the future, and also improve quality of life in the present. But poor accessibility, low population density, and lack of infrastructure, have led to low rates of data collection, and a general lack of reliable data for the region. This further highlights the need for greater investments by the Government of India to build scientific and research capacity and networking such institutions in the region.

IHR harbours about 8,000 species of flowering plants, i.e., nearly 50 percent of the total flowering plants of India.

Photo © Simon Allen/IHCAP

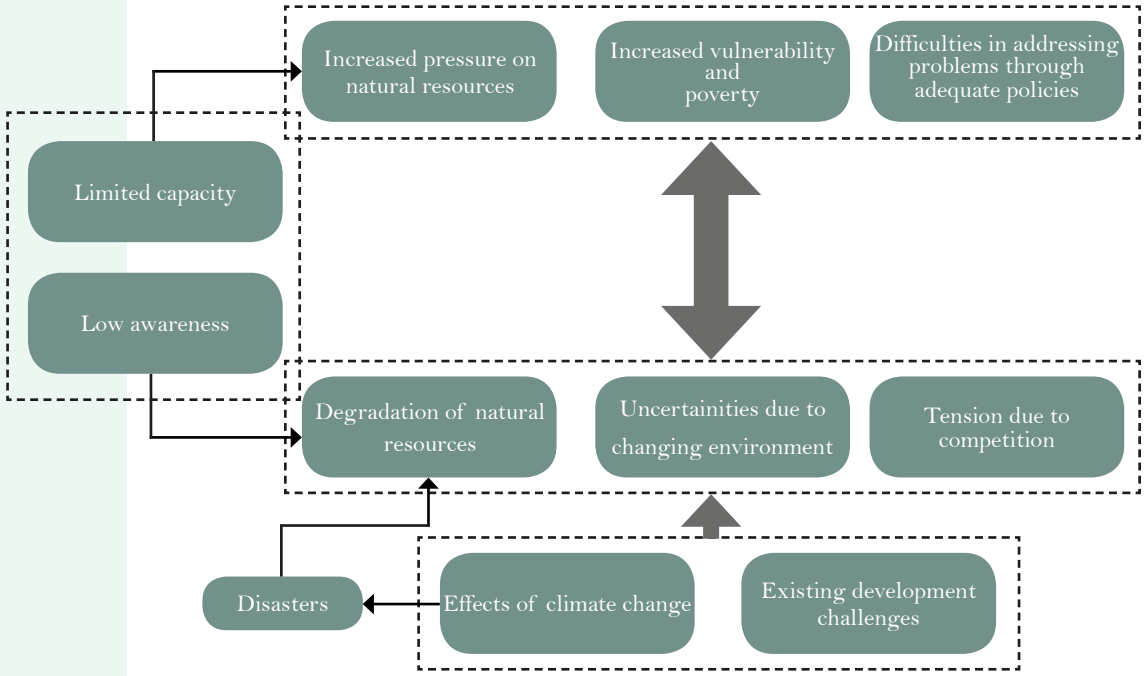

Figure 1: Issues of balancing sustainable management of environmental resources with economic growth and equitable social development in IHR

Photo © Mustafa Ali Khan/IHCAP

The National Mission for Sustaining the Himalayan Ecosystem

An integral part of NAPCC as one of its eight National Missions, NMSHE aims to a) understand scientifically the complex processes affecting this ecosystem b) evolve suitable management and policy measures for sustaining and safeguarding the Himalayan ecosystem including Himalayan glaciers and c) work with the states in the Indian Himalayan Region in the implementation of scientifically-derived policy measures. Recognizing the scientific and technological inputs required for sustaining the fragile Himalayan ecosystem, the Department of Science and Technology has been charged with the responsibility of implementing this mission.

The mission seeks to evolve management measures for sustaining and safeguarding the Himalayan glaciers and mountain ecosystem by:

» Enhancing monitoring of Himalayan ecosystem with a focus on recession of Himalayan glaciers, and its impact on river systems and other downstream socio-ecological processes

» Establishing observational and monitoring network to assess ecosystem health including freshwater systems

» Promoting community-based management through developing mechanisms for incentives for protection and enhancement of forested lands

» Strengthening regional cooperation through established mechanisms for exchanging information with countries sharing Himalayan ecology

NMSHE, towards achieving the above, proposes to involve various institutions already engaged in the analysis, conservation and management of natural resources in IHR. The mission would effectively network with institutions that have common and shared objectives, co-sharing of resources and co-generation of processes leading to ecologically sustainable development. Indicative categories of institutions in NMSHE include (i) Government institutions dealing with research and development (ii) Non-governmental organizations (NGOs) with local, national and international mandate (iii) Community-based organizations.

While designing and implementing strategies and plans for achieving the goals of the mission, focus will be to follow the following

principles enshrined in NAPCC:

» Protecting vulnerable sections of society – this includes participatory resource management strategies and development of livelihood options

» Developing human resource – there has to be strong emphasis on skill development, at all levels, across various sectors to enable communities to become sufficiently empowered with know-how, and requisite mountain-specific skills, necessary for adaptation to climate change

» Enhancing ecological sustainability – by examining causes and consequences of disturbance regimes, promoting conservation of native and endemic elements, and understanding glacier and river system dynamics

» Deploying technologies for hazard mitigation and disaster management, development of ideal human habitats, and agriculture and forest sector innovations

The task force set up by the Planning Commission of India on Mountain Ecosystems[6] had observed and highlighted an apparent need of coordination, networking and cohesiveness among the institutions working for conservation and development in the mountains. Requirements of adequate manpower and funds, infrastructure, communication and incentives for enhancing the delivery systems and connecting the laboratory findings to the real field requirements had been identified. The task force had also suggested setting up of a dedicated mission with effective coordination and management for filling the knowledge gaps, and for helping in evolving sustainable developmental strategies while sustaining the Himalayan ecosystem. As such, NMSHE aims to undertake a range of actions to address these gaps.

6 Report of the Task Force on Mountain Ecosystems (Environment and Forest Sectors) for the Eleventh Five-Year Plan, Planning Commission, GoI, November 2006

Photo © Om Kumar/IHCAP

Recognition of the Himalayas as one among 34 global biodiversity hotspots aptly reflects its wide-ranging ecological significance.

RELEVANCE OF NMSHE TO IHR STATES AND THEIR SAPCCs

NMSHE INTRODUCTION – IHR STATES LINKAGES

The 'Introduction' – Chapter 1 of NMSHE articulates various linkages with IHR states. For example, one of the stated aims of NMSHE is to:

» "Work with the states in the Indian Himalayan Region in the implementation of scientifically-derived policy measures."

Given the exclusive focus of NMSHE on IHR, the Mission's document introduction also states:

» "The Mission, therefore plans to position a sound coordination mechanism for ensuring cooperative and cohesive actions by the states in the Indian Himalayan Region (IHR)… active coordination with Ministry of Environment, Forests and Climate Change and Planning commission and concerned state governments is essential for successful implementation of the mission."

Further, the introduction states that the Mission will provide:

» "Assistance to states in the Indian Himalayan Region for implementation of sustainable actions through coordination functions."

NMSHE LINKAGES IN IHR SAPCCS

Relevant analyses and findings from IHCAP's Report 1 – 'Comparative Analyses of the IHR SAPCCs' – which is meant to be read with this report – are given below.

Comparing the Linkages

Table 1 briefly summarizes articulation of linkages in IHR SAPCCs to the eight National Missions, Jawaharlal Nehru National Solar Mission (JNNSM), National Mission on Sustainable Habitat (NMSH), National Mission for Green India (NMGI), National Mission for Sustaining the Himalayan Ecosystem (NMSHE), National Mission for Enhanced Energy Efficiency (NMEEE), National Water Mission (NWM), National Mission for Sustainable Agriculture (NMSA), and the National Mission on Strategic Knowledge on Climate Change (NMSKCC) to contextualize subsequent analyses of the linkages with SAPCCs.

IHCAP's Report 1 classified articulation of linkages in IHR SAPCCs to the National Missions into three categories: *Mention* – indicating that SAPCC had mentioned the National Mission at least once; *Explicit Articulation* – indicating that SAPCC had specifically articulated a link to a National Mission under its action agenda for the corresponding sector; and *Implicit Articulation* – meaning that SAPCC had articulated action agendas that matched the imperatives of a corresponding National Mission, but had not *specifically* indicated this.

The results of the analyses are presented in Table 1 below.

Table 1: Articulation of Linkages in the IHR SAPCCs to the National Missions

National Mission	J&K	UK	HP	Skm	Asm	Meg	Man	Nag	Miz	ArP	WB	Tri
JNNSM	●	●	●	◔	◔	●	●	●	●	●	●	●
NMSH	●	●	●	◔	◔	●	●	◔	●	●		●
NMGI	●	●	●	◔	◔	●	●	●	●	●	●	●
NMSHE	●	●	●	◔	◔	●	●	◔	◔	◔	◔	●
NMEEE	●	●	●	◔	◔	●	●	●	◔	●	●	●
NWM	●	●	●	◔	◔	●	●	●	●	●	◔	●
NMSA	◔	◔	●	◔	◔	●	●	◔	●	●	◔	●
NMSKCC	◔	◔	●	◔	◔	●	●	◔	◔	●	◔	●

Key: Explicit articulation = ● Implicit articulation = ◔

Examination of linkages in IHR SAPCCs to the National Missions under NAPCC yielded interesting results. While all IHR SAPPCs *mentioned* all the National Missions, there was wide variation in terms of articulation of linkages to the Missions, and many linkages were more implicit than explicit.

The table shows that JNNSM and NMGI had the most number of explicit articulations (10) followed by NMEEE and NWM (9). This was followed by NMSHE and NMSA with six IHR SAPCCs articulating explicit linkages to both – the second lowest numbers, whereas NMSKCC had the least number of explicit articulations. The picture for implicit articulations is almost the exact opposite – with NMSKCC getting the highest number of implicit articulations, followed by NMSHE and NMSA. JNNSM had the least number of implicit articulations. Only one National

Mission, NMSH had no articulation in one case (West Bengal, where sustainable habitat was not a focus sector).

These findings are important, especially because NMSKCC and NMSHE (the latter with a specific IHR focus) – both significant to IHR SAPCCs (and also closely related in terms of their scope and mandates), and both administered by DST - find relatively lower explicit articulation across IHR SAPCCs. This assumes even greater significance in the light of the findings from the comparison of NMSHE linkages across SAPCCs given below.

Comparing NMSHE Linkages across SAPCCs

Considering the above findings, and the focus of Report 1 comparing IHR SAPCCs, NMSHE was chosen to compare the degree of articulation of linkages with it in SAPCCs. As can be seen from figure 1 above, despite its specific focus on the Indian Himalayan Region, NMSHE along with NMSA received the second lowest number of explicit articulations in IHR SAPCCs, behind only NMSKCC (with which NMSHE shares a close relationship). Table 2 summarizes key areas of articulation in IHR SAPCCs relating to NMSHE.

Table 2: Comparing NMSHE linkages in IHR SAPCCs[7]

NMSHE	J&K	UK	HP	Skm	Asm	Meg	Man	Nag	Miz	ArP	WB	Tri
Primary Objectives												
Building human and knowledge capacities at the national level	●	●	●	●	●	●	●	●	●	●	●	●
Building institutional capacities	●	●	●	●	●	●	●	●	●	●	●	●
Building evidence-based policy implementation capacities	●	●	◔	◔	◔	◔	◔	●	◔	◔	◔	●
Building capacities for continuous learning & pro-active designing of development strategies	●	●	●	◔	●	●	NA	●	●	●	●	●
Scientific assessment of the vulnerability of the Himalayan ecosystem	●	●	●	●	●	●	●	●	●	●	●	●
Research for framing evidence-based policy measures to protect fragile ecosystems	●	●	●	●	●	◔	●	●	●	●	●	●
Time-bound action programmes at the state level	●	●	●	●	●	●	●	●	●	●	●	●

NMSHE	J&K	UK	HP	Skm	Asm	Meg	Man	Nag	Miz	ArP	WB	Tri
Secondary Objectives												
Network knowledge institutions in Himalayan Ecosystems	●	●	●	◔	●	●	●	●	NA	NA	●	●
Develop bio-geo data base for Himalayan ecosystems	●	●	●	●	●	●	●	●	●	●	●	●
Detect & decouple natural & anthropogenic induced signals	◔	◔	◔	◔	◔	◔	◔	◔	◔	◔	◔	●
Assessment of the socio-economic and ecological consequences of global environmental change	●	●	●	◔	●	◔	◔	●	●	●	●	●
Studying of traditional knowledge systems for community participation in adaptation, mitigation and coping mechanisms	●	●	●	●	●	NA	●	●	●	●	●	●
Evaluation of policy alternatives for regional development plans for key sectors	◔	◔	◔	◔	◔	◔	◔	◔	◔	◔	◔	◔

7 Where NMSHE mentions objectives at the national level, articulated counterpart actions in SAPCCs are taken to be at the state level, or where relevant, across IHR states In most cases though, articulation is more implicit than explicit.

NMSHE	J&K	UK	HP	Skm	Asm	Meg	Man	Nag	Miz	ArP	WB	Tri
Creation of awareness amongst stakeholders	●	●	●	●	●	●	◣	●	●	●	●	●
Development of regional cooperation with neighbouring countries	●	●	●	NA	NA	●	◣	●	NA	NA	●	●

Key: Explicit articulation = ● Implicit articulation = ◣

Selected examples of articulation (explicit or implicit) for the primary and secondary objectives are given in Table 3.

Table 3: Examples of articulation (explicit or implicit) for the primary and secondary objectives of NMSHE in IHR SAPCCs

NMSHE	State	Examples of corresponding articulation in IHR SAPCCs
Primary Objectives		
Building human and knowledge capacities at the national level	J&K ●	"Goals of the plan among others include: a) develop the capacity to undertake sectoral and national inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases by following appropriate adaptation and mitigation measures b) develop the capacity to conduct vulnerability assessment of sectors and communities and to identify adaptation measures required to address the impacts of climate change"
	UK ●	"The state recognizes that overall awareness of climate change and its impacts in Uttarakhand is limited. Therefore, UAPCC seeks the fulfilment of the following outcomes: • Significantly improved awareness of climate change and its impacts in government at all levels as well as in communities, civil society and the private sector in the state; and • Capacities of government line departments and agencies at all levels to analyse, plan, converge, implement and monitor programmes addressing climate change and its impacts."

NMSHE	State	Examples of corresponding articulation in IHR SAPCCs
	HP	"General guidelines for capacity building: "To inform the population about environmental problems and, in particular, to raise awareness about the effects of climate change, and to encourage education, awareness and research on this subject in Himachal Pradesh." The actions described below will be carried out under these general guidelines in order to build capacities for comprehensively addressing climate change in the long-term as well as to reinforce capacities already present in the state. • Creation of a State Fund for research on biodiversity and climate change • Evaluation of the technical and economic feasibility of establishing a basic Comprehensive Regional Network (Atmospheric and Terrestrial) for Monitoring and Studying Climate Change • Creation of a state-level Glacier Registry • Strengthening the institutional framework in Himachal Pradesh for addressing climate change Design of instruments to promote the development, transfer and adoption of technologies for climate change mitigation and adaptation"
	Asm	"The Assam SAPCC envisages a sustainable and climate resilient development pathway through a synergistic combination of adaptation and mitigation measures with focus on research, appropriate technology, capacity creation and governance."

NMSHE	State	Examples of corresponding articulation in IHR SAPCCs
	Meg	"Government of Meghalaya understands the common needs that emerge across sectors, and has proposed institutional mechanisms to move forward. This includes the apex council, building capacity of the district councils, an institution of governance, looking at programme monitoring and impact assessment, an entrepreneurship development institute to promote skill building in general with a special emphasis on the green skills"
	Nag	"Articulated need for significantly improved awareness of climate change and its impacts in government at all levels as well as in communities, civil society and the private sector in the state; and the need for enhanced capacities of government line departments and agencies at all levels to analyse, plan, converge, implement and monitor programmes addressing climate change and its impacts; States intends to initiate and foster a range of on-going awareness and capacity building measures to achieve the above State will examine the possibility of incorporating climate change related modules into the educational curriculum across various levels, including the development of specific academic programmes on climate change at the university level. Appropriate non-governmental agencies will be co-opted as necessary to support the awareness and capacity building processes. Nagaland will also explore the scope for expansion and revitalisation of the Climate Change Leaders (CCL) network, and develop a cadre of committed CCLs across the state."

NMSHE	State	Examples of corresponding articulation in IHR SAPCCs
	ArP	"While dealing with climate change challenges, some of the critical issues that are spread across the sectors and domains could be: Strengthening the nodal agencies and creation of human resource."
	WB	"Setting up of a state-level institute for climate change. Apart from research and research integration, the institute will carry out training and capacity building – Emphasis on skill development, at all levels, across various sectors to enable communities become sufficiently empowered with the know-how and specific required skills, necessary for adaptation to climate change"
	Tri	"The government understands the common needs that emerge across sectors, and has proposed several institutional mechanisms to move forward. This includes building capacity of the institutions of governance, looking at programme monitoring and impact assessment, an entrepreneurship development institute to promote skill building in general with a special emphasis on the green skills"
Scientific assessment of the vulnerability of the Himalayan ecosystem	J&K	"Capacity development and enhancement: • Facilitate understanding of the scientific evidence and interdependencies among climate variability and change, human livelihood, disasters, and disease vulnerability in J&K region."

NMSHE	State	Examples of corresponding articulation in IHR SAPCCs
	UK	"The UAPCC recognizes that the currently available vulnerability base vis-à-vis climate change and its impacts on the state, its economy, and its various sectors and communities is limited. On this front, UAPCC seeks to achieve the following outcomes (which are linked to the overall Knowledge Management Strategy under UAPCC): • Development of detailed climate vulnerability and risk analyses covering all districts, as well as specific analyses pertaining to each of the sectors addressed in UAPCC…."
	HP	"A rapid building up of capacities is essential to enhance the level of climate change research in Himachal Pradesh. In this context, scientific cooperation and collaboration is essential in the area of climate modelling, impact assessment, integrated impact assessments, research on mitigation of climate change concerns and adaptation to impacts of climate change."
	Skm	"The actions within the strategy need to include…. undertaking long-term scientific studies on flora and fauna, hydrology, limnology, etc."

NMSHE	State	Examples of corresponding articulation in IHR SAPCCs
	Asm	• "Scaling up of hazard mapping, early warning measures and assessments of vulnerability should take priority for long-term interventions… • The state-of-the-art scientific knowledge and in-depth impacts and vulnerability assessment and emission profiling faces a number of challenges in terms of expertise, institutional capacities and resource availability to conduct these exercises…."
	Meg	Key priorities: • ... Study on impacts of climate change on forest cover… • …. Assess additional threats to biodiversity and wildlife…"
	Man	Scientific assessment of the state's climatic variability and long-term climate change vulnerability…. …. The conservation of ecosystem is vital to the ecological security of the state's landscape in terms of restoring forest cover, maintaining the sources of perennial water required for drinking and irrigation purposes and sustaining agriculture, which in turn, is linked to the livelihoods of the people…."
	Nag	"Studies have also revealed gaps in our knowledge on the climate change vulnerability of mountain ecosystems in eastern Himalayas, and the inadequacy of human resources and institutional setups, as well as a lack of policy imperatives to address the issues. The region also lacks adequate scientific evidence to determine the impact of climate change on human well-being with any certainty…"

NMSHE	State	Examples of corresponding articulation in IHR SAPCCs
	Miz ●	"Key priorities Study of the impact of climate change on the indigenous fauna of aquatic ecosystem and open waters… Undertaking study on valuation of forest resources (non-traded) and climate change impacts on the vulnerable ecosystems…"
	ArP ●	"An assessment of the impact of projected climate change on forest ecosystems in Arunachal Pradesh… … Ecosystem restoration and increase in forest cover….'
	WB ●	"Studying the role of forests in ecosystems and supporting livelihoods, C sequestration potential of forests, and other forest-related studies, and understanding the impacts of climate change on forests and associated vulnerabilities…."
	Tri ●	"Limited research studies are available on the Tripura ecosystem… But a serious study to assess the relationship is needed before arriving at a conclusion, and such studies are urgently required for restructuring the controlling variables and processes."

NMSHE	State	Examples of corresponding articulation in IHR SAPCCs
secondary objectives		
Network knowledge institutions in Himalayan ecosystems	J&K	"Scoping work includes the following: • To coordinate and engage in national and international research and development services and networks in the area of climate and development…"
	UK	"UAPCC recognizes that knowledge creation, management, and dissemination/exchange will be critical and central to the successful implementation of SAPCC. UAPCC also recognizes that Uttarakhand does not exist in an independent developmental vacuum; it exists in the developmental context of IHR and also in the larger context of the Hindu Kush Himalaya (HKH). Therefore, the UAPCC will seek to achieve the following outcomes in this regard: • Develop mechanisms and partnerships for sharing the knowledge base and emerging experiences including best practices not only within the state at all levels, but also with other states in IHR as also in the larger HKH context…"
	HP	"Extensive networking of researchers within country to carry forward the work on science, impacts and mitigation of climate change in the state is required…."
	Skm	"Creation of knowledge centre (for disaster management)…"
	Asm	"The emphasis is clearly on strategic knowledge generation through promotion of relevant research for the region along with all-round capacity building at the institutional as well as individual levels…"
	Meg	"Meghalaya State Council on Climate Change and Sustainable Development… will forge partnership with private sector, academic institutions and civil society…"
	Man	"The main objective is the institutionalization of knowledge network and human resource development among the existing regional stakeholders."

NMSHE	State	Examples of corresponding articulation in IHR SAPCCs
	Nag	"NSAPCC recognises that knowledge creation, management, and dissemination and exchange will be critical and central to the successful implementation of SAPCC. NSAPCC also recognises that Nagaland does not exist in an independent developmental vacuum; it exists in the developmental context of north-eastern hills, IHR and also in the larger context of the Hindu Kush Himalaya (HKH). Therefore, NSAPCC will seek to fulfil the following outcomes in this regard. It will strive to develop and deploy mechanisms for collating and sharing the existing knowledge base on climate change and its impacts as relevant to the state, emerging experiences including best practices with other member states of IHR…"
	WB	"Core-business (of the proposed Institute for Climate Change): • … Enrolment of partners and partnering institutions/organizations for building effective co-ordination; the Institute will act as a "Knowledge Domain" for "Transitional Research," i.e. to foster exchange of data related to climate change, good practices and policy initiatives across states of the country/ adjacent countries with similar physiographic provinces, e.g. Bangladesh, Pakistan, Sri Lanka and Myanmar."
	Tri	"To create knowledge networks with selected core knowledge generating and applying institutions as nodes that are linked and involved in the development of activities through a wide range of knowledge partners…"

NMSHE	State	Examples of corresponding articulation in IHR SAPCCs
Studying of traditional knowledge systems for community participation in adaptation, mitigation and coping mechanisms	J&K	"Mountain communities" are rich repositories of traditional knowledge, practices and resources. Traditional knowledge and practices have evolved through generations of empirical experimentation… The state is fast losing its traditional practices…. • …. Traditional knowledge and local wisdom and innovation need to be promoted towards building community, which is resilient to climate change…"
	UK	"Priorities: …. Documentation of traditional knowledge…"
	HP	"This will be supported by the convergence and integration of traditional knowledge and practice systems, information technology, geospatial technologies and biotechnology…"
	Skm	"Archiving and dissemination of traditional knowledge on water harvesting and conservation…. "
	Asm	"The enormous, and to a great extent, still unchartered biodiversity of the state needs to be inventoried and traditional practices documented through biodiversity registers…"

NMSHE	State	Examples of corresponding articulation in IHR SAPCCs
	Man	"This (agriculture) will be supported by the convergence and integration of traditional knowledge and practice systems, information technology, geospatial technologies and biotechnology… Encourage cultivation of traditional varieties of crops and horticulture by promotion of organic farming enabling farmers to realize a price premium…'
	Nag	"Development of village-level holistic micro-plans for sustainable management of forests, which will incorporate the traditional management practices for conservation of forests and biodiversity, the forest-based livelihood needs of the communities, and incorporate climate change concerns…."
	Miz	"Key strategies under ecosystem biodiversity and livelihood sustainability sector: • Promotion of Indigenous Traditional Knowledge (ITK) with skill development and human resource development…'
	ArP	"Cross cutting activities: The state has already recognized a large number of issues critical to the management of climate change. Some of the critical areas recognized, and the areas of research that need to be taken up under the Strategic Knowledge Mission. The critical issues that are spread across the sectors and domains include: climate change vulnerability assessment studies across sectors, strengthening of database and infrastructure for climate-related data collection and analysis, capacity building and training, IPR and traditional knowledge protection, documenting traditional practices, local knowledge and folk traditions…"
	WB	"Popularization of indigenous varieties: Mapping of existing traditional varieties practised by farmers in different regions are to be conducted and characterized. Those that have high resilience to the changing climate need to be identified and promoted…"
	Tri	"To model and plan for the climate sensitive sectors and regions, assess the impacts of climate change, analyze the vulnerability of regions/districts, sectors and population groups, and evaluate the traditional adaptation and coping practices to climate variability and extremes…"

NMSHE	State	Examples of corresponding articulation in IHR SAPCCs
Develop bio-geo data base for Himalayan ecosystems	J&K	"Climate and hydrologic changes: There is inadequacy of data as well as statistical analysis related to climate, hydrological and hydrogeological changes in three regions of the state… Better research needs - Databases and knowledge platform…"
	UK	"On this front, UAPCC seeks to achieve the following outcomes (which are linked to the overall Knowledge Management Strategy under UAPCC): • Improved scientific evidence base and coordination mechanisms between scientific research and academic institutions (including both national and state-level agencies) for building a scientific data and evidence base for the state…"

NMSHE	State	Examples of corresponding articulation in IHR SAPCCs
	HP	"IPCC-AR4 addressed the global trends on climate change, but detailed analysis is lacking for India and its regions due to difficulties in obtaining database related to climate change. For this purpose, the state needs to make intervention in the following areas: Enhanced research on climate modelling - There is a need to develop high-resolution regional climate models that simulate regional climate change, in particular monsoon behaviour by pooling institutional capabilities and computational resources. The state needs to encourage regional data re-analysis projects… Promoting data access - Different line organizations, research institutions are carrying out various climate change related studies and generating data. It needs to be ensured that all such institutions may appoint a nodal officer who should be made responsible for providing access to such databases…"
	Skm	"Monitoring of climate change programmes - Information system within the department to be strengthened focusing on collection of baseline data and measure changes periodically with climate change impacts…."
	Asm	"Developing decision support system combining database (of crop, soil, weather) and modern information tools (with simulation models, remotely sensed information, use of GIS platforms) to provide drought/flood alerts, monitor the vegetation condition, develop crop yield forecasts and, identify best agronomic practices…"

NMSHE	State	Examples of corresponding articulation in IHR SAPCCs
	Meg	"To gain a better understanding of climate science, impacts and challenges. The plan envisions a new Climate Science Research Fund, improved climate modelling…"
	Man	"State Mission on Climate Change Strategic Knowledge: Under this mission, priority is given to setting up of an effective mechanism for certain basic climate change database on Meteorology, Land Surface, Hydrological, Agriculture, Socio-economic, and health-related matters…"
	Nag	"Create climate change related databases and identify responses to climate change… Creating a data repository of implementation strategies adopted globally, particularly in similar ecosystems…"
	Miz	"Although temperature is usually the first variable considered in assessments of climate change, it is important to consider other data that integrate the state of the climate system over space and time. These include such climate parameters like rainfall and humidity…"
	ArP	"The critical issues that are spread across the sectors and domains include: climate change vulnerability assessment studies across sectors, strengthening of database and infrastructure for climate-related data collection and analysis…"

NMSHE	State	Examples of corresponding articulation in IHR SAPCCs
	WB	"Actions: State database on landslide prone areas and intensity of landslides to assess the risk of landslides; Fisheries department has taken up a project for preparation of a comprehensive database and information networking in the fisheries sector by the use of remote sensing technology…"
	Tri	"Generation of knowledge/information: (a) at local level – Local-specific databases, scenarios and assessment….. ; (b) at state level - Research networks, input to national databases (e.g. NATCOM), scientific and policy models; and (c) national level - Interface with IPCC assessments, interface with regional/global databases, scenarios and assessments, technology inventory database…"

Analyses of IHR SAPCCs and their explicit or implicit articulated linkages to NMSHE and its objectives (primary and secondary) show that there is significant explicit articulation of linkages to the various primary objectives of NMSHE, with the exception of the primary objective relating to building evidence-based policy implementation capacities (articulation in this regard is more implicit, with most IHR SAPCCs articulating the need for policy analyses or policy formulation across various sectors).

For the secondary objectives of NMSHE, there is significant explicit articulation of linkages to the objectives relating to the development of bio-geo database for the Himalayan ecosystems, studying of traditional knowledge systems for community participation in adaptation, mitigation and coping mechanisms, and creation of awareness amongst stakeholders. At the same time, for some secondary objectives of NMSHE such as detecting and decoupling natural and anthropogenic induced signals, evaluation of policy alternatives for regional development plans for key sectors, there is more implicit articulation in IHR SAPCCs.

Only a few (seven) IHR SAPCCs articulate explicit links to NMSHE's secondary objective of development of regional cooperation (with neighbouring states and/or countries).

Photo © Mustafa Ali Khan/IHCAP

Mountains are the water towers of the world. They provide freshwater to half of the world's population for irrigation, industry, domestic use and hydropower.

KEY DISCUSSION POINTS/QUESTIONS

A range of key discussion points/questions emerge from the above chapters/sections:

» While in its introduction, NMSHE Mission document articulates clear linkages with IHR states, *it needs to be explored as to how these linkages/coordination with IHR states will be built.*

» The primary objectives of NMSHE raise several key questions:

- *While under the objective of building human and knowledge capacities at the national level, the Mission document suggests training of about 100 professionals for sustaining the Himalayan ecosystem and availability of a minimum of 25 well-trained glaciologists, , the IHR SAPCCs do not specify the nature of capacity building required. Many of the Indian Himalayan Region States (Jammu and Kashmir, Uttarakhand, Himachal Pradesh, Sikkim and Arunachal Pradesh) have glaciers and glacier systems themselves. However, most outline various other capacity building measures including human resources. Key questions include the issues of (a) how and where will they be deployed; and (b) can such capacities be also built at the state levels.*

- *Two of the primary objectives - building institutional capacities and building evidence-based policy implementation capacities also raise similar ques-tions – can DST, under NMSHE assist IHR states to identify and build capacities of key state institutions, and also provide IHR states support for building evidence base and capacity building for evidence based policy making?*

- *Some IHR SAPCCs have explicitly articulated the need for developing and deploying comprehensive knowledge management architectures and actions, while these are implicit in others. NMSHEs primary objective of building capacities for continuous learning and pro-active designing of development strategies implies an opportunity for IHR states to build systematic research programmes, connect climate science with practice and policy; and integrate knowledge management strategies. However, it needs to be explored how these IHR states can leverage this objective of the NMSHE.*

- *While many IHR states have had the benefit of access to advanced scientific assistance in developing state and sector-specific vulnerability analyses, others have used more generic assessments, largely based on secondary sources such as the 4x4 Assessment document. Given that NMSHE, in one of its primary objectives, includes scientific assessment of the vulnerability of the Hima-layan ecosystem, and given that this is a critical need and component of IHR SAPCCs, and also considering that a primary objective of NMSHE is to have time-bound action programmes at the state level, could DST provide support for such analyses in IHR states and initiating action for building the necessary scientific capacity in the states?*

- *How can the primary objectives of NMSHE (which are at the national level) be translated into actions at the state levels?*

» As seen from Section 2.1, the secondary objectives of NMSHE – largely covering knowledge architectures and management initiatives at the national level too find significant resonance in IHR states and their SAPCCs.

- *How can the secondary objectives of NMSHE (which are at the national level) be translated into actions at the state levels?*

- *How can the states leverage NMSHE for actions articulated under SAPCCs that have clear linkages to NMSHE's objectives?*

It can be seen that when broken down into NMSHE's primary and secondary objectives, there is considerable articulation of linkages in IHR SAPCCs. This clearly highlights the facts that:

» There is significant scope for augmented linkages between IHR SAPCCs and NMSHE, and by extension, the closely related NMSKCC

» There is, therefore, sufficient ground for several measures to be taken for building synergies between DST and IHR states on strengthening linkages between NMSHE (and NMSKCC) and IHR SAPCCs

Photo © Mustafa Ali Khan/IHCAP

Photo © Om Kumar/IHCAP

NOTES FOR READERS

NOTES FOR READERS

Indian Himalayas Climate Adaptation Programme

Swiss Agency for Development and Cooperation
Climate Change and Development
Embassy of Switzerland
Chandra Gupta Marg, Chanakya Puri
New Delhi – 110021, India
Ph. No. +91-11-49959570
Fax No. +91-11-49959589

Email: info@ihcap.in Website: www.ihcap.in