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MEETING REPORT

Anthropogenic impacts and their management options in different ecosystems of the Indian Himalayan Region*

The different ecosystems like snow or headwater from the northwestern to the northeastern Himalayan Region from mountains to riverine basins will be adversely affected due to rapid melting of glaciers/snow and erratic seasonal surface run-off flow. This may have direct or indirect implications on existing developmental interventions and economic activities such as hydropower projects, mass tourism, land-use components, biodiversity, riverine aquatic life, alternate livelihood options and above all human well-being. To know the primary status of climate change and related livelihood issues and to seek adaptive strategies, a series of four consultation meetings/workshops with a view to enhance capacity building of different representative stakeholders in different ecosystems of the Indian Himalayan Region (IHR) were organized.

Speaking to the audience on the occasion of all consultation meetings-cum-workshops, J. C. Kuniyal (JCK) (G.B.

Pant National Institute of Himalayan Environment and Sustainable Development) emphasized the need to create a healthy environment for a healthy life. He raised important environmental issues like solid waste problem and its management, black carbon emission, land-use changes and their impacts over the glacier environment and downslope regions with suitable mitigating measures. He reiterated the strong role of women in improving the Himalayan economy. He also deliberated on capacity building for women in rural areas to maintain their livelihood options, how to minimize solid waste problem under waste-to-energy initiatives and also how to combat climate change issues.

In the first meeting at Gagangir village in the Sindh Basin, Jammu and Kashmir (J&K), there were 74 participants. During the interactive session, the stakeholders, including senior citizens, public representatives of the village, government teachers and representatives from youth clubs during an interactive session raised issues related to deteriorating quality of drinking water supply, poor tourism development, poor road connectivity, need for upgradation of health and educational facilities, etc. They regretted how water bodies are being polluted by humans over the past decades. Project partners from the University of Kashmir highlighted the importance of environmental conservation and judicious use of natural resources. Natives spoke about deteriorating drinking water quality that causes waterborne diseases due to construction work of the Z-Morh road tunnel

near Gangangir in Ganderbal district, J&K. They mentioned that construction of the tunnel and indiscriminate dumping of debris have ruined the fragile environs along River Sindh.

The second workshop was conducted at CSIR-North East Institute of Science & Technology, Branch Laboratory, Lamphelat, Imphal Basin, Manipur, which had 25 participants, including officials, environmentalists, local residents, scholars and teachers. Here, Loktak Lake, the largest freshwater lake in North East India, covers about 61% of the wetland regime within Manipur River Basin. One of the representatives from the Loktak Development Authority, Manipur, raised concerns about the 'phumdis' (floating biomass) issue in Loktak Lake, causing excessive proliferation and choking of the central zone, deteriorating water quality, degrading catchment condition and siltation, and dwindling fish resources. This results in further deterioration of phumdi habitat in Keibul Lamjao National Park in Manipur. He also said the developmental activities for linking Loktak Lake with River Manipur have triggered fragmentation of useful wetland system. The Chief Conservator of Forest, Manipur spoke regarding poor diversity in the Changoung Forest in the Imphal Basin. This is due to repeated felling and burning of vegetation under jhum cultivation, heavy invasion by *Tithonia diversifolia*, *Lantana camara* and *Mikania*, etc. In the south Changoung, community forest protection needs to apply some scientific techniques. Floristic composition, corresponding

*A report on four consultative meeting organized under a National Mission on Himalayan Studies (NMHS) project titled, 'Anthropogenic impacts and their management options in different ecosystems of the Indian Himalayan Region'. Four consultative meetings were organized in 2017; first during 22–23 November at Gagangir village, Sindh Basin (Jammu & Kashmir), second from 1 to 3 December at CSIR-NEIST Branch Laboratory, Imphal Basin (Manipur), third on 7 December in Ranganadi Basin (Arunachal Pradesh) and fourth on 27 December at Gram Panchayat Bershaini in Parbati Basin (Himachal Pradesh).

water resources and current forest management practices have been affected by these activities.

Livelihood of the area mainly depends on forest products. Also, the farmers restrict themselves to monoculture under rainfed agriculture. This results in the destruction of natural resources for livelihood options. Furthermore, the whole Manipur river system is flooded during every rainy season due to various anthropogenic factors like encroachments along the river basin and destruction of watershed areas. Ithia barrage causes floods in the valley due to blockage of water between Loktak Lake and River Manipur. High intensity of rainfall also leads to frequent floods and landslides.

The third consultative meeting/capacity-building programme was conducted in the Ranganadi Basin region of Arunachal Pradesh, with 28 participants. People from different villages spoke about problems like scarcity of drinking and irrigation water, which may be due to day-to-day environmental changes. One representative from the Nature Care and Disaster Management Society stressed that the water is getting polluted in the area due to deforestation, water-logging, mining and nonplantation of native species. He suggested that different organizations should join hands together for conservation of natural resources and overall development of the Ziro valley in the state. A member of Apatani Women's Welfare Association Ziro highlighted that the organization has been working for biodiversity conservation, creating awareness and capacity building of women in the Ziro valley. A member from the Ziro Biodiversity Management Committee raised the issue related to disrupting land-use conditions,

especially construction of houses in paddy fields limiting agricultural land as well as landscape degradation, resulting in low tourists inflow in the valley. Proper planning of land-use management and construction of houses is urgently required in the valley. Restoration of ritualistic activities is necessary to maintain traditions. Extensive use of inorganic pesticides and weedicides in a agriculture and horticulture must also be avoided. The President of All Nishi Niti Youth Organization mentioned that they are actively working with the Forest Department for biodiversity conservation through regular patrolling to check illegal hunting and smuggling of wild flora and fauna in the Ziro valley.

The fourth meeting with 45 participants was held in the Parbati Basin in Himachal Pradesh. The President of the Panchayat (Pradhan) spoke about solid waste problem and judicious use of limited local resources. He also mentioned that the people are not aware of solid waste management in the Basin, which is the biggest hindrance to the Swachh Bharat Mission of the Government of India. The Head of the women's group (Mahila Mandal) raised issues related to decrease in drinking/irrigation water, and decrease in snowfall due to developmental activities like hydropower projects, constructions, etc. in the Parbati valley of Himachal Pradesh. To enhance women's livelihood, knitting and embroidery, microbial bio-composting from biodegradable solid waste and beekeeping could be sustainable options.

Bio-composting will enrich soil fertility, while beekeeping will help increase pollinators in apple orchards, which together would help increase crop and apple productivity. Farmers raised the

issue regarding unscientific use of pesticides and fertilizers. The Hoteliers' Association raised the problem of waste, its management and lack of infrastructural facilities for tourism activities.

In a nutshell, all the consultation meetings/workshops dealt with climate change, which has impacts on existing ecosystem services and people's livelihood options. The representatives from all the basins ensured that they would actively participate in similar programmes in future for combating the threat of climate change. They vowed to adapt to climate change in order to maintain their livelihood options depending on the geographic conditions of their region, by minimizing adverse impacts and developing resilience locally.

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