

NATIONAL WORKSHOP ON ENVIRONMENTAL THREATS IN THE COLD DESERTS
Issues and Challenges and the Way Ahead
Conducted by Pragma on 22 – 23rd July 09 in IHC, Delhi

Summary of Workshop Proceedings

BACKGROUND TO THE WORKSHOP

The Himalayan cold deserts are among the most vulnerable ecosystems in the context of climate change and the communities residing in these need special attention in the light of the greatly enhanced levels of risk from multiple environmental threats.

The pattern of global warming is more pronounced at high altitude zones, especially those in the tropics and sub-tropics – upto 3 to 5 times faster than in other areas. Since the mid-1970s the average air temperature in the Himalayan region has risen by 1°C. This is twice as fast as the 0.6°C average warming for mid-latitude northern hemisphere over the same time period (IPCC 2001).

Himalayan Cold Deserts, a Unique Ecosystem... Formed due to the rainshadow effect of the towering Himalaya mountain range, the cold deserts of the Himalayas comprise the trans-Himalayas that lie across the main Himalaya and are part of the vast Tibetan plateau, and the inner dry valleys within the main Himalayan range. It is a unique region, composed of different river valleys amidst high mountain ranges, the elevation of inhabited areas ranging from 8,000 ft. to 16,000 ft. It has highly arid conditions with annual rainfall averaging 279 mm; the bulk of the precipitation is in the form of snow received during a long, freezing winter when temperatures reach -32°C. Water resources are minimal with glacier-fed streams being the sole source for human use. Although the soil is not very productive and vegetation is very sparse, the biodiversity of the region boasts of some rare, valuable species.

Escalating Pressures on Cold Deserts... Cold deserts are characterized by a fragile ecosystem, a complex interplay of climatic and geomorphological processes, and limited natural resources. The unpleasant face of development and increasing biotic pressure in recent years have brought the natural resources and the traditional systems of management of these areas under severe strain. Climate change has also brought in a new threat of increasingly frequent environmental disasters, among them being droughts, flash floods, and Glacial Lake Outburst Floods (GLOFs), which cause immense destruction to life and property.

Natural Hazards in Cold Deserts

The Himalayan cold deserts are experiencing a rapid rate of desertification that is fast depleting the little vegetation and rendering large tracts of land barren and vulnerable to enhanced erosion. Thinning ice caps and receding glaciers – impacts of global warming on the Himalayan ecosystem – have caused streams to diminish and springs to dry up, and a reduced flow in the rivers. Inhabitants of cold deserts, typically dependent on natural resources for consumption and livelihoods, are faced with severe natural resource stress and associated impoverishment, as a result. Nearly 67% of the glaciers in the Himalayan and Tianshan mountain ranges have already retreated in the past decade.

The area has always been prone to frequent natural hazards, both of a meteorological and geophysical origin, such as snowstorms, avalanches, landslides, and earthquakes. Climatic volatility is on the increase today and the inhabitants of cold deserts are faced with recurrent droughts and frequent snowstorms and blizzards. Landslides and avalanches, often triggered by these climatic hazards, cause tremendous damage to inhabitants and lead to breakdown of public infrastructure as well. Severe snowstorms in the winter of '97-'98 affected more than a quarter million mobile pastorals in the Tibetan Plateau region including the Western Indian Himalayas; it led to the death of more than 3 million heads of livestock and hundreds of families lost their cattle.

As atmospheric temperatures continue to rise, a rapid meltdown of the permafrost and glacial runoff is accelerating soil erosion and associated natural hazards in the region. The escalated pace of glacial melt has also created a new terror for the Himalayan people – GLOFs! The high altitude Himalayan region has more than 5,000 glacial lakes, many of which are at risk of rupturing their walls due to rapid snow melt, earthquakes or a breach of terminal moraines. The flood (GLOF) that would result could impact upto 10,000 people, their property, land, bridges and other infrastructure. The frequent episodes of rapid-onset disasters and the associated loss to life and property has increased insecurity among

the inhabitants of cold deserts. There have been several incidents of glacial lake outbursts with catastrophic floods for hundreds of kilometres downstream, some with even trans-boundary impacts. At least 12 GLOF events have been recorded since 1935 in the Tibetan area of the Himalayas alone.

“Sustainable development, poverty reduction, good governance and disaster risk reduction are mutually supportive objectives, and in order to meet the challenges ahead, accelerated efforts must be made to build the necessary capacities at the community and national levels to manage and reduce risk. Such an approach is to be recognized as an important element for the achievement of internationally agreed development goals, including those contained in the Millennium Declaration.” (Hyogo Framework for Action, 2005-2015)

The Himalayan cold deserts are among the most critically affected by severe impacts of climate change, and the lives and livelihoods of its communities are at risk from multiple and escalating levels of environmental threats. These areas have however received very little development attention, in spite of their increasing vulnerability. Most policies and funds tend to flow to the most visible hotspots, and the extreme remoteness of the region obstructs it from grabbing the much needed attention. There is a clear need for first of all, acknowledging the marginal worlds such as the Himalayan cold deserts as urgently requiring attention and ensuring a flow of resources and interventions at global and national levels, and a special place in the environmental/climate change/disaster management policy-space. It also requires the delivery of a package of solutions that recognizes the inalienable right of cold desert communities for a secure and equitable life while protecting the ecological integrity of a region that is highly vulnerable.

Workshop Objectives and Design

The workshop 'Environmental Threats in Cold Deserts – Challenges and the Way Ahead' was aimed at creating an understanding of issues relating to the increasing vulnerability of cold desert communities, and exploring means to address them, through direct action and policy advocacy. It served as a platform that brought together a cross-section of stakeholders of the cold deserts- rural communities, scientists and State officials, to deliberate on the natural hazards that impact life in cold deserts, the trends in these as a consequence of climate change, and the potential mitigation measures, and initiated dialogue between the various stakeholders on roles and expectations. It enabled animated and constructive discussions among 40 members of local communities from the cold deserts of the Himalayas (districts Leh, Lahaul & Spiti and Kinnaur), 40 eminent scientists and researchers from 35 institutions of repute, and 11 officials from the cold desert districts, the respective states (Himachal Pradesh and J&K) and national ministries and departments, distinguished social workers and representatives of leading non-governmental organisations for the purpose. It helped initiate a deeper cross-stakeholder understanding and movement towards crystallizing the set of resources and actions required to address environmental threats in the cold deserts of the Himalayas.

The workshop was designed into two modules: 1) slow onset events, comprising droughts and desertification, and 2) rapid onset events, including floods, landslides and avalanches. The processes in each module comprised presentations and panel discussions for knowledge and experience sharing, followed by multi-stakeholder working group discussions.

The key outputs of the workshop are summarized below.

CONTRIBUTIONS BY SCIENTISTS AND OFFICIALS

The workshop included addresses by Mr. Jairam Ramesh, Minister of State for Environment & Forests, Mr. Dhar Chakrabarti, ED, NIDM, Brig (Dr.) B.K. Khanna, Advisor, NDMA, Mr. Phunchok Stanzin, Executive Director, Ladakh Autonomous Hill Development Council (LAHDC), and panel discussions that included contributions from Brig. R.S. Ahluwalia, Retd Dty Assistant Chief of Integrated Defence Staff, Dr. L.M.S. Palni, Director, G.B. Pant Institute of Himalayan Environment & Development (GBPIHED), Maj. H.P.S. Ahluwalia, Dr. A.B. Shrestha, Climate Change Specialist, International Centre for Integrated Mountain Development (ICIMOD), Dr. Anil Joshi, Himalayan Environmental Studies and Conservation Organisation (HESCO), Mr. Vivek Saxena, Director, MoEF, Mr. S. Rafique, Implementation Support Specialist, International Fund for Agricultural Development (IFAD), Dr. R.B. Singh, Professor, Department of Geography, Delhi School of Economics.

Some key contributions by the distinguished speakers are compiled as under:

- **Climate change impacts**

Mr. Dhar Chakrabarti informed the group that the duration and quantity of snowfall is declining and glaciers are receding. Soil moisture is lower and stream flows reduced. Receding glaciers leave behind debris which become source of materials for landslides, block the passage of the melt water and form morainal lakes; the outburst of such lakes threaten downstream life and property. Water reserves of wetlands are declining. Erosion is severe, through wind and water. The entire cold desert area is seismically high risk (Zone IV), and avalanche-prone, frequent events damaging house and infrastructure and blocking rivers and streams, causing flash floods. Torrential rains and cloudburst are becoming more common in the cold deserts and flash floods and floods are becoming more recurrent.

Mr. Tashi Thokmat, Deputy Director, Ladakh Environment and Health Organization, (LEHO) concluded that the chief drivers of desertification in Ladakh were overgrazing, anthropogenic pressures and poor rangeland management. His temperature and precipitation analyses over several decades (1973-2008) revealed an increase in the minimum temperature at Leh with the rise of the order of nearly 1°C for all the winter months and the maximum temperature for summer months showing a rising trend of nearly 0.5°C in the last 35 years. Analysis of precipitation patterns showed that there is clear declining trend in precipitation amount (decrease in snowfall) from November to March. Dr. R.B. Singh enumerated the reasons for disturbances in the ecological balance of the high altitude regions as overgrazing, pollution, climate change and tourism. With the increase in number of tourists to Ladakh (300 in 1992 to 6000 in 2006), pressures of waste management, unmonitored scattered camps, unplanned infrastructural activities like road construction and hotels are taking a toll on the fragile Himalayan ecosystem.

- **Existing and potential measures for adaptation and mitigation**

Dr. Anil Joshi, Founder, HESCO, emphasized the importance of recognizing the Himalayas as a critically endangered ecological heritage. He spoke of the multitude of disasters plaguing the Himalayas from landslides and earthquakes to avalanches and floods and cited examples as he explained that only a healthy combination of traditional knowledge and appropriate resource utilization techniques can empower local communities to decrease their vulnerability to natural hazards.

Mr. Dhar Chakrabarti indicated that there is a need to redefine the ecological balance of the area in the light of escalating impacts of climate change. Cold desert communities need to: reduce dependence on outside by strengthening the traditional system of agriculture and livestock production while incorporating appropriate technologies; focus on high value agro-horticultural products and a sustained marketing initiative; harvest scarce water resources, using traditional and modern innovative technologies and implement micro watershed projects; harness solar energy for agriculture and in architecture; conduct research to understand the precise impacts of climate change in cold deserts and adapt to it, particularly in agriculture and housing.

Mr. G. Sahibi, D.F.O. Kinnaur, HP, suggested that areas be classified on the basis of the level of land degradation and comprehensive reclamation plans be made accordingly. The classes could be demarcated as follows: (a) Areas with perennial sources of water or where water can be brought through channels (*kulh*), which can be addressed through small engineering structures and terrace farming; (b) Areas deriving moisture from snow melt require moisture regime intervention (MRI) techniques like raising small check dams and protection walls, gully plugging and making small effective closures to protect the area from overgrazing. After three years, afforestation with middle storey species like *Fraxinus*, Poplar and *Salix* can be adopted. (c) Areas without any vegetation require more attention and rod planting of *Salix* and Poplar followed by application of MRI techniques. (d) Areas with serious soil erosion problems require crate wire structures to avoid further loss of soil.

Involvement of local communities, he felt, was very important, right from development of broad management plans to implementation of the interventions and thereafter, monitoring of the work executed. Communities could play a key role in halting destructive activities such as illicit cutting/uprooting of ground vegetation for fuel, illegal mining, overgrazing (areas should be opened for grazing only after the middle canopy goes beyond the reach of grazing animals), movement of domestic animals in seriously soil erosion prone areas. Awareness programmes are required to initiate an attitudinal change in implementing agencies and local stakeholders. Dissemination of new technologies

in the field of reclamation must be imparted through demonstration of successful models, site visits, workshops and village melas.

Brig. Ahluwalia, Consultant with UN-OCHA and Retired Deputy Assistant Chief of Integrated Defence Staff, applauded the existing early warning systems in India, citing the immediate response of the Indian Army in the Kashmir earthquake of 2005 in which prompt rescue and relief measures helped reduce the number of deaths. However, he made an appeal to the government as well as civil society and welfare agencies to work together and formulate a comprehensive relief and recovery plan wherein every organization has a defined role. He also stressed the importance of mock drills with local communities to ensure proper coordination when disasters occur.

OUTPUTS OF MULTI-STAKEHOLDER WORKING GROUPS

Multi-stakeholder working groups assessed the vulnerability of cold desert communities to various natural hazards, in terms of both the frequency of occurrence of the specific hazard, as well as the potential impact of a single hazard event; the particular sectors and community sub-groups most vulnerable to the events were also identified. Following this, measures to prevent/mitigate the hazard events were crystallized, both pre-event measures (prevention, preparedness, adaptation) and post-event (relief and recovery).

Conclusions for Droughts & Desertification:

The group rated the vulnerability of cold deserts to droughts against the trend of increasing desertification and unpredictability of weather patterns to be high, both in frequency of occurrence and in impact potential, for all core cold desert areas; Lahaul block alone, a transition zone to cold deserts, was analysed to have a lower vulnerability, with a medium frequency of occurrence of droughts and low impact potential. Women and old people, farmers and pastoralists were deemed to be the most vulnerable sections of the community and agriculture and animal husbandry the most impacted sectors in a drought event. Measures crystallized to combat droughts and desertification included:

1. For Prevention:

- a. *Prediction systems:* Create a network of high altitude weather stations for reliable data collection and prediction. Set up appropriate technology cum training centres and provide technical back stopping for drought-prone areas through universities, institutions and government departments.
- b. *Sustainable resource utilization:* Promote more efficient and productive use of land and water resources, while protecting these from degradation, through measures such as cultivation of fast growing crop varieties and use of organic manure. Promote sustainable practices and technologies that reduce pressure on the ecosystem, such as installation of renewable energy units to replace fuel wood consumption, stall feeding/regulated grazing of livestock, recycling of water, restricting use of plastic.
- c. *Biophysical measures:* Identify and conserve snow and water resources in cold deserts. Promote adoption of appropriate technologies for their harvesting and efficient use: diversion channels and artificial glaciers for snow harvesting; lift irrigation; lining *kubls*/irrigation channels with poly-sheet or grass to prevent seepage; drip irrigation/sprinklers. Implement infiltration pits and snow accumulation methods such as snow fences, in order to recharge ground water, improve soil moisture and rejuvenate natural springs and pasturelands. Undertake greening and land development through agro-forestry practices (agro-horticulture, silvi-pastoral system), and implementation of erosion control measures, viz, construction of continuous contour trenches (CCT), shelter belts.
- d. *Awareness generation:* Spread awareness on and ensuring community participation in conservation/management of the ecosystem. Compensate local communities for environment and biodiversity conservation.
- e. *Alternate livelihood options:* Facilitate uptake of alternate non-farm livelihoods or those that involve value-addition to farm products, towards reducing pressure on land and water. Measures would include requisite skill development, technology infusion, enterprise establishment and strengthening of market linkages, particularly in food/fruit processing and handicrafts. Provide micro-credit from rural development banks for self help groups for non-farm micro-enterprises. Build robust community based organizations like SHGs, cooperatives, farmers' groups to facilitate market linkages, policy formulation, socio-political and economic empowerment.

2. For Preparedness:

- a. *Research*: Conduct periodic surveys to identify drought prone areas and plan preparedness for drought events.
- b. *Infrastructure development*: Create information infrastructure and systems that enable real-time information transfer. This would include better ICT linking villages with district headquarters and the state capital. Devise and set up weather forecasting and Early Warning Systems. Create the relief and recovery infrastructure for drought events. Construct food godowns and fodder silos for ensuring food and fodder security. Establish cold storage facilities in the Himalayas for local storage of agri/horti/MFP products. Promote greenhouse farming that provide for controlled atmosphere for cultivation in extremely arid conditions as well and create seed banks in drought-prone areas that would enable post-drought recovery. Introduce crop/livestock/life insurance in cold deserts.
- c. *Strengthening institutions*: Reinforce disaster management response machinery at the district level. Create disaster response teams at the village and district level. Impart necessary training to these teams and to local NGOs and Panchayat members for handling drought relief. Enhance the coordination between government, civil society and scientific bodies for drought response. Integrate drought preparedness into the education system with the involvement of local teachers. Enhance community awareness and promote local action.

3. For Adaptation:

- a. *Research and capacity building*: Promote research and extension for drought resistant high value crops. Facilitate local adaptation research through Farmer Expert Groups with a focus on crops, cropping patterns and irrigation methods. Set up research & extension counters in cold desert districts focusing on local adaptation.
- b. *Sustainable agricultural systems*: Facilitate agricultural diversity in the cold deserts and the cultivation of drought resistant indigenous varieties of crops, with a special thrust on fodder and food grains, such as *oogla* and *phaphra*, *raajma*. Since cold deserts have a distinct advantage in production of quality seeds, provide technology, subsidy and soft-loans to local farmers for the same.
- c. *Awareness generation*: Facilitate citizen science and flow of information to the community in drought-prone areas on trends in climate and appropriate technologies. Promote adoption of appropriate irrigation technologies in increasingly arid conditions, viz, low-cost water harvesting structures, roof top rainwater harvesting. Lay more thrust on water harvesting in employment schemes like NREGS.

4. For Relief:

- a. *Provision of basic amenities*: Provide fodder supplies from the Animal Husbandry Department and food and fuel-wood supply through PDS at subsidized rates. Provide emergency health services and supply of potable water. Undertake surveys to identify problem zones to be given immediate attention that should include setting up of relief camps for cattle and human beings.
- b. *Response cell*: Activate an emergency call centre (24X7) as stipulated under the Disaster Management Act. Strengthen the response management of the local administration with inputs from the state and national levels.

5. For Recovery:

- a. *Livelihood restoration*: Facilitate livelihood restoration through timely distribution of seeds, saplings and livestock among farmers for the next season. Facilitate alternate employment opportunities through NREGS that provide people affected by drought with cash incomes during the period of livelihood breakdown. Establish a system of drought credit for recovery at subsidized interest rates.
- b. *Insurance*: Provide insurance for people and assets that compensate people for losses incurred during drought events, such as for animal deaths due to starvation.

Conclusions for Floods, Landslides and Avalanches:

The vulnerability assessment indicated that mass movement events such as landslides and avalanches were by and large perceived to be very frequent in occurrence with moderate to high level of impact. Floods and other hydrological and meteorological events on the other hand, were felt to be of moderate frequency in occurrence (except GLOFs that were deemed to be of low frequency) but with very high impacts. The poor and marginalized, disabled and old and farmers were deemed to be the most vulnerable sections of the community and transportation and communication facilities and property the most impacted sectors in such events. Measures crystallized to combat such events included:

1. For Prevention:

- a. *Awareness generation:* Disseminate existing studies on trends in landslides and avalanches in these areas to the communities. Raise awareness about government policies and the causes and impacts of the environmental threats, for instance through media festivals in the region.
- b. *Zoning and appropriate use:* Periodically survey and identify vulnerable zones and determine appropriate structural and vegetative measures. Encourage the communities to develop their pastures and grazing grounds, floodplains and slopes.
- c. *Structural interventions:* Structural measures help in checking and controlling mass movement as well as water flows. Construct staggered dams to check the flow of masses of snow; check dams along with measures like contour bunding, to check the flow downstream. Promote vegetative measures for slope stabilization.
- d. *Soil conservation measures:* Enhance the quality of soil and retard erosion of soil through growing crops like legumes, etc., plantation of *Alpha alpha*, seabuckthorn, willow, poplar and other such species, that would also generate incomes and involve the community in afforestation. Promote the cultivation of perennial crops instead of annuals to reduce soil erosion.
- e. *Reduce biotic pressure:* Develop alternate and renewable sources of energy such as solar energy (which has a huge potential in this region) to ease pressure off the scarce and depleting resources of the region.
- f. *Appropriate research:* Ensure people-focused research and make findings more accessible to the people in this area. Although construction of check dams is a good way to check the water levels, they are very cost intensive; hence, research should be focused on developing cost effective methods for the same.

2. For Preparedness:

- a. *Early warning systems:* Develop an effective network for timely dissemination of information regarding the forecast on such events to the local communities. Collaborations with private channels and use of satellite communication can be a good way to do so. Various e-centers can also be set up to ensure timely dissemination of warnings. Make available existing research on weather elements to the cold desert communities in the local language.
- b. *Emergency Preparedness Plans:* Prepare Emergency Preparedness Plans for each district. Ensure a focus on especially vulnerable groups (children, women, elderly and the disabled) in all disaster management policies, guidelines and plans.
- c. *Create disaster infrastructure:* Identify sites for shelter creation based on land suitability analysis from the perspective of the various natural hazard events, and establish such shelters with appropriate capacity. Set up dispensaries and civic medical care centres. Establish measures for building up of buffer stock of essentials like food, fuel, fodder and medicine in areas prone to hazards.
- d. *Traditional knowledge:* Local Buddhist monks and other such resource people are believed to possess knowledge of indicators to such events. Such traditional wisdom may be studied towards bringing about a fusion of local knowledge and scientific technology. Revive the traditional systems for self-sufficiency and reliance in food, medicine and education and for basic survival.
- e. *Capacity building:* Appropriate capacity building will serve to reduce vulnerability levels. Strengthen the Panchayats and village level institutions and train all key institutions and stakeholders, including local teachers in preparedness for such events.
- f. *Financial security:* Set up community-based disaster management funds and micro credit schemes through SHGs. Insurance of life and property is essential so as to minimize monetary loss.

3. For Adaptation:

- a. *Improved practices:* Adapt improved irrigation facilities like drip, sprinklers etc., to cold deserts and promote their implementation on a large scale. This would make people shift away from the bank of rivers and other water-channels that are most prone to flooding.
- b. *Alternate livelihood options:* Develop alternate livelihood options like weaving and handicrafts since people are not ready to relocate to other areas in search of work.

4. For Relief:

- a. *Evacuation:* Proper coordination among various agencies, such as the PWD, IPH and District Administration must be ensured. Evacuation measures such as airlifting should be in place through concerted efforts of the Army, Air Force, BRO and ITBP.
- b. *Medical facilities:* Proper medical facilities are required for special groups such as the old and disabled. Temporary shelters with adequate amenities should be set up. Post-disaster medical facility is generally for

human beings and tends to ignore the fact that the livestock can also get fatally injured in such events. Considering their importance in the livelihoods of the people, proper veterinary care should also be made available to them.

- c. *Compensation*: Efforts need to be made to reduce the time lag between the onset of a disaster and the relief measures. All type of relief goods – in cash or kind – must be made available immediately. Since the compensation given to the people is very less (e.g. for a damage worth Rs. 50,000 only up to Rs. 15,000 is given as compensation), develop insurance schemes in a PPP mode, comprising inputs from the government and the private sector.

5. For Recovery:

- a. *Counselling*: Counseling to children and weaker sections of society to overcome the trauma of loss of lives and property in the event of a disaster.
- b. *Alternate livelihoods*: Focus on development of alternate livelihood options for affected communities. Design and implement programmes that provide adequate training and handholding to start new non-agricultural enterprises. Local handicrafts and handlooms can be developed and linked to proper market channels. Increase in wages under employment schemes, ensured timely payment during disasters, with the aim of providing alternate livelihoods/income sources to the people is necessary.
- c. *Revival of traditional systems*: Revive the traditional methods of construction of houses. Current construction methods being adopted in cold deserts have been found to be largely unsuitable for the local terrain and therefore carry a huge risk of causing damage to life and property at the time of floods. The research community must work together with the locals to infuse the local knowledge with scientific technology; the government needs to devise appropriate construction norms.
- d. *Monetary help*: Schemes facilitating loans for Self Help Groups, for starting micro-enterprises and rebuilding houses should be introduced. Raw materials to start enterprises must be provided at subsidies. Compensation by the government is inadequate and can be enhanced through the hybrid of government compensation and insurance. Also, compensation to recover in cash or kind, must be provided to affected communities immediately. Seeds can be distributed for the next agricultural season to affected farmers.

The workshop had a significant impact in raising awareness of issues of the Himalayan region and its people in mainstream India and the people who can make a difference, viz policymakers, researchers and civil society. It also helped the rural communities and NGOs working in the area gather strength through sharing and by reaching their voices to the above group. It helped the participants analyse in depth and understand the slow onset and rapid onset events in the cold deserts, the vulnerability hotspots and the flashpoints, and an effective brainstorming helped crystallize several ideas for mitigating the occurrence and impacts as well as adapting to changing climate regimes. A significant gain of the workshop was the process of dialogue itself, a feeling of inclusion for the Himalayan communities, and an education and opportunity for empathizing with long-neglected groups for the researchers and officials.