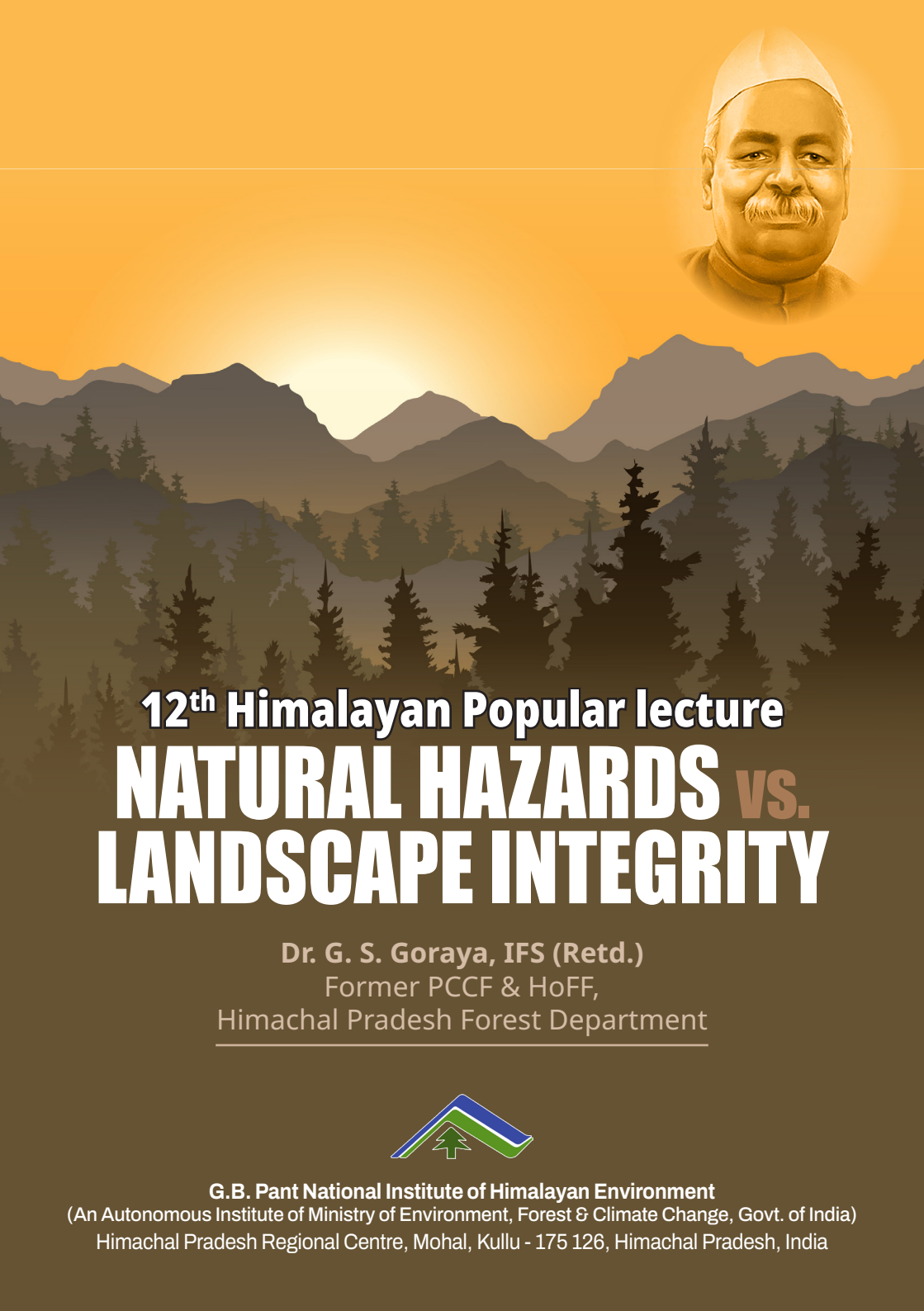




12th Himalayan Popular lecture **NATURAL HAZARDS vs. LANDSCAPE INTEGRITY**

Dr. G. S. Goraya, IFS (Retd.)
Former PCCF & HoFF,
Himachal Pradesh Forest Department



G.B. Pant National Institute of Himalayan Environment
(An Autonomous Institute of Ministry of Environment, Forest & Climate Change, Govt. of India)
Himachal Pradesh Regional Centre, Mohal, Kullu - 175 126, Himachal Pradesh, India



HIMACHAL PRADESH REGIONAL CENTRE

The Himachal Pradesh Regional Centre of the Institute was established on July 01, 1992. It is located in Mohal, Kullu district of Himachal Pradesh. This centre is situated in the North-Western Himalayas at 31.25° North latitude and 76.09° to 77.09° East longitude at an altitude of 1200 meters above sea level. The focus area of this regional centre is the entire state of Himachal Pradesh. The centre works on land and water resource management, biodiversity, rural technology, ecological economics, and environmental impact analysis. Scientists at the Himachal Regional Centre, along with researchers, are conducting studies on the management and conservation of the region's environmental biodiversity. Additionally, the institute is working on the following programs and projects:

- Developing strategies for the assessment and conservation management of ecosystem biodiversity in the Trans and North-Western Himalayas under biological, anthropogenic, and climate scenarios.
- Assessment, monitoring, and management of agricultural crops and systems for sustainability in the North-Western Himalayas; cultivation of medicinal plants, land restoration, and the socio-economic upliftment of farmers in the Kullu Valley.
- Development of strategies for monitoring and managing water resources under the impact of climate change.
- Evaluation and characterization of ecosystem services for the sustainable development of indigenous communities under changing climate scenarios.
- Development and strengthening of institutional mechanisms for sharing information among stakeholders and capacity building for environmental management.

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Gurinderjit Singh Goraya (IFS:1983)

Ph.D., retired as Principal Chief Conservator of Forests and Head of Forest Force, Himachal Pradesh

He has special interest in documentation, threat assessment and conservation of biodiversity with major focus on floral diversity, non-timber forest produce including medicinal plants, and management of forestry research and training. He was a key member of the team at FRLHT, Bangalore that steered a pioneering national medicinal plant conservation program and conducted floristic surveys in deccan peninsula and western ghats. He has served as a member of the Planning Commission of India's sub-group focused on medicinal plants, contributing to the development of proposals for the 11th and 12th Five Year Plans. Additionally, he has held the position of Chairman for the Project Screening Committee of the National Medicinal Plant Board, Government of India, and has been part of the National Biodiversity Authority's Expert Panels on "Medicinal Plants" and "Access and Benefit Sharing." Dr. Goraya has twice led teams to carry out national surveys on the demand and supply of medicinal plants in India for the

National Medicinal Plants Board, co-authoring analytical publications on the findings in 2007 and 2017. He has authored numerous research papers and reports, as well as educational materials on medicinal plants and resource management. Among his achievements is the creation of 'Van Sampada,' a comprehensive Interpretation Centre on Non-Timber Forest Produce in Himachal Pradesh, located at the Forest Research Complex in Sundernagar. He has consistently supported the Western Himalayan Temperate Arboretum since its inception and has joined the Arboretum team on various tree germplasm collection expeditions. Dr. Goraya has the distinction of having two new plant species named in his honor (*Aristolochia gurinderii* and *Litsea gorayana*). Dr. Goraya is passionate about trekking, particularly in the Himalayas, where he studies different floristic compositions, their ecological characteristics, and devises strategies for the conservation and sustainable management of unique habitats and endangered plant species.



Natural Hazards vs. Landscape Integrity

Dr. G. S. Goraya, IFS (Retd.)

Former PCCF & HoFF,

Himachal Pradesh Forest Department

1. Context

Himachal Pradesh and the neighbouring western Himalayan States are once again in the grip of devastation unleashed by unrelenting monsoons. Nearly 1,000 human lives and a large number of livestock have already perished over the past two months. Extensive damage has been caused to buildings and other infrastructure, especially to the road network and the piped water supply schemes, putting the public to great inconvenience. Such monsoon-linked destruction has become an almost annual feature, prompting debates and initiating blame-games. The issue needs critical introspection. The popular lecture series initiated by the G. B. Pant National Institute of Himalayan Environment (GBPNIHE) and its regional centres and held annually to commemorate the birth anniversary of Pt. Govind Bhallab Pant - 12th version of which is being organized by the Institute's Regional Centre, Mohal (Kullu) - provides me an opportunity to share my views on the subject with you all, a galaxy of attendees representing various government and non-government organisations, researchers, and concerned citizens.

Over the course of this popular lecture, I shall be, drawing major examples from the State of Himachal Pradesh, talking about some catastrophic natural events of the past on which we have little control. I shall then move on to the 'natural' hazards of rather current occurrence, including the monsoon-linked catastrophic events being experienced in the north-western Himalayan states over the past couple of decades. We shall, in appreciation of the innumerable ecological and socio-economic services provided by non-violate landscape, also attempt to list causes of such catastrophic events, evaluate their 'naturalness', and assess role of 'what-to-me' syndrome. We shall close the session with 'what I can do' to protect our landscape.

2. Some Catastrophic Natural Events of the Past

The north-western Himalayan States have a history of experiencing sporadic catastrophic natural events. Some of these events still fresh in collective memory include the following:

2.1 Earthquake of Kangra (April, 1905): The Kangra valley and adjoining areas in Jammu & Kashmir, and Punjab experienced an earthquake of 7.8 magnitude,

which caused large scale destruction of life and property. An estimated more than 20,000 human lives and more than 50,000 livestock were lost in Kangra valley alone due to this earthquake. The earthquake also resulted in leveling of more than one lakh houses/ buildings, and extensive damage to the other infrastructure, including aqueducts. This catastrophic event of 4th April 2005 continues to serve as a reminder of the region's high vulnerability to seismic activity, and the need for earthquake preparedness in all developmental activities.

2.2 Damming of Rivers by Landslides: We often hear about landslides occurring along the water courses causing small partial dams, and blocking part of the water flow. Such small landslides, a rather natural phenomenon caused by heavy rains, or seismic activity, clear on their own without causing any big damage. Sometimes, however, the landslides along the river courses are massive, and dam the affected river completely for days together causing a huge pile up of water behind these dams. Landslide induced damming of Parchu River, originating in Tibet and flowing through Spiti, in 1975 and again in 2004, which caused extensive destruction downstream on its breaching is still live in memory. It is estimated that the 2004 damming caused a water mass 3.5 kms long, 800 m wide and 15 m high to build up behind this dam, sending daily shivers down stream in Rampur area of Himachal Pradesh about potential damage its breach would cause. This artificial dam ultimately breached in 2005 causing extensive floods and destruction downstream.

The damming of river Sutlej, caused by a massive landslide near Sunni in the erstwhile state of Bhajji, is another such natural event that happened in 1782. As per records, this artificial dam blocked the river water for 40 days, flooding low-lying fields and settlements upstream upto Rampur. Not able to withstand the pressure of water behind it, the debris eventually gave way causing extensive damage downstream upto and beyond Bilaspur. The immediate trigger of this massive landslide was attributed to 'natural' causes, as the area was not known to suffer from any human induced stress.

2.3 Avalanche in Lahaul Valley: Avalanches form yet another category of natural disasters; and Lahaul valley has faced some of the very devastating avalanches. One of the most notable ones is March 1979 avalanche that completely razed three villages in Udaipur area, causing extensive damage to some infrastructure around the famous Trilokinath Temple too. More than 200 people were reported to have lost their lives in this snow damage. The 2009 avalanche of Miyar glacier in Miyar valley, even though it did not cause any damage to life and property, is a reminder that such events may recur at frequencies shorter than those in the past.

The historical catastrophic natural events I have cited above as examples, happened far apart in time and space, and were caused mainly by heavy rain, seismic, or geological factors on which man has little control. However, all these events did point to the need for keeping the landscape in good health and adopted practices and techniques that could absorb the shocks of such events. How did we respond to this learning? Let's have a look at the some devastating natural events that have occurred in the recent past.

3. Current Status of Catastrophic Natural Events

Nature has been over the years ringing the bell to draw attention towards our landscape-related actions. How have we responded to this call? Let's try to find answer to this question by looking at how the landscape has responded across the north-west Himalayan region to the ongoing monsoons of 2025. Closer here, we have seen the current monsoons causing havoc in Mandi and Kullu districts in Himachal Pradesh, triggering landslides, flooding the rivers with debris including wood, damaging and burying countless buildings, destroying public infrastructure and loss of livestock and human lives. Even as this devastation has been ascribed to climate change and cloudburst, the tampering of landscape of the area is equally to blame. Both these districts have seen unprecedented 'development' over the past few years, which involved clearing of vegetation from and cutting of the slopes, followed by construction of buildings or other infrastructure, expanding the road connectivity by cutting through forested areas, making the slopes unstable.

Then there was a devastating flash flood incident in Chisoti nala (a tributary of Bhut Nala) adjoining Chositi village in Jammu & Kashmir in August this year. Falling on the Machail Mata pilgrimage route, the pilgrims were taken unaware and more than 50 pilgrims lost their lives in this cataclysmic tragedy. Again, a cloud burst, probably with bursting of a glacial lake in higher reaches, has been cited as the reason for this tragedy. We tend to stop short of looking into and blaming our own activities that go into disturbing the stability of the landscape. This area is witnessing infrastructure development to cater to the annually increasing influx of pilgrims, and a road to Machail Mata Temple is also under construction.

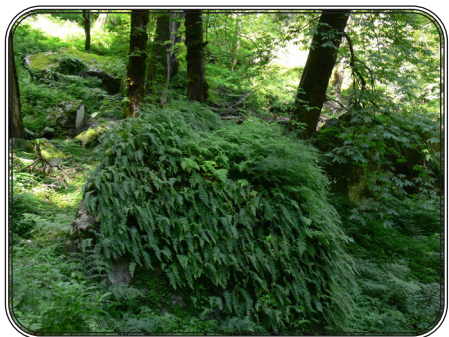
A devastating cloudburst triggered flooding in August 2025 in Uttarakhand has caused complete destruction of Dharali village. It is believed that the ongoing construction projects in the region acted as contributing factors and exacerbated the disaster by creating choke points that intensified the flow of water and debris.

The monsoon related events during the current year have already consumed nearly 1,000 human lives across the region. Correlating these catastrophic events with the similarly cataclysmic ones which have occurred over the past few years, like the Kedarnath flood of 2013, Sutlej floods of 2000 and 2003, extensive floods of 1978, 1988, and 1998 in Yamuna catchment of Himachal Pradesh it comes out that frequency of their occurrence has drastically increased over the years to having become an almost annual feature. Moreover, the severity of destruction caused by every such event has also multiplied. Should all these natural disastrous events be ascribed to climate change, or should we take part of the blame due to our own actions of interfering with the landscape health? Let's look at what landscape integrity means.

4. Landscape Integrity

North-western Himalayan landscape forms the crucial source of all-important ecological and ecosystem services like binding the soil, regulation of water flow, arresting soil erosion, and providing consumptive and religio-cultural service for local households. The benefits of the ecological services go far beyond the hills, and any non-sustainable interventions in this landscape have far reaching implications for the people dependent upon this Nature's largesse. All these ecological and social benefits can continue to flow only if we maintain the landscape integrity.

Before I move further with my talk, it is important for all of us to come to a common understanding about landscape integrity and how it is assessed. Landscape integrity, friends, can be seen as the ability of a landscape to maintain its structure, function, and composition over time, resisting degradation and preserving ecological health. You all must have walked through and appreciated pristine temperate forests formed by majestic conifer trees. You must have also had a chance to enjoy vast stretches of floristically rich alpine meadows, separated



Specific niches indicating ecological health of the landscape

from the sub-alpine forests by a contoured tree line. You would agree that the tree-lined hill streams present a breathtaking view. And you must have had a chance to closely observe the still un-spoilt niches of moisture loving plants, the niches that harbor multitude of micro flora and fauna, and that help in regulating moisture regime.

You must have also noticed that the water streams which are lined by good vegetation have survived the flood damage. The richness of this landscape is reflected in its encompassing 25 different forest types, harbouring nearly 3,500 taxa of higher plants alone, and every square meter of alpine meadows having an average of 16 species of herbs! These all are the signs of inviolate landscape, which, if kept intact, will continue to provide goods and services to humanity much beyond our lifetimes.



Documenting Floristic Diversity in Alpine Meadows

Now, close your eyes for a while, and visualize any landscape you are familiar with, and note the changes it has undergone over the past two decades. The results are likely to be shocking! During my visits to various parts of the State over years, I have noticed buildings coming up where there were none and **where these** should not be; road network expanding though lush green forests causing extensive damage to the landscape; removal of trees for agriculture creating eyesores of tree less patches; and spread of exotic weeds along roads, in fallow lands, and in forests. I have also noticed the hydro-electric projects coming up across the State, puncturing the landscape with tunnels, the excavated earthen mass deposited along the banks of hitherto undisturbed hill streams. Now these anecdotal observations spanning a period of time, form one of the ways to assess the change in landscape, and are very important, at least for framing local level ameliorative inputs.

The scientists have, however, come up with a globally consistent mechanism,

called the Forest Landscape Integrity Index (FLII), to estimate the land integrity, to assess the stress the landscapes are experiencing due to anthropogenic modifications, and to devise appropriate landscape conservation, management, and monitoring strategies. Infrastructure development, extension of agriculture, loss of tree cover, and species composition form some of the key anthropogenic indicators going into this assessment. Scored on a scale of 0 (lowest integrity) to 10 (highest integrity), India, as per 2024 assessment on this matrix, ranks 39th globally with a rather low score of 7.09, with the caveat that India's high forests were gradually becoming 'low on naturalness', and drifting towards modification by human activity, including because of the plantations of limited species. The situation in north-west Himalayan states is not much different. Almost all forests in this zone are suffering from intense anthropogenic activity and are under degradation stress, making the landscape highly vulnerable to the forces of Nature.

5. Changing Landscape Integrity: Causes and Impacts

We have already talked about the vulnerability of the north-western Himalayan landscape to natural disasters. We have also noted that considerate handling of the landscape has the capability of absorbing much of the disastrous impacts of natural events. However, the way we have treated our landscape over the past few decades in the name of development is already showing us the deleterious impact of such development. Whereas the frequency of catastrophic events has become an almost annual affair, the extent of damage these events cause has gone up multifold. Nearly 1,000 human lives have already been lost during 2025 floods and landslides. The loss to the infrastructure, including housing and farming, has been estimated to run in thousands of crore rupees! Let's try to analyse the major factors causing the landscape stress.

5.1 Cutting of Earth along Slopes and its Disposal: The north-western Himalayas in general and Himachal Pradesh in particular, had, till a few years back, most of its habitations located far from the road communication network, depriving the people from the health, educational, employment, and marketing benefits. There was a genuine need to expand road network to make the benefits of development reach the people inhabiting even the very remote localities. Now Himachal Pradesh has about 2/3rd of its geographical land area designated as forest, declared so since long to maintain the landscape integrity through minimal interference. However, laying any road or access path, to any remote locality in the State needs to pass through this designated forest land, many a times involving clearing the land of trees. As if cutting trees and clearing forest patches is not degrading enough, the faulty road designs, hasty slope cutting methods, and unscrupulous dumping - more commonly rolling along the slopes - of excavated

earth with boulders multiply the degrading impact. I have estimated that debris generated from a 100 meter cutting for road construction and rolled down the slope damages the vegetation, many a times well established plantations, over more than 10 hectares along that slope.



Muck dumping and damage to vegetation and plantation along the slope

And it is not the road-linked debris alone; a whole lot of construction activity is going on across the State and every new construction results in generation of debris that is unthinkingly dumped along the slopes. This excavated earth mass dumped along the slopes, after having damaged and smothered the vegetation, eventually flows down to the stream below forming new gullies, adding to the destructive potential of flood waters.

We would also need to critically observe and understand the damage to the landscape caused by earth-cutting for roads, housing or other infrastructure. Every such cutting causes the slope to lose its holding capacity, disturbing its angle of repose. The trees, with one side of their roots getting pruned during earth cutting process, become potentially vulnerable to fall/ getting uprooted with large soil mass, making the entire slope susceptible to slide. The impact of such ruthless earth-cutting spree, without appropriate provisions for stabilizing the cut slopes, is already visible in the form of landslides happening even along the stable slopes. The crumbling of nearly vertical cut slopes under their own weight along the under-construction highways is a very visible example of faulty earth cutting. The intensity and spread of landslides along these cut slopes gets exacerbated during rainy season, adversely impacting the road connectivity.

5.2 Impact of Infrastructure Development on Water Flow: Two different scenarios occur on this account. Firstly, the soil erosion initiated by cutting of earth for developmental activities, and the dumping of debris in and along rivers

and rivulets makes the water streams muddy, with all its consequential impacts on aquatic and stream-side biodiversity. The confluence of Tirthan river and Sainj river near Larji in Kullu district presents a live example of this scenario. The water of Tirthan river, the catchment of which has till now escaped any major infrastructure development, is always pristine, clean. On the other hand, the water of Sainj river, which has been subjected to construction of a series of hydro-electric projects and associated infrastructure upstream, has become silt-laden.



Confluence of clean Tirthan & muddy Sainj rivers

To make the conditions worse for the river flow, building construction has now been taken to the very brink of the water courses, leaving no space for spread of rain water. Moreover, indiscriminate mining in river beds for sand and stone for these very construction and developmental activities adds to disturbance of the water flow in the rivers. Stabilization of the catchment of this river, even if all further developmental activities are stalled there, will take decades. The sand deposits along almost all river courses in the State, which used to be silver-grey till when the rivers were carrying clean water, have taken a yellowish-brown tint due to mixing of silt in the sand.

The second and a very crucial impact of water storage and water harvesting projects is alteration in the natural water flow regime in the affected streams. Many of such projects result in drastic reduction in water flow downstream, especially during lean periods, adversely impacting the river ecology, including aquatic and stream-side biodiversity. The Hon'ble National Green Tribunal in 2015 had taken cognizance of this issue and mandated all States to maintain a minimum 'environmental flow' of 15-20% of the average lean season flow in their rivers. The State of Himachal Pradesh has accordingly adopted a regime of ensuring

a minimum 15% of the observed flow as environmental flow in respect of all hydro-electric projects. Most of the studies, and recommendations thereof about maintaining the minimum environmental flow in the impacted stretch of streams, however, are heavily biased in favour of aquatic fauna working out the quantum based on minimum water requirements of the keystone aquatic fish species during lean periods. These calculations largely ignore the water requirement during lean periods of river bank side floristic components.

It needs to be appreciated that during lean periods, usually over the pre-monsoon and post-monsoon months, the water flow in rivers and rivulets already recedes away from the river banks, putting the moisture loving vegetation along the stream-banks under stress. Maintaining integrity of this vegetation is critical for holding on to the stream-banks and embankments of the rivers and rivulets, and to minimize the incidence of floods. Putting the stream-bank vegetation to long periods of moisture stress impacts their ability to hold firmly the boulders and the soil. This parched and stressed out vegetation, when subjected to sudden water torrents due to release of water during monsoons or during snow melt, tends to give way, making the soils and boulders to break free, hit and dislodge larger boulders, and start a cascading flood effect. You all must have observed the debris load carried and devastation caused by the Beas river during current monsoon season, especially downstream the Larji dam. The recommended and adopted regime of environmental flow in lean periods, therefore, falls short of serving the intended environmental and ecological objectives. The water flow during lean periods can be augmented by practicing what is called 'green water' regime, i.e. keeping the watersheds green and intact with diversity of native species to enhance water percolation, better recharging of aquifers, and gradual discharge during lean periods.

5.3 Urbanisation and Multifold Increase in Roof and Concreted Area:

Monsoons and winter rains are the mainstay of all socio-economic and ecological features of the north-western Himalayas. Till some years ago, the rainwater would first spread along the soil, the vegetation there arresting its flow. It was only the runoff that would then gently move along contours and slopes to the nearest seasonal streamlet, before joining the larger streams. However, with expansion of habitations, there has been a multifold increase in concreted surfaces. With no mandatory roof water harvesting provisions in place, and with reduced availability of vegetated soil spaces for spread and flow check of rainwater, the entire rainwater turns into runoff. This runoff then gets accumulated, forms into torrents and, with almost no soil and vegetation to arrest its flow, gushes along the concreted lanes, and tends to take the first available exit along the slope, creating new gullies and triggering landslides along the hitherto stable slopes. This phenomenon is now

increasingly manifesting itself in and around townships, and causing extensive damage to common infrastructure, and private properties in these areas.

5.4 Agricultural and Animal Husbandry Practices: Traditionally, the agriculture in hilly terrains used to be a mix of miscellaneous trees on bunds and food cropping on the terraces. The animal husbandry also used to benefit from this arrangement in the form of leaf fodder from these trees. This age old practice has since largely given way to intensification of agriculture and horticulture, where the high-yielding varieties require elimination of shade along the field bunds, and tilling the land to the terrace brink. With trees removed, the first casualty is the availability of leaf litter that was getting naturally added to the fields. Secondly, bereft of the protection to the buds provided by the tree roots, the field bunds have become vulnerable to erosion and slides. It is no wonder that the number of fields getting damaged due to landslides is increasing by the year.

The state governments in this hilly region are enthusiastically promoting animal husbandry, be it sheep and goat, or domestic milch cattle. Even as the number of livestock in Himachal Pradesh has registered a little decline from the high of 50 lakh plus animal heads during 1990s, the current number of livestock in the state is almost double the number of livestock at the time of independence. The issue of concern is that the livestock promotion activities are not accompanied by any corresponding and concerted efforts at fodder cultivation, with the major fodder pressure getting shifted to the forests, whether it is in the form of open grazing or lopping of tree leaves for stall feeding of high milk yielding hybrid cattle varieties.



Common lopping practices to get leaves for stall feeding

With the fodder trees getting scarcer due to scanty regeneration, **pressure on the** nearest available fodder trees is increasing by the day. The result is excessive lopping of trees for leaf fodder, and no rest to any of the alpine meadows for its rejuvenation, causing further degradation of the landscape.

5.5 Unscrupulous Herb Mining: Collection and sale of herbs/ raw drugs from the Himalayan region has been an old vocation of the local communities. However, such collection used to be carried out after seeking local deity's blessings, and as per the traditional local practices under the watchful eyes of community elders. For example, underground parts of alpine herbs used to be opened for collection only after '20 bhadon', i.e. about mid-September when the monsoons started receding, to allow the seeds to ripen, and to minimize the soil erosion due to rains. This time-tested practice of herb collection has now given way to ruthless mining of these herbs starting immediately after snow melt, causing severe modification of the alpine landscape along with extensive soil erosion from these once pristine meadows.

5.6 Unprecedented Spread of Invasive Alien Species: Spread of invasive alien species is one of the indicators of landscape degradation. North-western Himalaya is reeling under the unprecedented influx of many noxious invasive alien species, viz. *Lantana camara*, *Parthenium hysterophorus*, *Ageratina adenophora*, and *Ageratum conyzoides*. These weed species overgrow the native species, smothering these completely, and not allowing their re-emergence due to their allelopathic effect on native vegetation. The weed infested soils lose much of their ability to arrest water flow, and the bare soil under the weed bushes become prone to erosion during rains. The speed of spread of the weeds has become a cause of serious concern, as these weeds are fast interfering with the landscape integrity,



Badly dug up alpine meadow for herb collection

making these landscapes susceptible to further degradation and landslides.

5.7 Increasing Incidences of Bush Fires: The increasing spread of weeds pushing out the native evergreen shrub species, diminishing moist niches in sub-tropical forests and grasslands, inadequate fire protection inputs, and increasing casual behaviour of local communities are some of the factors that result in almost annual bush/ forest fires taking place in the north-western Himalayan states. In addition to the adverse impact on native biodiversity, these fires parch the soil making it vulnerable to erosion during rains. That the incidence of fires is increasing by the year is both an indicator and cause of landscape degradation.

5.8 Unregulated Tourism/ Pilgrimage: The north-western Himalayan States have been a much sought after getaway for the people living in the plains below. In addition to forming a good source of cash income for the entrepreneurs engaged in tourism related activities, the state governments see tourism as one of the revenue earning opportunity. Tourism in these states is happening under three broad categories, (a) general tourism, (b) eco/ nature tourism, and (c) pilgrimage. As the things stand today, the number of tourists in all these three categories has inflated beyond the capacity of the designated tourist destinations. The response to this high number of tourists is developing more infrastructure including hotels and homestays, widening roads, and planning tourism related sports. All these activities, howsoever necessary for generating more cash income and revenues, are being developed by further modifying and degrading the landscape. This haphazard and unplanned tourism, especially to the places of religious importance, is witnessing fast depletion of many of the plant species like brahmkamal (*Saussurea obvallata*), and ghugi (*Saussurea simpsoniana* and *S. gossypiphora*) considered scared. The krumholtz vegetation is also taking a beating in the form of its cutting for firewood from this tourism pressure.

5.9 Solid Waste Issues: Garbage littering is another issue that is plaguing our landscape. We seem to be totally indifferent to littering our surroundings, especially our public spaces, with garbage, watching 'others' doing it, and perhaps also actively contributing to this menace by disposing trash anywhere and everywhere. We seem to ignore the health related and ecological implications of littering. This littered solid trash smothers the vegetation, clogs drainage systems and chokes waterways, and makes the slopes susceptible to erosion and slides.

The point to note is that Himachal Pradesh has already been designated as a 'multi hazard prone state' in the seismic hazard zone map of India, and with global warming only adding to this threat, it needs special attention towards maintaining its landscape integrity to cope up with natural catastrophic events. But are we on the right path?

6. 'What-to-Me' Attitude

It seems that we as a society thrive on short-term memory, and quickly resume the very activities that had resulted in devastation just a short while ago, without giving a due thought to the reasons for that devastation. Refusing to learn from the past happenings, we continue with our 'developmental' activities with disdain and a rather callous attitude towards nature in general and landscape in particular. We continue to clear natural tree lots to extend our agriculture and horticulture. We continue to dig for herbs even in the non-prescribed periods and from non-prescribed areas. We continue to cut through the slopes, making these unstable. We continue to encroach upon the natural flood plains, making the water to gush through the narrowing channels causing floods. We continue to extend our construction to the brink of rivers and streams interrupting the natural water flow. We continue with our attempts at taming of rivers through reinforced engineering interventions for harvesting water for power generation, irrigation, and drinking purposes. In all these activities there is a general apathy and lack of sensitivity towards maintaining landscape integrity. Have we entered into a 'compassion fade' mode, as we seem to have become immune to the fast recurring anthropogenically driven devastating natural events around us? We forget that our actions have consequences beyond our intentions. We tend to assume that the natural calamities impact only 'others', and it was duty of the 'others' to care for the environment. A perfect case of 'what-to-me' attitude! In the process, it is the landscape that takes the beating, making it more vulnerable to nature's vagaries.

7. The Way Ahead

Himalaya is a young mountain range, with a very fragile landscape that requires respectful handling. Healthy landscape forms the foundation on which all life depends and thrives. We have seen that this fragile landscape is under tremendous stress, and that our actions at its alteration and manipulation are turning even small natural events into catastrophic ones. So what we should do to sustainably maintain stability of the landscape? For one, we need to learn from our past mistakes and experiences. Let's take example of Beas river. It has been and continues to be a very volatile river, changing its course every few years, wrecking havoc along its course. The experience suggests that not only its banks must be kept free of any construction activity, but some land beyond its banks should also be kept fallow to allow spread of water during floods. However, we keep on constructing new buildings on the debris of the ones flattened just sometime back by the floods by this river. The examples of Dharali and Joshimath in Uttarakhand present a similar story. Whereas in case of Dharali, the current flood and landslide damage is reported to have caused destruction of the village for

the third time over the past few years, Joshimath, with its slopes slowly sinking, is witnessing continuing construction activity against the advice by experts, putting life and property in grave danger. And such examples are there for all to see in other areas too. The threat of damage is multiplied by shift from our seismically-stable traditional house designs to modern cement-concrete buildings, with little tests on their stability against the forces of nature. Unconcerned about the repercussions our actions will have on the environment and landscape and eventually on us, and with no concerted regulatory regime in place, we continue with altering and manipulating our landscape. The situation calls for a shift from the current 'anthropocentric' developmental model to 'ecocentric' development model, which takes into account the affect our environmental actions have on all living beings and their environment. It can only be achieved by putting in place ecologically sensitive sound urban development and construction norms and stringent implementation mechanisms.

Water is an essential life supporting resource, and the Himalaya form the 'water towers' that feed river systems that sustain life for millions of people in Indo-Gangetic plains. This is the water that we store and divert for drinking purposes, irrigation and power generation. However, the continuous flow of this 'blue water' is critically dependent upon how sensitively we manage our landscape for promoting the 'green water' regime i.e. keeping the vegetation cover, sponging effect, and flow regulating capacity intact.

We also need to change our attitude towards the landscape and develop a sense of empathy towards it. Our current anthropocentric approach, and within it also the 'I and Mine' at the front, has adversely disturbed the sustainable equation man had with nature. The respectful practices towards nature, developed by our forefathers over centuries, are fast giving way to shortcuts. For example, the time-tested ecologically resilient practices like collecting herbs from alpine meadows only after 'bees bhadon', community supervised non-destructive collection of Chilgoza cones, and leaving at least one-third of branches of trees un-lopped while collecting leaf fodder, are fast crumbling in the wake of changing life styles, and commercial pressures. You all must have heard this adage that our surrounding landscape is but a reflection of our inner one. It calls for introspection about our behavior towards landscape. It calls for a shift in our attitude from 'what-to-me' to 'what-I-can-do' towards conservation of our landscape. It calls for development and following of environmental ethics towards maintaining our landscape integrity so as to minimize the chances of turning of normal natural events into catastrophic natural hazards.

Jai Hind!



ABOUT THE INSTITUTE

The Govind Ballabh Pant National Institute of Himalayan Environment was established in 1988–89 by Bharat Ratna Pandit Govind Ballabh Pant, during his birth centenary year. Operating under the Ministry of Environment, Forest and Climate Change, this institute functions as an autonomous entity of the Government of India, dedicated to scientific research in the Indian Himalayan region.

The primary objectives of the institute include advancing knowledge and developing integrated management strategies for the conservation of natural resources. As a focal agency, it plays a crucial role in ensuring environmental development by demonstrating effective practices. Recognizing the complexity of institutions, which involve socio-cultural, ecological, economic, and physical systems, the institute strives to maintain a balance in relationships to achieve stability in the entire Indian Himalayan region.

To achieve these goals, the institute conducts research with a focus on linking natural and social sciences, adopting a multidisciplinary and holistic approach in development programs. It places particular emphasis on the delicate conservation of mountain ecosystems, preservation of indigenous knowledge systems, and the sustainable use of natural resources.

In its commitment to long-term acceptance and success of various programs, the institute makes efforts to ensure active participation from residents. The implementation of various types of training, environmental education, and awareness programs among different stakeholders is considered an essential component of all research and development initiatives.

The institute headquarter is situated at Kosi-Katarmal, Almora, Uttarakhand, with six regional centres working in a decentralized manner. These regional centres include the Himachal Pradesh Regional Centre in Mohal-Kullu, Himachal Pradesh; Garhwal Regional Centre in Srinagar, Garhwal, Uttarakhand; Ladakh Regional Centre in Leh, Ladakh; Sikkim Regional Centre in Pangthang, Gangtok, Sikkim; Northeastern Regional Centre in Itanagar, Arunachal Pradesh; and Mountain Division located in Paryavaran Bhawan, New Delhi.

- Undertake in-depth research and development studies on environmental problems of the Indian Himalayan Region (IHR).
- Identify and strengthen the local knowledge of the environment and contribute towards strengthening research of regional relevance in the scientific Institutions, Universities/NGOs and Voluntary agencies working in the Himalayan region, through interactive networking.
- Evolve and demonstrate suitable technological packages and delivery systems for sustainable development of the region in harmony with local perceptions.

Dr. I.D. Bhatt

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