

Mountain Researchers' Expressions

Newsletter-Volume 2 (1), 2025

In the spirit of the Himalayas: Where science meets soul

Director Desk



Mountain Researchers Expression (MoRe), a quarterly compendium, documents field-derived observations, empirical datasets, scholarly publications, perceptual impressions, and an impetus for inspiration that rarely find a place in formal scientific documentation.

Over the years, GBPNIHE researchers have continued to explore, observe, and connect with mountain ecosystems in various ways that extend far beyond traditional field protocols and scientific outputs. Equipped not merely with instrumentation but also imbued with inquisitiveness, inventiveness, and fascination with the terrains and socio-cultural milieus, our researchers investigate the Himalayan regions with rigour and resonance. This issue of MoRe being presented at the Himalayan Conclave 2025, offers a space to capture those lesser-known dimensions, the stories behind field journeys, the quiet motivations that shape hobbies and passions, and the reflections and learnings that unfold beyond structured methodologies. These experiences often enrich the scientific process and help transform research from a technical exercise into a meaningful exploration. MoRe Expressions seeks to bring these subtle yet vibrant elements into the black & white platform of communication. By sharing voices, impressions, creative pieces, field anecdotes, and innovations, the Institute aims to celebrate the full depth of the spirit of mountain research and its researchers. I extend my heartfelt appreciation to all the researchers for their unwavering dedication and wholehearted contributions to the growth of the Institute. Your efforts have beautifully crafted a collective portal into the various dimensions of field-based observations, bridging them to lab-based scientific exploration. I would also like to appreciate the efforts of Er. Himanshu Joshi, Scientist-C, for his invaluable support and guidance to the researchers.



Field Journey to Malari and Niti- In the Shadow of the Peaks	02
A tour for the Malari's Ecstasy	03
Promotion of medicinal plant cultivation through participatory approaches: A case study	04
Bioeconomy and Sustainability: Pathways for Himalayan	05
Restoring Himalayan Ecosystems for People and Plan	05
भारतीय हिमालय क्षेत्र में जलवायु परिवर्तन का स्थानीय जीवन पर प्रभाव	06
Biotechnological Breakthrough for Enhancing Terpenoid Yield in Kapur-Kachari	06
Through My Lens: The Living Harmony of G.B. Pant National Institute of Himalayan Environment	07
Where Faith Protects Feathers: Lessons from Arunachal's Tribal Heartlands	08-09
From Mountain Majesty to Micro-Details: My Photography Ethos	10
Ghosts Beneath the Canopy: A researcher's journey into the hidden world of fungus-feeding orchids	11-12
Into the Heart of the High Himalaya: Field Notes from Rulung Glacier	13
हिमालय की वेदना	14
हे शोधक	14
कागज की नाव	15
Delhi's Smog Extends to the Himalaya: Emerging Concern	16
Bridging Mountains and Minds: Indo-UK Academic Exchange on Environmental Sustainability and Climate Resilience	16
The Golden Bush of the Himalaya: Telling the Secrets of Sea Buckthorn	17
Impacts of Heavy Rainfall on the Livelihoods and Heritage of Locals- A Case Study of Bagan Village, Kullu,	17
A Green and Sustainable Approach for Extracting Plant Bioactive Compounds Using Natural Deep Eutectic Solvents	18
Aipan art	19
Forest disturbances and socio-cultural practices in Indian Himalayan Region: The two sides of a coin	20
In the Heart of the People: Reflections on Community-Based Research	21
Whispers of the Mountains: My First Field Visit to Darma Valley	22
Journey into the Glaciers of Darma Valley Pithoragarh	22
दार्मा घाटी	23
दारमा की धरती पर फाफर का गीत	24
Restoring Mountain Springs: Ecosystem-Based Approaches for Climate Resilience in the Indian	25
A glance of Himachal forests	26

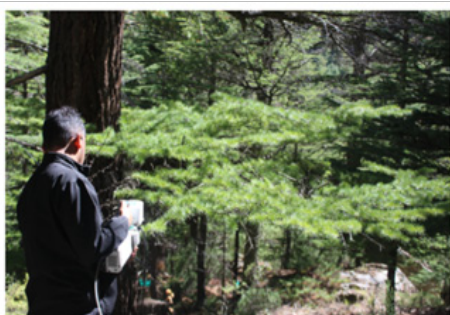
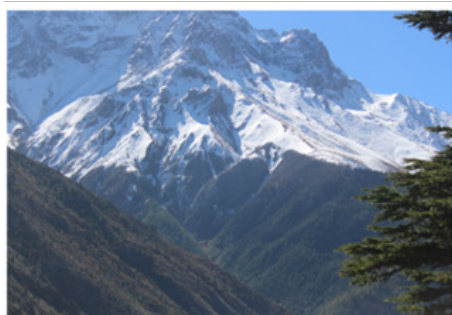
Mountains stand as timeless symbols of strength, mystery, and discovery calling not only to adventurers, but also to those who seek to understand the deeper rhythms of our planet. In this special issue of MoRe we celebrate the voices of scholars who have turned their attention to exploring the mystical and diverse landscape of the Indian Himalayan region spanning across its vertical and horizontal extremes. Each research journey shared here reflects a unique encounter with the mountains — their silent wisdom, their challenges, and their power to inspire awe besides the R&D and in this journey the landscape from the intricate ecosystems that thrive in thin air to the cultural stories that root entire communities in the shadow of peaks, the mountain becomes both subject and teacher. As you read these reflections, you may feel the same sense of wonder that drives each researcher to climb higher not only in altitude, but also in consciousness. The present volume [1 (1), 2025] of the MoRe Newsletter is in the series of its quarterly nonpriced (print and electronic) publication and contains more than 30 articles related to climate smart crop, food security, field Journey's, along with various art forms etc. The views in this newsletter are the views of the concerned authors. Therefore, they do not necessarily reflect the views of the editors or the Institute. We look forward to come up with the policy interventions for the holistic and sustainable development of the Himalayan region. The comments/suggestions for further improvement of this Newsletter are welcome.

Editorial Team
GBPNiHE

A Field Journey to Malari and Niti- In the Shadow of the Peaks

Kailash Chandra Joshi & Ashutosh Kumar, HQ

In the second week of October, our team conducted a field tour under the project “Structure and Functioning of Himalayan Monsoon Shadow Forest Ecosystem.” It was my first high-altitude field experience, covering Malari and Niti valleys in Chamoli district known for their unique ecological setting within the rain-shadow zone of the western Himalaya. The journey from Almora to Malari, nearly 354 kilometres, offered an opportunity to observe remarkable transitions in topography, vegetation, and climate. By the time we reached Malari, the temperature had dropped significantly, and snow-covered peaks surrounded the rocky terrain. We stayed at a small homestay located about a kilometre ahead of Malari village, at an elevation of around 3000 meters. From the next morning, site selection and systematic sampling was carried out in different forest patches representing dominant tree species — *Cedrus deodara*, *Pinus wallichiana*, *Abies pindrow*, *Picea smithiana*, *Juniperus* sp., and *Betula utilis*. Each plot was used for the collection of physiological, phenological, biochemical, soil, and vegetation parameters to understand how these forest types function under low rainfall and cold climatic conditions. During the observations, distinct phenological stages were noted. Cones of *Cedrus deodara*, *Pinus wallichiana*, *Abies pindrow*, and *Picea smithiana* were visible in both male and female forms, with female cones in gradual maturation. *Juniperus* shrubs exhibited immature green cones indicating the early reproductive phase. *Betula utilis* had entered senescence — yellowing leaves and drying catkin-like fruits marked the end of its active season. Nearby, *Rhododendron campanulatum* retained green foliage but no floral activity, suggesting dormancy before the winter months. These observations provided insight into the adaptive strategies of different species under extreme altitudinal and climatic stress. Subsequently, *Juniper* sp. sampling was carried out near Niti village, located close to the Indo-China border. Local interactions provided useful socio-ecological context. Villagers reported seasonal migration to lower areas such as Joshimath before heavy snowfall, returning only in April when snow begins to melt. Agriculture remains their primary livelihood — they cultivate crops like potato, rajma, apple, walnut, jambu, and kutki, which are well-suited to the short growing season. In addition, households engage in wool-based handicrafts such as caps, shawls, and mufflers, and a few operate small homestays to support eco-tourism. The field visit to Malari and Niti offered valuable observations on the structure, functioning, and resilience of high-altitude forest ecosystems within the monsoon shadow zone. The data collected from these sites will help in understanding vegetation composition, phenological cycles, and soil-plant interactions under changing climatic conditions. The experience also highlighted the close relationship between ecological patterns and local livelihoods, both of which are shaped by the unique mountain environment of the upper Himalaya.



A tour for the Malari's Ecstasy

Prakash Singh, HQ

When people think of visiting Badrinath, they often imagine the sacred temple, bustling pilgrims, and the glistening snow peaks echoing with chants. But our journey from GBPNIHE, Almora to the quiet frontier of Malari and Niti unfolded a different kind of pilgrimage, one of science and serenity, of learning and reverence. It was not merely a journey through space, but through layers of life, culture, and the living spirit of the Himalayas. Our expedition began from GBPNIHE, Almora, on a cool dawn when the hills were still draped in mist. The road meandered through the emerald slopes of *Quercus leucotrichophora* and *Pinus roxburghii* forests, echoing with the songs of thrushes and the rustle of pine needles. Passing through Kausani and Baijnath, we descended to the confluence of the Pindar and Alaknanda Rivers at Karanprayag, where two sacred streams merge, symbolizing both a beginning and a passage into the higher realms. From Chamoli to Joshimath, the terrain grew dramatic. The trees changed, *Cedrus deodara*, *Pinus wallichiana*, and *Abies pindrow* towered over the winding roads. The air carried a sharp edge of cold, and every bend revealed new wonders of ecological transition. Beyond Joshimath began a road less travelled. As we moved toward Tapovan and Jelam, the lush forests gradually surrendered to the dry grandeur of the monsoon shadow zone. The Himalayas here rise as a barrier, denying the monsoon's generosity. The air turns crisp and arid; the terrain, rugged yet magnificent. Sparse vegetation *Juniperus indica*, *Cupressus torulosa*, and *Thuja orientalis*, clung to cliffs of slate and shale, each trunk twisted by years of snow, wind, and patience. At one of the sharp bends, the ITBP Base Camp near Malari appeared, a disciplined oasis amid wilderness. The tricolour fluttered proudly against a sky of endless blue. The jawans stationed here, ever vigilant at this Indo-Tibetan frontier, offered warm smiles and stories of life amidst solitude. Their presence brought both safety and inspiration, human endurance mirroring the resilience of the landscape. Malari village, perched at about 3,000 meters, looked like a painting born of stone and sunlight. The traditional stone-roofed houses stood shoulder to shoulder, surrounded by terraced fields that shone golden under the mountain sun. The river Dhauli Ganga murmured below, its waters pure and icy. The Marchha tribe, the native inhabitants of this region, welcomed us with warm butter tea and simple smiles. Their lifestyle reflects a harmony honed by centuries of adaptation. Woolen attire woven from yak and sheep, barley-based cuisine, and homes designed to preserve heat, every aspect of their life is an art of balance. Tibetan influence gleamed in prayer flags fluttering over roofs and in the quiet reverence for their guardian deities, Nanda Devi and Latu Devta, and Timersain Mahadev whose temples stand humbly yet powerfully at the heart of the village. Our work began early each day. The cold air carried the scent of conifers and dry soil. We collected soil samples from terraced fields, riverbanks, and upland slopes. The soil, dark with glacial minerals, spoke of endurance low in moisture, moderate in organic carbon, yet thriving with microbial life uniquely suited to the high-altitude dryness. In our vegetation surveys, *Cedrus deodara* and *Abies pindrow* gave

way to *Juniperus sp.*, *Betula utilis*, *Taxus baccata*, *Cupressus torulosa* and *Thuja* species as we climbed higher. Each tree bore the signature of adaptation, needle leaves, thick bark, and wax-coated surfaces. Even the smallest herbs and cushion plants seemed to hold the rhythm of survival in their leaves. The region, though labeled "barren," was alive in quiet abundance. The road beyond Malari led us to Niti Village, the last Indian habitation near the Indo-Tibetan border, at an altitude above 3,600 meters. The path wound through glacial valleys, silent and vast, where herds of yaks grazed under watchful eyes. Niti, cradled between icy ridges, stood as a symbol of endurance, the Marchha tribe here living in perfect synchrony with nature's extremes. Vegetation was sparse: mostly *Juniperus* and dwarf shrubs scattered across scree slopes. The villagers spoke of their seasonal migration, descending to lower altitudes during winter and returning in summer when snow melts. Their deep reverence for the mountains was palpable; every peak had a name, every stream a spirit. The landscape itself felt sacred, a temple without walls. As we drove back toward Joshimath, the evening sun painted the Dhauli Ganga valley in gold. The peaks of Nanda Devi and Dronagiri glowed like celestial fires. Our notebooks were filled with data, but what lingered deeper were the whispers of wind, the resilience of life, and the humility of the people. From Almora's moist oak forests to Niti's arid terraces, the journey traced the full breath of the Himalayas from abundance to austerity, from science to spirituality. The monsoon shadow forests around Malari are not merely an ecosystem; it is a story of endurance written in rock and leaf. The nature, culture, and faith still live here. Our "Tour for the Malari's Ecstasy" was more than a scientific excursion. It was a reminder that true ecstasy lies not in grand discoveries, but in silent realization, that even in the harshest places on Earth, life finds a way to bloom, endure, and inspire.



Promotion of medicinal plant cultivation through participatory approaches: A case study

Amit Bahukhandi, Kuldeep Joshi, HQ

Conservation of medicinal plants is receiving attention all across the globe keeping in view the resurgence of interest in herbal medicines. With the increasing demands, medicinal plants are being explored from their natural source, which is affecting their availability in nature. This has promoted the conservation of such species through *in-situ* and *ex-situ* methods to improve their availability for end users and release the pressure of exploitation from their natural habitats. Moreover, it is pertinent to establish germplasm repositories to fulfill the need for quality planting material for the cultivation process in farmer's fields and establishment of market strategies for uplifting the economic condition of local inhabitants. In view of the above, Center for Biodiversity Conservation and Management of G.B. Pant National Institute of Himalayan Environment Almora has initiated the cultivation of threatened medicinal plants at farmers' fields of Chaudas area (29°59'22" N; 80°39'31" E; 900-2750 m asl), Pithoragarh district, Uttarakhand under the National Mission on Himalayan Studies funded project entitled "Promoting Conservation of threatened plant species in the west Himalayan Region - A participatory approach". The initiative targeted both biodiversity conservation and livelihood enhancement, focusing on seven threatened medicinal and aromatic (MAP) species namely *Allium stracheyi*, *Angelica glauca*, *Cinnamomum tamala*, *Hedychium spicatum*, *Picrorrhiza kurrooa*, *Saussurea costus* and *Valeriana jatamansi*, with approaches (i) identification of ecological suitable species and cultivation sites, (ii) mobilization and training of farmer on propagation, cultivation, and post-harvest management, (iii) provision of organic certification and quality assurance to enhance market value, (iv) establishment of buyback arrangements with reliable market partners for assured fair pricing, (v) integration of MAP cultivation into ongoing government schemes to strengthen resource support and long-term viability. A total of 21 awareness programs, field orientation workshops and hands-on training on medicinal plant cultivation were held in the region, which made 1579 stakeholders (male 1111; female 468) more aware of the importance of protecting threatened medicinal plants. As results, 172 farmers from 11 villages have initiated cultivation of selected seven plant species in 125 nali (2.5 ha) land after the intervention of the project. Similarly, species specific protocols of 7 species using different propagation methods were developed (i.e. seed germination for *Angelica glauca*, *Cinnamomum tamala*, *Saussurea costus*; vegetative propagation for *Allium stracheyi*, *Picrorrhiza kurrooa*, and in-vitro propagation technique for *Valeriana jatamansi*) and produced about 46 lakh plants. Simultaneously, 14 demonstration sites (11 villages, 1 Sri Narayan Ashram, 2 school conservation models) were established along the elevation gradient (900-2750m) in the region. These sites have functioned as mother nurseries. The nursery developed at Sri Narayan Ashram is being maintained for the conservation and production of threatened medicinal plants. Germplasm of 15 high-value threatened Himalayan species are maintained in the Sri Narayan Ashram, and function as a demonstration site and capacity building center. In addition, progressive farmers were registered at the Herbal Research and Development Institute (HRDI) Gopeshwar, and certification of cultivated produce was done with the Quality Council of India (QCI) New Delhi under the certification scheme for medicinal plant produce (VCSMPP). For the development of market linkages for selling cultivated produce and providing direct benefit to farmers, a buy-back arrangement were facilitated, and a Memorandum of Understanding (MoU) was signed between traders and farmers. Synergy was established between farmers and ongoing schemes of line agencies like MNERGA, Bhesaj Sangh, etc. These efforts provided opportunities for the farmers to develop their skills and knowledge's for the cultivation and conservation of threatened medicinal plants. All these efforts help to promote a cluster-based approach to promoting medicinal plant cultivation in the Chaudas area. This is the first of its kind intervention where cultivated produce was directly sold to end users and all the steps from the sensitization to capacity building/skill development, collection of propagules to certification, registration to buyback arrangements were facilitated. Based on the intervention program, 40 farmers of Chaudas area earned more than Rs. 15 lakh through selling of cultivated produce (*Hedychium spicatum*), and other crops are ready for sell-out.



Bioeconomy and Sustainability: Pathways for Himalayan Mountain Livelihoods

Paras Upadhyaya, HQ

The bioeconomy potential in the Himalaya region is an exciting subject that offers hope for both the environment and the people living in these mountain villages. As a researcher, looking at the Himalaya, what stands out most is the incredible richness of plants, animals, and traditional knowledge that have shaped life here for centuries. These assets, if used wisely, can help create new jobs, healthier ecosystems, and a sustainable future for rural communities. The Himalaya is not just a chain of towering peaks but a living, breathing landscape that supports millions of people. Villagers here rely on forests, medicinal plants, and streams for their daily needs. Yet over the years, pressures like forest degradation, climate change, and migration have started to threaten these delicate systems. One big challenge for local people is finding ways to earn a good living without harming the environment. This is where the idea of bioeconomy comes in: using biological resources in smart and sustainable ways, so that communities and nature can thrive together. The bioeconomy focuses on creating economic value from biological resources like plants, trees, bamboo, and even livestock—especially those found in forests and farms. In the Himalaya, this can mean processing medicinal herbs into teas or balms, making crafts or eco-friendly packaging from bamboo, developing small-scale honey businesses, or even ecotourism activities based on local culture and nature. These businesses rely on local skills and encourage people to protect their resources, rather than exploit them. Many communities have known how to use plants and animals sustainably for generations. Young entrepreneurs and local women's groups are now combining this traditional knowledge with new technologies—like better ways of drying herbs or branding local products—to reach wider markets and improve family incomes. Bioeconomy projects even help slow migration, keeping families together by providing fresh opportunities at home. As Mountain areas can be tough to reach. Skills and education vary. Sometimes rules and policies are slow to catch up to new ideas. But researchers working in the Himalaya see a wave of change. Young people are returning to villages with new ideas. NGOs and government programs are supporting innovative projects—like value-added products, organic certification, training for women's groups, and eco-friendly farming methods. The bioeconomy in the Himalaya represents much more than just economic growth; it is a way to keep culture, nature, and livelihoods alive in harmony. I believe that by working together with local people, a resilient and sustainable future can be created in these mountain villages—where the environment is valued and economic opportunities continue to grow. As bioeconomy in the Himalaya can only succeed if local people are partners, not just participants.

Restoring Himalayan Ecosystems for People and Planet

Vibhash Dhyani, HQ

Aligned with the UN Decade on Ecosystem Restoration (2021–2030) and commitments under UNCCD and SDG-15, a large-scale eco-restoration initiative was undertaken in the fragile Himalayan landscapes of Pithoragarh district, Uttarakhand. The project successfully restored 26 hectares of degraded land across three watersheds, planting over 24,400 individuals of 10 native and medicinal species with an average 60.44% survival rate. Key species such as *Cinnamomum tamala*, *Phyllanthus emblica*, *Myrica esculenta*, and *Zanthoxylum armatum* showed strong establishment, improving soil fertility, water retention, slope stability and biodiversity recovery, while enhancing carbon sequestration. Community engagement was central, 937 villagers (571 men and 366 women) from 41 villages were trained in nursery development, moisture conservation, plantation, invasive species management and monitoring. Local stewardship was ensured through bio-fencing and stone-wall protection measures. Livelihood diversification was promoted by integrating high-value medicinal plants and distributing 5,000 *C. tamala* seedlings to 120 house holds. Training in bio-briquette production from pine needles further provided income opportunities and reduced fire risk. Through convergence with MGNREGA and Bhesaj Sangh, the project reduced community costs, enhanced local participation and ensured sustained impact. This initiative exemplifies how combining ecological science, community leadership, and institutional collaboration can restore degraded ecosystems while strengthening rural resilience, offering a scalable model for the Indian Himalayan Region.



Hkkjrh; fgeky; {k= e t yok; ifjorlu dk LFkkuh; thou ij
çHkko दीपक सिंह बिष्ट, मुख्यालय

भारतीय हिमालय क्षेत्र न केवल भारत की भौगोलिक सीमाओं का रक्षक है, बल्कि यह देश की नदियों, जलवायु और जैव विविधता का प्रमुख आधार भी है। यहाँ की प्राकृतिक सुंदरता, संसाधन और पारिस्थितिकी तंत्र करोड़ों लोगों की आजीविका से जुड़े हुए हैं। परंतु बीते कुछ दशकों में जलवायु परिवर्तन ने इस क्षेत्र के पर्यावरण और स्थानीय जीवन को गहराई से प्रभावित किया है। जलवायु परिवर्तन के संकेत हिमालयी क्षेत्रों में औसत तापमान में लगातार वृद्धि हो रही है। ग्लेशियरों का तेजी से पिघलना, अनियमित वर्षा, अत्यधिक ठंड या गर्मी, अचानक बाढ़ और भूस्खलन जैसी घटनाएँ अब सामान्य हो चुकी हैं। इन परिवर्तनों ने इस नाजुक पारिस्थितिकी तंत्र के संतुलन को डगमगा दिया है। कृषि और खाद्य सुरक्षा पर प्रभाव हिमालयी क्षेत्र की अधिकांश आबादी पारंपरिक कृषि पर निर्भर है। तापमान और वर्षा के पैटर्न में परिवर्तन से फसलों का उत्पादन घट रहा है। जैसे पहले गेहूँ, जौ, मंडुआ और झंगोरा जैसी फसलें उपजाऊ थीं, पर अब जल की कमी और मौसम की अनिश्चितता के कारण किसानों को भारी नुकसान झेलना पड़ रहा है। इससे खाद्य असुरक्षा और गरीबी बढ़ रही है। जल संसाधनों में कमी हिमालय की पर्वत श्रेणियाँ भारत की अधिकांश नदियों की जननी हैं, परंतु ग्लेशियरों के पिघलने और वर्षा के असंतुलन से इन नदियों के जलस्तर में गिरावट आई है। गाँवों में पारंपरिक जल स्रोत जैसे नौले, धारे और गदरे सूख रहे हैं, जिससे पीने के पानी और सिंचाई की गंभीर समस्या उत्पन्न हो रही है। पर्यावरण और जैव विविधता पर असर जलवायु परिवर्तन से इस क्षेत्र की जैव विविधता भी खतरे में है। कई दुर्लभ औषधीय पौधे और वन्यजीव प्रजातियाँ अपने पारंपरिक आवास छोड़ रही हैं। जंगलों में आग की घटनाएँ बढ़ने से वनस्पति और जीव-जंतुओं की प्रजातियाँ नष्ट हो रही हैं, जिससे पारिस्थितिक संतुलन बिगड़ता जा रहा है। स्थानीय समुदायों का सामाजिक जीवन प्राकृतिक संसाधनों की कमी से लोगों की आजीविका पर गहरा असर पड़ा है। खेती और पशुपालन से मिलने वाली आय घटने के कारण युवाओं का पलायन तेजी से बढ़ा है। इससे पहाड़ी गाँव खाली हो रहे हैं और पारंपरिक संस्कृति, लोकगीत, पर्व-त्योहार और सामुदायिक एकता पर नकारात्मक प्रभाव पड़ रहा है।

हिमालय क्षेत्र में पर्यटन रोजगार का एक बड़ा स्रोत है, लेकिन बार-बार आने वाली प्राकृतिक आपदाएँ जैसे भूस्खलन, बादल फटना, ग्लेशियर झील फटना आदि इस क्षेत्र की छवि को नुकसान पहुँचा रही हैं। केदारनाथ (2013), जोशीमठ (2023) और 5 अगस्त 2025 को उत्तरकाशी के धराली गाँव में हुई धराली की घटना एक भयानक बादल फटने की त्रासदी थी, जिससे गाँव पूरी तरह तबाह हो गया। इस बाढ़ के कारण कई घर, होटल और इमारतें बह गईं, और 34 सेकंड में ही पूरा गाँव मलबे में तब्दील हो गया। इस आपदा में कई लोग लापता हुए, जिनमें से कुछ अभी तक नहीं मिले हैं। जैसी घटनाएँ यह दर्शाती हैं कि यह क्षेत्र कितना संवेदनशील हो गया है।

उपरोक्त हेतु संभावित समाधान निम्नलिखित हैं— (i) स्थानीय जल स्रोतों का पुनर्जीवन और संरक्षण (ii) जलवायु अनुकूल कृषि तकनीकों का प्रयोग (iii) वनीकरण और जलागम प्रबंधन कार्यक्रमों को बढ़ावा (iv) पारंपरिक ज्ञान और सामुदायिक भागीदारी को सशक्त बनाना (v) इको-टूरिज्म और वैकल्पिक आजीविका के माध्यम से रोजगार के अवसर बढ़ाना निष्कर्ष भारतीय हिमालय क्षेत्र में जलवायु परिवर्तन केवल पर्यावरणीय संकट नहीं, बल्कि मानव जीवन, संस्कृति और अर्थव्यवस्था के लिए गहरी चुनौती है। इस क्षेत्र की रक्षा तभी संभव है जब सरकार, वैज्ञानिक समुदाय और स्थानीय लोग मिलकर जलवायु अनुकूल नीतियाँ अपनाएँ। हिमालय केवल पहाड़ नहीं, बल्कि जीवन का आधार है—इसका संरक्षण हमारे अस्तित्व की भी रक्षा है।

Biotechnological Breakthrough for Enhancing Terpenoid Yield in Kapur-Kachari

Vibhash Dhyani, HQ

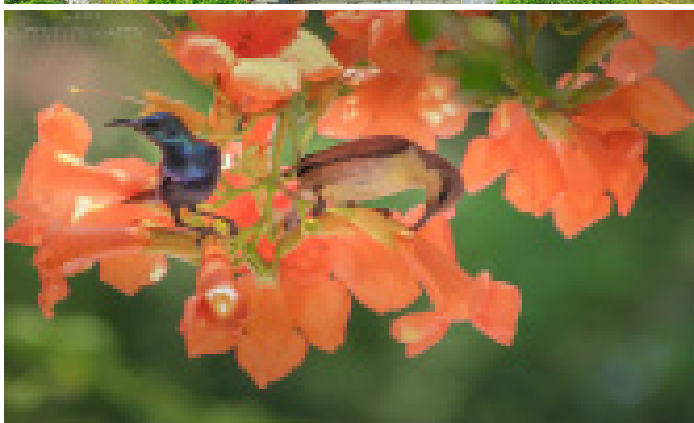
In his recent Ph.D. research, Mr. Vibhash Dhyani developed an integrated biotechnological approach to enhance terpenoid yield and promote the sustainable cultivation of *Hedychium spicatum* (Kapur-Kachari), a medicinal herb valued for its terpenoids like 1,8-cineole, linalool, and eudesmol used in cosmetics, perfumery and therapeutics. To address challenges of overharvesting, poor propagation and yield inconsistency, an efficient plant regeneration protocol was established, achieving 100% callus induction, 16.34 shoots per explant and 2,700 hardened plantlets within 26 weeks. Optimized MS medium and elicitor-precursor treatments enhanced essential oil yield by 2.43 times and 1,8-cineole content by 6.56 times. Field studies revealed that high-altitude sites (2,550 m asl), such as Sri Narayan Ashram, Pithoragarh district, produced the highest biomass and oil yield, while mid- and low-altitude sites favored specific terpenoid profiles, highlighting the significant influence of altitude on chemical composition and productivity. This research provides a scalable model combining biotechnology and ecological insights for the conservation and commercial cultivation of *H. spicatum*, supporting both biodiversity conservation and livelihood generation in Himalayan communities.



Through My Lens: The Living Harmony of G.B. Pant National Institute of Himalayan Environment

Kuldeep Joshi, HQ

High in the calm hills of Almora lies a place where nature and science live together in harmony—the G.B. Pant National Institute of Himalayan Environment. Surrounded by tall green trees, singing birds, and fresh mountain air, the institute feels like a home for both researchers and nature lovers. Every morning begins with golden sunlight touching the red-roofed buildings, while the songs of bulbuls, magpies, and sunbirds fill the air. Sometimes, after a gentle rain, a rainbow or even two arches over the sky, making the whole campus look like a dream. These small moments remind us how beautiful and alive the Himalayan environment truly is. Inside the laboratories, researchers work quietly and carefully, studying plants, soils, and ecosystems. Each experiment is a small step towards protecting the fragile balance of the mountains. Watching them work inspires me; it shows how science, when done with love and patience, can truly help nature heal. As night falls, the campus glows softly under the stars. The tall pine trees stand like silent guardians, and the cool breeze carries the soft calls of night birds. Walking through the peaceful pathways, surrounded by light and green, one feels deeply connected with the earth. Photography, for me, is a way to capture this connection—the joy of seeing science and nature side by side. Through my lens, I try to show how every leaf, every bird, every drop of rain, and every smile here tells a story of hope. The G.B. Pant Institute is more than just a workplace; it's a living example of how humans and nature can coexist beautifully. Every day here teaches one simple and timeless truth: “Prakriti Rakshati Rakshita” Nature protects those who protect it.



Where Faith Protects Feathers: Lessons from Arunachal's Tribal Heartlands

Bishal Kumar Majhi, NERC

Fieldwork, for many of us, is more than data collection—it's a journey into the stories that landscapes whisper and communities guard. During the fieldwork for my doctoral research in Arunachal Pradesh, I had the privilege of walking through valleys where faith, folklore, and forests coexist in remarkable harmony. My work combines bird diversity assessment with community-based questionnaires to understand how local perceptions and cultural practices shape the diversity of birds in these Himalayan frontiers. The field experience in Arunachal has been as humbling as it has been enlightening. Every valley here holds a different rhythm of life, and with it, a unique conservation narrative. From the snow-clad ranges of Tawang to the misty forests of Shi-Yomi, and from the Nyishi settlements of Kra Daadi to the rolling hills of Eaglenest in West Kameng, I witnessed how deeply cultural belief and community participation can sustain ecological balance. In Tawang, home to the Buddhist Monpa community, the teachings of the Tripitaka forbid the taking of life. Hunting here is rare, and some villages even prohibit the processing of meat within their premises. The reverence for wildlife is beautifully exemplified at Zemithang, where, despite being a sand mining location, people cease to touch the riverbed during the arrival of the sacred Black-necked Crane (*Grus nigricollis*) (Figure 1).



Fig.1. Zemithang riverbed in Tawang, where sand mining halts during the arrival of the sacred Black-necked Crane

This spiritual protection ensures that these majestic birds can rest undisturbed, illustrating how faith can become a force of conservation. Moving westward to Shi-Yomi district, I observed a coexistence of both hunting and non-hunting traditions. Among the Galo tribe, some ritualistic use of bird products persists, yet this practice is steadily fading as awareness spreads. In contrast, the Buddhist settlements of Mechuka have institutionalised conservation through community rules. Village committees have erected signboards warning against hunting and

deforestation, imposing fines of 30,000–50,000 for violations (Figure 2). These initiatives, sustained over recent years, have visibly contributed to the revival of bird populations in the region—a testament to how social governance can reinforce ecological stewardship.



Fig. 2. Signboards installed by village committees in Mechuka, Shi-Yomi district, prohibiting hunting and extraction of forest resources.

Perhaps the most striking transformation was visible in Kra Daadi district, inhabited by the Nyishi tribe, once known for their hunting traditions. Here, a combination of strong community leadership and government collaboration has sparked a conservation movement. Local welfare societies have enforced strict anti-hunting regulations, with penalties ranging from 50,000 to 1,00,000 (Figure 3a). The Airgun Surrender Abhiyan, an initiative encouraging people to voluntarily surrender airguns used for hunting, has become a model of participatory conservation. The creation of an Airgun Museum at the Palin DC Office, honouring individuals who surrendered their guns, symbolises a collective change of heart (Figure 3b). What began as a local campaign has now evolved into a national inspiration, lauded by the Hon'ble Prime Minister in Mann Ki Baat and recognised by UNESCO as one of India's most promising wildlife conservation success stories. Further south, in West Kameng, the Bugun tribe's conservation efforts have become a legend of hope. The discovery of the Bugun Liocichla (*Liocichla bugunorum*), a bird found nowhere else on Earth, near the Eaglenest Wildlife Sanctuary, brought both fame and responsibility to the community. Instead of allowing exploitation, the Buguns chose protection. They set aside community forest land for the bird's habitat and welcomed researchers and eco-tourists alike. This shift not only protected biodiversity but also diversified local livelihoods through bird-based tourism—showing that conservation and development can walk hand in hand when guided by local will.

Across these journeys, I realised that conservation in Arunachal is not just about protecting species—it is about preserving relationships: between people and place, between culture and ecology, and between belief and biodiversity. My field experiences taught me that sustainable conservation cannot be imposed from outside; it must grow from within communities, rooted in their traditions and collective ethics. Although hunting has not yet completely ended in Arunachal, there is still much to do. Yet I remain optimistic that awareness, government efforts, and community participation together will help the state regain its pristine diversity. Each conversation with village elders, every dawn spent listening to bird calls, and each story of a revived forest reaffirmed a simple truth: nature thrives when communities care. The people of Arunachal, through their evolving practices and deep reverence for life, are quietly scripting a conservation model for the world—one that listens to both science and spirit.



Fig. 3. (a) Notice board by the Takar Welfare Society, Kra Daadi district, enforcing anti-hunting regulations with heavy fines. (b) Airgun Museum at Palin DC Office displaying surrendered airguns under the Airgun Surrender Abhiyan

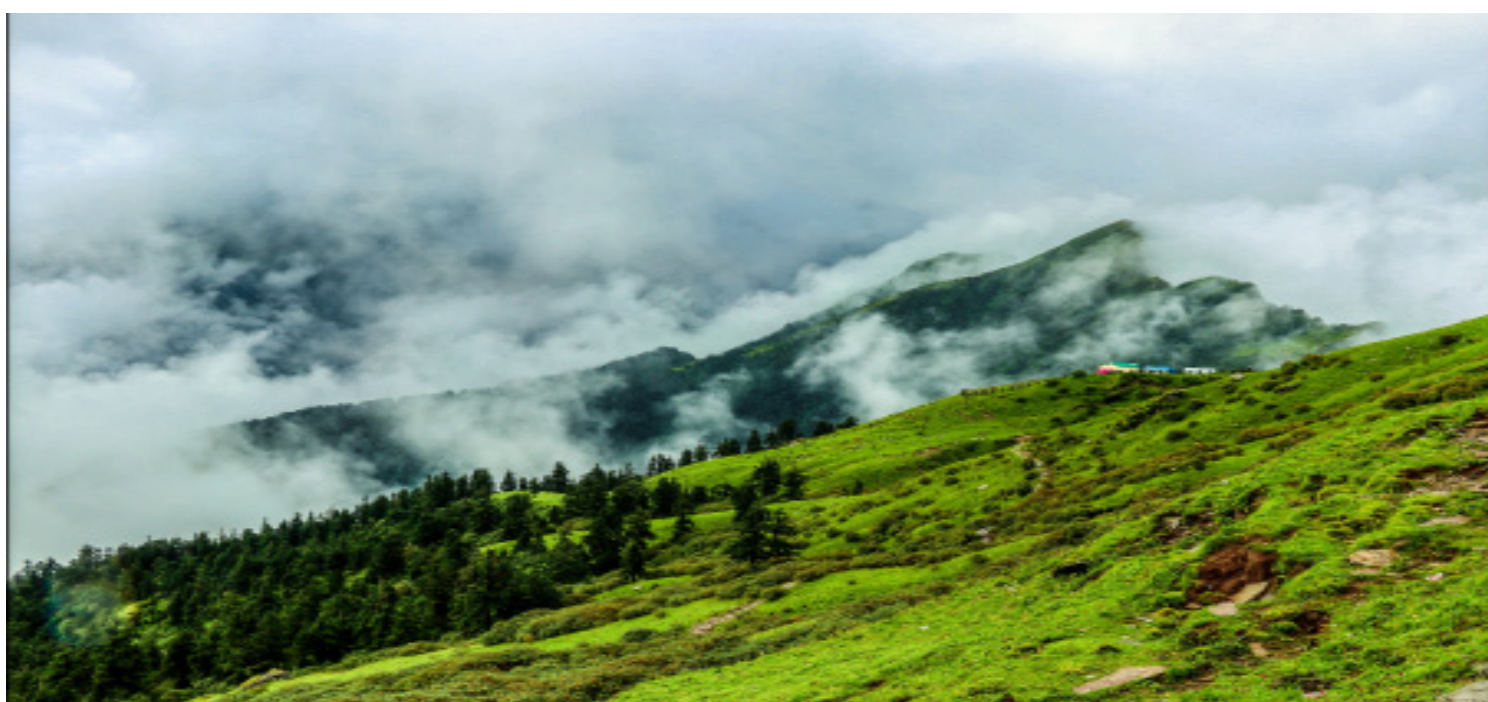


Photo Credit: Saurav Mehra, HQ

From Mountain Majesty to Micro-Details: My Photography Ethos

Kamal Rawat, HQ

Photos can tell stories about nature that words alone can't convey. Images of beautiful places and interesting wildlife can captivate our imaginations and evoke emotions. Spending time in nature for photography can be deeply therapeutic, the process fosters a deep personal connection with the natural world, leading to a greater appreciation for the intricate web of life. It sharpens observation skills and patience. The pursuit of unique images can involve adventure, travel, and the excitement of discovering hidden details or rare sights that might otherwise go unnoticed, such as a tiny insect or a fleeting moment of animal interaction. Photographs that capture the beauty and fragility of nature can inspire others to care about the environment. Sharing images on different platforms helps to create a broader community interested in conservation and environmental protection. Each image tells a story, conveying emotions and the reality of the lives of plants and animals. You will be amazed how many beautiful subjects are quite tiny and therefore easily overlooked. It pays to think small and not be in a rush. I take my time when visiting interesting habitats. This narrative power can effectively educate people about conservation issues, habitat loss, or climate change in a way that is immediately understandable and impactful. Photographs can provide valuable data for scientific research, such as documenting species' locations, behaviors, and population dynamics. Ultimately, capturing flora and fauna is a rewarding pursuit that

deepens one's own connection to the planet while also providing a powerful medium to share its wonders and advocate for its preservation. I began photography not just to remember life, but to reconcile myself with the overwhelming, silent majesty of living in Uttarakhand. Here, where there is so much biodiversity the mighty peaks stand as eternal, watchful sentinels, the moments I sought to capture were not simply fleeting; they were profound, often dwarfing my ability to grasp them fully.



Ghosts Beneath the Canopy: A researcher's journey into the hidden world of fungus-feeding orchids

Madhusudhan Khanal, NERC

In the dim understory of the Eastern Himalaya, where sunlight trickles through dense canopies and decay nurtures new life, there exists a world few have witnessed - a realm where orchids feed not on light, but on fungi. These are the holomycotrophic orchids - plants that have abandoned photosynthesis entirely, surviving instead through intricate, unseen relationships with soil fungi. Over the past two years, my journey through the moss-draped forests of Sikkim led me to discover five such rare and remarkable orchids, including two new species, two new records for India, and a new generic record. Together, they narrate an unseen story of Himalayan biodiversity, fragility, and resilience.

Orchid imitates a rotten mushroom- *Gastrodia bambu* :

It was during a chilly morning in the bamboo forests of Kalimpong when I first encountered what seemed to be a patch of decaying fungal tubes pushing through the leaf litter. At a glance, they looked lifeless, like remnants of a rotting fungus - until I looked closer. The brownish stalks, slender and tube-like, bore minute flowers that hinted at something extraordinary. What I had stumbled upon was *Gastrodia bambu*, a holomycotrophic orchid previously unknown in India. This orchid, later found in parts of Sikkim as well, thrives in decomposing bamboo litter - an unlikely, dimly lit microhabitat that shelters the hidden threads of mycorrhizal fungi. The plant's complete dependence on fungi throughout its life cycle is a testament to the complexity of underground ecological networks. Despite growing near human settlements, its presence signified a soil rich in fungal life - a quiet indicator of ecosystem health. After detailed morphological study and comparison with existing literature, *Gastrodia bambu* was formally documented as a new national record and published in the Journal of Japanese Botany in 2023.

The Orchid That tested patience- (*Gastrodia sikkimensis*):

The second discovery was one that tested both patience and intuition. In 2021, while surveying the Rey Khola area of Gangtok, I noticed a curious cluster of fruiting capsules sprouting from the soil - about forty in a clump. Their peculiar arrangement struck me as orchid-like, yet I had never seen such a structure before. The following year, I returned to the site, only to find no trace of the plant. It was not until April 2023 that I finally witnessed the moment I had been waiting for. There, under the subdued light of a bamboo thicket, tiny brownish flowers curved delicately, their striated petals barely opening. They were modest, almost secretive -but in that quiet bloom, I felt a surge of awe. It was as if the forest itself had revealed one of its deepest secrets. Upon closer study, the specimen turned out to be a completely new species - *Gastrodia sikkimensis*, named in honour of Sikkim's legacy. It was later published in Phytotaxa. The orchid's occurrence in such small numbers -barely twenty individuals- underscored its vulnerability and the fragility of its niche.

Treasure among the Snakes and Shadows- (*Didymoplexiella siamensis*):

While monitoring the site for *G. sikkimensis*, I noticed tall,

stick-like growths emerging from the upper zone of the Rey khola bamboo groove. Initially, I assumed these to be *Didymoplexis*, another holomycotrophic genus common in bamboo understories. I continued monitoring until one June morning when the buds began to swell. Eager not to miss the fleeting bloom, I reached the site early - only to find myself face-to-face with a copper-headed trinket snake. In my excitement, I forgot caution; the snake bit me before I gently released it. Despite the sting, curiosity triumphed over pain. When I finally reached the site, I found the orchids in bloom- delicate, pinkish flowers with a faint bluish labellum and a pleasant aroma, unlike the usually foul-smelling holomycotrophs. Microscopic examination revealed a surprise- it wasn't *Didymoplexis* at all but *Didymoplexiella siamensis*, a genus never before recorded from India. This discovery, later published in Feddes Repertorium, marked the first generic record of *Didymoplexiella* for the country. Such moments of serendipity and struggle define the joy of fieldwork -where danger and discovery coexist.

The Orchid That Never Opened (*Gastrodia indica*):

During a routine survey at the Arboretum of GBPNiHE-SRC, my attention was caught by slender brown stalks bearing tiny, unopened buds. Their persistence intrigued me. I tagged them and began regular monitoring. Over weeks, they grew taller, yet none of the buds opened into flowers- instead, they matured directly into capsules. This enigma led me deep into literature, where I found reference to cleistogamy- a rare phenomenon where flowers self-pollinate without opening. My suspicion proved right. The plant was indeed a new, self-pollinating *Gastrodia*, the first cleistogamous orchid known from India. We named it *Gastrodia indica* and published it in Phytotaxa. Its discovery broadened our understanding of reproductive strategies in these elusive orchids - an evolutionary adaptation to ensure survival in the dim, fungus-fed ecosystems of the Himalaya.

A Friend's Find (*Gastrodia flavilabella*) :

Sometimes, discoveries come through collaboration. While conducting fieldwork in the Barsey Rhododendron Sanctuary, a colleague stumbled upon another holomycotrophic orchid. Its glossy flowers and slender build hinted at something rare. Upon examination, it matched *Gastrodia flavilabella*, a species previously unknown from India. It was subsequently reported as a new national record in Feddes Repertorium. The orchid, found in fewer than ten individuals, highlights how even protected landscapes hide fragile species on the brink of disappearance.

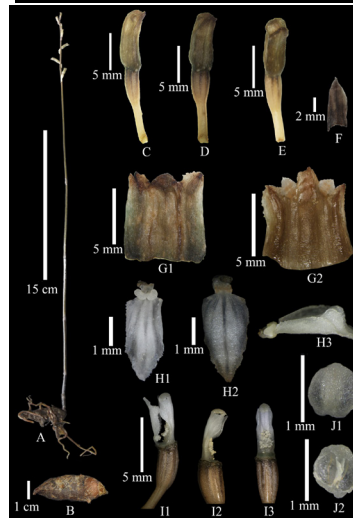
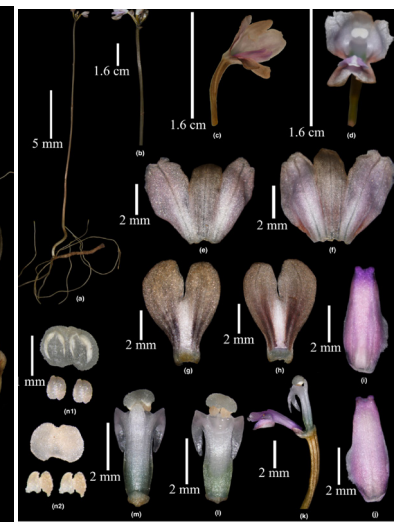
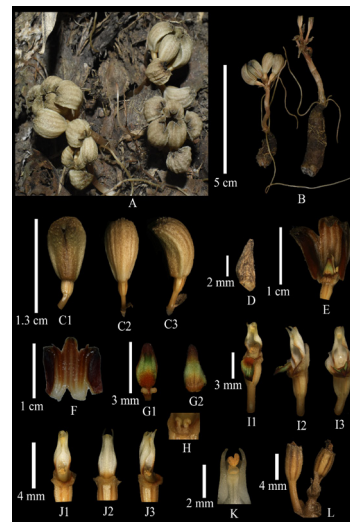
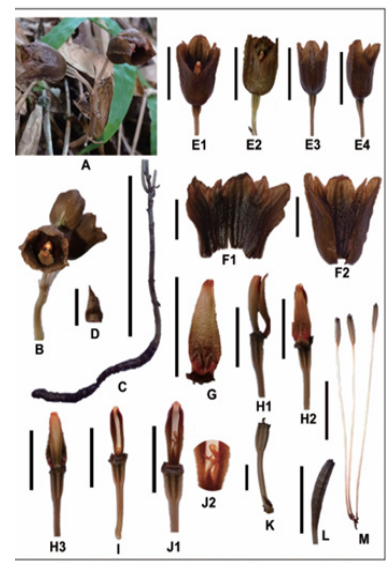
Orchids of the Hidden World:

All five species- *Gastrodia bambu*, *G. sikkimensis*, *G. indica*, *G. flavilabella*, and *Didymoplexiella siamensis*

share a common trait: their complete dependence on fungal symbiosis. They emerge only when environmental conditions and underground fungal networks align perfectly. Their habitats- bamboo forests, moist leaf litter, shaded ravines are microcosms of ecological balance. The fungi they associate with are often the unseen architects of the forest floor, decomposing organic matter, recycling nutrients, and creating conditions for these orchids to thrive. Yet, their rarity is alarming. Population assessments conducted during our studies revealed less than twenty mature individuals for *G. bambu* (Endangered), fewer than twenty for *G. sikkimensis* (Critically Endangered), about fifty for *G. indica* (Critically Endangered), fewer than fifteen for *D. siamensis* (Endangered), and fewer than ten for *G. flavilabella* (Endangered). These numbers highlight not just the fragility of these orchids but also the vulnerability of the microhabitats that support them.

Beyond Discovery: The Urgency of Conservation
Discovering these orchids is both a joy and a responsibility. Their existence depends on the delicate web of soil fungi, decomposing leaf litter, and undisturbed forest microclimates- all of which are increasingly threatened by habitat fragmentation, unregulated tourism, and changing land use patterns. Conservation of these orchids thus requires a multi-pronged approach involving local communities, forest departments, and research institutions. GBPNIHE, through its ongoing projects and regional collaborations, has been playing a vital role in promoting research-based conservation in the Eastern Himalaya. The documentation of holomycotrophic orchids adds an important dimension to this effort, reminding us that conservation must extend beyond the visible- to the roots, the fungi, and the dark soil that sustains life unseen.

Reflections from the Forest Floor:
As a researcher, I often find myself drawn to the forest's quietest corners - places where decay smells of renewal and silence hums with life. The holomycotrophic orchids of Sikkim have taught me that beauty does not always seek sunlight. Sometimes, it blooms in darkness, hidden under leaves, feeding on the invisible threads of life. They are reminders that even the most overlooked corners of the Himalaya hold stories worth listening to- stories of persistence, adaptation, and quiet glory. These orchids are not just scientific finds; they are symbols of the unseen vitality that binds the living world. Protecting them is, in essence, protecting the very pulse of our forests- a call for researchers, institutions, and communities alike to look beneath the surface, where the real magic of the mountains lies.



Into the Heart of the High Himalaya: Field Notes from Rulung Glacier

Mohit Prajapati, LRC

Today is 6th October, 2025. We are working at Rulung Glacier of Leh, Ladakh Union Territory, to monitor how the glacier and weather are changing. The place is extremely high and harsh. We started from the Sumdo village at an elevation of 4300 masl on 4th October, 2025. The Sumdo village is a small hamlet of Changthang nomads. Our team comprised of 6 researchers with around 6 porters and 12 mules. Our first challenge is just getting to our camp. We climb about 1,200 meters of elevation. Up at 5,600 meters above the mean sea level, there's much less oxygen in the air. This means we get tired very, very fast, and even simple walking drains our energy quickly. The path is not an easy road. It's hard, rough terrain, full of rocks, steep slopes, and difficult ground that makes every step a struggle. The wind up here is unbelievably strong. We measured it at speeds of about 16 meters per second—that's like a small storm blowing constantly! Just standing up is hard, and putting up our tents to create a shelter is a real fight against the wind, but we managed to get them up safely. The water flowing from the melting glacier is fast and powerful. It's so high and rapid that it's dangerous and difficult to cross. we built a two-bund (two-barrier) section to cross safely and to put instruments in but building these structures in high flow water was hard. The glacier surface is often like polished glass, very glossy and slippery. Without special equipment, it's impossible to stand. Other times, the surface is covered in 1 to 2 feet of soft snow, which makes trekking extremely slow and exhausting. The biggest fear is what is hidden underneath the snow. Sometimes, streams of meltwater run on top of the glacier but are completely hidden by the snow, making them a surprise hazard. Worst of all are the crevasses—deep cracks in the ice that are covered and disguised by fresh snow. We have to be extremely careful to avoid falling into these dangerous, hidden gaps. The weather in this valley changes instantly. It's a very unpredictable micro-climate. One moment it can be clear, and the next we can be hit by a sudden snowstorm, thunder, or hailstorm. These sudden, intense storms and the extreme cold pose a real risk, including the danger of frostbite, which can seriously injure our hands and feet. Despite all these enormous challenges, the thin air, the brutal wind, the fast water, the slippery ice, and the unpredictable storms, our team is deeply dedicated and motivated. We established one of the highest hydro-meteorological station (~5600m asl) a major step toward understanding our high-altitude water sources. We are also conducting research on one of the highest glaciers in the region, where in-situ measurements are being carried out at ~5,700 m asl- to 6100 m asl. We are doing this demanding work to collect crucial information from the heart of the mountains. This data will help us all understand our water resources better, so we can prepare and build a better, safer future for the generations to come.

Our temporary home at 5,600 meters from the Rulung Glacier. Battling thin air, strong winds, and sudden snowfall, the team remains focused on setting up the world's highest

hydro-meteorological station. Every cold day brings us closer to understanding our future water resources. The ice here is so slick and glassy it's almost impossible to stand. It's beautiful, but challenging fieldwork demands extreme caution with every step.

The weather here changes in an instant. One moment, we're trekking; the next, we're working in a full-blown snowstorm. Despite the freezing temperatures and low visibility, essential measurements must be taken. This is what in-situ monitoring looks like high in the Himalayas! Trekking through fresh snow on the glacier. It looks soft but beneath can be anything from solid ice to hidden dangers. Focus and teamwork are essential. The meltwater stream from the Rulung Glacier is often very high and fast, making it difficult and dangerous to cross. Here, the team relies on strong teamwork.



हिमालय की वेदना

पर्णिका गुप्ता, मुख्यालय

मैं शिखरों पर खड़ा हूँ अब भी, जग का प्रहरी कहलाता
जीवनदायिनी नदियों से, हर घाटी को सींचता जाता
पर आज कहूँ मैं अपनी पीड़ा, तुम सुनो ध्यान लगाकर
मानव ने मेरे तन मन को, जला दिया लोभ में आकर
हे गिरिराज क्यों व्याकुल हो, क्यों इतनी भारी पीर?
तुम्हारे शीतल शिखरों में, क्यों बहते अश्रु नीर?
क्या मानव इतना निर्दयी है, जो घर को तोड़ रहा
अपने ही पालनहार का, अस्तित्व मोड़ रहा
सुनो कवि, सुनो मेरी कथा, सुनो मेरी यह बात।
कंक्रीट और सुरंगो ने छीनी, मेरी हरियाली की याद।
पर्यटन का भारी बोझ, चीर गया हर घाटी को।
सड़क चौड़ीकरण की यह भूख, तोड़ गई मेरी छाती को।
कभी मंदिरों से गूँजता था, मंत्रों का मधुर गान
अब पर्यटकों के शोर ने छीने, मेरे पावन धाम
ग्लेशियर पिघलते रोते हैं, झीलें बनती विकराल
बदल फट कर बहा ले जाते, गाँव नगर बेहाल
प्लास्टिक कंक्रीट के बोझ तले, मैं साँस न ले पाता हूँ
तुम्हारे विकास के मोह में, मैं टूटता जाता हूँ
वनाग्नि ने राख बना दी, शताब्दियों की छाँव
भूकंप की थरथराहट से, हिलते हैं मेरे गाँव
मानव ने बदल दी जलवायु, बिगड़ गया संतुलन
हर साल नई विपत्ती लेकर, आता है अब सावन
हे मानव तू ज्ञान की खोज में, मेरे द्वारा आता है।
कभी शिखरों पर कभी घाटियों में, आँकड़े जुटाता है।
पर क्या तुझे आभास नहीं, तेरे शोध की अंधी दौड़
मेरे तन मन पर छोड़ रही, असंख्य गहरे घाव और चोट
प्रयोगशाला से पहले ही, तू मुझ पर बोझ बढ़ाता है
कभी प्लास्टिक, कभी धातु, अपशिष्ट यहीं छोड़ जाता है।
पर मैं तो सत्य का साधक हूँ, क्यों रोते हो पर्वत राज
मेरे शोध से ही समझेगा जग, पर्यावरण को आज
मैं तो संरक्षण की भाषा लाऊँ, नई नीतियां गढ़ दूँ
फिर क्यों मुझसे शिकायत करते, क्यों आहत है तू

हे शोधक

पर्णिका गुप्ता, मुख्यालय

हे शोधक

ईरादा तेरा पावन है, पर साधन दोषपूर्ण
ज्ञान की खोज में हो गया, दृष्टीकोण शून्य
नई नई परियोजनाएं बनती, पर क्रियान्वयन अधूरा
संवेदनहीन विधियां लेकर, बनता है मजबूर
कितनी बार तू अनावश्यक वनस्पतियां उखाड़ लाता
प्रजातियों का संतुलन तोड़, खाली आँकड़े बाँध जाता
सम्मेलनों में चमक दिखाने, पर्वतों को बेच आता
मेरी नदियों, मेरी मिट्टी में, प्रयोगों का जहर मिलाता
प्यासे हैं गाँव पहाड़, पर चिंता किसी को नहीं
जल अमृत बह निकला हाथ से, पर आह भी उठी कहीं नहीं
मेरे वनों में जो गूँजते थे, पंछियों के गीत
अब वहाँ सन्नाटा है, छिन गया हर संगीत
औषधियां, पुष्प दुर्लभ वृक्ष, सब हो रहे लुप्त
मानव की अंधी दौड़ में जीवन हो गया सुप्त
अगर बदल जाए तेरी सोच, संवेदनशील हो विधियां
तो शोध वही जो दे संतुलन, प्रकृति को कर सुरक्षित
सत्य वही जो बाँटे जीवन, हर प्राणी को कर समर्पित
अब से मैं प्रण यह लेता हूँ, तेरे आँसू पोछूंगा
प्रकृति सम्मत पद्धतियों से ही, अनुसंधान करूंगा
न रहेगा अब दिखावा कोई, न होगा व्यर्थ विनाश
तेरे चरणों में बस रचूंगा, सतत विकास का प्रयास
सतत विकास का प्रयास



कागज की नाव

मनोज बोहरा, मुख्यालय

क्या मुझे याद है अपना गांव?
वो चढ़ाई,
वो टेढ़े-मेढ़े रास्ते,
वो नदी,
वो बरसों पुराना पुल—

जिस पर खड़े होकर
हम फेंकते थे कागज की नावें,
इस उम्मीद से
कि वो पार करेगी पहाड़,
और पहुंचेगी उन मैदानों तक,
जहां सब जाते हैं —
पैसा कमाने,
जिंदगी बनाने।

मैं भी उतरा था
उसी नाव के साथ—
पैसा कमाने,
जिंदगी बनाने।
पैसा कमाया —बहुत कमाया,
पर जिंदगी...
वो तो रह गई
उसी पहाड़ के गांव में।

बरसों बीत गए—
नहीं गया वहां,
नहीं पता
जाने-पहचाने चेहरे
अब कहाँ हैं, कैसे हैं।

वो पेड़, वो आंगन, वो खेत
जिनमें कभी हम खेलते थे—
अब न जाने कैसे दिखते होंगे।
मंदिर के वो विशालकाय देवदार,
क्या अब भी उतने ही विशाल होंगे?

अब गांव जाऊं तो कैसा होगा?
कोई पहचानेगा?
कोई बात करेगा?
मुझे तो अपनी भाषा भी याद नहीं।
इतने सालों बाद
अगर कोई पूछेगा—
तो क्या जवाब दूंगा?

पर चाहे कितने भी सवाल हों,
मैं जाऊंगा।
और जरूर जाऊंगा —

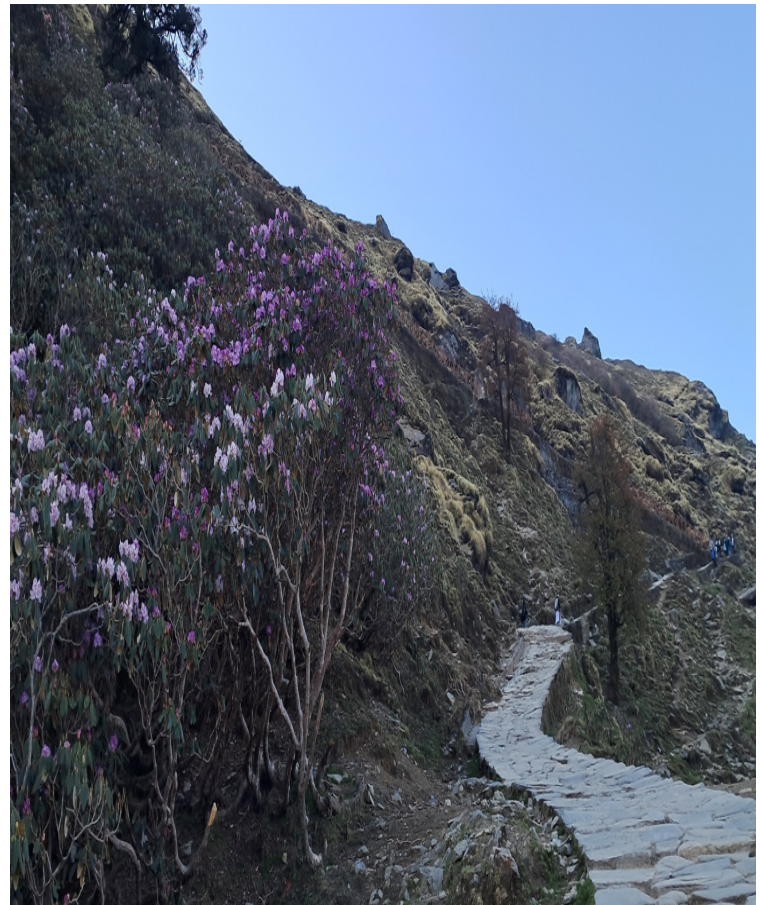
अपने गांव,
अपने घर,
जहां रहते हैं
मेरे कुछ अपने,

जहां हैं
मेरे कुछ अपनों की यादें।

जहां का आंगन
अब भी कर रहा है इंतजार,
कि कोई अपना फिर से रहे —

फिर से वो घर जगमगाए,
वो खेत लहलहाएं,
और मैं फिर देख सकूँ
महसूस कर सकूँ
मंदिर के वही विशालकाय देवदार।

फिर से चल सकूँ
उन पहाड़ी, टेढ़े-मेढ़े रास्तों पर,
छू सकूँ नदी के ठंडे पानी को,
चल सकूँ उसी पुराने पुल पर—
और देखूँ
बच्चे कागज की नाव लिए,
उम्मीद से भरे,
पहाड़ों के पार जाने को तैयार।



Delhi's Smog Extends to the Himalaya: Emerging Concern

Archana Bawari, HQ

The worsening air quality across northern India is now extending far beyond the Indo-Gangetic Plains (IGP), affecting even the Himalayan foothills. Recent observations from Katarmal, Almora, revealed that the haze typically restricted to Delhi and nearby regions has reached higher altitudes, raising serious environmental and health concerns. During the peak pollution phase of the last winter, particulate matter (PM) concentrations showed a marked rise at Katarmal. PM_{2.5} levels increased by over 20% within two weeks, while PM₁₀ concentrations nearly doubled, indicating a persistent pollution episode. Even after a brief decline, PM₁₀ remained close to 110 $\mu\text{g m}^{-3}$, and PM_{2.5} exceeded 94 $\mu\text{g m}^{-3}$, well above permissible limits. Our analysis, along with other scientific observations attribute this to the long-range transport of pollutants from the IGP, compounded by stable winter meteorological conditions that hinder dispersion. October cluster-weighted trajectory analysis at Katarmal confirmed significant contributions from the IGP. Although crop-residue burning was lower than in preceding years, secondary aerosol formation through atmospheric chemical reactions and emissions from vehicles and industries played a major role. Fine particulate matter can penetrate deep into the lungs and bloodstream, posing significant risks to human health. Prolonged exposure poses a serious threat to the fragile Himalayan ecosystem, emphasizing the urgent need for coordinated airshed management, as pollution extends beyond geographical boundaries.

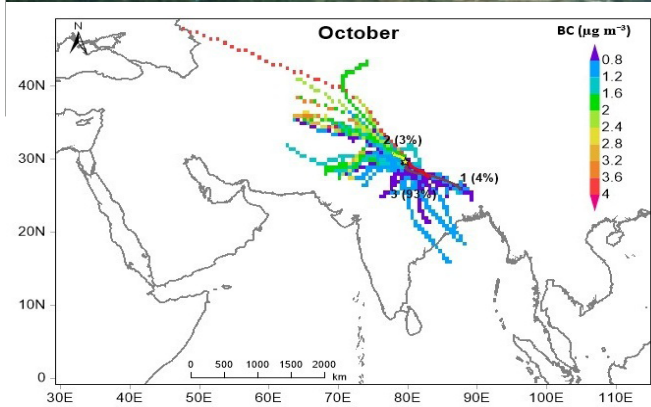


Fig. 1. Hazy view of Almora, Uttarakhand, on 30th October 2025 (left). The accompanying HYSPLIT-based Concentration Weighted Trajectory map for October (right) depicts dominant long-range transport pathways of black carbon (BC, $\mu\text{g m}^{-3}$) from the Indo-Gangetic Plains

Bridging Mountains and Minds: Indo-UK Academic Exchange on Environmental Sustainability and Climate Resilience

Nidhi Kanwar, HQ

The Centre for Environmental Assessment & Climate Change (CEA & CC, NIHE), Almora, hosted an enriching week-long academic exchange programme from 9–16 June 2025 for seven students from the University of Cumbria (UoC), UK, under the Turing Scheme. The programme served as a dynamic platform for cross-cultural learning and scientific dialogue, focusing on environmental sustainability, climate change, and the unique ecological challenges of the Indian Himalayan Region (IHR). Over the following days, the UoC students participated in a series of lectures, interactive sessions, and hands-on demonstrations covering diverse themes such as dendrochronology, air pollution monitoring, biodiversity conservation, and rural technological innovations. Visits to the Rural Technology Centre (RTC) and Suryakunj biodiversity site provided experiential insights into bio-briquetting, pine needle utilization, integrated fish farming, and medicinal plant cultivation. In addition, UoC students explored advanced research facilities, including the 3D Lab, meteorological and aerosol laboratories, among other things. UoC students also interacted with experts working on carbon sequestration, ecosystem modelling, and disaster resilience. Discussions on climate change and natural hazards in the Himalaya offered them a mountain perspective on sustainability challenges and adaptive research strategies. The programme concluded with an interactive debriefing session, where students shared their experiences and expressed appreciation for the institute's hospitality and scientific exposure. Ethan Baxter said "Being part of a such programme helped in developing his research awareness. It brought home to me the real-world importance. Katie MacDonald said "it has taught me about interdisciplinary nature of environment- society challenges and has overall, an unforgettable experience. Both NIHE and UoC representatives highlighted the success of the collaboration in nurturing interdisciplinary research, innovation, and long-term academic partnerships.



The Golden Bush of the Himalaya: Telling the Secrets of Sea Buckthorn

Pankaj Pratap Singh, HQ

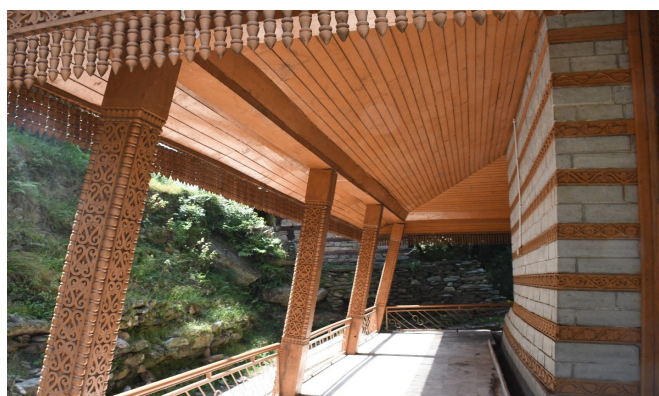
High in the cold, wind-swept valleys of the Himalayas, where snow, stone, and silence shape life, grows a remarkable plant (Sea Buckthorn (*Hippophae* spp.)), whose berries gleam like drops of sunlight. To the mountain people, it is more than a plant; it is a healer, a protector, and a symbol of endurance. During my field surveys across Uttarakhand and Ladakh, I discovered how deeply rooted this plant is in local culture. In Uttarakhand, it is called Chuk, Amesh, or Badri berry. Villagers distinguish its two main species - *Hippophae salicifolia*, the tall, spineless Bhogdiyari Chuk, and *H. rhamnoides*, the hardy, spiny Turu Chuk. In Ladakh, it is lovingly known as Chesta Lulu or Leh berry. These traditional names reflect a profound ecological understanding, passed down through generations of Himalayan residents. The therapeutic use of Sea Buckthorn dates back to the 4th century BC in Greece, where it enhanced horse vitality. Ancient Vedic texts (1500–500 BC) and Tibetan medical manuscripts (618–907 AD) also praise its healing powers. Once valued for animal strength, it soon became a trusted remedy for wound healing, skin renewal, and immunity, earning the title Gold Mine of Cold Deserts. Modern science confirms this ancient wisdom. Sea Buckthorn is rich in over 190 bioactive compounds, including vitamin C (52–896 mg/100 g), vitamin E (up to 15 mg/100 g), and vitamin A (432 IU/100 g), far exceeding most fruits. Packed with carotenoids (30–40 mg/100 g) and rare omega-7 fatty acids, it supports skin health, heart function, and immunity, earning its name as a modern-day Sanjeevani. During my doctoral research at the Forest Research Institute, Dehradun, and NIHE, Almora, I explored how environment and altitude shape the chemistry of Sea Buckthorn across Uttarakhand and Ladakh. Ecologically, this hardy shrub is a true guardian of the Himalaya; its nitrogen-fixing roots stabilize fragile slopes, prevent erosion, and enrich barren soils. During my first field visit to Munsyari, I found Sea Buckthorn as a tall, gentle tree with broad, spineless leaves. But in Leh Ladakh, it appeared transformed into a tough, thorny bush battling the icy winds. These contrasting forms revealed the two Himalayan species, *Hippophae salicifolia* of Uttarakhand and *H. rhamnoides* of Ladakh, each a master of adaptation. In every thorn and berry lies a story of resilience, a reminder that even in the harshest cold, life finds a way to heal and flourish.



Impacts of Heavy Rainfall on the Livelihoods and Heritage of Locals- A Case Study of Bagan Village, Kullu, H.P

Neha Thakur, HRC

The village of Bagan, situated at latitude 31°57'4.61" N and longitude 77°5'9.53" in the Lug Valley of Kullu district, Himachal Pradesh, underwent significant ground subsidence and landslides induced by the intense and persistent rainfall on August 25-26, 2025. These occurrences inflicted significant harm on infrastructure and livelihoods. Land subsidence of 1 to 1.5 meters was recorded during the field survey. Twenty-three dwellings were completely destroyed, and sixty-seven were partially damaged, in addition to nine cow sheds. Both pucca and kutcha constructions were impacted, however the majority of residences were built from cement and bricks. Critical infrastructure including roadways, water supply systems, electrical connections, and mobile telecommunications, were compromised. The reduction of horticultural land including *Diospyros kaki* (Persimmon) and *Malus domestica* (Apple) substantially affected the economic foundation of local inhabitants, majority of whom rely on daily wage labor, agricultural and horticultural revenue. The temple of Ajay Pal Devta, integral to the community's social and spiritual life, sustained significant damage, representing a cultural loss. Currently, displaced households reside in rented accommodations, the homes of relatives, or the local school in Bagan at night, as stated by the village Pradhan during an interview conducted by NIHE Regional Center at Mohal, Kullu. Due to active ground movement and vicinity to Jonga stream, migration to safer areas has been recommended, as even light rainfall in the area induces recurrent instability, presenting significant future hazards.



A Green and Sustainable Approach for Extracting Plant Bioactive Compounds Using Natural Deep Eutectic Solvents

Basant Singh, HQ

Extraction is a fundamental and crucial step in both the chemical analysis of plant materials and the formulation of herbal products, as it converts plant raw material into a suitable form for processing. Over the past several decades, volatile organic solvents have been widely employed for the extraction and isolation of bioactive compounds, which are extensively utilized in the food, pharmaceutical, nutraceutical, and cosmetic industries. Commonly used solvents (i.e., methanol, ethanol, ethyl acetate, acetone, and petroleum ether) pose concerns due to their flammability, toxicity, volatility, and negative environmental impacts. The hazardous nature of such solvents was tragically highlighted by the death of Indian chemist, who reportedly succumbed to methanol inhalation at Deccan Remedies Limited (Source: The Hindu; News on 08 September 2025). Therefore, replacing these conventional organic solvents with sustainable and environmentally friendly alternatives has become a major challenge for both biorefineries and the chemical industry.

In response to these challenges, Natural Deep Eutectic Solvents (NADESS) have emerged as a promising new class of green solvents, exhibiting excellent extraction efficiency and environmental compatibility. NADESS are typically composed of non-ionic natural compounds such as organic acids (i.e., citric acid, lactic acid, malic acid, tartaric acid, oxalic acid, succinic acid, etc.), amino acids (i.e., glycine, proline, alanine, leucine, etc.), and sugars (i.e., glucose, fructose, sucrose, maltose, etc.). When mixed in defined stoichiometric ratios, these components form a eutectic liquid mixture at room temperature. The formation of NADES solvents is mainly attributed to colligative properties, particularly the depression in freezing point. Interestingly, the melting point of the eutectic mixture is much lower than that of its individual components. For example, while tartaric acid and glycerol have melting points of approximately 170 °C and 18 °C, respectively, their combination in a 1:1 molar ratio result in the formation of a clear, viscous liquid at room temperature ($\approx 25\text{ }^{\circ}\text{C}$). Because their constituent compounds are naturally occurring metabolites already present within plant cells, NADESS are recognized as next-generation green solvents. The extraction efficacy of various prepared NADES (10 types) was tested for the extraction of berberine alkaloids from *Thalictrum foliolosum* (locally known as Mameera) and compared with conventional solvents (methanol, ethanol, & water). Results emphasized that, NADES such as tartaric acid with glycerol (8.827 mg/g DW) and ethylene glycol (8.28 mg/g DW) produced higher yield than with traditional organic solvents, i.e., ethanol (6.63 mg/g DW) and methanol (6.19 mg/g DW). Also, the obtained yield was threefold higher than sugar-based NADES [citric acid with glucose ($3.01 \pm 0.16\text{ mg/g DW}$)] and distilled water (3.40 mg/g DW). The comparison between the conventional solvents and NADES was drawn in Figure 1. Overall, the findings suggest that NADES can serve as a sustainable, safe, and environmentally friendly alternative for the green extraction of bioactive compounds from plant materials.

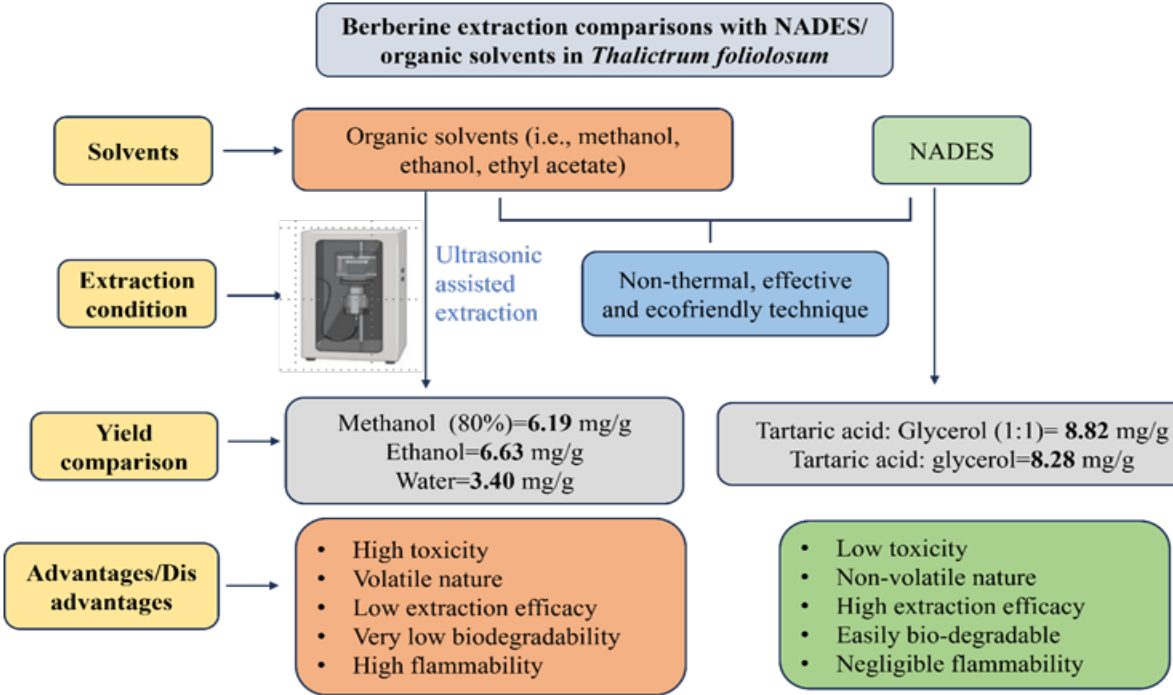


Fig. 1. Comparative analysis of berberine extraction from *Thalictrum foliolosum* using Natural Deep Eutectic Solvents (NADES) and conventional organic solvents

Aipan art

Ritika Gupta & Pooja Bisht, HQ

Name of the Painting: Aipan art
Origin and Significance: Aipan art has roots in the Kumaon region and flourished during the Chand dynasty. Its name is derived from the Sanskrit word "Arpan", meaning to offer or to present. The art is used for a variety of purposes, from celebrating joy to commemorating solemn events.
Creation process: A red base is prepared using geru (ochre mud). A white paste, known as bisvar, is made by grinding cooked rice with water. Women typically use their fore, ring, and middle fingers to draw the designs freehand, often on floors and walls.
Motifs and symbolism: Designs are inspired by both religion and nature. Common motifs include the swastika, footprints representing Goddess Lakshmi, and various geometric patterns. While traditionally found on household floors and walls, Aipan art is now also seen on clothing and daily objects.



Science says about science

I am not silly, I am not Mad

I am knowledge, I am fad

I am everywhere in nature

No one can feel me without reason

It knows a real discoverer

I am logical, I have sequence of miracle

I have technology, I have data

Thoda or search karne mai kuch nhi jata

I am innovation, I am indication

Without me you cannot start any implementation

I have growth, I have initiation

I just act like a medication

If you want to do live with me genuinely

You have to do everything practically

I am dynamic, I am in each house

You have to decide, what is your choice

I am the Science, I am the Science



Forest disturbances and socio-cultural practices in Indian Himalayan Region: The two sides of a coin

Sunita Bisht, HQ

Human can serve as both agents of degradation and protectors of nature; the difference lies in their level of awareness and guidance. The article highlights the two sides of the same coin on one hand, the disturbances and pressures threatening the survival of valuable plant species, and on the other, the traditional beliefs and socio-cultural practices that have contributed to their protection, proliferation, and continued existence. Discussions about the harm faced by nature often point to human self-interest, which leads to the destruction of valuable forest resources. Although illegal logging has long been banned, violators continue to engage in such activities in the Indian Himalayan Region. Visible evidence of such activities can still be found in forest areas of the Indian Himalayan Region, reflecting ongoing pressures on ecologically sensitive ecosystems. Just like a criminal hides evidence of a crime, the same is found to be happening in forests. When people cut down valuable trees illegally, they often try to hide the remains by burning them or covering them with dried leaves and grass to keep the damage hidden from sight. Many trees have been severely damaged by deep incisions on the stems of *Pinus* species for resin extraction. In several regions, the leaves of *Taxus* which is a source of anti-cancer compounds are being illegally harvested and sold, posing a serious threat to the species survival. As the saying goes, the hands that protect are nobler than those that harm, a thought reflected in the socio-cultural traditions that sustain our floral diversity. India is a country where people have deeply intertwined their culture, religion, and beliefs with nature worshipping plants, animals, mountains, rivers, and land as sacred entities. The socio-cultural traditions of tribal and indigenous communities have played a crucial role in the protection of biodiversity and the sustainable management of natural resources. A significant example of this is the practice of associating trees or forest patches with local deities, forming sacred groves that discourage exploitation and help maintain genetic diversity. The Mawphlang Sacred Grove in Meghalaya exemplifies such community-led conservation, where the Khasi people not only safeguard ancient, well-flourished trees but also promote eco-tourism that supports their livelihoods. Similarly, in the Mukhla Sacred Grove, strong cultural beliefs ensure the protection of forest patches harboring old and majestic trees. The concept of sacred groves highlights how traditional beliefs and community stewardship contribute to conserving valuable plant species in their natural habitats, while simultaneously enhancing the well-being of local communities. India has a rich tradition of worshipping not only deities within temples but also the plants associated with them. As a result, many ancient and massive trees can still be found thriving across the country. The ancient *Cedrus deodara* trees at the Jageshwar Temple in Almora are revered as the embodiment of Lord Shiva and Goddess Parvati in their Ardhanarishvara form. The Indian Himalayan Region is home to numerous sites where the cultural values and traditional practices of local communities have allowed floristic diversity to flourish in its natural setting.

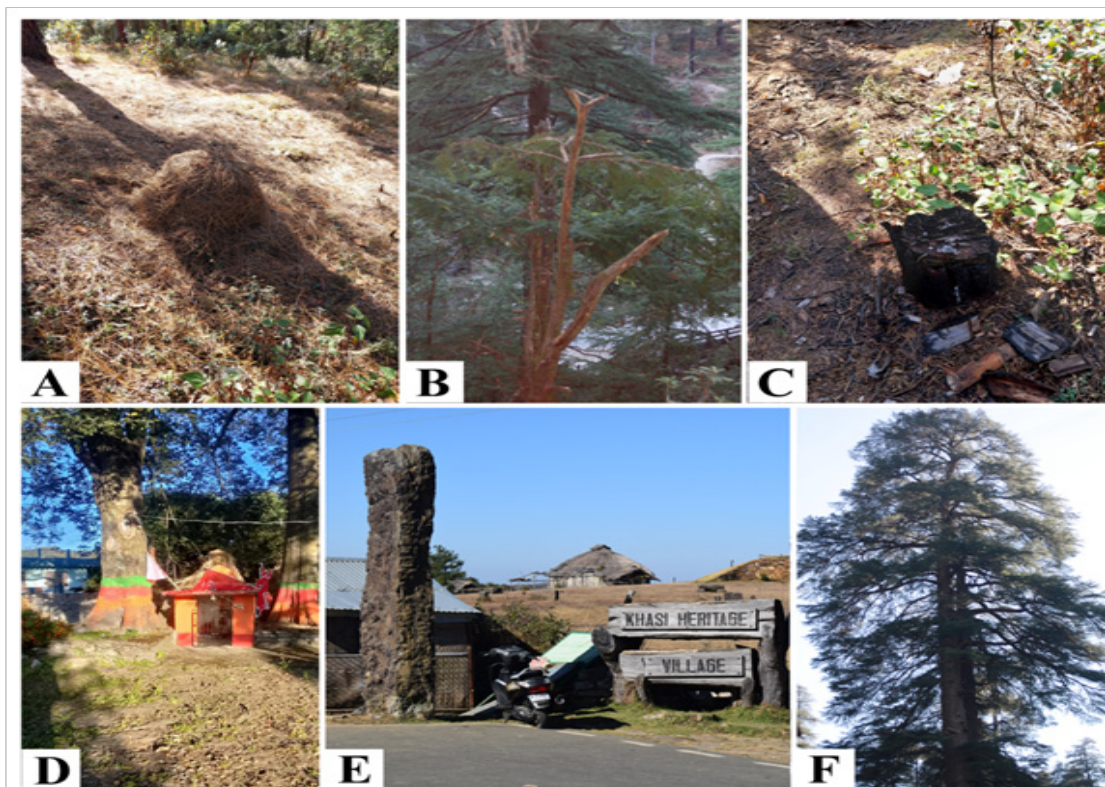


Fig.1. A- *Cedrus deodara* stump covered with dried needles of *Pinus*, B- Damaged tree of *Taxus* after removal of leaves, C- Half burned tree stump, D- Worshipped tree and temple, E- Mawphlang sacred grove maintained by Khasi heritage village people, F- *Cedrus deodara* tree at Jageshwar Temple, Almora.

In the Heart of the People: Reflections on Community-Based Research

Jhony Lepcha, SRC

For over a decade, my work has focused on community-based projects spanning diverse landscapes and cultures. When I first began, I imagined community interactions to be warm, easy, and exciting. They were exciting, sometimes heart-touching and inspiring, but never truly easy. “This blog attempts to capture the lessons, observations, and realizations gathered throughout this journey. It is not a guideline, it is simply a story about people, relationships, and learning together.”

Entering the Community Space

The first truth I learned was simple: “You cannot work with a community without first understanding the community.” Before walking into a village with questionnaires, one must take time to understand social & cultural foundations, economic realities, local beliefs and practices, and community dynamics. And above all, their language. Language is more than just words; it is emotion. When you speak their language, you connect with their hearts. And once trust is earned, everything else becomes easier.

Communities are Knowledge Libraries

Communities, especially those deeply connected with nature, are living sources of knowledge. Their understanding of local ecology, crops, soil, climate, and surroundings often outruns scientific literature.

The First Field Test

My first opportunity to lead a participatory or community-based study came on 20th September 2015, in communities across Ribdi-Bhareng, Bandapani, Dzongu, and other places across Khangchendzonga Landscape. Only then did I realize the real nature of community research. Theory gave me confidence, but reality gave me humility. Every community required a different approach. Tools and techniques changed with geography, culture, local expectations, and social behavior. It was a thrilling yet overwhelming experience that shaped my future work.

Walking the Talk

Trust is the real currency in community-based work. That trust is earned only when we do what we promise, we avoid exaggeration, and we communicate honestly. Over-claiming or making empty promises can destroy years of effort. Communities value sincerity over sophistication.

When Science Meets Tradition

Years of working in the field strengthened my belief that the most meaningful progress happens when scientific knowledge meets indigenous wisdom. We successfully integrated community knowledge with scientific methods to generate context relevant insights. This work was a true partnership where traditional practices and scientific tools complemented each other. Such collaborations do not just generate data, they empower communities and enrich science.

What a Decade Has Taught Me

Reflecting on over ten years of field involvement, a few truths stand out: communities are the real experts of their environment, language & empathy are more powerful than any tool, every community is different, no single approach works everywhere, knowledge flows both ways, we learn as much as we teach, and the best outcomes come from

partnership, not persuasion. Working with communities is not just research; it is relationship-building, emotion sharing, mutual growth, and co-learning. But accessing this knowledge is not automatic. Gathering information from communities requires time, patience, trust, tools, and above all, mutual respect. Community-based research is fascinating, yet incredibly demanding. Every village and every household is a unique ecosystem with its own internal logic and information. My First Encounter With PRA

My structured journey into participatory approaches began on 5th August 2015 in Haa, Bhutan, where I received hands-on training in Participatory Rural Appraisal (PRA) under the guidance of various experts, supported by ICIMOD, Nepal. That training transformed the way I looked at communities. PRA is not merely a method; it is a philosophy. The training emphasized that listening is more powerful than talking, respect builds collaboration, and kindness builds confidence. These foundational principles deeply shaped my approach to community engagement and remain among the most valuable outcomes of my learning experience. At the time, all this knowledge felt exciting yet theoretical. I had no idea how challenging its practical implementation would be.

A Bittersweet Journey

My decade-long journey has been emotional, difficult, joyful, and transformative. It has shaped my thoughts, values, and understanding of society. Community engagement is bittersweet, filled with challenges and triumphs. But when people trust you, open their homes, and share their stories, all the struggles seem worthwhile. To many, community-based research is just another field activity. To me, it has been a journey of learning, unlearning, reflection, and growth. It taught me that meaningful research begins not with methods but with empathy. As I continue this path, I carry a simple promise, to keep learning from the people who live closest to the land we all share.



Whispers of the Mountains: My First Field Visit to Darma Valley

Srijina Bisht, HQ

Last year, in the month of December, a project tour was conducted to the serene Darma Valley for collecting plant samples, discovering the richness of traditional culture, documenting local dishes and understanding the challenges faced by localities in cultivation. The roads were narrow and winding, taking us through the Himalayas leading to Darma Valley, a remote corner of Dharchula. It was my first field visit as a young professional, a project meant to study migration and traditional livelihoods but it turned out to be a much more meaningful experience than just research. The valley, near the Indo-Nepal border, covered with the long pine trees. Here, life flows at its own slow pace, determined by the altitude, the weather, and the traditional ways. The local food reflects the purity and resilience of mountain life. Locals mostly rely on what they grow, finger millet, buckwheat, barley, and potatoes form their staple diet. One interesting practice is drying potatoes to preserve them for the long winters; these dried potatoes are later rehydrated and cooked into vegetables. Warm rotis made from ragi or buckwheat flour are often served with chutney made of timur, a tangy Himalayan pepper. During the cold months, people drink tea brewed with sea buckthorn berries or herbal infusions of jatamansi to stay warm and healthy. Their meals are simple yet nourishing, often cooked over wood fires. Soups made with wild greens, nettles, and local herbs are common, offering strength in the freezing climate. During the harsh winters, families often migrate to lower regions, due to limited access to resources, difficulty in growing crops and maintaining livestock. They return to the valley when the snow melts in summer to resume farming and other activities. The people's simplicity, their quiet strength, and the way they honored the land left a deep imprint on me. During the trip, I collected several interesting plant samples, including *Phaseolus vulgaris*, *Valeriana jatamansi*, *Allium stracheyi*, *Fagopyrum esculentum*, *Fagopyrum tataricum*, *Carum carvi*, *Picrorhiza kurroa*, and *Brassica juncea*. Each plant carried a story of survival, adaptation, and use whether for food, medicine, or local trade. By the end of the visit, I understood that research here was not just about collecting data. It was about experiencing a way of life and seeing the world through the eyes of a community that lives in harmony with nature. The journey was eye-opening and deeply meaningful, leaving a lasting impact on me both as a researcher and as a person.



Journey into the Glaciers of Darma Valley Pithoragarh

Saurav Singh, HQ

Some stories are written in ink, others in stone but glaciers write their tales in ice, one frozen layer at a time. My own journey with glaciers began not only in the heart of Darma Valley, but also, years earlier, when I first stood at the snout of the Pindari glacier in Bageshwar. The crushing silence of that landscape, broken only by the roar of streams bursting from under the ice, left me spellbound. Later, treks to Namik glacier in Pithoragarh and Thajwas glacier in Jammu & Kashmir deepened that fascination. Each visit was a reminder of both grandeur and fragility, a paradox etched into the Himalayan ice. That passion eventually shaped my choices. In 2022, I enrolled in a Mountaineering course, determined to understand the skills not just of trekking, but of truly “living with the mountains”. I didn't know then that within a year, hobby and profession would collide. When I joined the NMHS-funded project “Assessment of Glacier-Climate Functional Relationships across the Indian Himalayan Region through Long-Term Network Observations” in 2023, my journey turned from personal exploration into scientific purpose. Under the leadership of Dr. Ashutosh Tiwari (PI) and the guidance of Er. Mahendra Singh Lodhi (Centre Head, CLWRM), I stepped into a role where curiosity could become contribution. The Darma valley is not a place you simply visit but you earn it, step by step. Our ten-day expedition began where pine dark forests still whispered of civilization and ended where only rock, ice, and prayer flags stood guard. The villages of Baling and Dantu greeted us like gates to another world. Their wooden homes clung stubbornly to the slopes, children ran alongside our path, and elders wrinkled in years paused to offer ‘Namaste’ with the kind of warmth you rarely find outside the Himalayas. Behind them loomed the Panchachuli peaks, five snow-capped sentinels guiding us as we marched higher. Each bend of the trail stripped away a layer of comfort and replaced it with something rawer: the air thinning, silence deepening, and a sense of scale so enormous that it humbled every human ambition. Expeditions survive on teamwork. Science may have been the reason we came, but camaraderie was what pushed us forward each day. Arjun Kumar (Field Assistant), ever steady with his brown cap pulled low, was a quit good carrying instruments, setting markers, and never declining despite the pushing altitude. Then there was Dheeraj Tripathi (Field Assistant), quick-witted and quick to smile, whose bright red shirt became an emblem of morale amidst the grey-white landscape. Together, we shared the weight; not just of equipment but of endurance, laughter, and silence. The glaciers may have tested us, but the team ensured we passed. Science gave purpose to this journey, but the Himalaya gave it meaning. At the Chipa glacier snout, standing before ice that had taken centuries to form, I felt both awe and responsibility.

दार्मा घाटी.....

पूजा पांडे, मुख्यालय

Once, holding the national flag with my teammates, the silence of the glacier valley turned into a moment of quiet patriotism; the idea that even in the most remote corners, we carried a bond with the land we belonged to.



Pic. As the first picture unfolds, it brings us face to face with the very snout of the Chipa glacier, the point where ice meets the valley floor. Moving to the second picture, the view widens, revealing the entire stretch of the Chipa glacier valley, capturing its vast expanse and rugged beauty in a single frame.



Pic. It was during one of our field visits to Chipa and Neola glaciers that we paused for a photograph while testing the drone. Standing from the right, I, Sourab Singh, was joined by my colleague Dheeraj Tripathi in a bright red shirt and Arjun Kumar at the far corner with his brown cap pulled low against the glare. Around us stood the rest of the drone team.

हिमालय की गोद में बसता, दरमा घाटी का गाँव,
जहाँ हर सुबह उगाती, उम्मीदों से भरी एक छाँव।
पंचाचूली के साए तले खिलता, प्रकृति का सुंदर
आँगन, जहाँ मिट्टी में बसता है परिश्रम, और हर बीज में
खिलता है एक जीवन।

फाफर, मंडुवा, झंगोराकृये अमूल्य धरोहर अन्न, पहाड़ की
शक्ति, पोषण का भंडार, पहाड़ी जीवन का असली धन।
रंग-बिरंगे राजमा, जटा मांसी-कुटकी की सुगंध, महान,
दर्मा की धरती कहती — "हर ऋतु मैं में रखूँ पहचान।"
समुदायों की परंपराएँ, ज्ञान और अनुभव का अदभुत
संसार, चलते मौसम संग बदलते, पर संस्कृति रहती
अटल हर बार।

पहाड़ों की ठंडी हवा अब यह संदेश सुनाती है, कि
बदलाव की पगडंडी भी मुस्कान दिलाती है।
घाटी आज कह रही है — हम बढ़ रहे हैं, हम खिल रहे
हैं, और अपने सपनों की राह खुद बुन रहे हैं।



दारमा की धरती पर फाफर का गीत.....

अनुराग चौहान, मुख्यालय

दारमा घाटी की सँकरी राहों पर,
जब सुबह धूप सुनहरी खिलती है,
फाफर का खेत अपनी महक से
हवा में एक मीठी याद भर देता है।

पीढ़ियों की थाली में बसा यह दाना,
सिर्फ अनाज नहीं एक संस्कृति है।
कड़वाहट में भी मिठास छिपाए,
यह मौसम की कठिनाई से लड़ना सिखाता है।

जून की मिट्टी में जब बीज बोया जाता,
अक्टूबर तक हर पौधा कहानी बन जाता।
घी से सेना "ज्यादू" हो या सर्द सुबह की रोटी,
हर कौर में पहाड़ का आशीर्वाद मिलता है।

आज जब बदलाव की हवा तेज चली,
तो इसके खेत कुछ खाली से दिखते हैं।
पर गाँव की दादी अब भी कहती
"फाफर खाओ, ताकत पाओ, थकान दूर
भगाओ।

"यह सिर्फ पोषण नहीं, ये विरासत है
मैग्नीशियम, फाइबर, आयरन की मुस्कान लिए।
अब जरूरत है फिर से इसे अपनाने की,
ताकि आने वाली पीढ़ी भी जाने
फाफर सिर्फ फसल नहीं, दारमा का गर्व है।



Restoring Mountain Springs: Ecosystem-Based Approaches for Climate Resilience in the Indian Himalayan Region

Sachin Uniyal, Narendra Parihar & Ravindra K. Joshi, HQ

“In the Himalaya, every drop counts—not only as water, but as the pulse of the mountain ecosystem.” The Indian Himalayan Region (IHR) spans approximately 533,000 km², encompassing 10 mountain states and supporting nearly 50 million people whose livelihoods are intricately linked with the region’s natural resources. Springs, which account for over 60% of rural water supply in the mid- and high-altitude zones, are increasingly drying up due to climate variability, deforestation, and land-use changes. Recent assessments suggest that nearly 50% of perennial springs in the central and eastern Himalaya have shown a decline in discharge, posing serious threats to water security and ecosystem integrity. The degradation of recharge areas, loss of vegetative cover, and erratic rainfall patterns have further compounded the situation. In response, the HI-REAP project — “Scaling Ecosystem-Based Approaches in the Indian Himalayan Region for Climate Adaptation and Biodiversity Resilience” — is working to apply ecosystem-based adaptation (EbA) and springshed management as scientific and community-driven strategies to restore hydrological balance and enhance climate resilience. The project currently operates at three pilot sites representing distinct biophysical and socio-cultural settings:

Pilot Site	State	Primary Focus	Elevation (m asl)	Avg. Annual Rainfall (mm)
Bisra Village	Uttarakhand	Catchment treatment, soil-moisture conservation, spring recharge mapping	1,350	2,100
Bidyang Village	West Bengal (Kalimpong)	Community-based governance, gender inclusion, vegetation restoration	1,500	2,800
Kimin Village	Arunachal Pradesh (Papum Pare)	Integration of traditional ecological knowledge, forest biodiversity monitoring	600	3,200

At the pilot sites, a combination of biophysical and social measures based on ecosystem-based approaches has been introduced to enhance groundwater recharge, improve biodiversity, and strengthen local adaptive capacity. These interventions were designed through participatory planning processes and implemented with active community involvement.

- (i) Degraded slopes in the identified recharge zones have been treated with soil and moisture conservation measures and plantation of native species to promote infiltration and reduce erosion.
- (ii) Checkdams, recharge trenches, and percolation pits have been constructed and maintained to facilitate groundwater recharge and improve the flow of natural springs.
- (iii) Indigenous tree and shrub species have been planted in strategic areas to restore vegetation cover, stabilize slopes, and enhance ecosystem services such as carbon sequestration and soil fertility.

(iv) Local community members, particularly women and youth, have received training on springshed management, water monitoring, and ecosystem-based adaptation. Participatory governance mechanisms have been established to ensure equitable decision-making and long-term maintenance of interventions.

One of the strongest pillars of the project is its participatory governance model. Local committees manage decision-making, maintenance, and data collection, ensuring transparency and ownership. Women have emerged as key custodians of the interventions. In all three sites, they now constitute over 60% of local committee members, taking active roles in spring monitoring, plantation management, and water-use regulation. Their leadership is ensuring that the interventions go beyond environmental gains by promoting social equity and strengthening collective resilience.



A glance of Himachal forests

Pooja Negi, HQ

Nestled within the vibrant ecosystems of Himachal Pradesh, the temperate forests of Kangra and Chamba districts are a treasure trove of biodiversity. Here, towering conifers stand tall alongside resilient broadleaf species, creating a stunning ecological tapestry. These lush landscapes are not just beautiful; they play a vital role in keeping our planet balanced. One of the most striking residents of these forests is the majestic *Cedrus deodara*, or Deodar cedar. With its aromatic wood and impressive height, the Deodar serves as a guardian of the forest, providing habitat for countless wildlife and holding a special place in local culture. However, during my visits to the Deodar forest at Dharamkot, I couldn't help but notice some alarming signs of trouble. The remnants of logging—felled trees and cut logs—were everywhere, a stark reminder of human encroachment. Local residents voiced their concerns, mentioning how temperatures have risen over the past two years, affecting the health of the forest. As one local resident wisely remarked, “We won't protect what we don't care about, and we can't care about what we don't know.” This really struck a chord with me, emphasizing how crucial it is to understand our natural surroundings to foster a sense of stewardship. I was particularly troubled by the lack of seedlings in the area. Many saplings looked flattened at the top, indicating low survival rates. This loss of young trees could have serious implications for the forest's future, compromising its ability to regenerate and thrive. The health of this forest is not just important for its ecological functions; it also supports local tourism, making it vital for the community. Venturing deeper into the region, I explored the mixed broadleaf oak forest at Jyot, where *Quercus leucotricophora*, or the oak tree, shared a different story. The oak leaves were surprisingly small—an unusual sight for a healthy broadleaf species. Surrounding the oaks was a colorful understory filled with rhododendrons and *Lyonia*, creating a lively environment. This led me to wonder: Is the altitude limiting the size of the leaves, or are soil composition and moisture levels playing a role? These questions prompted me to think more deeply about how these trees adapt to their challenging surroundings. Among the conifers, I was captivated by the coexistence of *Cedrus deodara*, *Picea smithiana*, and *Abies pindrow*. Their healthy growth patterns suggest a well-adapted ecosystem where these species thrive together, possibly sharing resources more effectively. This harmonious interaction opens up many questions about how coniferous and broadleaf species compete for resources and what their coexistence tells us about habitat suitability. To dive into these questions, we used scientific methods. Our vegetation analysis spanned various forest types, with ten quadrats set up in each selected site to collect data on species distribution and health. We also conducted detailed soil sampling to assess factors influencing growth, gathering samples from different depths and distances from tree canopies. This approach helped us understand how soil characteristics like nutrient content and moisture levels support these thriving ecosystems.

Of course, the journey wasn't without its challenges. The visible signs of logging and local concerns about climate change complicated our assessments of forest health. Many trees bore the scars of human activity, making it tricky to find suitable specimens for our studies. Additionally, the environmental variability across different sites added complexity to understanding species interactions and adaptations. Each location had its own unique character, shaped by elevation, soil composition, and human impact.

As we wait for laboratory analyses of our collected samples—which will help reveal the physiological traits and overall health of these iconic species—one thing is clear: the temperate forests of Himachal Pradesh are invaluable treasures that deserve our attention and protection. The insights from this research will not only deepen our understanding of these ecosystems but also inform conservation efforts. As Albert Einstein once said, “Look deep into nature, and then you will understand everything better.” This understanding is crucial for fostering effective conservation strategies. Ultimately, this research is a reminder of the interconnectedness of our natural systems. The forests of Himachal Pradesh, with their rich biodiversity and unique climatic conditions, are essential for maintaining ecological integrity. They provide critical habitat for wildlife, contribute to carbon sequestration, and offer invaluable ecosystem services. As we face the pressures of a changing world—evidenced by logging, climate change, and habitat loss—there is an urgent need for proactive measures to protect and restore these unique habitats. In this context, we must promote policies and practices that safeguard these invaluable resources, ensuring that the beauty and ecological functions of these forests endure. By fostering a greater understanding of the intricate relationships within these ecosystems, we can advocate for a future where the crown jewels of our environment continue to thrive, enriching both the landscape and the lives of those who depend on them.



Events and Activities

HIREP Annual review (28-29 Aug. 2025)

Dr. Sanjeev Bucher (Senior Intervention Manager – Springs, ICIMOD, Nepal) visited the Institute's Head Quarter (Almora) and the project pilot site at Bisra village(Almora) to review and evaluate the activities under the ICIMOD's HIREAP Project.



World Ozone day (16 th Sep. 2025): The EIACP Centre on Himalayan Ecology of the Institute organized an interactive session among the students of GGIC Almora Uttarakhand under this year them “Surface Ozone Formation, Sources and Minimization in the Indian Himalaya”.



Wildlife Week celebrations (2-8 Oct. 2025): The institute celebrated Wildlife Week in various schools across Almora Under the theme 'Human-Wildlife Co-existence,' the Institute celebrated Wildlife Week across five schools in Almora district, with 650 students participating in various competitions



New Faces

Mr. Manoj Singh Bohra joined as Young Professional-II in the UNEP TEEB AgriFood supported project titled 'True Value Accounting: Making the Economic Case for Food Systems Transformation in India and Kenya' at GBPNIHE-HQ

Mr. Paras Upadhyaya has joined as Senior Project Fellow in the In-House 03 project titled 'Fostering Socio-Ecological Security and sustainable Bio economy in the Indian Himalayan Region through Community Driven Block chain Governance Models' at GBPNIHE-HQ.

Mr. Deepak Singh Bisht has joined as Field Assistant in the In-House 03 project titled 'Fostering Socio-Ecological Security and sustainable Bio economy in the Indian Himalayan Region through Community Driven Block chain Governance Models' at GBPNIHE-HQ.

Ms. Pooja Pandey has joined as a Junior Project Fellow in the NMHS funded project titled 'Mainstreaming cash generating potential of underutilized crops to enhance food, nutritional and livelihood security in face of change in climate in vibrant villages of Kumaon Himalayas' at GBPNIHE-HQ

Mr. Anurag Kumar Chauhan has joined as a Junior Project Fellow in the NMHS funded project titled 'Mainstreaming cash generating potential of underutilized crops to enhance food, nutritional and livelihood security in face of change in climate in vibrant villages of Kumaon Himalayas' at GBPNIHE-HQ

Mr. Rohan Bhakuni joined as IT officer/GIS Officer in the EIACP Centre on Himalayan Ecology supported by EIACP cell, MoEF&CC Scheme at GBPNIHE-HQ



Awards and Honours

- During the Annual Day function on 10th September 2025 Best Performer 2025 Award was conferred to Dr. Nidhi Kanwar (CEACC), Dr. Amit Bahukhandi (CBCM) and Ms. Priyanaka Lohani (CLWRM) and Er. Ankit Dhanai (GBPNiHE)
- Young Scientist award received in the Third International Multidisciplinary Conference On Aerosols, Air Quality and Climate Change (Imcaac 2025) over the Himalayan Region (Aligned with the Objectives and Themes of Bharat's National Education Policy 2020) during 13th – 15th October 2025 (Archana Bawari, CEA&CC, HQ)
Academic Examination Qualified
 1. Ritika Gupta, Ph.D. Scholar Qualified (Gate 2025) in Environmental Sciences & Engineering
 2. Pankaj Pratap Singh, Ph.D. Scholar- Qualified – NTA UGC NET, 2025 in Environmental Sciences
 Also Qualified CPCB Scientist – 'B' Exam.
- Ms. Himani Tiwari earned a Ph.D. in Botany, and her thesis focused on the 'diversity, distribution, and conservation of endogenous plants in the Indian Himalayan region'.
- Mr. Kamal Singh Rawat has qualified for the CSIR UGC net in Life Sciences.

Conferences attended (last 03 months)

Participated and presented a paper entitled as “Black Carbon Estimation for a Forested Himalayan Site Using Data-Driven Machine Learning Models “ at Third International Multidisciplinary Conference on Aerosols, Air Quality, and Climate Change (Imcaac-2025) Over the Himalayan Region (Aligned with the Objectives and Themes of Bharat's National Education Policy 2020) during 13th–15th October 2025 (Archana Bawari).





About the Institute

About the Institute: G.B. Pant National Institute of Himalayan Environment (NIHE), Kosi-Katarmal, Almora was established in 1988, during the birth centenary year of Bharat Ratna Pt. Govind Ballabh Pant, as an autonomous Institute of the Ministry of Environment, Forest & Climate Change (MoEF&CC), Govt. of India. The institute has been identified as a focal agency to advance scientific knowledge, to evolve integrated management strategies, demonstrate their efficacy for conservation of natural resources, and to ensure environmentally sound development in the entire Indian Himalayan Region (IHR). The Institute follows a multidisciplinary and holistic approach in all its Research and Development programmes with emphasis on interlinking natural and social sciences and particular attention is given to the conservation of fragile mountain ecosystems, indigenous knowledge systems and sustainable use of natural resources. Training, environmental education and awareness to different stakeholders are essential components of all the R&D programmes of the Institute.



Editorial Board

Dr. Ravindra Kumar Joshi, HQ

Dr. Nidhi Kanwar, HQ

Er. Manoj Singh Bohra, HQ

Mr. Paras Upadhaya, HQ

Dr. Neha Thapaliyal, GRC

Ms. Neha Thakur, HRC

Mr. Jhony Lepcha, SRC

Mr. Bishal Kumar Majhi, NERC

Disclaimer:

Contributions are MoRe open from Academicians & Researches for Publications. The articles published in this newsletter are authors own outlook, it does not reflect any view point of the publishing institute or the editorial team that is publishing this Newsletter. The articles have not been checked through any licensed anti plagiarism software.

Special Assistance

Dr. Mahesha Nand & Mr. Kamal Tamta,
EIACP HQ



Copyright ©: 2025, GBPNIHE

G.B. Pant National Institute of Himalayan Environment (NIHE)

(An Autonomous Institute of Ministry of Environment, Forest and Climate Change, Government of India)

Kosi-Katarmal, Almora, Uttarakhand- 263643

(Code +91-5962) 241015 (Office), EPABX: (05962) 241041, 241154 Fax: (05962) 241014, 241150

Email: psdir@gbpihed.nic.in | Website: www.gbpihed.gov.in