Editorial

Mountains are the providers of ecosystem services to nearly half the world's human population. The extreme colder environments of mountains possess several climatic factors that generate stress for life, such as, high exposure to harmful radiation, low nutrient and water availability, desiccation, etc. While these environments harbour a variety of cold adapted plants, animals, and microorganisms, it has also been realized that the climate and land use pattern have enriched biodiversity in the mountain ecosystems. Moreover, mountain ecosystems are known to be rich in endemics.

Next to Polar regions, Himalaya is one of the geographic locations that is recognized as a unique low-temperature environment. Himalaya is referred with highly diverse regions in terms of geographical and biological aspects, including evergreen forests, grass lands, cold deserts, glaciers, lakes, hot springs, etc. Further, the Himalayan mountain ranges offer huge natural resources in the region. These distinct geographic regions have climatic dissimilarities that make the Himalayan region a hot spot of biodiversity. From foothills to the top, these mountain ranges possess unique and highly different biological components.

Extensive studies have been done on the floral and faunal diversity of Himalaya; interestingly in last few decades microbial communities have also come in the frontline research, particularly with respect to the diversity and applications of extremophilic microorganisms. While the biodiversity under low temperature environments contributes to a range of ecosystem services, it is equally important in biotechnology perspective, leading to its applications to Agriculture, Medicine, and Industry. The literature published on Himalayan Biodiversity, emphasize on the prospection of bioresources, including all three categories- plants, animals and microbes. Bioprospection revolves around three major components- the taxonomic and genetic diversity, the discovery of bioactive compounds, and the ability of the organisms to

adapt to a particular set of climatic conditions, for example the colder regions in Himalaya.

In this perspective, in recent research, plant-microbe associations have also been recognized for their contribution in adaptation and survival of the host plants under stressed conditions. The necessity of identification of bioindicators from these ecosystems is also being realized in the growing awareness on climate related issues. Further, in view of the preservation and conservation of these bioresources, judicious measures are being considered by establishing the facilities like the Biodiversity Authorities, the Herbaria, the Gene banks, the Seed banks and the Microbial Culture Collections at State, National, and International levels.

With this context, we organized an International Webinar on Himalayan Biodiversity on August 8th, 2020 at Graphic Era deemed to be University. It aimed to share the knowledge with the researchers working on various aspects related to Mountain Biodiversity, particularly the Himalayan Biodiversity. This will be helpful in designing and formulating the research programs or even writing a PhD synopsis. With this objective we identified the leading Institutes working on various aspects of Himalayan Biodiversity and invited the Eminent Scientists for sharing their views and experience.

The eminent speakers for this webinar were: Dr Eklabya Sharma- Deputy Director General, International Centre for Integrated Mountain development, Kathmandu, Nepal; Dr Dhanajai Mohan, Director- Wild-Life Institute of India, Dehradun, Uttarakhand, India; Dr Sher S Samant, Director- Himalayan Forest Research Institute, Shimla, Himachal Pradesh, India; Dr Ranbeer S Rawal, Director- GB Pant National Institute of Environment, Almora, Uttarakhand, India; and Dr Manju Sundriyal, Senior Scientist- Uttarakhand Science Research and Education Centre, Dehradun, Uttarakhand, India.

We are pleased to compile these five lectures in form of research papers in this special issue "Proceedings of the International Webinar on Himalayan Biodiversity" of Graphic Era University journal. In Paper 1, Dr E Sharma, with his colleague Dr N Chettri, discusses the Biodiversity Conservation and Ecosystem Services in the Hindu Kush Himalaya (HKH). They present the retrospect of their understanding and learnings in the HKH through trans-boundary landscape management and regional cooperation mostly focused on biodiversity conservation and ecosystem services perspectives. It emphasizes on Regional co-operation with further strengthening at the government, civil society, private sector, and community levels. One of the critical factors for achieving some of the aspirations mentioned in the Paper is to have more investment in the HKH region from donors, governments, and the private

sector to ensure the sustainability of the assets while pursuing the larger goals of poverty alleviation, economic development, and overall human wellbeing.

Dr Dhanajai Mohan (Paper 2) shares his experience on Avian diversity in the Himalayas. The high species diversity of the Himalayas is attributed to the species turnover associated with elevational variation in habitat and the variation in species composition along the range. Further he discusses that the diversity of birds in Himalayas is not uniform along it's 2400 km length. Dr Mohan describes the interesting patterns in the diversity gradients along the length and breadth of the Himalayas citing the collaborative research project involving Wildlife Institute of India and University of Chicago, the USA.

Dr SS Samant (Paper 3) suggests the appropriate strategy for the conservation and management of floristic diversity. While presenting the geographic description of Himalaya briefly, the paper elaborates on the enormous diversity of ecosystems and immense biological diversity of the Himalaya which is attributed to its wide range of altitude, rainfall, climate, geological conditions, river systems and topography. It is particularly rich in endemic, medicinal, economically important, multipurpose, rare and endangered plant species. However, the available studies on floristic diversity of IHR are fragmentary and do not provide comprehensive inventory of the regions/states. As a result, it is difficult to develop an appropriate strategy to reach any concrete conclusion. Therefore, it is essential to prepare a comprehensive inventory of the floristic diversity following the authentic nomenclature.

In Paper 4, Dr RS Rawal and his co-authors (Drs VS Negi and ID Bhatt) emphasize on conservation and sustainable utilization of biodiversity to ensure the continuous flow of ecosystem services and goods. The paper also highlights the role of recent pandemic of COVID 19 in increasing the focus of people on bio-resources of the region. It presents a case for the biodiversity in IHR through SWOT (Strength, Weakness, opportunities, and Threats) assessment. Certain cases have been elaborated wherein the outlook has changed to harness the values. It concludes that the Himalayan biodiversity values require due appreciation from the beneficiaries. And in this context, promotion of conservation education is stressed as a way forward.

Dr Manju Sundriyal (Paper 5) addresses an applied issue related to the livelihood of the Himalayan state, Uttarakhand, taking example of Non-Timber Forest Products (NTFPs) as the key global commodities and an important component of International trade. She emphasizes on developing the linkages between NTFPs and poverty reduction properly. The important example in this perspective are the promotion of food crops, rich in proteins and micronutrients that will support the food security and the climate-resilient

ability of communities. Similarly, promotion of medicinal plant sector is important for new drugs and medicines. Besides, bamboo sector also needs a proper strategy for development and marketing.

We are grateful to the distinguished authors and their co-authors for their contribution. The reviewers are also thanked for their time and cooperation.

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