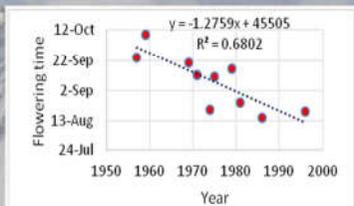


### The Progress made so far:

With the initiation of the work, seven study sites were demarcated and plots were established by physical visit and with consultation with the local authority. Seasonal tours were made to the study site regularly in different flowering season. Till now 15 experimental trips were made to the sites covering in five states of Indian Himalayan states for sampling, monitoring of floral diversity. Both quantitative and qualitative samples were taken from all the sites for flowering as well as not flowering plants. A total of 309 quadrates have been laid in different monitoring plots, in such a way that, it covers maximum habitats and ecological niches in the selected landscape. Altogether, 3279 numbers of plant specimens were collected, of which more than 50% were identified so far. The plots were intended for multiple layer vegetation analysis and for geo-spatial recording. Lichens, soil fungus and algal components were also collected along with associated diatoms to assess the environmental impact on lower plants due to climate change.



Phenological data of more than 4000 species occur in temperate to alpine regions of Himalaya has also been compiled from herbarium sheets. This information is crucial for determining the sensitiveness of plants to any change in its environment in particular to temperature and other energy sources. Therefore, phenological changes are used as an indicator to determine the ecological effect of climate change on flora and fauna and consequently on the whole ecosystem.



A baseline data of plants that occur in entire Himalayas has also been compiled. The data confirms occurrence of 10906 taxa belonging to 2256 genera and 231 families. Besides, the field data of more than 6500 herbarium specimens since one hundred year also been compiled, to analyse, the change in habit, phenology and other characters if any in the last 100 years.

The research findings of the project were published time to time in various International/National Journals of repute. Many of the research outputs were also presented in various seminars/conferences, which include a new species of algae, a new family record to India, several new distributional records, type of forest community structure at different gradient etc. Capacity building workshops were also organized to create a awareness among local mass, students, farmers, NGO, forest officials and all other stallholders, on need for monitoring of biodiversity in Himalaya and their conservation.

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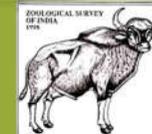
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सत्यमेव जयते

**Biodiversity Assessment through  
Long-term Monitoring Plots in Indian  
Himalayan Landscape**  
under the scheme of  
**National Mission on Himalayan Studies (NMHS),  
MoEF & CC, Govt. of India**



**Biodiversity Assessment through Long-term Monitoring Plots in Indian Himalayan Landscape**

The biodiversity and ecosystem health of Himalaya has been increasingly threatened due to ongoing anthropogenic activities and climate change. Studies have indicated that temperature will continue to increase with high variability in precipitation as a result of climate change. Altitudinal shift of vegetation is observed in many places and is estimated to be 80-200m per decade. Biodiversity of glaciers, snow fields and high altitude zones will be most adversely affected by these changes.

The project "Biodiversity Assessment through Long-term monitoring plots in the Indian Himalayan Landscape" under National Mission on Himalayan Studies program of MoEF & CC, Govt. of India, both Botanical Survey of India & Zoological Survey of India are working on collaboration on a broad thematic group "Conservation and Sustainable use of Biodiversity". The projects proposes to establish long term monitoring plots for assessment of biodiversity in the Indian Himalaya region thereby enabling to address the climate-change-induced impact on the region. The baseline data collected over a period of last 100 years by both the surveys will be compared with the data which are being collected by the researchers of this project presently.



**Objectives of the Project:**

OBJECTIVE OF THE PROJECT	TARGET GROUP/ STAKE HOLDERS	RELEVANCE
To create a geospatial and genetic database on the flora of Himalaya and the climate change-induced impact on floral diversity of the region.	Academic and Institutional Researchers	Knowledge networking
To establish long-term floral diversity monitoring plots across the Himalayan region	Academic and Institutional Researchers	Identification of target localities for research and development activities
To develop long-term monitoring protocols for selected indicator taxa in the region and to develop appropriate methodology for propagation of individual species for conservation.	Academic and Institutional Researchers, Forest Departments	Capacity building towards research and development
To develop local level capacity building among students, teachers and NGO's in long-term monitoring through training programmes and publications for awareness.	Locals, NGOs involved in conservation, Forest Department, State and Central Government	Capacity building towards research and development; grass-root level participation

**Methodology:**

Seven target landscapes of IHR are selected for floristic and ecological assessment. Long term monitoring grids of size 1 km x 1 km are established to document species diversity. The size of plots/quadrats selected for trees are 20 m x 20 m, shrubs 5 m x 5 m, herbs and cryptogams 1 m x 1 m. Species occurring within each plots are collected and assessed both quantitatively and qualitatively for ecological interpretations. The voucher specimens of the plants collected from these regions are being processes and deposited in Central National Herbarium.

IHR STATES	STUDY SITES	BIOGEOGRAPHIC PROVINCE	VEGETATION
Himachal Pradesh	Great Himalayan National Park	Western Himalaya	Broad leaved and coniferous forests, alpine meadows, villages, agriculture, pastures.
Uttarakhand	Valley of Flowers	Western Himalaya	Alpine meadows, villages, agriculture, pastures.
Sikkim	Kyangnosla Alpine Sanctuary	Central Himalaya	Rhododendron, Temperate Broad leaved and coniferous forests, villages, agriculture, pastures.
	Gnathang plateau (East District)	Central Himalaya	Rhododendron, Temperate Broad leaved and coniferous forests, villages, agriculture, pastures.
West Bengal	Neora Valley National Park	Central Himalaya	Subtropical, Broad leaved and coniferous forests, villages, agriculture, pastures
Arunachal Pradesh	Tawang district, Arunachal Pradesh	Eastern Himalaya	Alpine, including Rhododendron, Broad leaved and coniferous temperate forests, village Ecosystems , agriculture, pastures
	Namdapa National Park, Arunachal Pradesh	Eastern Himalaya	Tropical Evergreen to temperate forest, villages agriculture

