

## FLORAL WEALTH OF NUBRA VALLEY: TRANS-HIMALAYAS

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Present paper focuses at the natural wealth of biodiversity in Trans-Himalayas and its conservation. The study reveals that the vegetation of this zone is identified with scattered low bushes, sparsely covered grasslands, herbaceous formation, sedge meadows and stony deserts. In all 400 plant species were recorded, which belong to 52 families and 200 genera. Most of these plants are under the list of Rare, Endangered and Threatened species (RET). The major plant resources in the study area are Medicinal and Aromatic Plants (MAPs). Along with the agricultural crops, a large number of fuel, fodder and multipurpose species are being cultivated for various purposes and have immense conservation significance.

**Keywords :** Biodiversity; Conservation; Endangered; Medicinal; Rare; Threatened species.

### Introduction

The Himalayas represent the largest mountain chain in the world, covering about one million sq. km. 'Himalaya' the youngest mountain range of world is famous for its rich plant diversity and varied ecosystem, containing large number of plants. The Trans-Himalayas of Indian cold desert covers under alpine and high alpine zones with peculiar climatic condition featuring snow covered mountains. The use of plants in curing and healing is as old as man himself<sup>1</sup>. Plants containing beneficial and medicinal properties have been known and used in some or other form by primitive people. Biodiversity of Trans-Himalayas is our natural wealth and its conservation is important for economic, ecological, scientific and ethical reasons. Biodiversity provides us goods and services, fundamental to our survival, including food, fodder and medicine.

The flora of cold desert areas and their ethnobotanical importance were studied earlier<sup>2,5</sup>, which focused on plant diversity, its documentation and scattered ethnobotanical uses by the tribal communities. Keeping in view floral wealth of Nubra valley, Field Research Laboratory, an establishment of Defence Research and Development Organization (DRDO), extensive survey was carried out with the help of local tribals and Amchis. This area falls under zone I of India's biogeographic classification<sup>6</sup>. A large number of ethnic groups with varied culture inhabiting the remote and isolated valleys of Ladakh offer a great scope for diversity studies. However, the cold arid areas lying in the Indian Trans-Himalaya with respect to Nubra valley have not received adequate

attention. There are very few livelihood options available for the local inhabitants therefore, the floral wealth of Nubra valley is pertinent to document the patterns of plant resource distribution and current use patterns so as to evolve suitable cultivation and land use policies.

*Study area* - The Nubra valley in Ladakh comprises the Valley of Shyok River from its acute-angled bend down to its confluence with Nubra and further towards Indus. It is northern most valley of Ladakh. Khardung-La pass (18,380 ft) is the gate way of the valley and it includes Siachin glacier. The area lies between two great mountain ranges i.e., Ladakh (on the south) and Karakoram (on the north). Approximately, 34° 15' 45 to 35° 30' N latitude and 76° 55' to 78° 05' E longitude. The topography of the valley is entirely different from other valleys of Ladakh. There is a great variation in altitude and ranges approximately between 2700m and 6000m asl. The climate of the region is extreme cold desert and characterized by high wind velocity continues throughout the year causes great variation in temperatures. Winter temperature goes below zero (minimum -25°C) and summers as high as 38°C. Precipitation is scanty with less than 80 mm per annum. The valley remains cut off from other parts of country during winter months due to extreme weather conditions.

*Methodology* - The field survey was undertaken to get acquainted with the general patterns of vegetation and habitat types of the area. Major cover types and few prime localities of the characteristic types were recorded. Traverse along the major roads, drainage and hilltops were made for collecting ground information. An existing

literature survey and interaction with local people was made for collecting the existing knowledge base. Systematic survey of vegetation across various landscape units was conducted in the study area covering a wide altitudinal range (8000-19000ft) along the valleys of Nubra and Shyok. The present information on the 65 medicinal plants, used by the Amchis of Nubra valley, has been collected during around all seasons of the year.

### Results and Discussion

The pattern of biodiversity determines the state of ecosystem stability and resource use pattern of the local inhabitants. The vegetation of this zone is characterized by scattered low bushes, sparsely covered grasslands, herbaceous formations, sedge meadows and stony deserts. The conservation of biodiversity will be fundamental to achieve sustainable development in the Ladakh area. This zone predominated, at high altitudes, around the major peaks of the mountains. The landscape is characterized by vast glaciers, boulders and sheer cliffs. The vegetation is largely xerophytic, although moist areas are found beneath glaciers, snowfields and along the river banks of "Nubra and Shyok".

Major vegetation in the valley includes species such as *Hippophae rhamnoides*, *Myricaria elegans*, *Capparis spinosa*, *Tribulus terrestris*, *Sassuria lappa* and *Ephedra Gerardiana*. Major tree species includes *Salix denticulate*, *Juniperus communis*, *Populus sp.* In summers, the valley is covered with wild flowers such as *Iris*, *Anemone*, *Primula* and variety of wild roses. The richness of the floral biodiversity of Nubra is the result of the great variation in light, elevation, temperature, water availability, terrain and soil type which create a variety of micro climate and growing environments. In all 400 plant species were recorded, which belong to 52 families and 200 genera. Dominant families of the study area include Asteraceae (>45 species), Brassicaceae (>25 species), Rosaceae (>20 species) and Fabaceae (>15 species).

During the course of the present survey, emphasis was laid on medicinal uses of plants of "Nubra valley" with different mode of application. A total of 65 medicinal plant species belonging to 30 families were recorded after conducting the survey and having discussion with local medicine men. Of which 14 species have the medicinal property against kidney complaints followed by 13 plants for curing cold and cough. Eleven species are being used in treating fever and decoctions of 7 species are used to treat respiratory problems like asthma and bronchitis etc. Other plants of ethnomedicinal importance, occurring in the Nubra valley, have the property for curing wide range of diseases and disorders related to digestive system, liver

ailments, blood purification, antibacterial, rheumatism, diseases of ear and teeth etc. The Amchi's (herbal practitioners) are still looking after more than 60% public health of tribal communities<sup>7</sup> and they totally depend upon natural resources for collection of plants and their parts. Traditional and indigenous system of medicine persists in all over the world<sup>8</sup>.

Traditional food crops in the valley include Buck wheat (*Fagopyrum tataricum* and *F. esculentum*), Millet (*Panicum miliaceum*), different varieties of Barley (*Hordeum vulgare*, *H. aegiceras*) and Oat (*Avena sativa*). Cultivated species through DIHAR are *Allium cepa*, *A. sativum*, *Coriandrum sativum*, *Carum carvi*, *Brassica oleracea*, *B. rappa*, *Cucurbita maxima*, *Cucumis mela*, *Lycopersicon esculentum*, *Solanum melongena* etc. Fodder species are *Medicago lupulina*, *Melilotus alba*, *M. indica*, *M. officinalis* and different members of Poaceae etc. Fruit trees include *Morus alba*, *Prunus armeniaca*, *P. persica*, *Pyrus malus*, *Juglans regia* etc. Many people believe that we should protect and restore biodiversity primarily because of its benefits to humankind; others believe that it is our moral obligation to care about biodiversity simply because all species have a right to live and have value in nature, whether or not we understand their benefits to humans<sup>9</sup>.

The people of the Nubra valley depend on wild plants for fuel, food supplements, medicine, construction material, farm nutrients and livestock feed. However, many species of wild plants are now threatened by the loss or degradation of habitat. The rare and threatened species of cold desert plants are listed in various threat categories of Indian Red Data Book (Table 1). Each of these taxa has a unique threat profile or reasons for its decline and there is an urgent need for more autecological data to reverse these worrying trends perhaps, with the most critically threatened plants. New approaches of biotechnology and conservation strategy can help to preserve and utilize the indigenous knowledge of medicinal plants for human kind<sup>10</sup>.

**Conclusion** - Compared to other parts of Indian Trans-Himalayas, Nubra valley exhibits much wider altitudinal and topographic variation. A detailed analysis of phytogeographic affinities and micro-habitat requirements of rare, endemic and threatened species will reveal insights on the biodiversity values of the study area. These species are of highest priority in terms of conservation. The study area has very short growing season and land available for cultivation is limited. Intensification of agriculture and recent introduction of several horticultural species have long term ecological implications. Over exploitation of

**Table 1.** List of Rare, Endangered and Threatened (RET) Taxa of Nubra valley.

S.No	Name of the Taxa	Family Name	Local name	Status
1	<i>Acantholimon lycopodiodes</i>	Plumbaginaceae	Longze	Endangered
2	<i>Aconitum heterophyllum</i>	Ranunculaceae	-	Near Endangered
3	<i>Aconitum violaceum</i>	Ranunculaceae	Yangtso	Critically Endangered
4	<i>Allium humile</i>	Amarylidaceae	Skotche	Near Endangered
5	<i>Arnebia euchroma</i>	Boraginaceae	-	Endangered
6	<i>Artemesia maritima</i>	Asteraceae	-	Endangered
7	<i>Astragalus oxyodon</i>	Fabaceae	Khalyangar	Endangered
8	<i>Astragalus tribulifolus</i>	Fabaceae	Yangro	Endangered
9	<i>Berberis zabeliana</i>	Berberidaceae	Shinnar	Near Endangered
10	<i>Braya aenea</i>	Brassicaceae	-	Endangered
11	<i>Corydalis adiantifolia</i>	Papaveraceae	-	Endangered
12	<i>Dactylorhiza hatageria</i>	Orchidaceae	Sanchu	Critically Endangered
13	<i>Ephedra gerardiana</i>	Ephedraceae	-	Endangered
14	<i>Geranium sibiricum</i>	Geraniaceae	Eyاملomentok	Rare
15	<i>Geranium walichianaum</i>	Geraniaceae	-	Near Endangered
16	<i>Heracleum pinnata</i>	Apiaceae	-	Near Endangered
17	<i>Hermidium monorchis</i>	Orchidaceae	Paliksket	Rare
18	<i>Hyoscyamus niger</i>	Solanaceae	Gyelamtag	Threatened
19	<i>Inula rhizoephala</i>	Asteraceae	Riamko	Endangered
20	<i>Juniperus recurva</i>	Cupressaceae	Shupa	Threatened
21	<i>Lancea tibetica</i>	Scrophularaceae	Raikse	Rare
22	<i>Lloydia serotina</i>	Liliaceae	Kngkar	Rare
23	<i>Meconopsis aculeate</i>	Papaveraceae	Achatsarmum	Threatened
24	<i>Physochleina praelta</i>	Solanaceae	-	Critically Endangered
25	<i>Rheum speciformae</i>	Polygonaceae	-	Critically Endangered
26	<i>Rheum webbianum</i>	Polygonaceae	Lacchu	Endangered
27	<i>Saussurea bractiata</i>	Asteraceae	Phamsi	Rare
28	<i>Saussurea gnaphaloides</i>	Asteraceae	Yuliang	Rare
29	<i>Saussurea obvallata</i>	Asteraceae	-	Critically Endangered
30	<i>Saussurea thomsonii</i>	Asteraceae	-	Endangered
31	<i>Senecio tibeticus</i>	Asteraceae	-	Endangered
32	<i>Waldhemia vestita</i>	Asteraceae	-	Endangered

plant species can lead to the local extinction of the valuable herbs. Therefore, there is an urgent need to draw up the necessary plans for plant utilization and conservation of Nubra valley.

#### Acknowledgements

Author is thankful to Dr. Shashi Bala Singh, Director, DIHAR, Leh for her kind guidelines and also thankful to the tribals and amchis of Nubra valley in sharing their precious knowledge on local medicinal uses of the plants.

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