2.0 Nilang : A Little Known Trans-Himalayan Valley in Uttarakhand and its Floral Wealth

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Introduction

The landscape immediately north of main central thrust (MCT) in the state of Uttarakhand represents a unique cold arid ecosystem that has largely escaped the attention of the ecologists, geographers and natural resource managers, owing to the remoteness, inaccessibility and harsh climatic conditions. This area forms a narrow strip (50 – 80 km wide) between the crest of Greater Himalaya and water divide between Satluj and Yarlung-Tsangpo that also forms the international boundary between India and Tibet (Valdiya 2001, Mazari 2007). One of such valleys in the state is Nilang (31° 00 44.1" to 31° 27' 06.26" N latitudes and 78° 53' 39" to 79° 15" E longitudes), located in Uttarkashi District. It is spread over an area of about 1100 km^2 and forms the entire catchment of the river Jahnavi or Jad Ganga and its tributaries. Biogeographically, the Nilang Valley exhibits close affinities with the Tibetan Plateau both in terms of proximity and species composition. Although, Rodgers and Panwar (1988) had categorized the entire region of Uttarakhand (erstwhile Uttar Pradesh) under Western Himalaya (2B), this area can safely be categorized into Trans-Himalaya (Zone 1). However, owing to rapid transition between the Greater Himalaya (2B) and juxtaposition of valleys and varied topography it is rather difficult to mark sub-division and characteristics of any provinces within zone A. Presence of snow leopard (*Uncia uncia*), blue sheep (*Pseudois nayaur*), historical presence of wild yak (*Bos grunniens*), seasonal movement of great Tibetan sheep (*Ovis ammon*), characteristic cold arid steppe vegetation and dominance of floral elements similar to Ladakh and Tibetan Plateau qualifies this area to be classified under Indian Trans-Himalaya.

Historical account of Nilang Valley is given by Atkinson (1981 *Rep*.). The original inhabitants of this valley (Jadhs) were resettled at lower altitudes *viz.*, Harsil and Dunda following Chinese aggression in north India in 1962. Presently this area forms a part of Gangotri National Park .

This article highlights the botanical wealth and a few species of high conservation significance from Nilang Valley.

The Landscape and Vegetation Characteristics

The area is dissected broadly by snow fed tributary streams of the Jadh Ganga that drain the area to meet the Bhagirathi River at Bhaironghati. These tributaries are arranged in almost parallel lines where the mountain slopes are steep in the area of the central crystalline granites closer to Bhaironghati towards the southern portion of the Jadh Ganga valley but assume a dendritic pattern towards the north where slopes are comparatively gentler and the gradient of the Jadh Ganga is also less severe due to the plateau like formation proximal to Tibet. At some points on the Jadh Ganga more than one tributaries confluence to form an important drainage plexus, as at Tirpani, where the southerly flowing Jadh Ganga is met by the Rangmanch Gad from the west and the East Nala from the east. The lower portion of the valley is

extremely rugged and steep in the form of a canyon formed by the river Jadh Ganga. Visually, the study area is divisible into glacial and periglacial types of landforms. The valley gradually widens as one goes for about 10 -15 kms from Bhaironghati. The areas close to MCT are highly broken and unstable owing to regular avalanches and enormous glacial erosion. On the right flank of Jad ganga between Gartang and Nilang there are deep gorges, visually impenetrable. One of such gorges leads to Sangla Valley in Himachal Pradesh, traditionally used by Gaddis for annual movement between Nilang Valley and their homeland with their domestic livestock. Nilang (3400 m asl) is the first traditional village that has been abandoned subsequent to Chinese aggression. The mountain slopes around Nilang and beyond up to Tipani, Jadung and Neelapani Gad are extremely broken, at places with extensive scree slopes, colluvial deposits and lateral moraines. The morainic deposits are prone to wind erosion giving rise to typical barnacles at several places. The areas around Rangmanch Gad, Plumsumdo (PDA) and beyond are gentle and stable (Plates 2A, 2B).

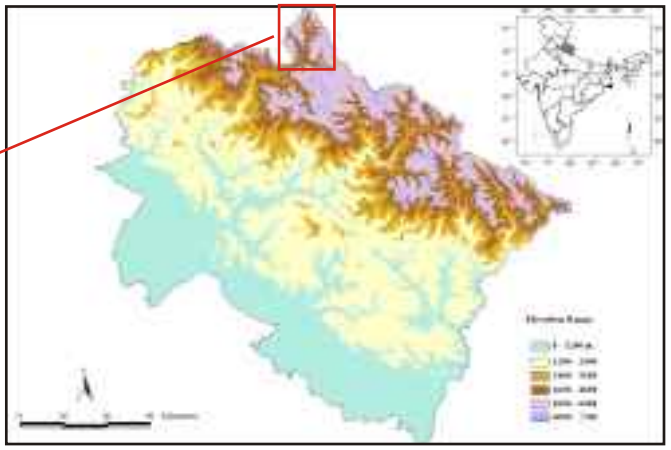
The lower parts of Jadh Ganga (Jahnavi) especially around Bhaironghati support Dry Temperate Deodar forests (Champion & Seth 1968) with open canopy and stunted growths. *Pinus wallichiana* occurs as a common associate. Second storey generally consists of *Ribes alpestre*, *Rosa macrophylla*, *Abelia triflora, Viburnum cotinifolium, Jasminum humile, Berberis aristata, B. pseudumbellata, Artemisia japonica,* etc. Broad-leaved species occurring in the shallow depressions are *Populus ciliata, Acer acuminatum, Sorbaria tomentosa, Rubus niveus* and *Salix karelinii*. Ground vegetation consists of *Thalictrum foetidum, T. minus, Mirabilis himalaica, Veronica stewartii, Impatiens scabrida, I. brachycentra, Arenaria serpyllifolia, Arabidopsis himalaica, Arisaema flavum* and *Salvia nubicola*. Between Karchha and Nilang the vegetation undergoes rapid transition from Deodar mixed blue pine to open juniper woodland and alpine scrub. Commonly associated tree species including *Prunus cornuta* and *Euonymus fimbriatus, Artemisia dracunculus, A. santolinifolia, A. dubia*, *Abelia triflora, Viburnum cotinifolium, Juniperus communis, J. indica, Cotoneaster roseus, Berberis umbellata, B. pachyacantha* and *Lonicera hypoleuca* are the common shrubs and the ground vegetation consists of *Arenaria serpyllifolia, A. neelgherensis, Erigeron acer* var. *multicaulis*, *Asparagus filicinus* and a few grasses such as *Phaceleurus speciosus, Piptatherum munroi* etc.

Along the side stream courses near Karcha and on opposite slopes a few remnant patches of birch / Bhoj Patra (*Betula utilis*) can be seen. Ground vegetation of scattered birch patches consists of *Anaphalis royleana, Astragalus maddenianus, Danthonia schneideri, Erigeron multiradiatus* and *Solidago virga-aurea*. Beyond Nilang – on way to Naga, Nilapani and Sonam the vegetation is rather sparse and in the form of scattered scrub. Characteristic species include *Rhamnus prostrata, Ephedra gerardiana, Rosa webbiana, Spiraea canescens, Hyssopus officinale,* and *Astragalus candolleanus*. Stream courses and river banks are often dominated by *Myricaria elegans* and *Salix flabellaris.* The past camping sites and nitrogen rich areas are frequented by the high altitude nettle *Urtica hyperborea, Chenopodium tibeticum, Rumex patentia* and *Atriplex hybrida*.

The interior valleys and undulating slopes exhibit characteristic steppe vegetation dominated by *Lonicera spinosa* and *Caragana versicolor* and at places by *Eurotia ceratoides*. Here the unstable scree slopes harbour a distinct community characterized by *Aconogonum tortuosum, Lamium rhomboideum, Cicer microphyllum* and *Rubia tibetica*. Gregarious patches of *Aconogonum tortuosum* on scree slopes turn reddish pink during autumn making the hill slopes picturesque. The seemingly barren rock surfaces have luxuriant growth of colourful lichens *e.g., Xanthoria elegans* (orange red) and *Acarospora chlorophoea* (lemon yellow). The valley bottoms and moist places with clayey soil support patches of sedge meadows dominated by *Kobresia schoenoides, Kobresia royleana* and various species of *Carex.* Towards Shankar glacier and Thag La (above 4500 m) the vegetation reflects the characteristic features of arctic tundra dominated by a few cushion forming dwarf herbs such as *Thylacospermum caespitosum, Arenaria festucoides, Androsace globifera* and *Rhodiola tibetica.* Thus the flora of the Nilang Valley typically reflects the prevalence of Trans-Himalayan elements.

Plate 2A
Location and Landforms of Nilang Valley, Uttarakhand

FCC of Nilang Valley



Location of Nilang in Uttarakhand

Vegetation and Landforms

Riverine Scrub and Scree Slopes

Plate 2B
Unique Plants of Nilang Valley

Allium carolinianum

Arnebia euchroma

Dictamnus albus

Malus baccata

Acarospora chlorophoea

Biebersteinia odora

Hyssopus officinalis

Ephedra gerardiana

Floral Wealth and Plants of High Conservation Significance

Naithani (1988) gave the first botanical account of this Valley in which he reported about 170 species of flowering plants from this valley. The authors have been conducting regular floristic surveys in the valley since past 3-4 summers. Our latest estimate reveals that this valley harbours about 221 genera and 421 species of vascular plants distributed over 69 families. A detailed break up of the general flora is given below :

Groups	Families	Genera	Species
Pteridophytes	3	6	9
Gymnosperms	4	4	7
Dicotyledons	53	174	341
Monocotyledons	9	37	64
Total	**69**	**221**	**421**

Some of the little known species of high conservation value in this area are briefly described below :

1. *Allium carolianum* DC. (Amaryllidaceae)
Local Name: *Rogba; Rukba*

Bulbous, delicate herbs. Leaves 5-6, flat, linear, strongly aromatic. Flowering scape up to 30 cm. Flowers pink in many flowered umbels. Frequent in alpine moist meadows 3000 – 4500 m asl. Bulbs and leaves of this herb are used in the treatment of constipation.

2. *Arnebia euchroma* (Royle) Johnston (Boraginaceae)
Local Name: *Khami*

Perennial herbs with dense stiff hairs and thick root stock that yields purplish – red dye. Basal leaves long, linear. Upper leaves shorter and broader. Flowers pink or purplish white in terminal dense (globular) racemes. Occasional on dry sandy / stony slopes 3500 – 4500 m asl. Roots yield purple dye which is mixed with oil and used as hair tonic. The roots are also used as ingredient in Tibetan medicine especially for the treatment of cough, back-ache and several other ailments.

3. *Biebersteinia odora* Steph. (Geraniaceae)
Local Name: *Taksha*

Strongly aromatic, glandular-pubescent herb. Rootstocks densely tufted. Leaves pinnately compound with irregularly lobed leaflets. Flowers yellow in short terminal racemes. Occasional in tussocks on rocky slopes between 4500-5000 m asl. Whole plant is used in the treatment of cuts, wounds and peptic ulcer. It is also used in the treatment of diarrhoea.

4. *Cicer microphyllum* Benth. (Fabaceae)
Local Name: *Chhel*; English Name: Wild Gram

A low spreading glandular-hairy herb. Leaves pinnate, ending in a coiled trendril. Flowers solitary or paired, purple to white. Pod 2-3 cm, inflated, explosive, beaked and densely hairy. Occasional on dry sandy river beds and stable scree slopes between 3500-4500 m asl. It is also a source of vitamin C and used as ingredient in various medicines.

5. *Ephedra gerardiana* Wall. (Ephedraceae)
Local Name : *Chesna;* Trade Name: *Som Lata*

A low rigid tufted shrub up to 60 cm tall. Branches slender, numerous and jointed. Joints covered with scales. Fruits ovoid 7-10 mm, with freshy red succulent bracts enclosing the 1-2 seeds. Frequent on alluvial fans, gravel terraces and rocky slopes between 3000-5000 m asl. Young branches used for the extraction of ephedrine which is used for instantaneous cure of asthma, rheumatism and as heart stimulant. It is also used in preparation of nasal sprays to cure sinusitis and inflammation of mucous membrane.

6. *Dictamnus albus* L. (Rutaceae)
English Name : Burning Bush

Strongly aromatic herb up to 50 cm. Stem and leaves clothed with glandular hairs. Leaves pinnate 20-30 cm long. Flowers 2.5-4 cm in erect racemes. Petals pink, easily falling. Sparse in inner dry ranges 2800 – 3300 m among bouldery scrub vegetation. Not in much local use but its potential as aromatic herb needs to be explored.

7. *Hyssopus officinalis* L. (Lamiaceae)
Local Name : *Chhabra*

Perennial much branched and tufted herbs. Stem and leaves rough in texture, highly aromatic. Flowers bluish – purple. Frequent on inner dry ranges, especially on dry gravelly soil between 3400 – 4000 m asl. Leaves are used for extraction of certain oils by Ayurvedic industries. Tea of Hyssop flower tops are highly useful in the treatment of respiratory problems and for easing cough, sore throat and for loosening phlegm.

8. *Lillium polyphyllum* Don. (Liliaceae)
Local Name : *Kakoli*, *Kashir Kakoli*

Perennial, erect herbs upto 50 cm tall. Leaves sessile, alternate or nearly opposite or whorled, narrowly lanceolate or linear, 8-12 x 1 – 2 cm. Bracts leaf-like, often whorled. Flower solitary or whorled with 4 – 10 long stalk. Perianth 5 – 8 cm long, greenish white with purple dots inside, segments obtuse, recurved when fully expanded. Stigma obscurely 3-lobed. Capsule 2.5 to 3.5cm long.

Rather sparse in a few patches upto Karcha under open deodar forests. Tubers are said to be highly medicinal. One of the rare lilies of higher Himalaya.

The Jadh Ganga valley has hosted large scale grazing for millennia and an estimated 30,000 sheep, goats and mules graze these pastures intensively even today, entering from Bhaironghati in May and branching out into various micro-catchments to spend the summer. *Lonicera* and *Caragana* are heavily browsed during onward passage while *Eurotia* is favoured on the return journey with the onset of autumn. The plant diversity of Nilang is seriously threatened by heavy grazing even as the inclemency of the climate leaves a very short period for its revival. It is imperative that the Forest Department should involve the local communities and evolve a practical strategy of rotational grazing, allowing sufficient rest to grazed valleys to restore their diversity.

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