Plant Formations in the Western Himalayan BioProvince

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Western Himalayan Broadleaf Forest

Forming a band between altitudes of 1500m and 2600m these rich temperate forests extend along much of the southern slopes of the Western Himalayas. As with the Eastern Himalayas, these include both evergreen and deciduous forest. The former is dominated by *Quercus dilatata*, *Q. incana*, *Q. lamellosa* and *Q. semecarpifolia*, and often includes a variety of lauraceous species such as *Litsea lanugunosa*, *L. umbrosa*, *Machilus odoratissima* and *Phoebe pulcherrima*. The under story is often rich in mosses and ferns, while the trees provide habitat for a rich variety of epiphytes, especially orchids, ferns and aroids. Endemic trees in this zone include *Acer acuminatum* (Aceraceae), *Carpinus laginae* (Betulaceae), *Fraxinus micrantha* (Oleaceae) and the palm *Trachycarpus takil* (Arecaceae). In fact, this is one of the few palm species in the world that can grow at high altitude. Other endemic forest dwellers include *Caragana brevispina* (Fabaceae), *Primula edgeworthii*, *P. sessilis* (Primulaceae), and *Pteracanthus urticifolius* (Acanthaceae). The deciduous forests tend to be distributed along riverbanks and include species such as *Carpinus viminea*, *Juglans regia* the endemic *Aesculus indica* (Sapindaceae) and near endemic *Alnus nepalensis* (Betulaceae). However, at high altitudes along the upper Karnali River, the latter species is replaced by the endemic *Alnus nitida* (Betulaceae).

Western Himalayan Subalpine Conifer Forest

Roughly between altitudes of 2400-3500 m these extensive conifer forests stretch from central Nepal in the east to Jamma, Kashmir and beyond the Pakistan border in the west. The dominant tree species include *Abies sectabilis*, *A. pindrow* the endemic *Picea smithiana* (Pinaceae) and near endemic *Pinus gerardiana* (Pinaceae). However, they show several recognizable variations, with oak and rhododendron forming conspicuous components in some areas, while in some of the dryer areas above 2400m, forests of the endemic *Cedrus deodora* occurs. These deodora forests provided habitat for several other endemic species including *Cupressus torulosa* (Cupressaceae), *Pseudomertensia racemosa* (Boraginaceae) and *Rhododendron lowndesii* (Ericaceae), although the former species seems to be confined to limestone areas. Other endemics generally confined to these subalpine conifer forests include *Iris milesii* (Iridaceae) and the orchid *Elophia dabia* (Orchidaceae).

Western Himalayan Alpine Scrub and Meadows

These alpine habitat complexes, which occur between 3000-5000 m, can be broadly divided into western and northwestern types. In the former the forest alpine transitions are marked by Krumholtz type vegetation of *Rhododendron campanulatum*, *R. barbatum*, species of *Salix* and the endemic *Syringa emodi* (Oleaceae). This gives way with increasing altitude to colourful alpine scrub composed of dwarf rhododendrons, *Cotoneaster microphyllus*, *Hippophae rhamnoides*, *Juniper commnis* and *J. wallichiana*. Similar transitions and scrub communities occur in the more northwestern areas. These scrublands provide habitat for a variety of endemic species including *Draba radicans* (Brassicaceae), *Geranium himalayense* (Geraniaceae), *Heracleum lallii* (Apiaceae), *Rubus foliolosus* (Rosaceae) and *Saussurea roylei* (Asteraceae). In addition, the now widespread *Impatiens glandulifera* (Himalayan balsam), which is naturalized throughout much of Europe, was once possibly nearly endemic to these alpine scrub communities. At higher altitudes or interspersed among the scrub communities are rich alpine meadows supporting diverse communities of *Anaphalis*, *Anemone*, *Aster*, *Cynanthus*, *Delphinium*, *Gentiana*, *Jurinea*, *Meconopsis*, *Mertensia*, *Morina*, *Pedicularis*, *Polygonum*, *Primula*, *Copyright © 2010 Peter Martin Rhind*
Saussurea, and a high proportion of these, especially in the families Fumariaceae, Primulaceae, Saxifragaceae and Scrophulariaceae are endemic. Examples include *Androsace primuloides* (Primulaceae), *Aster indamellus* (Asteraceae), *Astragalus himalayanus* (near endemic) (Fabaceae), *Caragana brevifolia* (Fabaceae), *Delphinium cashmerianum* (near endemic) *D. himalaaya, D. kamaonense,* (Ranunculaceae), *Lavatera kashmiriana* (Malvaceae), *Megacarpaea polyantha* (Brassicaceae), *Nepeta leucophylla* (Lamiaceae), *Pedicularis klotzschii* (Orobanchaceae), *Primula poluninii* (Primulaceae), *Rheum moorcroftianum* (Polygonaceae) and *Roylea cinerea* (Lamiaceae), although some of these are mainly confined to the more steeper slopes. At very high altitudes, close to the upper limit of plant life, the vegetation is reduced to a few scattered bushes of *Rhododendron anthopogon* and *Berberis spp* and the occasional cushions of *Cassiope fastigiata*. The herbaceous species include *Bergenia stracheyi,* with its fleshy leaves that turn red in autumn, *Ephedra gerardiana,* the curious woolly *Saussurea gossypiphana,* and *Paraquilegia anemoides.* However, most species tend to peter out before 5000 m, although the near endemic *Christolea himalayensis* (Brassicaceae) has been recorded at 6300m on Mount Kamet, which is the highest altitude recorded for a flowering plant in the Western Himalayas.

**Western Himalayan Rocky Slopes and Ledges**

These often exposed, harsh habitats provide niches for a variety of alpine species including a number of endemic species. Among the rough rocky or stony slopes these include *Aster tapete,* *Clematis phlebantha,* *Gentiana stipitata,* *Hedysarum cashmerianum,* *H. kumaonense,* *Incarvillea younghusbandii,* *Lilium oxypetalum,* *Meconopsis latifolia,* *Onosma bracteayum,* *Oxytropis cashemiriana,* *O. mollis,* *Primula minutissima,* *Rosa webbiana,* *Saxifraga poluniniana* and *Viola kunawarensis.* The endemic species, which seem to be mainly confined to rocky ledges, include *Primula reidii* and *P. sharmae* (Primulaceae).

**Western Himalayan Scree Slopes**

Despite their lack of stability these dynamic habitats are home to a number of alpine species including the endemic scree specialists *Cremanthodium nanum* and *C. purpureifolium* (Asteraceae).

**Western Himalayan Riparian Communities**

Along streams and watercourses species of *Aletris,* *Caltha,* *Pedicularis,* *Polygonum,* *Potentilla* and *Ranunculus* are likely to be seen. Endemic species that rely on these wetter areas include *Hedysarum microcalyx* (Fabaceae) and *Oxytropis williamsii* (Fabaceae).

Further information required.

**References**


