

## FLORISTIC INVENTORY AND ETHNOBOTANICAL STUDY OF THE NALTAR VALLEY (KARAKORAM RANGE), GILGIT, PAKISTAN

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### Abstract

Naltar valley has diverse range of flora inhabiting some natural population of endemic plants listed as endangered category. The present study was carried out to record ethnobotanical uses of plants by local inhabitants of the Naltar Valley during summer 2009-11. The detailed information was gathered from the native herbal healers (*Hakeems*), shepherds and midwives (*Daai*) by using open ended questionnaire. Global Positioning System (GPS) was used to record coordinates of the 46 localities and their distribution map was designed by using ArcGis 9.3. In all, 141 plant species belonging to 107 genera and 48 families were found in practice by the natives for fulfilling their daily life requirements. The reported ethnoflora were comprised of 91 herbs and 23 shrubs. The highest numbers of species (133) were used for medicinal purpose, followed by fodder and forage (101 spp.), fuel and timber (37 spp.), ethnoveterinary uses (27 spp.) and miscellaneous (10 spp.). With reference to medicinal plants, 133 species were used in treating 48 different diseases/ailments by the local herbalists. Family Importance Value (FIV) indicated that Asteraceae was the most dominant (12.06%), followed by Fabaceae (7.09%), Polygonaceae and Rosaceae (7.67% each), while rest of the families had fewer species. The natural ecosystem is declining at rapid pace due to over harvesting coupled with overgrazing and un-sustainable management of flora causing threat to local biodiversity and need a comprehensive plan to protect natural resources.

### Introduction

The Northern areas of Pakistan presently called Gilgit-Baltistan are well known for their biodiversity due to diversified climate. These areas are located at the junction of three great mountainous ranges i.e. Karakoram, Himalaya, & Hindukush (Shinwari, 2010). Most parts of the Northern Areas lie within the watershed of Karakoram, Himalaya, and Hindukush mountain ranges. The area is surrounded by snow covered mountains with deep gorges and narrow valleys (Rasool, 1998; Shinwari & Gilani, 2003). The Naltar Valley is situated at 36° N and 74° 4' E covering a total area of 27,206 ha situated within the Karakoram highlands (Fig. 1). It lies very close to the Hunza Valley in the Karakorum Range of Northern Pakistan and 40km from the Gilgit city. From the Hunza River a narrow steep area starts, which ends up in the rocky terrain of Naltar. The valley is designed as IUCN Management Category no.4, according to IUCN-WCMC (1993). It is located in the Northwest Karakorum in the Northern Areas of Pakistan, North West of Gilgit above 38km west of the Hunza River. The altitude of the area range from 1700 to 5000m (above sea level) ending in the glacier and Naltar Pass. It covers a total area of 188 km<sup>2</sup> and is homes of some 3000 permanent settlers as well as nomadic shepherds. The upper and more open portion of

the valley lies at 3,000m, where most of the human settlements and activities are found (Sheikh *et al.*, 2002).

The valley comprises a range of habitats from the perpetual snow zone to alpine grassy meadows and pastures, pockets of forest, stony and rocky vertical cliffs. This is beautiful valley covered with snow peaks and glacial lakes at the altitude ranging between 1700 and 5000m. The valley basin ranges from a width of approximately 1700-1800m. The glaciations have covered the formation of moraines, especially in the area near the wetlands in the valley, which may have occurred due to the continuous geographical changes in the valley. The winter normally very harsh and temperature may fall to -18C and below at 3000m, with an annual rainfall 254-400mm. The rain mostly fall more than three times than that of Gilgit valley, which is only 38Km away. The general climate of the valley is dried temperate characterized by severe and prolonged winters and short but pleasant summers. The highest temperatures recorded in August and lowest in January. The Rain mostly fall in during the months of March and May and snowfall appeared in December to January. The mean annual rainfall and temperature record of Naltar is as under (Anon., 2003). Ethnobotanical surveys were conducted in neighboring areas (Sarwat *et al.*, 2012; Saqib *et al.*, 2011; Khan *et al.*, 2011) but not much is written on Naltar, though ecologically it is an important area (Shinwari & Qaisar, 2011).

#### Mean monthly rainfall (mm) (1960-2003)

| Year | Jan. | Feb. | Mar. | Apr. | Mar. | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. | Total |
|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|
| 2003 | 11.5 | 15.5 | 15.5 | 63.8 | 25.3 | 93   | 73   | 69   | 43   | 0.5  | 3.8  | 3.1  | 366   |

#### Mean monthly temperature °C (1960-2003)

| Month | Jan. | Feb. | Mar. | Apr. | Mar. | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. |
|-------|------|------|------|------|------|------|------|------|------|------|------|------|
| Max   | 2.8  | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  |
| Min   | -9.7 | -9.4 | -4.7 | 0.7  | 4.1  | 8.7  | 9.6  | 12.1 | 9.6  | 2.6  | 0.4  | -6.1 |

Source: Govt. of Pakistan and IUCN, 2003

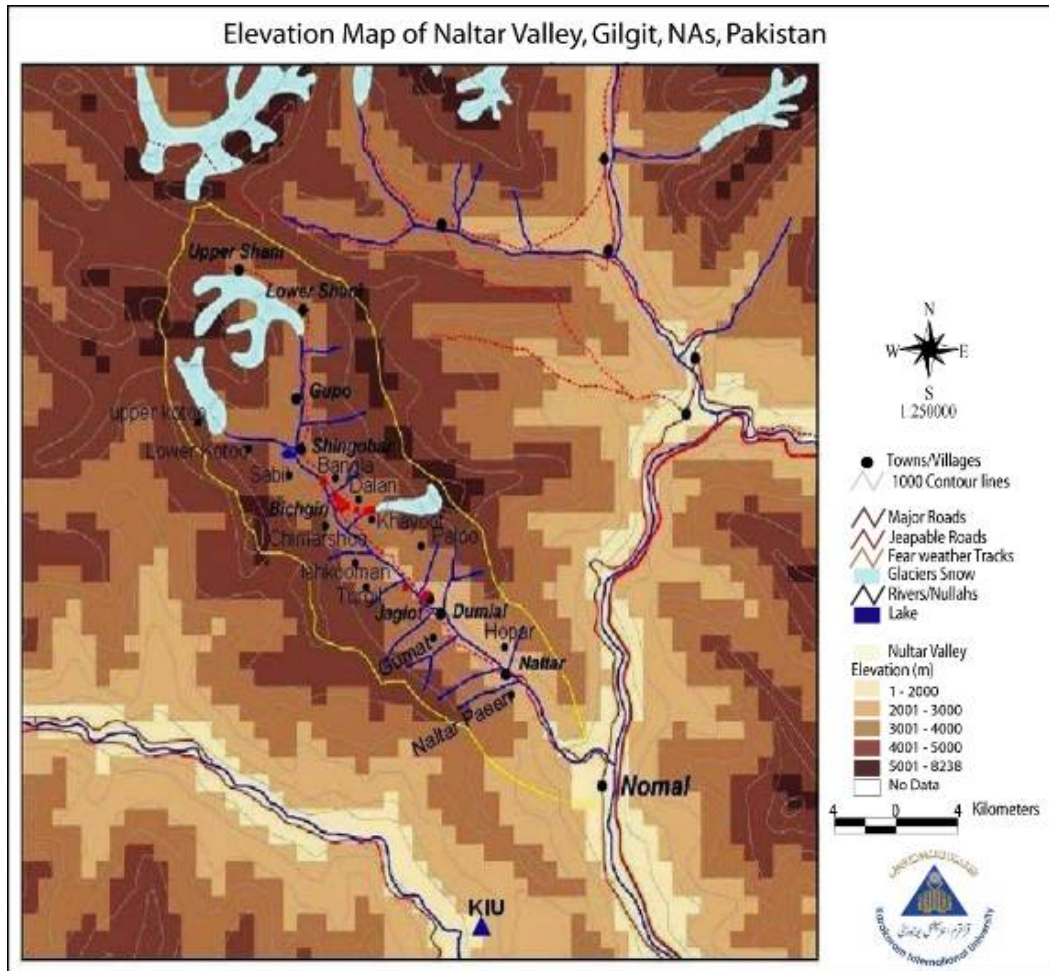


Fig. 1. Showing GIS map of Naltar Valley, District Gilgit in the Karakoram Range.  
Source: Qamar Abbas, Karamat Ali and WWF Representative

The Northern Area of Pakistan with unique biodiversity due to the presence of the Himalayas, Karakorum's and Hindu-Kush mountain ranges are under tremendous pressure from locals because of illicit cutting of valuable plants, poor collection and storage methods of medicinal plants, smuggling of timber wood, over grazing, corrupt forest officials, illiterate population with no sense or lust for conservation and above all passive and non practical policies of Government as well as NGO's working in the area Hamayun *et al.*, 2003.

Sheikh *et al.*, (2002) reported preliminary study on the use, exploitation and prospects for conservation from the study area. Keeping the importance and potentiality of the ecosystem, it was worthwhile to record floristic diversity in terms of their uses from the Naltar valley.

#### Materials and Methods

**Field survey:** Field trips were arranged to collect ethnobotanical data from the study area during 2009-2011. An open ended questionnaire was designed to collect the information from the native herbal healers (*Hakeems*), midwives (*Daai*), elderly known people and shepherds. For each species, botanical name, local name, habit, locality, altitude, parts used, medicinal and other multifarious uses were recorded. Global Positioning

System (GPS) was used for recording coordinates of the localities and a distribution map was designed by using Arc GIS 9.3.

**Specimen collection and identification:** During the survey, plant specimens were also collected, pressed, dried and mounted on standard herbarium sheets. These specimens were then identified with the help of Flora of Pakistan (Jafri, 1966; Nasir & Ali 1970-1989; Ali & Nasir, 1989-1991; Ali & Qaiser, 1993-1995, 2000-2008).

#### Results

**Ethnobotanical use:** In all, 141 plant species belonging to 107 genera and 48 families were identified which are being used by the inhabitants for the accomplishment of their daily life requirements. The detailed information of all ethnobotanical categories is summarized under the Table 1. Of them, seven species belonged to gymnosperms and 134 species belonged to angiosperms. Most of the recorded flora served the daily life requirements of the natives of study area. Figure 2 showed that the highest numbers of species (133 species) were used for medicinal purpose followed by fodder & forage (101 spp.), fuel and timber (37 spp.), ethnoveterinary uses (27 spp.) and miscellaneous uses (10 spp.).

Table 1. Alphabetical list of species along with their family, local names and various ethnobotanical uses recorded from the Naltar Valley, in the Karakoram Ranges, Gilgit Baltistan, Pakistan.

| S. # | Family Name             | Botanical name  | Local Names            | Medicinal uses | Veterinary uses | Fuel & Timber | Fodder & Forage | Cultural & others |
|------|-------------------------|---|------------------------|----------------|-----------------|---------------|-----------------|-------------------|
| 1.   | Anacardiaceae           | <i>Pistacia khinjuk</i> Stock.                        | Kawoo                  | +              | -               | +             | +               | -                 |
| 2.   | Apiaceae (Umbelliferae) | <i>Carum carvi</i> L.                                 | Hayoo                  | +              | -               | -             | -               | -                 |
| 3.   | -do-                    | <i>Carum bulbocastanum</i> Clarke                     | Hayoo                  | +              | -               | -             | -               | -                 |
| 4.   | -do-                    | <i>Daucus carota</i> L.                               | Jangli Kachoon         | +              | -               | -             | +               | -                 |
| 5.   | -do-                    | <i>Heracleum candicauase</i> Wall.                    | Phoola                 | +              | -               | -             | +               | -                 |
| 6.   | Asteraceae (Compositae) | <i>Artemisia maritima</i> L.                          | Zoon                   | +              | +               | -             | +               | -                 |
| 7.   | -do-                    | <i>Artemisia gmelinii</i> Web. ex Stechm.             | Khakhamos              | +              | +               | -             | +               | -                 |
| 8.   | -do-                    | <i>Artemisia brevifolia</i> Wall. ex DC.              | Zoon                   | +              | +               | -             | +               | -                 |
| 9.   | -do-                    | <i>Anaphalis nepalensis</i> (Spring) Hand-Mazz.       | Chikee                 | +              | -               | -             | +               | -                 |
| 10.  | -do-                    | <i>Cichorium intybus</i> L.                           | Ishkanagi              | +              | -               | -             | -               | -                 |
| 11.  | -do-                    | <i>Carthamus tinctorius</i> L.                        | Pong                   | +              | -               | -             | -               | -                 |
| 12.  | -do-                    | <i>Cirsium vulgare</i> (Savi) Ten.                    | Jacheer                | +              | -               | -             | +               | -                 |
| 13.  | -do-                    | <i>Echinops echinatus</i> Roxb.                       | Jacheer                | +              | +               | -             | +               | -                 |
| 14.  | -do-                    | <i>Hieracium sherwali</i> S. Abedin & Zamarud         | -                      | -              | -               | -             | +               | -                 |
| 15.  | -do-                    | <i>Ligularia thomsonii</i> (Clarke) Kitam.            | -                      | -              | -               | -             | +               | -                 |
| 16.  | -do-                    | <i>Inula rhizocephala</i> Wend.                       | -                      | +              | -               | -             | +               | -                 |
| 17.  | -do-                    | <i>Saussuria simpsoniana</i> Field & Garden.          | Booshi Phonar          | +              | -               | -             | -               | -                 |
| 18.  | -do-                    | <i>Sonchus arvensis</i> L.                            | -                      | +              | -               | -             | -               | -                 |
| 19.  | -do-                    | <i>Solidago virgaurea</i> L.                          | -                      | +              | -               | -             | +               | -                 |
| 20.  | -do-                    | <i>Senecio krascheninikovii</i> Schischkin            | -                      | +              | -               | -             | +               | -                 |
| 21.  | -do-                    | <i>Taraxacum officinale</i> Weber                     | Ishkinaji              | +              | +               | -             | +               | -                 |
| 22.  | -do-                    | <i>Tanacetum artemisoides</i> Schultz-Bip. ex Hook.f. | Khakhamos              | +              | +               | -             | -               | -                 |
| 23.  | Balsaminaceae           | <i>Impatiens edgeworthii</i> Hook.f.                  | -                      | +              | -               | -             | -               | -                 |
| 24.  | Betulaceae              | <i>Betula utilis</i> D. Don.                          | Jhonze/Buruj           | +              | -               | +             | +               | +                 |
| 25.  | Berberidaceae           | <i>Berberies brandisiana</i> Ahrendt.                 | Ishkeen/ Simdoo        | +              | +               | -             | +               | -                 |
| 26.  | -do-                    | <i>Berberies orthobotrys</i> Biens ex Aitch.          | Ishkeen/ Simdoo        | +              | +               | -             | +               | -                 |
| 27.  | -do-                    | <i>Berberies pseudoumbellata</i> Parker               | Ishkeen/ Simdoo        | +              | +               | -             | +               | -                 |
| 28.  | Boraginaceae            | <i>Heliotropium dasycarpum</i> Ledeb.                 | SaboKuch/ Sabongha     | +              | -               | -             | +               | -                 |
| 29.  | -do-                    | <i>Onosma hispidum</i> L.                             | Tal Sharung/ Ratanjock | +              | -               | -             | +               | -                 |
| 30.  | Brassicaceae            | <i>Sisymbrium trio</i> L.                             | Jangali Sarssoon       | +              | +               | -             | +               | -                 |
| 31.  | -do-                    | <i>Capsella bursa-pastoris</i> L.                     | Borbordhi              | +              | +               | -             | +               | -                 |
| 32.  | Cannabaceae             | <i>Cannabis sativa</i> L.                             | Thonchi                | +              | -               | -             | -               | -                 |
| 33.  | Capparidaceae           | <i>Capparis spinosa</i> L.                            | Kabir                  | +              | -               | -             | +               | -                 |
| 34.  | Caprifoliaceae          | <i>Lonicera microphylla</i> Willd. ex Roem.           | Poshkaar               | +              | -               | +             | -               | -                 |

Table 1. (Cont'd.).

| S. # | Family Name              | Botanical name  | Local Names     | Medicinal uses | Veterinary uses | Fuel & Timber | Fodder & Forage | Cultural & others |
|------|--------------------------|---|-----------------|----------------|-----------------|---------------|-----------------|-------------------|
| 35.  | Chenopodiaceae           | <i>Artiplex crossifolia</i> C.A.Mey   | -               | +              | -               | -             | -               | -                 |
| 36.  | -do-                     | <i>Chenopodium album</i> L.   | Kunah           | +              | -               | -             | +               | -                 |
| 37.  | -do-                     | <i>Chenopodium botrytis</i> L.  | Hamaghee        | +              | -               | -             | +               | -                 |
| 38.  | -do-                     | <i>Chenopodium foliosum</i> L.  | Hamaghee        | +              | -               | -             | +               | -                 |
| 39.  | -do-                     | <i>Salsola tragus</i> L.  | -               | -              | -               | -             | +               | -                 |
| 40.  | Caryophyllaceae          | <i>Arenaria serpyllifolia</i> L.  | -               | +              | -               | -             | +               | -                 |
| 41.  | -do-                     | <i>Silene vulgaris</i> (Moench) Garacke.  | -               | +              | -               | -             | +               | -                 |
| 42.  | Crassulaceae             | <i>Hylotelephium eversii</i> (Ledeb.) H.ohba  | -               | -              | -               | -             | +               | -                 |
| 43.  | Cupressaceae             | <i>Juniperus communis</i> L.  | Muthary         | +              | -               | +             | +               | +                 |
| 44.  | -do-                     | <i>Juniperus excelsa</i> M. Bieb.   | Chilli          | +              | -               | +             | +               | +                 |
| 45.  | -do-                     | <i>Juniperus turkestanica</i> Komarov   | Chilli          | +              | -               | +             | -               | +                 |
| 46.  | Ephedraceae              | <i>Ephedra Gerardiana</i> Wall. ex Stapf.   | Soom            | +              | -               | -             | +               | -                 |
| 47.  | -do-                     | <i>Ephedra intermedia</i> Schrenk & Meyer   | Soom            | +              | -               | -             | +               | -                 |
| 48.  | Elaeagnaceae             | <i>Elaeagnus angustifolia</i> L.  | Ghoonar         | +              | -               | +             | +               | -                 |
| 49.  | -do-                     | <i>Elaeagnus latifolia</i> L.   | Faiz            | +              | -               | -             | +               | -                 |
| 50.  | -do-                     | <i>Hippophae rhamnoides</i> L.  | Bhoroo          | +              | -               | +             | +               | -                 |
| 51.  | Fabaceae (Papilionaceae) | <i>Astragalus falconeri</i> Bunge   | Chono Hapoocho  | +              | +               | -             | +               | -                 |
| 52.  | -do-                     | <i>Glycyrrhiza glabra</i> L.  | Shalakoo        | +              | -               | -             | +               | -                 |
| 53.  | -do-                     | <i>Melilotus alba</i> Desr.   | -               | +              | -               | -             | +               | -                 |
| 54.  | -do-                     | <i>Medicago sativa</i> L.   | Ishfit          | +              | +               | -             | +               | -                 |
| 55.  | -do-                     | <i>Sophora mollis</i> (Royle) Baker   | Poshool         | +              | -               | +             | +               | -                 |
| 56.  | -do-                     | <i>Sophora alopecuroides</i> L.   | Poshool         | +              | -               | +             | +               | -                 |
| 57.  | -do-                     | <i>Trifolium pratense</i> L.  | Chapati/ Shafal | +              | -               | -             | +               | -                 |
| 58.  | -do-                     | <i>Colutea nepalensis</i> Sims  | Bizhee          | +              | -               | -             | -               | -                 |
| 59.  | -do-                     | <i>Caragana brevifolia</i> Komarov  | Hapoocho        | +              | -               | +             | +               | -                 |
| 60.  | -do-                     | <i>Robinia pseudoacacia</i> L.  | Keekar          | +              | -               | +             | +               | -                 |
| 61.  | Gentianaceae             | <i>Gentianodis tianshanica</i> Rupr ex Kusn.  | Palamath        | +              | +               | -             | +               | -                 |
| 62.  | -do-                     | <i>Swerdia petiolata</i> D. Don   | Palamath        | +              | +               | -             | +               | -                 |
| 63.  | Geraniaceae              | <i>Geranium pratense</i> L. ssp. <i>stewartianum</i> var. <i>schimidii</i> Y. Nasir | Kurat Kachoo    | +              | -               | -             | +               | -                 |
| 64.  | -do-                     | <i>Geranium ocellatum</i> Camb.   | Kurat kachoo    | +              | -               | -             | +               | -                 |
| 65.  | Grossulariaceae          | <i>Ribes alpestre</i> Decne.  | Shumloo         | +              | +               | -             | +               | -                 |
| 66.  | -do-                     | <i>Ribes orientale</i> Desf.  | Ghono Shatoo    | +              | -               | -             | -               | -                 |
| 67.  | Juglandaceae             | <i>Juglans regia</i> L.   | Ashooy          | +              | -               | +             | -               | -                 |
| 68.  | Labiatae (Lamiaceae)     | <i>Isodon regosus</i> (Wall. ex Benth) Codd.  | Lahashee        | +              | -               | +             | +               | +                 |

Table 1. (Cont'd.).

| S. # | Family Name    | Botanical name                              | Local Names    | Medicinal uses | Veterinary uses | Fuel & Timber | Fodder & Forage | Cultural & others |
|------|----------------|---|----------------|----------------|-----------------|---------------|-----------------|-------------------|
| 69.  | -do-           | <i>Mentha longifolia</i> L.                 | Pheclil        | +              | +               | -             | +               | -                 |
| 70.  | -do-           | <i>Mentha royleana</i> Benth.               | Pheclil        | +              | +               | -             | +               | -                 |
| 71.  | -do-           | <i>Mentha arvensis</i> L.                   | Podina         | +              | -               | -             | -               | -                 |
| 72.  | -do-           | <i>Nepeta royleana</i> Stewart              | -              | +              | -               | -             | +               | -                 |
| 73.  | -do-           | <i>Sabvia mibicola</i> Wall ex. Sweet       | Chropoh        | +              | -               | -             | +               | -                 |
| 74.  | -do-           | <i>Thymus linearis</i> Benth.               | Tumuro         | +              | -               | -             | +               | -                 |
| 75.  | Malvaceae      | <i>Malva neglecta</i> Wall.                 | Shanishah      | +              | -               | -             | +               | -                 |
| 76.  | -do-           | <i>Malva sylvestris</i> L.                  | Shamihah       | +              | -               | -             | +               | -                 |
| 77.  | Moraceae       | <i>Ficus carica</i> L.                      | Fakh           | +              | -               | +             | -               | -                 |
| 78.  | -do-           | <i>Morus alba</i> L.                        | Marooch        | +              | +               | +             | +               | -                 |
| 79.  | -do-           | <i>M. nigra</i> L.                          | Marooch        | +              | +               | +             | +               | -                 |
| 80.  | Oleaceae       | <i>Fraxinus hookeri</i> Wenzing             | Kasoonar       | +              | -               | +             | +               | +                 |
| 81.  | -do-           | <i>Olea ferruginea</i> Royle                | Kawoo          | +              | -               | +             | +               | -                 |
| 82.  | Onagraceae     | <i>Epilobium hirsutum</i> L.                | -              | +              | -               | -             | +               | -                 |
| 83.  | -do-           | <i>E. angustifolium</i> L.                  | -              | -              | -               | -             | +               | -                 |
| 84.  | Poaceae        | <i>Poa gilgitica</i> Dickore                | Kuch           | -              | -               | -             | +               | -                 |
| 85.  | -do-           | <i>Poa pratensis</i> L.                     | Kuch           | -              | -               | -             | +               | -                 |
| 86.  | -do-           | <i>Pennisetum flaccidum</i> Griseb.         | Kuch           | -              | -               | -             | +               | -                 |
| 87.  | -do-           | <i>Saccharum bengalensis</i> Retz.          | Phoroo         | +              | -               | -             | +               | -                 |
| 88.  | Plantaginaceae | <i>Plantago major</i> L.                    | Kanh Khapai    | +              | -               | -             | +               | -                 |
| 89.  | -do-           | <i>Plantago lanceolata</i> L.               | Shelitu        | +              | -               | -             | +               | -                 |
| 90.  | Podophyllaceae | <i>Podophyllum emodii</i> Wall. Ex Royle    | Bankakari      | +              | -               | -             | -               | -                 |
| 91.  | Polygonaceae   | <i>Bistorta affinis</i> (D. Don) Green      | Chumii         | +              | -               | -             | +               | -                 |
| 92.  | -do-           | <i>Oxyria digyna</i> L.                     | Churkii        | +              | -               | -             | +               | -                 |
| 93.  | -do-           | <i>Polygonum hydropiper</i> L.              | -              | +              | -               | -             | -               | -                 |
| 94.  | -do-           | <i>Rheum spiciforme</i> Royle.              | Jaro Chontal   | +              | +               | -             | +               | -                 |
| 95.  | -do-           | <i>Rheum wabbianum</i> Royle                | Chontal        | +              | -               | -             | +               | -                 |
| 96.  | -do-           | <i>Rumex hastatus</i> D. Don.               | Churka         | +              | -               | -             | +               | -                 |
| 97.  | -do-           | <i>Rumex nepalensis</i> Spreng.             | Babal          | +              | -               | -             | +               | -                 |
| 98.  | -do-           | <i>R. dentatus</i> L.                       | Jangali Palak  | +              | -               | -             | +               | -                 |
| 99.  | Papaveraceae   | <i>Papaver nudicaule</i> L.                 | Ghoshal phonar | +              | -               | -             | -               | -                 |
| 100. | Primulaceae    | <i>Primula macrophylla</i> D. Don           | Mecou          | +              | -               | -             | -               | -                 |
| 101. | -do-           | <i>Primula moercroftiana</i> Wall. ex Klatt | Mecou          | +              | -               | -             | +               | -                 |
| 102. | Pinaceae       | <i>Picea smithiana</i> Wall.                | Kachul         | +              | -               | +             | +               | -                 |
| 103. | -do-           | <i>Pinus wallichiana</i> A.B. Jackson       | Cheenh         | +              | -               | +             | +               | -                 |
| 104. | Punicaceae     | <i>Punica granatum</i> L.                   | Danooh Dadoo   | +              | -               | -             | +               | -                 |

Table 1. (Cont'd.).

| S. # | Family Name      | Botanical name  | Local Names  | Medicinal uses | Veterinary uses | Fuel & Timber | Fodder & Forage | Cultural & others |
|------|------------------|---|--------------|----------------|-----------------|---------------|-----------------|-------------------|
| 105. | Ranunculaceae    | <i>Aquilegia fragrans</i> Benth.                      | Shay Makhoti | +              | +               | -             | +               | -                 |
| 106. | -do-             | <i>Aconitum heterophyllum</i> Wall.                   | Kunain       | +              | -               | -             | -               | -                 |
| 107. | -do-             | <i>Clematis orientalis</i> L.                         | Murghashi    | +              | -               | -             | -               | -                 |
| 108. | -do-             | <i>Delphinium brunonianum</i> Royle.                  | Makhoti      | +              | +               | -             | -               | -                 |
| 109. | -do-             | <i>Ranunculus trichophyllus</i> Chaix ex Vill.        | -            | +              | -               | -             | +               | -                 |
| 110. | Rosaceae         | <i>Contoneaster integerrima</i> Medik                 | Chimardani   | +              | -               | -             | +               | -                 |
| 111. | -do-             | <i>Fragaria nubicola</i> Lindl. ex Lamdl. ex Laneaita | Kruchal      | +              | -               | -             | -               | -                 |
| 112. | -do-             | <i>Prunus armeniaca</i> L.                            | Joyeen       | +              | -               | +             | +               | -                 |
| 113. | -do-             | <i>Prunus amygdalata</i> Baill.                       | Badam        | +              | -               | +             | +               | -                 |
| 114. | -do-             | <i>Rosa webbiana</i> Wall. Ex Royle                   | Shighayn     | +              | -               | +             | +               | +                 |
| 115. | -do-             | <i>Rubus irritans</i> Focke                           | Ichcejeh     | +              | -               | +             | -               | -                 |
| 116. | -do-             | <i>Spiraea canescens</i> D. Don                       | Darah        | +              | -               | +             | +               | +                 |
| 117. | -do-             | <i>Sorbus tianchanica</i> Rupr.                       | Byaar        | +              | -               | +             | -               | -                 |
| 118. | Rubiaceae        | <i>Rubia cordifolia</i> L.                            | Choro        | +              | -               | -             | +               | -                 |
| 119. | Salicaceae       | <i>Salix acmophylla</i> Boiss.                        | Bawoo        | +              | -               | +             | +               | -                 |
| 120. | -do-             | <i>Salix alba</i> L.                                  | Muchoor      | +              | -               | +             | +               | +                 |
| 121. | -do-             | <i>Salix denticulata</i> N.J. Andersson               | Bawoo        | +              | -               | +             | +               | -                 |
| 122. | -do-             | <i>Salix illensis</i> Regel                           | Bawoo        | +              | -               | +             | +               | -                 |
| 123. | -do-             | <i>Salix turanica</i> Nasarov                         | Mushoor      | +              | -               | +             | +               | -                 |
| 124. | -do-             | <i>Populus alba</i> L.                                | Fulsoo       | +              | -               | +             | +               | -                 |
| 125. | -do-             | <i>Populus nigra</i> L.                               | Fulsoo       | +              | -               | +             | +               | -                 |
| 126. | Saxifragaceae    | <i>Bergenia stracheyi</i> Hook. & Thoms               | Sapsar       | +              | +               | -             | -               | -                 |
| 127. | -do-             | <i>Bergenia ciliata</i> (Ham.) Sternb.                | Sapsar       | +              | +               | -             | -               | -                 |
| 128. | -do-             | <i>Saxifraga flagellaris</i> Willd.                   | -            | +              | -               | -             | +               | -                 |
| 129. | Scrophulariaceae | <i>Verbascum thapsis</i> L.                           | Masugut      | +              | -               | -             | -               | -                 |
| 130. | Solanaceae       | <i>Datura stramonium</i> L.                           | Datura       | +              | +               | -             | +               | -                 |
| 131. | -do-             | <i>Solanum nigrum</i> L.                              | Gabilli      | +              | -               | -             | +               | -                 |
| 132. | -do-             | <i>Physochlana praedalta</i> Decne.                   | Phaphagn     | +              | -               | -             | -               | -                 |
| 133. | -do-             | <i>Hyoscyamus niger</i> L.                            | Bazarbang    | +              | -               | -             | -               | -                 |
| 134. | Tamaricaceae     | <i>Myricaria germanica</i> L.                         | Hokaroo      | +              | -               | +             | +               | -                 |
| 135. | -do-             | <i>Tamaricaria elegans</i> Royle                      | Hokaroo      | +              | -               | +             | +               | -                 |
| 136. | Thymelaeaceae    | <i>Daphne mucronata</i> Royle                         | Nirkoo       | +              | -               | +             | +               | -                 |
| 137. | Urticaceae       | <i>Urtica dioica</i> L.                               | Jumii        | +              | -               | -             | -               | -                 |
| 138. | Valerianaceae    | <i>Valeriana wallichii</i> DC.                        | Mushkbala    | +              | -               | -             | +               | -                 |
| 139. | Violaceae        | <i>Viola serpens</i> Wall. ex Roxb.                   | Lillo        | +              | -               | -             | -               | -                 |
| 140. | Zygophyllaceae   | <i>Pogonum harmala</i> L.                             | Ispandor     | +              | +               | -             | -               | +                 |
| 141. | -do-             | <i>Tribulus terrestris</i> L.                         | Shawoo kono  | +              | -               | -             | +               | -                 |

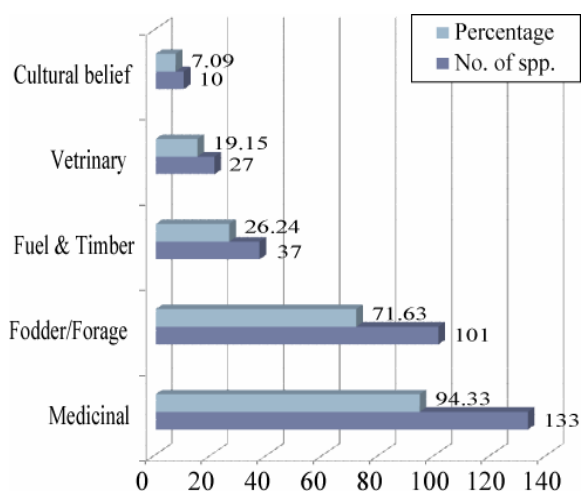


Fig. 2. Showing different Ethnobotanical uses of plants by the people of the Naltar Valley.

The largest ethnobotanically important family was Asteraceae which contributed 17 species (12.06%), followed by Fabaceae (10 species, 7.09%), Polygonaceae, and Rosaceae (8 species, 5.67% each), Lamiaceae and Salicaceae (7 species, 4.96% each), Chenopodiaceae and Ranunculaceae (5 species, 3.55% each) and Apiaceae, Poaceae and Solanaceae (4 species, 2.84% each); while rest of the families had fewer species (Table 2). Altogether, the recorded ethnoflora comprised of 91 herbs, 27 trees and 23 shrubs.

**Medicinal uses recorded from the study area:** Forty eight diseases /ailments were treated through 133 plant species by the traditional herbalists (*Hakeems*) and elderly experienced people (Table 3). With reference to medicinal plants habit forms, herbs (64.54%) were heavily used followed by trees (19.15%) and shrubs (16.31%). Table 4 revealed that in most of the preparations, leaves were used (41.35%), followed by aerial parts (31.58%), fruit and seeds (26.32%), roots and its bark (26.32%), stem bark/resins (15.04%), and flower (11.28%).

Various modes of applications were documented in the study area (Fig. 3). It has been observed that most of the recipes were given in powder form (32%). It was followed by decoction (27%), fresh leaves (16%), fruits and seeds (13%) paste & poultice (9%) and pills (3%).

**Cultural myths and believes:** People of the Naltar Valley have a lot of cultural and mythical beliefs and religious dogmas regarding to some of the local plant species. These plants include *Juniperus excelsa*, *J. communis*, *Isodon rugosus*, *Spiraea canescens*, *Salix alba*, and *Paganum harmala*, etc. The inhalation of smoke of leaves of *J. communis* and *J. excelsa* is supposed to have hypnotic activity operated by special people called *Dayaln*. This practice is kept to extract information from the person about unforeseen things; evil deeds and other unfold matters, diseases, etc. The aerial parts of *Isodon regosus* is shaken on the person and seems to reduce

honor and demoralize his/her status in the society. The stem of *Spiraea canescens* (*Raacht* means protector) is kept in a house which is supposed to prevent from evils and deeds. The people of this area avoid sitting under shade of *Salix alba* during 12.00pm to 3.00pm with a belief supposing that there is possibility to be harmed by evils. The houses are fumigated by burning of *Peganum harmala* used as disinfectant and removing evil eyes.

Table 2. Major role of plant families in ethno flora of the Naltar Valley, Karakoram Ranges Gilgit.

| S.# | Family                  | Genera     | Species    |
|-----|-------------------------|------------|------------|
| 1.  | Asteraceae (Compositae) | 15         | 17         |
| 2.  | Fabaceae                | 9          | 10         |
| 3.  | Polygonaceae            | 5          | 8          |
| 4.  | Rosaceae                | 7          | 8          |
| 5.  | Lamiaceae (Labiatae)    | 5          | 7          |
| 6.  | Salicaceae              | 2          | 7          |
| 7.  | Chenopodiaceae          | 3          | 5          |
| 8.  | Ranunculaceae           | 5          | 5          |
| 9.  | Apiaceae (Umbelliferae) | 3          | 4          |
| 10. | Poaceae                 | 3          | 4          |
| 11. | Solanaceae              | 4          | 4          |
| 12. | Berberidaceae           | 1          | 3          |
| 13. | Cupressaceae            | 1          | 3          |
| 14. | Elaeagnaceae            | 2          | 3          |
| 15. | Moraceae                | 1          | 3          |
| 16. | Saxifragaceae           | 2          | 3          |
| 17. | Boraginaceae            | 2          | 2          |
| 18. | Brassicaceae            | 2          | 2          |
| 19. | Cariophyllaceae         | 2          | 2          |
| 20. | Ephedraceae             | 1          | 2          |
| 21. | Gentianaceae            | 2          | 2          |
| 22. | Geraniaceae             | 1          | 2          |
| 23. | Grossulariaceae         | 1          | 2          |
| 24. | Malvaceae               | 1          | 2          |
| 25. | Oleaceae                | 2          | 2          |
| 26. | Onagraceae              | 1          | 2          |
| 27. | Pinaceae                | 2          | 2          |
| 28. | Plantaginaceae          | 1          | 2          |
| 29. | Primulaceae             | 1          | 2          |
| 30. | Tamaricaceae            | 1          | 2          |
| 31. | Zygophyllaceae          | 2          | 2          |
| 32. | Anacardiaceae           | 1          | 1          |
| 33. | Balsaminaceae           | 1          | 1          |
| 34. | Betulaceae              | 1          | 1          |
| 35. | Cannabaceae             | 1          | 1          |
| 36. | Capparidaceae           | 1          | 1          |
| 37. | Caprifoliaceae          | 1          | 1          |
| 38. | Crassulaceae            | 1          | 1          |
| 39. | Jaglandaceae            | 1          | 1          |
| 40. | Papaveraceae            | 1          | 1          |
| 41. | Podophyllaceae          | 1          | 1          |
| 42. | Punicaceae              | 1          | 1          |
| 43. | Rubiaceae               | 1          | 1          |
| 44. | Scrophulariaceae        | 1          | 1          |
| 45. | Thymelaceae             | 1          | 1          |
| 46. | Urticaceae              | 1          | 1          |
| 47. | Valerianaceae           | 1          | 1          |
| 48. | Violaceae               | 1          | 1          |
|     |                         | <b>107</b> | <b>141</b> |



Different mode of preparations for making recipes during medicaments

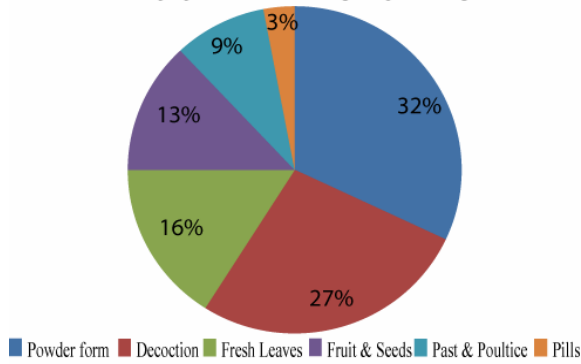


Fig. 3. Different mode of preparations for making recipes during medicaments.

Table 3. Major ailments treated by the local inhabitants of the Naltar valley, District Gilgit.

| S. No. | Ailments                      | No. of plants | Percentage |
|--------|-------------------------------|---------------|------------|
| 1.     | Diarrhea/ Dysentery           | 15            | 6.55       |
| 2.     | Constipation                  | 13            | 5.68       |
| 3.     | Skin diseases                 | 12            | 5.24       |
| 4.     | Diabetes                      | 12            | 5.24       |
| 5.     | Jaundice                      | 10            | 4.37       |
| 6.     | Asthma                        | 9             | 3.93       |
| 7.     | Cough                         | 9             | 3.93       |
| 8.     | Fever                         | 8             | 3.49       |
| 9.     | Headache                      | 7             | 3.06       |
| 10.    | Toothache                     | 7             | 3.06       |
| 11.    | Backache                      | 6             | 2.62       |
| 12.    | Joints pain                   | 6             | 2.62       |
| 13.    | Pneumonia                     | 6             | 2.62       |
| 14.    | Influenza                     | 6             | 2.62       |
| 15.    | Wounds healing                | 5             | 2.18       |
| 16.    | Kidney stone                  | 5             | 2.18       |
| 17.    | Leucorrhea                    | 5             | 2.18       |
| 18.    | Nerve disorder                | 5             | 2.18       |
| 19.    | Aphrodisiacs/Sexual ability   | 5             | 2.18       |
| 20.    | Rheumatic                     | 5             | 2.18       |
| 21.    | Ulcer                         | 4             | 1.75       |
| 22.    | Blood purifier                | 4             | 1.75       |
| 23.    | Ear infection                 | 4             | 1.75       |
| 24.    | Allergies                     | 4             | 1.75       |
| 25.    | Inflammations                 | 4             | 1.75       |
| 26.    | Anthelmintic/Intestinal worms | 4             | 1.75       |
| 27.    | Perfumes/Aromatic             | 4             | 1.75       |
| 28.    | Carminative                   | 3             | 1.31       |
| 29.    | Hair tonic                    | 3             | 1.31       |
| 30.    | Urinary bladder infection     | 3             | 1.31       |
| 31.    | Cardiac diseases              | 3             | 1.31       |
| 32.    | Tuberculosis                  | 3             | 1.31       |
| 33.    | Ophthalmic/Eye diseases       | 3             | 1.31       |
| 34.    | Stomach diseases              | 3             | 1.31       |
| 35.    | Diuretic                      | 3             | 1.31       |
| 36.    | Antiseptic                    | 3             | 1.31       |
| 37.    | Throat Infection              | 2             | 0.87       |
| 38.    | Bleeding                      | 2             | 0.87       |
| 39.    | Hair dye                      | 2             | 0.87       |
| 40.    | Blood pressure                | 2             | 0.87       |
| 41.    | Laxative/ Purgative           | 2             | 0.87       |
| 42.    | Hepatitis A,B,C               | 2             | 0.87       |
| 43.    | Anti Cancer                   | 1             | 0.44       |
| 44.    | Poisonous                     | 1             | 0.44       |
| 45.    | Typhoid                       | 1             | 0.44       |
| 46.    | Refrigerant/ Cooling effect   | 1             | 0.44       |
| 47.    | Energy tonic/Blood formation  | 1             | 0.44       |
| 48.    | Bone fractures                | 1             | 0.44       |

Table 4. Parts used for the preparation recipes during medicaments.

| S. No. | Part of plant used | No. of plants used | Percentage |
|--------|--------------------|--------------------|------------|
| 1.     | Leaves             | 55                 | 41.35      |
| 2.     | Aerial parts       | 42                 | 31.58      |
| 3.     | Root/Root bark     | 35                 | 26.32      |
| 4.     | Fruits / Seeds     | 35                 | 26.32      |
| 5.     | Stem bark/Resin    | 20                 | 15.04      |
| 6.     | Flowers            | 15                 | 11.28      |

## Conclusion and Recommendation

Out of 141 plants, 23 are newly reported from the study area, while some of the 48 species recorded additional usage. The newly reported species are such as *Pistacia khinjuk*, *Heracleum candicans*, *Hieracium sherwali*, *Saussuria simpsoniana*, *Impatiens edgeworthii*, *Berberis pseudumbellata*, *Artiplex crossifolia*, *Hylotelephium ewersii*, *Sophora alopecuroides*, *Caragana brevifolia*, *Swertia petiolata*, *Geranium pratense*, *Ribes alpestre*, *Olea ferruginea*, *Epilobium hirsutum*, *Podophyllum emodii*, *Papaver nudicaule*, *Primula macrophylla*, *Aquilegia fragrans*, *Clematis orientalis*, *Delphinium brunonianum*, *Spiraea canesens* and *Bergenia stracheyi*.

Un-sustainable collection and utilization of plants for different purposes cause a great threat to the flora of Naltar valley. These Plants include *Gentianodis tianshanica* (Plamath), *Glycyrrhiza glabra* (Shalakoo), *Thymus linearis* (Tumuro), *Saussurea simpsoniana* (Boshi Phonar), *Podophyllum emodi* (Isha maruch) and *Rheum spiciformae* (Jaro chontal). These are highly important medicinal plants and are heavily used for the medicaments. As a result various valuable and medicinal plant species of the study area are becoming rare and some are at the risk of danger for being extinction. This exerted huge pressure on the population of these species which may result in the extinction of species. So efforts should be made to conserve germplasm of such valued species. Therefore collective efforts should be made to make awareness among the communities, provision of alternate sources of energy on cheap prices and to generate employments for the people of this area. In addition, conservation of valuable species is the need of hours by propagating species and making germplasm to save them for our future generations.

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