An Ethnobotanical Inventory of Himalayan Region Poonch Valley Azad Kashmir (Pakistan)

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Research

Abstract

This study indicated that the inhabitants of Poonch Valley utilized 169 plant species for more than 30 domestic needs. Major use categories were determined with the largest (most species) being for medicines and foods. Medicinal plants, timber and fodder are identified as use categories that are of particular conservation importance in the area.

Introduction

Poonch, from an ethnobotanical point of view, is one of the least investigated of the Kashmir regions (Bakhari 1996, Dastagir 2001, Ghorsi & Shahzad 2002, Haq & Hussain 1995, Shahzad *et al*. 1999, Shahzad & Qureshi 2001, Stewart 1972, Zandial 1994). The study was conducted in order to obtain an inventory of the flora and to document the indigenous knowledge of the local inhabitants on potentially useful plants and their uses. The second aim of the study was to record data about ethnobotanically important plants of the area. This research is focused on a limited area: Poonch, that administratively comes under three districts namely Poonch, Sudhnoti and Bagh. The area is bordered by occupied Poonch district of central Kashmir on the east, Rawalpindi district of Punjab province on the west, Tatta Pani and Kotli district on the south and Suddhen Gali Muzaffarabad on the north (Figure 1).

Poonch valley is about 8500 hectares at an elevation ranging from 1750 meters to 2500 meters above sea level. Geographically, the whole area is divided into an upper and lower region. Rainfall occurs in the monsoon season and winter, with the average being 1600mm per year. The area is included in the cold temperate forest.

Vegetation

Stewart (1972) conducted vegetation surveys of Poonch valley including comprehensive collections of ferns and flowering plants. Malik & Khatoon (2001) conducted a phytosociological study of Bunjosa Hills (Rawalakot) District Poonch (during Monsoon). They reported ten plant communities from Bunjosa hills. The studies showed that *Pinus wallichiana* A.B. Jacks. is a dominant species from the base to the top of the hills. At the top mostly ferns were recorded such as *Onychium* and *Adiantum*.

Malik *et al*. (1988) recorded three plant communities from She Badana and the Palan hills near Kotli Azad Kashmir. The communities were *Pinus* - *Mallotus* - *Themeda*, *Pinus* - *Dodonaea* - *Themeda* and *Pinus* - *Carissa* - *Themeda*. There was a high degree of deforestation and over grazing. Malik *et al*. (1990b) also reported on three communities from Sudhan Gali District Muzaffarabad: *Malvestrum* - *Cymbopogon* - *Adiantum*, *Medicago* - *Euphorbia* and *Cymbopogon* - *Reinwardtia* - *Micromeria*. They reported extensive deforestation and high degree of degradation.

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Ethnobotany Research & Applications 8:107-123 (2010)

Published: May 26, 2010

www.ethnobotanyjournal.org/vol8/i1547-3465-08-107.pdf

Malik *et al*. (1990a) reported five communities on different parts of Bhimber hills, Azad Jammu and Kashmir: *Acacia- Vitex - Medicago*, *Carissa - Pinus - Themeda*, *Betula - Artemisia - Adhatoda*, *Pinus - Themeda - Morus* and *Pinus - Dodonaea*, *- Themeda*. Their findings shows a high degree of deforestation and heavy grazing in the investigated areas. The index of diversi-

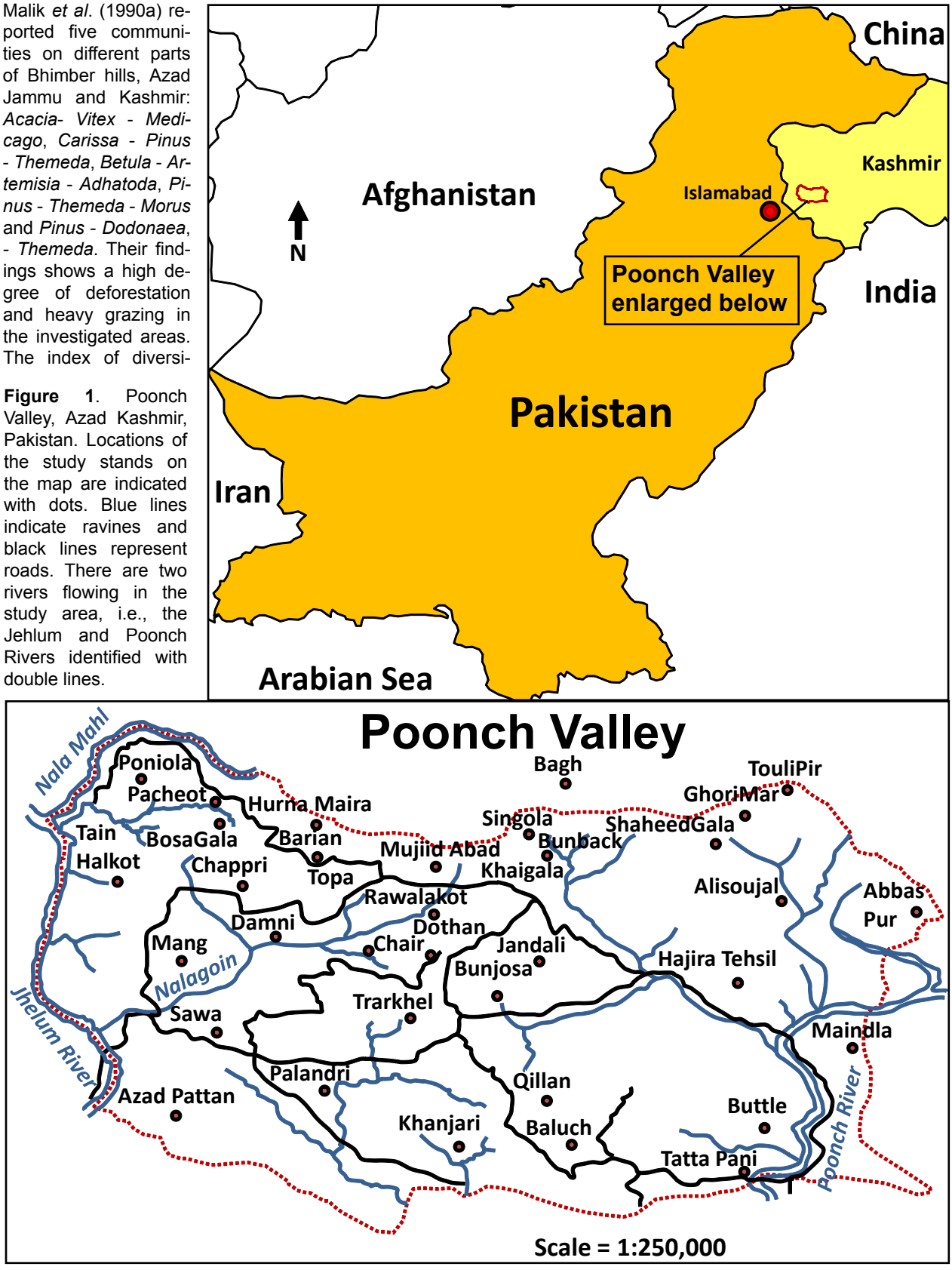

Figure 1. Poonch Valley, Azad Kashmir, Pakistan. Locations of the study stands on the map are indicated with dots. Blue lines indicate ravines and black lines represent roads. There are two rivers flowing in the study area, i.e., the Jehlum and Poonch Rivers identified with double lines.

ty, species richness and equilibility decreased from low altitude to high altitude. Malik *et al*. (1994) recorded six plant communities from the Dhirkot area of Azad Kashmir. Their findings showed that these forests have degraded into non-stratified scrub due to deforestation, overgrazing and erosion. It was concluded that the present forest needs protection against deforestation and overgrazing. Malik and Rauf (1995) studied the vegetation of Machyara National Park near Muzaffarabad. They reported *Cedrus deodara* (Roxb.) G. Don as the first dominant and *Abies pindrow* (Royle ex D. Don) Royle as second dominant in four stands. The whole area was covered with *Pinus wallichiana* A.B. Jacks. while *A. pindrow*, was low in number in a few stands showing deforestation and human pressure.

People

The people of Poonch valley are poor and the area is highly under developed (Azad Jammu & Kashmir I.T. Board 2005, Bamzai 1995, Lawrence 1991). The area is hilly, rugged in topography and unapproachable. The only source of income for the local people is agriculture products and their livestock. The average annual income of a family is only Rs 25,000 (Anonymous 2003). The area is also far behind in health and education sectors from the from rest of the districts in the region since the government is not paying for basic human requirements (Bamzai 1995, Lawrence 1991). Local people are primarily farmers or tenants. They also rear livestock. The area, particularly, the foothills and plains, has an agricultural economy mainly dependent on rainfall. Crops such as *Amaranthus viridis* L., *Brassica campestris* L., *Oryza sativa* L., *Papaver somniferum* L., *Phaseolus vulgaris* L., *Pisum sativum* L., *Solanum melongena* L., *Solanum tuberosum* L., *Triticum aestivum* L., *Vicia faba* L. and *Zea mays* L. are cultivated in the area. Among fruits; apples, apricots, peaches, walnuts, plumbs, pears, and citrus are grown and are exported from the area. Some people collect medicinal plants, morels and sell them in local markets, thus earning their livelihood. The people also earn income by selling handicrafts such as **namda** (floor rugs), **gubba**, **patto** (tweed), and woolen shawls. (Azad Jammu & Kashmir I.T. Board 2005)

Tourism has recently greatly improved the socio-economic conditions of the area by providing jobs opportunities to local people. Local people work in hotels and restaurants, as guides and jeep drivers, while some have opened shops at tourist resorts. In Rawalakot, Bunjosa and Ghori Mar, the tourism department has constructed rest houses for tourists. Beside tourist rest houses, some good hotels and private guest houses provide comfortable accommodation at reasonable rates in the valley. (Azad Jammu & Kashmir I.T. Board 2005)

However, during the winter season in hilly areas, all activities stop due to heavy snowfall. Local people travel to the lower comparatively warmer places like Kotli, Mirpur, Rawalpindi and even Karachi.

The literacy rate is around 50.7% (District Census 1998). There are 25 high schools, 8 inter-colleges and four degree-colleges in the valley. For girls 15 high schools, 8 inter- colleges and 4 degree- colleges are present. Many schools and colleges are also functioning in the private sectors. Urdu is the official language of Poonch valley. Pehari language is spoken in the entire valley especially in Rawalakot, Dothan, Bagh, Sudhnoti, and Hajira Tehsil. Besides Pehari, the Gojri, Hindko and Kashmiri languages are spoken in different parts of the valley as well. Hindko is the predominant language of lower part of the valley such as Azad Pattan, Buttle, Trarkhel, Sawa, Qillan, Baluch,and Khanjari. Rawalakoti is the dominant language in the village of Chair, Damni, Bunback, Shaheed Gala, Singola, Hornamera, Barian, Bosa Gala and Pacheott. On the boundary of Poonch district where Hindko is the predominant language of Kashur, the language of Kashmir, is spoken by Mir families residing in different parts of the valley as well as in Azad Kashmir. Most of the learned Kashmiries state that the Kashur vocabulary is a polyglot. Kashur has a grammar of its own (Lawrence 1991).

Ethnobotany

Haq & Hussain (1995) conducted a survey of medicinal plants of Palandri District, Poonch, Azad Kashmir. The survey revealed that there were 47 medicinal plants in the area. Sadiq (1996) described 37 medicinal plants from Azad Kashmir and determined their quantitative availability. He also described methods of propagation of medicinal plants in the area. Khan (1996) recorded more than 202 plant species from the Machyara National Park area, Azad Kashmir. He reported that local people are dependent on these plant resources for different requirements. It was found that about 80 plant species are used extensively in the area. Sheikh (1996), while describing medicinal plants from Pakistan, listed 25 medicinal plants from Azad Kashmir. Since then no research work has been carried out in the region in connection with ethnobotany.

Poonch valley has about 430 species of wild plants of which 16% are considered to be medicinally important (author's observation) . The traditional practitioners (herbal doctors) are playing an important role in providing health care to 75% of the population in rural areas (author's observation). A variety of herbal products have been used by the herbal doctors for the treatments of various diseases common in the area (author's observation). The elder people of the area use local plant resources to treat many common diseases, especially of children (Anonymous 2003, Bamzai 1995, Haq & Hussain 1995, Lawrence 1991). The knowledge and experience of these elderly people (men and women) is a precious wealth of the area.

Agriculture

Owing to its system of mountain streams and **nullahs** (intermittent stream/ravine) and river Poonch valley possess-

es a large area of alluvial soils. The new alluvial, which is found in the deltas of the river Poonch has great fertility and every year it is renewed and enriched by the silt of the mountain streams. The old alluvial is less fertile but in years of good and timely rain and moderate tillage results excellent dry crops. The most important staple diets of the Poonch valley are rice, maize, wheat and potato. The area is mostly hilly and there are no facilities for the cultivation of other different crops due to lack of water.

Fruit Plants: Kashmir is the country of fruits, many types of temperate fruits such as apples, pears, mulberries, walnuts, cherries, peaches, apricots, raspberries and strawberries can be obtained without difficulty in most parts of the valley. These fruits are of great help to the people as food and a source of income (Table 1).

Vegetables: Vegetables as underground stems, herbs and fruits are commonly used in the valley (Table 1).

Fodder Species: The people of Poonch valley depend very much for their comfort on milk and wool and in winter, and milk, cattle and sheep penned in biers which form the lower story of their Kashmiry houses. The straw of rice and the stalks of maize furnish portions of the fodder required for the winter months, but this has to be supplemented by leaves of various kinds of trees (Table 1).

Methods

The timing for fieldwork was selected according to the growth and collection season of plants in the region. The plants of ethnobotanical importance were collected and classified on the basis of their use in the area. Local people including plant collectors and others on an age group basis were interviewed for ethnobotanical information of the area. Population size and its distribution, history of settlement, major social groups or classes, productive activities, subsistence crops, etc. were also explored during the field work.

Table 1. Major fruits, vegetables, fodders and fuelwood species of Poonch Valley, Azad Kashmir, Pakistan. (Sources: Anonymous 2003, Bamzai 1995, Lawrence1991)

Useful Species		**Plant Type**						
	Fruit vegetable	**Fruit**	**Fuel wood**	**Leafy fodder**	**Underground vegetables**	**Hay fodder**	**Herbage vegetables**	**Green fodder**
Allium cepa L.					X			
Allium sativum L.					X			
Amaranthus viridis L.							X	
Avena sativa L.								X
Betula utilis D.Don			X					
Brassica compestris L.							X	
Brassica oleracea L.							X	
Brassica rapa L.					X			
Capsicum frutescens L.	X							
Celtis australis L.			X	X				
Chenopodium album L.							X	
Citrullus vulgaris Schrad. ex Eckl. & Zeyh.	X							
Colocasia esculenta (L.) Schott					X			
Cucumis sativus L.	X							
Cucurbita maxima Duchesne ex Lam.	X							
Cucurbita pepo L.	X							
Cymbopogon spp.						X		
Cynodon dactylon (L.) Pers.								X
Daucus carota L.					X			
Dichanthium annulatum (Forssk.) Stapf.						X		
Diospyros lotus L.		X						

Useful Species		Plant Type						
	Fruit vegetable	Fruit	Fuel wood	Leafy fodder	Underground vegetables	Hay fodder	Herbage vegetables	Green fodder
Ficus palmata Forssk.		X						
Imperata cylindrica (L.) Raeusch.						X		
Lagenaria vulgaris Ser.	X							
Luffa acutangula (L.) Roxb.	X							
Lycopersicon esculentum Mill.	X							
Malus pumila Mill.		X						
Momordica charantia L.	X							
Morus alba L.		X	X	X				
Olea ferruginea Royle			X	X				
Panicum colonum L.						X		
Panicum miliaceum L.								X
Persea duthiei (King) Kosterm.				X				
Phragmites karka (Retz.) Trin. ex Steud.						X		
Pinus roxburghii Sarg.			X					
Pinus wallichiana A.B. Jacks.			X					
Pisum sativum L.	X							
Populus nigra L.			X	X				
Punica granatum L.		X						
Prunus cerasus L.		X						
Prunus persica (L.) Batsch		X						
Pyrus communis L.		X						
Pyrus pashia Buch.-Ham. ex D. Don	X		X	X				
Quercus incana W. Bartram			X					
Raphanus sativus L.					X			
Rubus fruticosus L.		X						
Saccharum spontaneum L.						X		
Salix alba L.	X		X	X				
Solanum melongena L.								
Sorghum halepense (L.) Pers.						X		
Solanum tuberosum L.					X			
Trichosanthes dioica Roxb.								
Trifolium alexandrinum L.								X
Trifolium resupinatum L.								X
Trigonella foenum-graecum L.							X	
Ulmus wallichiana Planch.	X		X	X				
Viburnum foetens Decne.		X						
Vitis vinifera L.		X						
Total	**13**	**11**	**11**	**8**	**7**	**7**	**5**	**5**

The methods included three stages:
1. Field work.
   - Interviews
   - Observations
2. Inventory Documentation
3. Market assessment

Field Work

The study trips were made from January to May and from July to December (twice a month) for three years (2000-2003). The field work was based on interviews, observations and guided field trips (Appendixes 1-2) .

Interviews: Surveys were carried out during the field work; interviews were conducted with the local inhabitants and **hakims** (local herbal physicians). 40 informants were randomly selected and interviewed. Three questionnaires (Appendixes 1-3) were used during the survey for information about the plant resources, quantities used, rate of consumption, availability and percentage of plants species found and their utilization by the people.

Observations: The observations were made during growth of the plants that were then collected, dried, identified and preserved. The specimens were deposited in Quaid-e-Azam University Islamabad herbarium (ISL). Harvesting time, processing and their utilization was recorded.

Inventory Documentation

The ethnobotanical data obtained was checked and compared with existing literature (Cotton 1996, Haq & Hussain 1995, Hocking 1958, Jain 1995, Martin 1995) and was analyzed both quantitatively and qualitatively. Hence the indigenous knowledge about plant resources, religious and cultural aspects such as population diversity was also documented. For the ethnobotanical inventory a series of questions were asked about who, what, how and when and were plants were used:

- Who collects the plants?
- Who is responsible for their destruction?
- What are the uses of plant resources?
- What are destructive agencies?
- What type of benefits one obtained from natural resources to the local communities?
- How can ethnobotanists and conservationist know what is happening to the real picture of natural ecosystems?
- When are plants available in full grown states with roots, stems, leaves and flowers?

Finally the ethnobotanical inventory included vernacular names and uses, locality, elevation, ecological status, and derived botanical names (Table 2).

Table 2. Selected folk traditional uses and useful plants of Poonch Valley, Azad Kashmir. Vernacular names are reported in parentheses ( ). Voucher specimens collected that represent these results are reported in brackets [ ].

ACANTHACEAE
Dicliptera roxburghiana Nees (**Churu**)[130]. An extract of the roots is used to treat wounds.

ACERACEAE
Acer acuminatum Wall. ex D.Don (**Jangli Chanar**, Field Maple)[05]. Wood is useful as fuel.

Acer caesium Wall. ex Brandis (**Jangli chanar**, Field Maple)[06]. Wood is used as fuel. Leaves serve as fodder.

AMARANTHACEAE
Amaranthus viridis L. (**Gahnar**, Green amaranth)[475]. It is locally used as vegetables. It is considered good for obese persons. Antisnake and scorpion bite.

Celosia argentea L. (**Dumbi**, Cock's comb)[77]. Used as an ornamental plant. Leaves used as vegetables also.

APOCYNACEAE
Carissa caranta L. (**Garanda**)[73]. Root extract is used to treat Jaundice. Fruit is edible acidic berries.

Nerium indicum Mill. (**Kanair**, Oleander)[244]. A common pink flowered shrub near steams. Bark of root is used to treat arthritis. Stem branches used as mouthwash (***Maswak***). Leaves are extremely poisonous.

AQUIFOLIACEAE
Ilex dipyrena Wall. (**Bareen**, Himalayan Holly)[194]. Wood is used as fuel. Branches and leaves used as thatching and roofing material.

ARACEAE
Arisaema flavum (Forssk.) Schott (**Hathbis**, Cobra plant)[34]. The rhizome is poisonous. The mixture of boiled rhizome and wheat flour is given to cattle for increasing milk.

ASTERACEAE
Calendula officinalis L. (**Sadberga**, Marigold)[476]. Cultivated in gardens for beautiful flowers. The extract of young branches is used to relieve kidney pain and release kidney stones.

Cichorium intybus L. (**Kasni**, Chicory)[88]. The roots are boiled in water, then cooled and used to treat fever and vomiting. The leaves are used as vegetable.

Dendranthema indicum (L.) Des Moul. (**Gul-e-Daudi**, Painted Daisy)[477]. Ornamental, cultivated in gardens.

Helianthus annuus L. (**Dainhphair**, Sunflower)[453] An annual Garden herb. Cultivated in gardens for beautiful gandy capitula, which are usually deep yellow.

Sonchus asper (L.) Hill. (**Hundh**, **Dodak**)[380]. An annual weed (herb) with milky juice. In local areas leaves are used as a vegetable which is considered to be good for abdominal pain.

BALSAMINACEAE
Impatiens balsamina L. (**Maindi**)[195]. A moisture loving herb. An extract of the fleshy stem is used as henna.

BERBERIDACEAE
Berberis aristata DC. (**Sumbalu**, Berbery)[51]. Shruby plant of exposed places. Fruit is edible. It is a thorny bush and used for fencing crop fields.

BETULACEAE
Betula utilis D. Don (**Brain**, Birch)[54]. Wood is used for making agricultural tools, utensils, fences and as fuel. Shoots are used for thatching.

BRASSICACEAE
Brassica campestris L. (**Sirian**. Mustard)[478]. Leaves and young branches are used as a vegetable.

Lepidium sativum L. (**Haleon**, Garden cress)[479]. Leaves are used as a vegetable. Seeds are used as an eye cleaner.

Nasturtium officinale R.Br. (**Chou**, Water cress)[237]. Used as a vegetable and as a carminative.

BUXACEAE
Buxus papillosa C.K.Schneid. (**Kangi**, Box wood)[63]. Wood used for making sickle handles. Branches used as thatching and roofing material. The stem is used for toothbrushes and is a remedy for toothache.

CHENOPODIACEAE
Chenopodium album L. (**Ghanari**, Fat-hen, Goosefoot)[85]. Leaves are used as a pot herb.

CONVOLVULACEAE
Ipomoea purpurea (L.) Roth (**Eird**, Morning-glory)[202]. Used as a fodder and an ornamental.

CUCURBITACEAE
Citrullus vulgaris Schrad. ex Eckl. & Zeyh. (**Tinda**, Round gourd)[480]. The fruit is used as a vegetable.

Cucurbita moschata Duchesne (**Aal**, Squash)[481] The large fruit is used as a vegetable and for making squash.

Cucurbita pepo L. (**Dubbri**, **Safaid**, Pumpkin)[482]. The fruit is used as a vegetable.

Luffa aegyptiaca Mill. (**Tori**, Luffa)[483]. The fruit is used as a vegetable. The fibrous material obtain from dried fruit is used as as bath-sponges and for washing dishes.

Momordica charantia L. (**Karella**, Bitter Gourd)[484]. Fruit is used as a vegetable famous for their bitter taste.

Trichosanthes anguina L. (**Paroul**, Snake gourd)[485]. The fruit is cooked as a vegetable.

DRYOPTERIDACEAE
Onoclea sensibilis L. (**Bamchar**, Fern)[248]. The aqueous extract of the plant is a tonic and sedative.

EBENACEAE
Diospyros lotus L. (**Amlock**, Black Ebony)[134]. Fruit is used as purgative and laxative agent. The wood is used as a fuel. The leaves serve as fodder.

ELAEAGNACEAE
Elaeagnus parvifolia Wall. ex Royle (**Kankoli**, Oleaster)[145]. The fruit is edible and cardiac stimulant. Locally used as fuel wood. Fruit is considered as good for cancer patients. A leaf infusion is used as a diuretic.

EUPHORBIACEAE
Andrachne cordifolia (Wall. ex Decne.) Müll. Arg. (**Karukni**)[23]. Used as a vermifuge for cattle.

Euphorbia cognata (Klotzsch ex Klotzsch & Garcke) Boiss. (**Dodali**)[157]. Extract and paste of fresh stem and leaves is used as a poultice to treat skin disease of goats.

Mallotus philippensis (Lam.) Müll. Arg. (**Kamilla**, Rauni)[219]. Used as fuel wood. A red powder is obtained from the surface of the fruit that is used medicinally to remove threadworms and ascaris. It is also use to treat mumps and measles in children.

FABACEAE
Acacia modesta Wall. (**Plahi**, Acacia)[02]. Wood is used as fuel, branches used as toothbrushes.

Dalbergia sissoo Roxb. ex DC. (**Tali**, Shisham)[141]. The timber is used as fuel wood. The wood is used for making furniture and agricultural tools. Branches used for thatching and fencing.

Desmodium podocarpum DC. (**Sukhea–ni-Jari**)[125]. The fresh herb is used as fodder. An extract of the roots is used as a tonic for general weakness in growing children.

Lathyrus odoratus L. (**Karak**, Sweet pea)[486]. Cultivated in the garden as an ornamental.

Medicago denticulata Willd. (**Sarri**, Toothed bur clover)[487]. Used as a vegetable and fodder.

Medicago minima (L.) L. (**Chotisari**)[222]. Used as fodder.

Pisum sativum L. (**Karab**, Pea)[488]. The seeds and buds are eaten as a vegetable.

Trifolium pratense L. (**Tire**, Red Clover)[400]. Used as fodder.

Trifolium resupinatum L. (**Shatala**, Persean clove)[489]. Grown as a fodder crop.

Trigonella foenum-graecum L. (**Methray**, **Methi**)[490]. The fragrant leaves are used as a pot herb and fodder .The seeds are used as a spice and condiment. The seeds are also used medicinally as a carminative and tonic.

FAGACEAE
Quercus baloot Griff. (**Rianh**, Oak)[309]. Wood is used for timber, fuel, and making agricultural tools, especially ploughs and handles.

Quercus dilatata Lindl. ex Royle (**Rianh**, **Moru**)[310]. Wood is used as fuel. Due to its toughness, the wood is used in agricultural tools, handles of plough, axes, gun butts and walking sticks. The seeds are edible, astringent and diuretic, used in diarrhoea, indigestion and asthema. Children use the seeds as playing tops.

Quercus floribunda Lindl. ex A. Camus (**Ban**)[311]. Wood is used as fuel and for thatching and roofing.

Quercus incana W. Bartram (**Rianh Moru**, Silver oak)[312]. Wood is used as fuel. Seeds are edible, astringent and diuretic, used in diarrhoea, indigestion and asthema. Due to its toughness, the wood is used in agricultural tools, handles of plough, axes, gun buts and walking stick. tools specially ploughs and handles.

HIPPOCASTINACEAE
Aesculus indica (Wall. ex Cambess.) Hook. (**Bunkhor**, Horse chestnut)[13]. Leaves are used as fodder. Nuts are used for colic and for chest diseases of horses, donkeys and mules. Nuts are also given to cattle as a stimulant. Wood is used as fuel and in making furniture, agricultural appliances and gun butts.

JUGLANDACEAE
Juglans regia L. (**Khor**, Walnut)[491]. Wood is used in making furniture. Nuts are edible and used as a sex stimulant. Nuts are also used to treat hypertension. Bark (**dandasa**) is used for cleaning and sparkling teeth. Leaves are used, particularly by women, as they impart a pinkished color to the lips.

LAMIACEAE
Mentha sylvestris L. (**Pudina**, Peppermint)[226]. Locally it is used in chutney and for the treatment of stomach pain.

Mentha viridis (L.) L. (**Pudina**, Fieldmint)[228]. Leaves are used as carminative, stimulant and refrigerant.

Micromeria biflora (Buch.-Ham. ex D. Don) Benth. (**Bouti**)[229]. An aqueous extract of leaves is used to treat kidney stones.

LAURACEAE
Persea duthiei (King) Kosterm. (**Breein**, Avocado)[258]. Shoots are used as fresh fodder, thatching and roofing material. Wood is used as fuel.

LILIACEAE
Allium cepa L. (**Piaz**, Onion)[492]. Bulb is used as vegetable and as a flavoring. The green leaves are also eaten. Used medicinally as a stimulant, diuretic and expectorant.

Allium sativum L. (**Thoom**, Garlic)[493]. Leaves are used as a vegetable. Bulb is used as a condiment and flavouring substance for meat and vegetables. Garlic powder is extensively used as a condiment and also serves as a carminative and gastric stimulant. Fresh bulbs are eaten to treat hypertension.

MALVACEAE
Bombax malabaricum DC. (**Simbal**, Bombax)[494]. Wood is used for making boards of shattering. The fruit fiber is used for stuffing pillows, etc.

Hibiscus esculentus L. (**Bindi**, Ocra)[495]. Green juicy fruit is used as a vegetable. These are anti-purgative, stomachic and aphrodisiac.

MELIACEAE
Cedrela toona Roxb. ex Rottler & Willd. (**Toon**, Redcedar)[75]. Wood is used for furniture and shuttles. Branches are used for making picking sticks. Bark is used medicinally as an astringent.

Melia azedarach L. (**Dharek**, Pride of India)[224]. Wood is used as fuel and for making furniture and agricultural tools, especially bullocks. Roots are bitter and used as antihelmintics. A decoction of leaves is said to be astringent and stomachic. Leaves are also used as a seedbed for growing rice seeds.

MORACEAE
Ficus glomerata Roxb. (**Tohsi**, Wild fig)[166]. Fresh leaves are used as fodder for sheep and goats. Fruit is edible.

Ficus palmata Forssk. (**Phagwara**, Wild fig)[168]. Wood is used as fuel, thatching and fencing. Fruit is edible.

Morus alba L. (**Karoon**, Mulberry)[233]. Wood is used as fuel and in furniture. Goats and sheep eat the leaves. Leaves are used in rearing silkworms. Flexible branches

are used for baskets. Fruit is eaten both fresh and dry. Fruit is laxative and purgative.

MORCHELLACEAE
Morchella esculenta (L.) Pers. (**Cofathu**, Morel)[496]. Mushrooms are dried in **desi ghee** and eaten after a meal.

Verpa bispora L. (**Patgochi**, Bell morel)[497]. Fresh mushrooms are cleaned and converted into pieces. These are roasted in **desi ghee** and used as part of a curry.

MUSACEAE
Musa acuminata X *balbisiana* Colla. (**Kela**, Banana)[498]. The edible fruit is rich in starch and vitamins. The juice of leaves and pseudostem is mixed with *Solanum nigrum* leaf extract and viniger and used as a treatment for liver inflammation. The large banana leaves are also used as dining plates on festive occasions.

MYSINACEAE
Myrsine africana L. (**Kathi**, Cape myrtle)[235]. The flexible branches are used for making baskets.

MYRTACEAE
Callistemon lanceolatus DC. (**Boutle Bursh**, Bottlebrush)[499]. Grown in gardens as an ornamental.

OLEACEAE
Jasminum humile L. (**Chamba zard**, Yellow Jasmine)[203]. A decoction of roots is said to be useful in treating ringworm. Grown in gardens as an ornamental.

Jasminum officinale L. (**Cahamba suafid**, White Jasmine)[204]. Grown in gardens as an ornamental. Flowers are used as an emollient, aromatic and flavouring agent.

Olea ferruginea Royle (**Kohu**, Wild olive)[247]. Wood is an excellent timber, which is hard and durable and used for agricultural tools specially ploughs and handles. The branches are used as washing sticks (**muswak**). A decoction of leaves is used in toothache, as an astringent and antiseptic. Fresh leaves are chewed to treat stomachache.

PINACEAE
Abies pindrow (Royle ex D. Don) Royle (**Tung**, West Himalayan silver fir)[01]. Wood is used as timber for building purposes, bridges, beams, and furniture. Branches are used as fuel. Cones are used as fuel and for decoration. The powder of the inner red fleshy bark is used to treat cough and asthema.

Pinus roxburghii Sarg. (**Chir**, Pine)[270]. Wood is used as timber for building purposes, houses, bridges, beams. Cones are used as fuel.

Pinus wallichiana A.B. Jacks. (**Rair**, Blue pine)[271]. Wood used for making furniture, bridges and beams. Cones are used as ornaments.

POACEAE
Arundo donax L. (**Nard**, Giant reed)[42]. Stems are used in the manufacture of baskets and as thatch. The stems also used by children for making dip pens (**kalams**).

Avena sativa L. (**Kandial**, Oats)[448]. Used as fresh and dry fodder.

Phragmites karka (Retz.) Trim. ex. Stead. (**Nari Gah**, Water grass)[264]. Leaves and soft stems used as fodder. Stems are used for making baskets.

PTERIDACEAE
Adiantum venustum D. Don (**Dilpattra**, Maiden hair fern)[12]. Rhizome is used as an astringent, diuretic and stomachic.

RANUNCULACEAE
Aconitum heterophyllum Wall. ex Royle (**Atisb**)[09]. The rhizome is used as an astringent and tonic, and in cough and diarrhea.

Clematis gouriana Roxb. ex. DC. (**Cochani**)[93]. Shoot is is used to wash milk pots in the sense that it acts as a fermenter in converting raw milk into yogurt. Shoot is also used for treating leprosy.

Ranunculus arvensis L. (**Chochumba**)[315]. Fruit is used as a vegetable.

Thalictrum javanicum Bl. (**Mamira**)[392]. Yields **mamira** for application to eye in opthalmia and other eye troubles.

RHAMNACEAE
Rhamnus purpurea Edgew. (**Dadralu**, Buckthorm)[320]. Fresh fruit and leaves are given to cattle as antihelmintic.

Zizyphus mauritiana Lam. (**Ber**)[428]. Fruit is edible. Used for roof thatching.

Zizyphus nummularia (Burm.f.) Wight & Arn. (**Brunhi Unab**)[429]. Fruit is used as emollient and expectorant and for bronchitis and blood purifying effects.

Zizyphus oxyphylla Edgew. (**Tukbari**)[430]. Fruit is edible. Root bark is used to treat hypertension.

ROSACEAE
Agrimonia pilosa Ledeb. (**Jlabi Booti**, Agrimony)[14]. Root extract is used as an astringent, tonic, diuretic and for blood diseases.

Malus pumila Mill. (**Seb**, Apple)[500]. Valuable commercial fruit, purgative, expectorant, and thouht to be a good

source of iron, and good for the heart. Wood used as fuel. Leaves used as fodder.

Prunus armeniaca L. (**Khubani**, Apricot)[501]. Fruit and seeds are eaten both dry and fresh, and function as a laxative. Wood used as fuel. Leaves used as fresh fodder. Important plant for honey bees.

Prunus padus L. (**Jamana**, European bird cherry)[502]. Fruit eaten. Wood used as fuel. Leaves used as fresh fodder.

Prunus persica (L.) Batsch (**Arwari**, Peach)[503]. Fruit eaten. Wood used as fuel. Leaves used as fodder.

Pyrus pashia Buch.-Ham. ex D. Don (**Tungi**, Wild pear) [308]. Wood used as fuel, for walking sticks and tobacco pipes. Leaves are used as fresh fodder. Leaf extract is used as a tonic for hair loss.

Rosa indica L. (**Gulab**, Edward rose)[504]. Grown in gardens as an ornamental for its fragrant flowers. Largely grown for rose water and **attar**. The petals of the rose have a purgative property and are used in the manufacture of **gulband**, a laxative.

Rubus ellipticus Sm. (**Akhara**, Himalayan yellow raspberry)[332]. Evergreen shrub with stout stem covered with rufous bristles and recurved spine, thus being used as a living fence or hedge. Fruit eaten and functions as a laxative.

Rubus fruticosus L. (**Bari**, Blackberry)[333]. Fruit eaten and functions as a laxative.

Rubus hoffmeisterianus Kunth & Bouché (**Bari**, Hoffmeister rasberry)[334]. Fruit eaten and functions as an expectorant.

RUTACEAE
Zanthoxylum alatum Roxb. (**Timber**, **Kababe**)[427]. Locally seeds are used as spice, condiment and carminative. Walking sticks are made from its warted stem. Branches are used as tooth brushes.

SALICACEAE
Populus ciliata Wall ex.Royle (**Sufaida**, Himalayan poplar)[295]. Tree grown as an ornamental and for shade. Wood used as fuel and for making shelters. Leaves used as fodder for goats and sheep.

Salix alba L. (**Beesa**, Willow)[339]. Tree planted along water courses to prevent soil erosion. Wood used as fuel and in making kitchen utensils, cricket bats and light furniture.

SAPINDACEAE
Dodonaea viscosa Jacq. (**Sanatha**, **Dodoes**)[36]. Leaves are used in wound healing and as an astringent. The plant is used for thatching and fencing. Stems are used as tooth brushes and home cleaning brushes.

Sapindus mukorossi Gaertn. (**Raintha**, Soap nut)[505]. Wood used as fuel and for making light furniture. The pericarp of fruit is widely used for soap. Extract of fruit skin is used for the treatment of piles. Powder of the soap nut is used as an aphrodisiac.

SCHIZAEACEAE
Lygodium japonicum (Thunb.) Sw. (**Kharshi**, Japanese climbing fern)[217].The plant is used as a decoration piece due to beautiful curly stems and fronds. The powder of the dry plant is sprinkled on wounds to hasten healing. A root extract is taking for reducing body aches and swelling.

SCHLERODEMATACEAE
Scleroderma cepa Pers. (**Khakhun**, Morel)[506]. Fresh-mushrooms are cleaned and the skin of the fluffy mass of mushroom removed. The remainder is converted into pieces that are used for preparation of a curry.

SIMARUBACEAE
Ailanthus excelsa Roxb. (**Punjabi tun**, Tree of Heaven) [15]. Bunches of dry fruit are used as decorations in flower pots. Wood is used as fuel, fencing and thatching.

SOLANACEAE
Capsicum annuum L. (**Marchi**, Red pepper, Chili)[507]. Fruit used as an extremely pungent condiment. It is also used in prickles.

Cestrum nocturnum L. (**Rat – ki – rani**, Night jessamine) [508]. Ornamental, grown in the garden for its fragrant flowers which are scented at night.

Lycopersicon esculentum Mill. (**Chaigun**, Tomato)[509]. Flavoring agent and vegetable used in salad and chutney.

Solanum melongena L. (**Baigun**, **Brinjal**)[510]. Fruit eaten as a vegetable and are also as a stomachic.

Solanum tuberosum L. (**Aalu**, Potato)[511]. Tubers used as a vegetable and also a source of starch.

ULMACEAE
Celtis australis L. (**Khirk**, Nettle tree)[78]. Wood used as fuel, fencing and thatching.

Ulmus villosa Brandis ex Gamble. (**Kai**, Elm)[404]. Wood used for furniture. Fresh leaves used as fodder.

Ulmus wallichiana Planch. subsp. *xanthoderma* Melville & Heybroek. (**Munu**, Kashmir Elm)[405]. Wood used as fuel, and for making furniture and agricultural tools. Branches used for fencing and thatching. Fresh leaves used as fodder.

URTICACEAE
Debregeasia salicifolia (D. Don.) Rendle (**Sindari**)[124]. Fruit is edible, reductive. Leaves are given to the animals as a treatment of diarrhea and flatulence.

VERBENACEAE
Citharexylum spinosum L. (**Ratanuath**)[90]. Leaves are poisonous if eaten by animals in large amounts. Otherwise they are purgative for animals.

Vitex negundo L. (**Banah**, **Samaalu**, Chinese charte tree)[421]. Wood used as fuel, for fencing and thatching, and as **meswak**. Fresh leaves are used in gum diseases.

ZINGIBERACEAE
Curcuma longa L. (**Haldi**, Turmeric)[512]. Rhizome used as a condiment to flavor and color pickles and other foodstuff. It is one of the principle ingredients of curry.

Market Assessment

Market assessment of medicinal plants available in the markets of Abbaspur, Hajira, Rawalakot and Trarkhel was carried out (Kloos 1976, Martin 1995) using a survey (Appendix 4). A marketing chain for medicinal plant collection and the people involved in medicinal plant trade was investigated. A list of economic plants was prepared from the survey with emphasis on plant market availability status, collection methods and local prices of these plants (Table 3).

The recorded data were compared with specific ethnobotanical literature (Berlin 1992, De Feo *et al*. 1992, Jain 1995, Jain & Dam 1979, Jain & Rao 1978, Leporatti & Corradi 2001, Martin 1995, Rao 1981), not limited only

Table 3. Important medicinal plant species of Poonch Valley, Azad Kashmir, Pakistan.

Botanical Name	Part used	Approximate annual yield (Kg.)	Price per Kg
Berberis lycium Royle	Roots	180	450
Bergenia ciliata Sternb.	Rhizome	165	250
Caryopteris odorata (D. Don) B.L. Rob.	Leaves	155	50
Dioscorea deltoidea Wall. ex Griseb.	Roots	200	25
Galium elegans Wall. ex Roxb.	Roots	140	150
Geranium wallichianum D. Don ex Sweet	Roots	160	230
Mallotus philippensis (Lam.) Müll. Arg.	Fruits	175	300
Pistacia integerrima J.L. Stewart ex Brandis	Pod	165	150
Punica granatum L.	Fruits	190	150
Trichodesma indicum (L.) Lehm.	Plant	150	50
Viola biflora L.	Flower/whole plant	155	100
Zanthoxylum alatum Roxb.	Fruits	195	60
Sapindus saponaria L.	Fruits	500-600	10
Colchicum luteum Baker	Rhizome	140	150

Table 4. Plants species identified with multiple (3 or more) uses in Poonch Valley, Azad Kashmir, Pakistan.

Uses	Species
7	*Melia azedarach* L.
6	*Ficus palmata* Forssk
	Morus alba L.
	Ulmus villosa Brandis ex Gamble
5	*Celtis australis* L.
	Dalbergia sissoo Roxb. ex DC.
	Juglans regia L
	Pinus roxburghii Sarg.
4	*Abies pindrow* (Royle ex D. Don) Royle
	Acacia modesta Wall.

Uses	Species
4	Ailanthus excelsa Roxb.
	Buxus papillosa C.K. Schneid.
	Pinus wallichiana A.B. Jacks.
	Populus ciliata Wall. ex Royle
	Zanthoxylum alatum Roxb.
3	*Cedrela toona* Roxb. ex Rottler & Willd.
	Dodonaea viscosa Jacq.
	Mentha sylvestris L.
	Quercus dilatata Royle
	Salix alba L.

to Pakistan, in order to identify analogies, differences or eventual uses not cited previously.

Results

Table 2 shows the results of the ethnobotanical survey of Poonch valley Azad Kashmir. The inhabitants of the valley utilized 169 plant species belonging to 72 families. These were used for 30 different purposes including medicinal. In the study area 30 medicinal plants out of 68 were found as commonly utilized during different months of the year. Only 8 of them are traded in national markets while the rest are used only locally. 50% of the plant collectors were men, 21% women, and 27% children. Collectors indicated that they felt that the number of medicinal plants has been declining over the past 15 years.The data related to economics of medicinal plant parts used is reported in Table 3 and plants with multiple uses is table 4.

Discussion

The present study of ethnobotanical knowledge about plants used by local inhabitants allows us to draw some possible conclusions about the impacts of these uses and the likely near future needs and planning that should be done for conservation and development. A large proportion of the population of the valley living in remote areas rely on plants to meet almost every need of their lives. It was observed that the people maintain their own forests for medicinal plants, wild fruit, mushrooms, fuel wood, thatching/roofing, field fencing and fodder. Detailed studies have been carried out in the ethnotaxanomy or folk classification system by Berlin (1992) and are covered in detail in Martin (1995). These conclusions are discussed below in four harvest use categories.

Medicinal plants

Knowledge of medicinal plants does not appear to be homogenous in the area. It is however, more or less, distributed by gender. Men, especially old ones, are more informative of traditional knowledge of medicinal plants than the women in the area. This is consistent with earlier reports (Hamayun 2003).

It was observed that commercial gatherers (Gypsies and local people) collect medicinal plants in large amounts from remote areas of the valley. Such activity is likely causing a rapid depletion of medicinal plant resources in the area. Similar activities have been reported in other areas such as Swat where Choudhry *et al*. (2000) reported that 500 families were involved in medicinal plant collection and that they collected 5000 tons of medicinal plants annually. Similar field results have been reported in India in Meghalaya tribal areas (Jain *et al*. 1979, Rao *et al*. 1981). It is likely that similar harvest pressures are at work here.

Positive trade of medicinal plants in the valley could be promoted through 1) improved selection of good quality and 2) cultivated of those that are easier to grow in large amounts in local conditions. Folk knowledge on medicinal plants would be helpful in this respect. In our opinion *A. pilosa*, *Asparagus filicinus* Buch.-Ham. ex D. Don, *B. ciliata*, *C. odorata*, *Ceterach dalhousiae* (Hook.) C. Chr., *Daphne papyracea* Wall. ex Steud., *D. podocarpum*, *G. elegans*, *G. wallichianum* and *L. japonicum* are all species that would prove to be useful if they could be brought into cultivation in this area. Kloos *et al*. (1976/77) in their study of medicinal plants in Ethiopian markets, counted the number of sellers who were selling different species in each market, recording the total number of people selling each species for all markets. Their data also illustrates a lesson which is widely applicable for people who have limited time and funds and need to focus market survey efforts.

Medicinal plant collectors in the Poonch valley are monetarily poor villagers. Plant collection is their part time activity supplementing primary farming and livestock rearing. Many of the medicinal plants collected are rhizomatous. These plants are primarily collected in summer and during this period the plants utilize the root chemistry and nutrition for the development of aerial parts and fruit yield. As a result the rhizomes collected are depleted of active chemical constituents. The ideal time for the collection of these plants is winter or early spring when the plants are dormant. During this period the plants theoretically convert the nutritional chemistry of aerial parts into alkaloidal contents and store it in the underground parts. Beside this, the rhizome collection is thought to have resulted in a drastic decrease of these medicinal plants in the area.

Ten species were found to be used in the study area for veterinary medicine. Similar reports have come from nearby areas such as Samahni valley District Bhimber Azad Kashmir (Ishtiaq 2006). However, in Andhra Pradesh (Sundarsanam 1995) revealed 106 species used to treat veterinary disease implying that it is possible for a much more rich knowledge base to be present. Perhaps greater emphasis on sampling of this specific subset would have revealed more but it was not the focus of this work.

Wild fruits are not only collected as foods and syrups but are also used medicinally. In addition the leaves of some wild fruit trees, e.g., *F. glumerata*, *F. palmata*, *M. alba* and *P. pashia* are used as fodder. (Incidentally, many of the wild fruit species are relatives of domesticated species and therefore are potentially important sources of genetic diversity to be used in the future.)

One final medicinal practice arises from the fact that the people of the valley are Muslims, practicing Islam. They use **maswak** (chewing sticks) to clean their teeth. These **maswak** are made from the roots (particularly the root bark) of *J. regia* and branches of *A. modesta*, *O. ferrug-*

inea, and *Z. alatum*. Women of the study area use bark and leaves of *J. regia* for cleaning their teeth. Widespread use of maswak in various parts of Pakistan made of *Acacia nilotica* (L.) Willd. ex Delile and *J. regia* implies that this is not a unique custom in this area (Dastagir 2001, Haq 1993).

Mushrooms

Morel collection is an important activity in the study area during the spring season. Present investigation only confirmed that three species of morels were collected in the area. The villagers take keen interest in morel collection as it provides them with a source of income. Similar studies were conducted by Ali (2002) reported that different types of morel are collected from the Hindu Kush Himalayan region of Swat. However in Pakistan there are 56 edible species of mushrooms. These include 44 from NWFP and Azad Kashmir (Sultana *et al*. 1996). The implication is that further study in this area, with focus on mushrooms, would likely reveal more of these in use.

Fuel wood

Fuel wood is likely one of the prime causes of forest destruction in study area (Poonch valley) because the winter season is long and very harsh. People need fuel for heating and cooking. The five most often reported fuel woods, e.g., *D. sissoo*, *Q. dilatata*, *Q. incana*, *P. roxburghii* and *P. wallichiana* are under harvest pressure since the bulk of the population of the area use these plants for their fuel requirements. Similar study was conducted by Shinwari and Khan (1999) in Margalla Hills National Park. Martin (1995) revealed that the chief threat to the trees and shrubs of the Sulaiman range is the fuel shortage and that during long and severe winter seasons a huge amount of wood is used as fuel. Based on studies elsewhere, continuous cultivation and a periodic ban on some areas of the forest should be enforced to decrease the pressure of fuel wood consumption and allow for regular forest regeneration.

Twelve tree species are utilized by the local people for construction purposes. Most of the houses in the Poonch valley are made up of stones and mud, with supporting wood inside. Wood is used lavishly in the construction of houses. Timber constitutes the most important components of biodiversity in these forests. In Poonch valley, *C. deodara*, *D. sissoo*, *M. azedarach*, *Quercus* spp., *P. roxburghii*, *P. wallichiana*, and *U. wallichiana* are common. However, in the Poonch valley a timber “mafia” is active and involved in illegal trade. As a result timber stands are declining.

Fodder

The area is economically disadvantaged. Local communities depend on farming and livestock rearing with supplementation from harvest of timber and medicinal plants/ morels. Livestock rearing requires fodder. Thirty five species were identified in the area. In the summer season, livestock graze upper lands. The lush green pastures are thus subjected to intensive overgrazing and are converted to barren lands at the end of the season. During the winter season, the livestock is kept indoor due to heavy snow fall in upper mountainous areas. The people face great difficulty and report regular fodder shortages resulting in livestock face malnutrition during this harsh period of the year. Similar observations were reported by Rawat and Uniyal (1993) for the alpine meadows of Jammu & Kashmir, where overgrazing results in great loss to vegetation cover and wide occurrence of unpalatable weedy species of *Sambucus*, *Stipa*, and *Viburnum.* Similarly, Khan (1994) reported that thorn forest area of Punjab is under decline due to overgrazing, felling, wind erosion, desertification, salinity and water logging. Jabeen (2006) conducted a comprehensive study on the fodder situation in and around Ayubia National Park in the moist temperate forest of Nathia gali. She also concluded that good quality palatable species are replaced by unpalatable weedy species due to overgrazing in the area. Rotational grazing in the Poonch valley would be a useful strategy to save palatable fodder species in the valley.

Conclusion

This study explores some details of the ethnobotany of the area. Basic documentation is presented but our analysis and development of conservation strategies is just beginning. Assessment of conservation status and vulnerable species of the area is needed. There is need in the area for a sustainable and long-term natural resource management plan that actively involves the local people in maintenance of biodiversity, monitoring, documentation of change over time, and the decision-making process. This will create or revive awareness among the people in the area that they should fulfill their requirement to keep in mind the biodiversity of the local area and not simply exploit it.

Recommendations and perspectives

On the basis of our findings we suggest the following points:

1. The transition to sustainable reforestation should be as rapid as possible to allow the conservation of natural old-growth forest which is very valuable for biodiversity.

2. Consumption of resources can be significantly reduced by improved efficiency of fuel-wood use and substitution with modern fuels like natural gas.

3. Cultivation of threatened medicinal plants should be encouraged by the local community in order to relieve pressure on these plants.

4. Chemical analysis and screening of medicinal plants needs to be done to determine possible correlation between the chemical constituents and the disorders treated by the herbalists. This information is not available in the area.

5. Awareness programs at grass root level should be introduced in the area to educate the local communities about use and selection of fuel wood species.

6. Permanent pastures in the valley base should be improved by introducing new fodder crops in the area. Improvements are also possible to some extant through controlled grazing. Measures on fodder improvement require enough understanding and adoption of appropriate management practices.

It is hoped that this study will provide useful information about conservation and sustainable use of the natural resources of the area.

Acknowledgements

The authors are grateful to the coordination of National Agricultural Research Council (NARC) for herbarium facility. Appreciations also goes out to the AJK Forest and Tourist Departments for their kind assistance, Prof. Dr. Syed Zahoor Huusain, Dr. Rizwana Qureshi and Dr. Rifat Naseem for their technical assistance and the local communities of the Poonch Valley for their cooperation

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Appendix 1. Questionnaire for ethnobotanical survey (general) conducted in Poonch Valley, Azad Kashmir, Pakistan.

Date:
Informant Name: Age: Gender:
Education: Locality:

Information about potential plant species used in the area

Local name of the species: Locality:
Uses in the area:
Quantities harvested each year:
Who collected the plant? (Women/ Men/Children)
Why collected?
Which part is collected?
How the plant is collected:
Is it sold? To whom it is sold:
Whether the plant material is stored: Why?
For how long it is stored and why?
Local price per Kg. (Rs.) Quantity sold each year:
Availability status of the plant in last 10 years: (Increased/Decreased)
Any conservation effort on the part of locals:
Other Observations:

Appendix 2. Performa for ethnobotany field work conducted in Poonch Valley, Azad Kashmir, Pakistan.
Place: Date: Informer's name: Age:

Plant used for	**Local Name**	**Botanical Name**	**Quantity consumed**	**How and when consumed**	**How preserved**	**Source**	**Cost**	**Extent of availability**
Food								
Cooking utensils								
Medicinal plant								
House construction and forming implements								
Economic plants with economic utility								
Clothing and others miscellaneous uses								

Appendix 3. Questionnaire for interviews about medicinal plants used by traditional practitioners (**hakims**) in Poonch Valley, Azad Kashmir, Pakistan.

Date: Name of Informant: Experience:

Q.1. How many patients have been investigated by you so far?

Q.2. What type of ailments have you observed in the local population?

Q.3. Name the ailments you have dealt with?

Q.4. What was the result of your treatment?

Q.5. Description of the medicinal plant:
Local name: Botanical name:
Time of harvesting: Why is the plant medicinal?

Q.6. How is the plant converted into a product?

Q.7. How is the plant stored?

Q.8. What is the dosage and forms used?

Q.9. Methods of external use?

Q.10. Methods of internal use?

Q.11. Therapeutic indications if any?

Appendix 4. Questionnaire for market survey interviews of medicinal plants in Poonch Valley, Azad Kashmir, Pakistan.

Date:
Locality: Name of vender: Address:
Age: Type of vender: Permanent/Temporary/Ambulatory stall
Village of vender: Total No. of species traded: No. of suppliers:
No. of employees: Qualification:

Information on medicinal plants

Local name: Life form:
Part used: Price per Kg. (Rs.) Locality of collection

Availability: Increased/ decreased Demand: Increased/ decreased

Who is the buyer: (locals or outsiders)
Exported to: Provinces/foreign Please mention the place:

Cultivation status: Cultivated/wild/managed from:
No. of species in collection: Mixture/single
Condition of plants: Fresh/dried/preserved in:
Brought to market: Daily/weekly/occasionally:
Month of availability:

How much is sold in comparison to the past: More/less/same?
Reason:

Who sells it to you: Middle men/direct collectors:
In case of direct collectors, either they are: Men/women/children:

The material sold to you is it either: in crude form or refined:
How much material is wasted during refinement (estimated):

Other observations: