

## INTERRELATIONSHIP OF CULTURAL DIVERSITY AND BIODIVERSITY AND ITS IMPACT ON CONSERVATION

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### Abstract

The concepts of culture, cultural diversity and indigenous knowledge are demonstrated in conjunction with biodiversity in Samahni zone of District Bhimber (AK), Pakistan. The interrelationship between cultural and biodiversity was elucidated based on linguistic and traditional customs of the area. It is demonstrated that there is imperative correlation between cultural and biodiversity, as mega-diversity countries harbor the rich cultural diversity. The cultural diversity of the area was found to be 8.66 and biological diversity was estimated to be 211, which generated IBCD of the area 109.83. Global studies revealed that there was significant role of different cultures of the world such as Buddhism culture in China, Sacred grove culture in India on conservation and protection of biodiversity. Similar findings of the study were obtained from Samahni area, where Gujar and Jat tribes implemented their traditional cultural customs not only to their daily life but also on conservation of biodiversity in their vicinity region. There has been determination of informant consensus factor (ICF), data matrix ranking (DMR) and priority ranking (PR) for vegetation and its effects on man. The important plants of the area and their ethnobotanical uses were also formulated and presented in it. Many are used as a sole source of medication by the tribes as they live in the remote area. It was proven that cultural diversity could promote the conservation and application of biodiversity. Fuel wood consumption was determined as prevalent threat to the flora of valley. The studies suggested that indigenous knowledge (Ethnobotanical informations) should be employed for biodiversity conservation and sustainable ecosystem propagation. The conservation scientists may establish close affinity with indigenous peoples and religious persons, and attract and encourage their active participation in different activities of biodiversity conservation. Finally the perspectives of taking conservation as a culture should be proposed and promoted and extended in practical lives of communities of the area.

### Introduction

Since time immemorial there has been a strong bond among language, religion and knowledge diversity and the biodiversity. This is an era of globalization and hitherto diminishing of biodiversity and cultural diversity has lead scientists to ponder over and explore the phenomenon of human relationship with environment (Harmon, 2002; Ahmad *et al.*, 2008).

Biological diversity (BD) is the total number of organisms and germplasm present on the globe. Presence of diverse indigenous cultures in an area is paramount for sustainably flourishing of biodiversity on the globe and this is termed as cultural diversity (CD). BD is presence of all sorts of life on land and hitherto more than 1.75 million species of plants, animals, bacteria, fungi and other microbes have been reported. Biodiversity is not an object to be conserved but an integral part of human existence, in which utilization is part of the celebration of life (Posey, 1999). In the biodiversity, plants play pivotal role in establishment and sustainability of different ecosystems. Cultural diversity (CD) has diverse definitions in the past and its origin connects back with ancient times. The word "Culture" is Latin of origin and comes from "colelere" with meaning of "care" or "look after" in term of agriculture.

In the world, different changes in BD and CD has oozed many environmental and social plethora which led the researchers to frame a new field called "biocultural diversity" (BCD) and it means world's natural and cultural systems. In different previous research it was described that cultural diversity is integral part of socio-economic scenario culminating into BD loss (Harmon, 2004). BD is very important in area because it is part and

parcel for establishment and progressing of ecosystem in an area and dynamic ecosystem with proper functioning "ecosystem services (ES)" is very vital for recycling of natural cycles of soil, air, water, pollination and providing other requirements of life such as food, fodder, shelter and medicines for life of man and livestock too. BD is major pillars in area on which any building of human civilization is constructed and nature's diverse products support different industries such as pharmaceutical, agricultural, cosmetics, pulp, paper, construction and waste treatments which comes under umbrella of Ethnobotany (Mafi, 2001; Ishtiaq *et al.*, 2006; 2007b).

Ethnobotany describes that plants have been used for various purposes by fauna and human beings since emergence of life on this planet. There has been researched that plants and man life necessities are intermingled and interrelated with each other which comes under umbrella of Ethnoecology (Ishtiaq *et al.*, 2006; 2007c; Reijntjes, 2010; Ahmad *et al.*, 2011a). The term Ethnobotany comes from the Greek word "Ethnos", which means 'people', and "Botane" which means 'herb', so literally it would be translated as "the study of the interaction between plants and people, with a particular importance on traditional tribal cultures" (Harshberger, 1896; Ishtiaq *et al.*, 2007b; 2012). Ethnobotany is part of an ancient tradition which is seeking information about beneficial plants from other cultures. In very early history, the rulers of ancient Egypt, Greece, and Rome encouraged ethnobotanical exploration and prescribed different herbal recipes for treatment of epidemics and warriors. Schultes was a Harvard trained botanist, who spent years documenting the indigenous use of plants in the Americas especially in the Amazon and was the counselor of many other scholars who have since contributed to the discipline. Schultes was an authority on such useful plants as

coca, palms, orchids, and rubber (Schultes, 1988). Along with an increasing acknowledgement that there is a link between cultural and biological diversity on the planet, what is now referred as biocultural diversity: Ethnobotany has also become increasingly important in applied conservation projects that take in account both social and environmental aspects, i.e. both biodiversity and people (Terralingua, 2010; Ahmad *et al.*, 2011b).

The field of ethnobotany has become part of syllabi in different academia and many pharmaceutical industry research has been initialized and culminated into drug discovery and drug design at national and international level (Ishtiaq *et al.*, 2007b, 2010). Pakistan is rich in plant resources particularly the medicinal plants and many plants are directly or indirectly used in medicaments and other daily life subsistence (Ishtiaq *et al.*, 2007a; Ali *et al.* 2001). At least 1,000 medicinal plants species were reported from Pakistan (Baquar, 1989) of which 500 species were commonly used in health care practices and 350 were traded for billion of rupees to the national and international markets. Most of the medicinal plants that are available in the market or supplied directly to the pharmaceutical industries are extracted from the rural forest (Ikram & Hussain, 1978; Ahmad *et al.*, 2010).

Azad Kashmir is very rich in plant biodiversity and it has many endemic species of plants located in Leepa and other high altitudinal range (Ishtiaq *et al.*, 2012). Samahni area is quite rich in flora of diverse type and many of those plants are prevalently used by local tribes in fulfilling different needs of life. The people of an area are responsible for protection and devastation of biodiversity of the area and their traditional knowledge has paramount significance in collection, protection and conservation of biodiversity. In Samahni valley (SV) two major traditionally rich culture tribes Gujar and Jat were selected in this case study. It is demonstrated that information and traditional ethnobotanical knowledge (TEK) inherited by these pools of two tribes is very important for collection, utilization of various plants different aspects and their keen interest to protect and propagate the flora for future. There is invasion of global consumerism by losing traditional and endemic values and rituals and it is hour need to build consensus by global communities to develop cooperation and dialogue for preservation and conservation of world BCD. The main objectives of this paper were: (1) to find out the capacity of biological diversity of the area, (2) to explore the cultural diversity of two tribes (Jat & Gujar) and their consequent impacts on the biodiversity in the specific areas of Tehsil Samahni, (3) to document the usages of plants in daily life of communities and (4) to find out correlation between CD and BD at indigenous and its impacts on protection and conservation of biodiversity in the area.

## Methodology

**Study area:** Samahni is one Tehsil of District Bhimber, Azad Kashmir, bearing lush green plants and lofty mountainous terrains. Geographically Samahni valley is located between 30.05° latitude and 74.82° longitude (Ishtiaq *et al.*, 2007b, 2010). It covers ca. 1270 km<sup>2</sup> with

high lush green and lofty mountainous terrains. It has north facing and south facing high mountains with 1080–18975 ft altitude and variable topography (Ishtiaq *et al.*, 2006; 2007). The valley is rich in cultural diversity (CD) having different ethnic groups such as; Jat, Gujar, Raja, Syed and others (Ishtiaq *et al.*, 2008).

**Climate & temperature:** The climate is at variance. The average maximum and minimum temperature is 28.9°C and 15.8°C, respectively. June and July are the hottest months of the year with 38.18°C and 37.18°C average temperatures, respectively. December and January are the coldest months of the year with 6.34°C and 5.22°C average temperature, respectively (Hussain & Ishtiaq, 2009).

**Sample and data collection:** Many field trips were arranged in order to collect information about the ethno medicinal survey by the local people in Samahni Valley, District Bhimber (AK) Pakistan. Standard methods such as open –ended and close-ended interview methods were followed for collection of plant materials (Ishtiaq *et al.*, 2007b), drying, mounting, preparation and preservation of plant specimens described by previous botanists (Nasir & Ali, 2001; Ishtiaq *et al.*, 2007a). Plants with their correct nomenclature were arranged alphabetically by family name, vernacular name and ethnomedicinal uses. Some data was collected in such a way that collected specimens were carried to old men (age above 60) and sometimes old ladies and hakims and asked them their uses as medicinal purposes. There were five informants for each plant (Heinrich *et al.*, 1998; Fisseha *et al.*, 2009; Ishtiaq *et al.*, 2010).

**Data analysis:** Statistical methods were employed to get results from the observations and data collected from the study area. The data were grouped into 2 categories based on the information gathered from the interviewees. Information consensus factor (ICF) was calculated for each category to identify the agreement of the informants on the reported cure. ICF was calculated by equation and method described by Ishtiaq *et al.*, 2012. [Equation:  $ICF = \frac{Nur - nt}{Nur - 1}$ ] where Nur = number of use citation in each category and Nt = number of species used.

The fidelity level (FL) which is percentage of informant's claims for the use of a certain plants in the same major purpose. [Equation:  $FL (\%) = \frac{Np}{N} \times 100$ ], where Np = number of informants that claim a use of plant species to treat a particular disease and N = number of informants that use the plants as a medicine to treat any given disease. Data Matrix Ranking (DMR) of plants with different uses other than medicinal value was calculated. Priority Ranking (PR) of plants was also calculated to determine biotic pressure on the flora and show correlation between BD and CD (Ishtiaq *et al.*, 2012).

The index of biocultural diversity (IBCD) has been formulated and determined by Harmon & Loh in 2002. The data of BCD has been generated from (a) number of languages (LD) (b) number of religions (RD) (c) number of ethnic group (ED) (d) number of bird/mammal species (MD) and number of plant species (PD). First, CD of an area or region was calculated by using equation:

CD=(LD+RD+ED)/3; and BD was determined by formula: BD=(MD+PD)/2. Finally, the IBCD value of an area or country is determined by using its average CD and BD by equation: IBCD= (CD+BD)/2 (Harmon & Loh, 2002).

## Results

The Ethnobotanical survey yielded various data which demonstrates that plants are integral part of humane life. The research produced useful informations which are elaborated and discussed in coming sections. Some medicinally important flora is only described here and other will be presented elsewhere. The quantitative assessment produced 60 plants are used in different botanics as folklore therapies, as for fodder and as construction and as ethnoveterinary medicaments.

## Enumerations:

1. Botanical name: *Abelmoschus esculentus* L.  
Local name: Bhindi  
Family: Malvaceae  
Locality: Chaii  
Status: Herb  
Part used: Seeds  
Herbarium No: MUH-1204  
Ethnomedicinal uses: It is used to cure stomach disorders, diabetes, depression, gastritis, pimples and atherosclerosis

2. Botanical name: *Acacia Arabica* L.  
Local name: Keekar  
Family: Mimosaceae  
Locality: Chaii  
Status: Tree  
Part used: Leaves, stem  
Herbarium No: MUH-1205  
Ethnomedicinal uses: It is used to treat pneumonia, sore throat, tooth ache and diarrhoea

3. Botanical name: *Acacia modesta* Wall.  
Local name: Phulai  
Family: Mimosaceae  
Locality: Chaii  
Status: Tree  
Part used: Stem  
Herbarium No: MUH-1206  
Ethnomedicinal uses: It is used as tonic for tooth-ache and oral infection

4. Botanical name: *Allium cepa* L.  
Local name: Piyaz  
Family: Liliaceae  
Locality: Chaii  
Status: Herb  
Part used: Bulb  
Herbarium No: MUH-1207  
Ethnomedicinal uses: It is used to cure cholera, heart attack and blood pressure

5. Botanical name: *Allium sativum* L.  
Local name: Lehsan

Family: Liliaceae  
Locality: Chaii  
Status: Herb  
Part used: Bulbules`  
Herbarium No: MUH-1208  
Ethnomedicinal uses: It is used against blood pressure, cholesterol, asthma, ear-ache and heart attack

6. Botanical name: *Albizia juliberism* Durazz.  
Local name: Shree  
Family: Mimosaceae  
Locality: Chaii  
Status: Tree  
Part used: Leaves, stem, bark, gum  
Herbarium No: MUH-1209  
Ethnomedicinal uses: It is used for treatment of insomnia

7. Botanical name: *Amaranthus viridis* L.  
Local name: Chulair  
Family: Amaranthaceae  
Locality: Chaii  
Status: Herb  
Part used: Whole plant  
Herbarium No: MUH-1210  
Ethnomedicinal uses: The plant is used to treat stomach problem, snake biting and scorpion sting

8. Botanical name: *Anethum graveolense* L.  
Local name: Soye  
Family: Apiaceae  
Locality: Chaii  
Status: Herb  
Part used: Whole plant  
Herbarium No: MUH-1211  
Ethnomedicinal uses: It is used against abdominal pain, insomnia, dry cough, pimples and gastritis

9. Botanical name: *Bombax ceiba* L.  
Local name: Bans  
Family: Bombasaceae  
Locality: Chaii  
Status: Tree  
Part used: Leaves  
Herbarium No: MUH-1212  
Ethnomedicinal uses: It is used against cough, menstrual pain, fever and baldness

10. Botanical name: *Brassica compestris* L.  
Local name: Sarson  
Family: Brassicaceae  
Locality: Chaii  
Status: Herb  
Part used: Whole plant  
Herbarium No: MUH-1213  
Ethnomedicinal uses: It is used against stomach disorders, headache, and constipation

11. Botanical name: *Brassica repa* L.  
Local name: Shaljam

Family: Brassicaceae  
 Locality: Chaii  
 Status: Herb  
 Part used: Root  
 Herbarium No: MUH-1214  
 Ethnomedicinal uses: It is used for blood clotting, abdominal pain, tuberculosis and urinary disorders

12. Botanical name: *Boerrehavia diffusa* L.  
 Local name: Snnati  
 Family: Nyctaginaceae  
 Locality: Chaii  
 Status: Herb  
 Part used: Leaves  
 Herbarium No: MUH-1215  
 Ethnomedicinal uses: It is used against pneumonia, atherosclerosis and abscesses

13. Botanical name: *Calotropis procera* L.  
 Local name: Desi aak  
 Family: Asclepiadaceae  
 Locality: Chaii  
 Status: Herb  
 Part used: Flower and branches  
 Herbarium No: MUH-1216  
 Ethnomedicinal uses: Its latex is used against snake biting and eye irritation. Its flower and leaves are used against epilepsy, liver inflammation and jaundice

14. Botanical name: *Canabias sativus* L.  
 Local name: Bhang  
 Family: Cannabiaceae  
 Locality: Chaii  
 Status: Herb  
 Part used: Whole plant  
 Herbarium No: MUH-1217  
 Ethnomedicinal uses: It is used against cough, headache, depression and abdominal pain

15. Botanical name: *Capsicum annum* L.  
 Local name: Mirch  
 Family: Solanaceae  
 Locality: Chaii  
 Status: Herb  
 Part used: Fruit  
 Herbarium No: MUH-1218  
 Ethnomedicinal uses: It is used against earache, kidney problems, vermifuge and cancer

16. Botanical name: *Carissa opaca* Stapf ex Haines  
 Local name: Granda  
 Family: Apocynaceae  
 Locality: Chaii  
 Status: Shrub  
 Part used: Stem and fruit  
 Herbarium No: MUH-1219  
 Ethnomedicinal uses: Its latex is used against scorpions and insects sting and snake biting. Fruit is used against stomach disorders and jaundice

17. Botanical name: *Chenopodium album* L.  
 Local name: Bathu  
 Family: Chenopdiaceae  
 Locality: Chaii  
 Status: Herb  
 Part used: Whole plant  
 Herbarium No: MUH-1220  
 Ethnomedicinal uses: It is used against stomach ache and gastritis

18. Botanical name: *Citrus acida* L.  
 Local name: Khata  
 Family: Rutaceae  
 Locality: Chaii  
 Status: Tree  
 Part used: Fruit  
 Herbarium No: MUH-1221  
 Ethnomedicinal uses: Its fruit is used against diabetes, fever, constipation and depression

19. Botanical name: *Citrus aurantifolia* L.  
 Local name: Kaghazi lemon  
 Family: Rutaceae  
 Locality: Chaii  
 Status: Tree  
 Part used: Fruit  
 Herbarium No: MUH-1222  
 Ethnomedicinal uses: It is used against blood pressure, enlarged spleen, mouth ulcer, obesity and constipation

20. Botanical name: *Citrus medica* L.  
 Local name: Lemmon  
 Family: Rutaceae  
 Locality: Chaii  
 Status: Tree  
 Part used: Fruit  
 Herbarium No: MUH-1223  
 Ethnomedicinal uses: Its fruit is used for elimination of thirst, skin irritation and stomach disorders

21. Botanical name: *Citrus sinensis* L.  
 Local name: Orange  
 Family: Rutaceae  
 Locality: Chaii  
 Status: Tree  
 Part used: Fruit and peel  
 Herbarium No: MUH-1224  
 Ethnomedicinal uses: It is used against insomnia, fever, asthma and pimples

22. Botanical name: *Coriandrum sativum* L.  
 Local name: Dhania  
 Family: Apiaceae  
 Locality: Chaii  
 Status: Herb  
 Part used: Whole plant  
 Herbarium No: MUH-1225  
 Ethnomedicinal uses: It is used against small pox, pimples, blood cholesterol and dyspepsia

23. Botanical name: *Cymbopogon citratus* (DC) Stapf.  
Local name: Lemon grass  
Family: Poaceae  
Locality: Chaii  
Status: Herb  
Part used: Leaves  
Herbarium No: MUH-1227  
Ethnomedicinal uses: Its decoction is used against sore throat, obesity, flue and fever
24. Botanical name: *Cynodon dactylon* L.  
Local name: Khabal  
Family: Poaceae  
Locality: Chaii  
Status: Herb  
Part used: Roots  
Herbarium No: MUH-1227  
Ethnomedicinal uses: Its roots are used against skin problem, enlarge spleen, piles and wounds
25. Botanical name: *Delbergia sissoo* L.  
Local name: Shesham  
Family: Pappilionaceae  
Locality: Chaii  
Status: Tree  
Part used: Leaves  
Herbarium No: MUH-1228  
Ethnomedicinal uses: It is used as blood purifier, skin problems and abscesses
26. Botanical name: *Datura alba* L.  
Local name: Datura  
Family: Solanaceae  
Locality: Chaii  
Status: Herb  
Part used: Leaves  
Herbarium No: MUH-1229  
Ethnomedicinal uses: It is used against cholera, rabies and arthritis
27. Botanical name: *Dodonia viscosa* L.  
Local name: Santha  
Family: Nyctaginaceae  
Locality: Chaii  
Status: Shrub  
Part used: Leaves  
Herbarium No: MUH-1230  
Ethnomedicinal uses: It is used against arthritis, wounds, tooth ache and inflammation
28. Botanical name: *Emblica officinalis* L.  
Local name: Amla  
Family: Euphorbiaceae  
Locality: Chaii  
Status: Tree  
Part used: Fruit  
Herbarium No: MUH-1231  
Ethnomedicinal uses: It is used for treatment of anemia, urinary disorders, stomach disorders and tonic for diabetes
29. Botanical name: *Eriobotrya japonica* Lindl.  
Local name: Lokat  
Family: Rosaceae  
Locality: Chaii  
Status: Tree  
Part used: Fruit  
Herbarium No: MUH-1232  
Ethnomedicinal uses: It is used against liver problems, cough, vomiting and elimination of thirst
30. Botanical name: *Euclyptus citriodora* Parker.  
Local name: Safaidda  
Family: Myrtaceae  
Locality: Chaii  
Status: Tree  
Part used: Leaves  
Herbarium No: MUH-1233  
Ethnomedicinal uses: It is used against flue, fever and pneumonia
31. Botanical name: *Euphorbia helioscopia* L.  
Local name: Cat's milk  
Family: Euphorbiaceae  
Locality: Chaii  
Status: Herb  
Part used: Seeds and stem  
Herbarium No: MUH-1234  
Ethnomedicinal uses: Its seeds are used against cholera. Its latex is used against eruption and scorpion stings.
32. Botanical name: *Ficus carica* L.  
Local name: Phakwar  
Family: Moraceae  
Locality: Chaii  
Status: Tree  
Part used: Stem and fruit  
Herbarium No: MUH-1235  
Ethnomedicinal uses: It is used against constipation, oral infection, pain and suffocation in chest. 1111
33. Botanical name: *Justicia adhatoda* L.  
Local name: Behkar  
Family: Acanthaceae  
Locality: Chaii  
Status: Shrub  
Part used: Leaves  
Herbarium No: MUH-1236  
Ethnomedicinal uses: It is used against arthritis, wounds, suffocation and pain in chest
34. Botanical name: *Lawsonia inermis*  
Local name: Mehndi  
Family: Lythraceae  
Locality: Chaii  
Status: Shrub  
Part used: Leaves  
Herbarium No: MUH-1237  
Ethnomedicinal uses: It is used against baldness, jaundice, skin burn and boils and sore throat

35. Botanical name: *Luffa cylindrica* L.  
Local name: Tori  
Family: Cucurbitaceae  
Locality: Chaii  
Status: Climbing herb  
Part used: Fruit  
Herbarium No: MUH-1238  
Ethnomedicinal uses: It is used against jaundice, skin irritation, constipation and piles
36. Botanical name: *Lycopersicon esculentum* L.  
Local name: Tamatar  
Family: Solanaceae  
Locality: Chaii  
Status: Herb  
Part used: Fruit  
Herbarium No: MUH-1239  
Ethnomedicinal uses: It is used as tonic for heart attack. It acts as a blood purifier and liver disorders
37. Botanical name: *Malva preflora* L.  
Local name: Sonchal  
Family: Malvaceae  
Locality: Chaii  
Status: Herb  
Part used: Leaves  
Herbarium No: MUH-1240  
Ethnomedicinal uses: It is used to treat depression, dry cough and scurvy
38. Botanical name: *Mangifera indica* L.  
Local name: Mango  
Family: Anacardiaceae  
Locality: Chaii  
Status: Tree  
Part used: Fruit  
Herbarium No: MUH-1241  
Ethnomedicinal uses: It is used to gain body weight called skinny, heart disorders and fever
39. Botanical name: *Melia azadarach* L.  
Local name: Draik  
Family: Meliaceae  
Locality: Chaii  
Status: Tree  
Part used: Leaves  
Herbarium No: MUH-1242  
Ethnomedicinal uses: It is used against diabetes, jaundice, healing of wounds, pimples and inflammation
40. Botanical name: *Mentha longifolia* L.  
Local name: Podina  
Family: Apiaceae  
Locality: Chaii  
Status: Herb  
Part used: Whole plant  
Herbarium No: MUH-1243  
Ethnomedicinal uses: Its decoction is used against vomiting, gastritis, abdominal pain, flue and stomach disorders
41. Botanical name: *Momordica charantia* L.  
Local name: Karela  
Family: Cucurbitaceae  
Locality: Chaii  
Status: Climbing herb  
Part used: Fruit  
Herbarium No: MUH-1244  
Ethnomedicinal uses: Its used against paralysis, diabetes and jaundice
42. Botanical name: *Moras alba* L.  
Local name: Toot  
Family: Moraceae  
Locality: Chaii  
Status: Tree  
Part used: Fruit, leaves and stem  
Herbarium No: MUH-1245  
Ethnomedicinal uses: Its fruit is used to treat nose bleed, anemia and constipation. Dry leaves are used to treat cough, rheumatic pains and stem is used as tonic for toothache
43. Botanical name: *Narcissus tazetta* L.  
Local name: Nurgis  
Family: Amaryllidaceae  
Locality: Chaii  
Status: Herb  
Part used: Flower and leaves  
Herbarium No: MUH-1246  
Ethnomedicinal uses: It is used against flue, gastritis and cough
44. Botanical name: *Nerium indicum* L.  
Local name: Gandeera  
Family: Apocynaceae  
Locality: Chaii  
Status: Shrub  
Part used: Flower and leaves  
Herbarium No: MUH-1247  
Ethnomedicinal uses: It is used against snake bite, scorpion biting and baldness
45. Botanical name: *Nicotiana tobaccum* L.  
Local name: Tobacco  
Family: Solanaceae  
Locality: Chaii  
Status: Herb  
Part used: Flower and leaves  
Herbarium No: MUH-1248  
Ethnomedicinal uses: It is used for smoking against depression
46. Botanical name: *Ocimum bacilicum* L.  
Local name: Niazbu  
Family: Lamiaceae  
Locality: Chaii  
Status: Herb  
Part used: Seed  
Herbarium No: MUH-1249  
Ethnomedicinal uses: It is used to treat urinary disorders, stomach problem and skinny

47. Botanical name: *Oxalis corniculata* L.  
 Local name: Khati boti  
 Family: Oxalidaceae  
 Locality: Chaii  
 Status: Herb  
 Part used: Whole plant  
 Herbarium No: MUH-1250  
 Ethnomedicinal uses: It is used against jaundice, scorpion stings, and snake biting and liver disorders
48. Botanical name: *Pandanus odoratissimus* L.  
 Local name: Kewra  
 Family: Liliaceae  
 Locality: Chaii  
 Status: Herb  
 Part used: Leaves  
 Herbarium No: MUH-1251  
 Ethnomedicinal uses: It is used to treat epilepsy, fever and heart problem
49. Botanical name: *Pennisitum typhoides* Burm.  
 Local name: Bajra  
 Family: Poaceae  
 Locality: Chaii  
 Status: Herb  
 Part used: Seeds  
 Herbarium No: MUH-1252  
 Ethnomedicinal uses: It is used for heart disorders, migraines, asthma and cancer
50. Botanical name: *Phoenix dactylifera* L.  
 Local name: Khajoor  
 Family: Arecaceae  
 Locality: Chaii  
 Status: Tree  
 Part used: Fruit  
 Herbarium No: MUH-1253  
 Ethnomedicinal uses: It is used against heart attack, night blindness and bronchial asthma
51. Botanical name: *Pinus roxburgii* Sargent  
 Local name: Cheerh  
 Family: Pinaceae  
 Locality: Chaii  
 Status: Tree  
 Part used: Seed, stem  
 Ethnomedicinal uses: It is used to cure kidney disorders, tuberculosis, flue, cough and skin eruption
52. Botanical name: *Pisum sativum* L.  
 Local name: Matar  
 Family: Papilionaceae  
 Locality: Chaii  
 Status: Climbing herb  
 Part used: Seed  
 Herbarium No: MUH-1255  
 Ethnomedicinal uses: It is used to cure urinary disorders, skin burns and stomach disorders
53. Botanical name: *Prunus persica* L.  
 Local name: Aru
- Family: Rosaceae  
 Locality: Chaii  
 Status: Tree  
 Part used: Fruit and leaves  
 Herbarium No: MUH-1256  
 Ethnomedicinal uses: It is used against constipation, skin problem, cough, arthritis, diarrhoea and vomiting
54. Botanical name: *Prunus armeniaca* Marsh.  
 Local name: Apricot  
 Family: Rosaceae  
 Locality: Chaii  
 Status: Tree  
 Part used: Fruit  
 Herbarium No: MUH-1257  
 Ethnomedicinal uses: It is used against cough, constipation, skin problem and stomach disorders
55. Botanical name: *Psidium guajva* L.  
 Local name: Amrood  
 Family: Myrtaceae  
 Locality: Chaii  
 Status: Tree  
 Part used: Fruit  
 Herbarium No: MUH-1258  
 Ethnomedicinal uses: It is used against diarrhoea, vomiting, scurvy, rheumatic pain and inflammation
56. Botanical name: *Punica granatum* L.  
 Local name: Anar  
 Family: Punicaceae  
 Locality: Chaii  
 Status: Tree  
 Part used: Fruit  
 Herbarium No: MUH-1259  
 Ethnomedicinal uses: It is used against dry cough and fever. It acts as a blood purifier
57. Botanical name: *Pyrus communis* L.  
 Local name: Saib  
 Family: Rosaceae  
 Locality: Chaii  
 Status: Tree  
 Part used: Fruit  
 Herbarium No: MUH-1260  
 Ethnomedicinal uses: It is used to cure anemia, heart attack, blood pressure, constipation and arthritis
58. Botanical name: *Raphanus sativus* L.  
 Local name: Moli  
 Family: Brassicaceae  
 Locality: Chaii  
 Status: Herb  
 Part used: Rhizome  
 Herbarium No: MUH-1261  
 Ethnomedicinal uses: It is used to cure stomach disorders, kidney problem and inflammation. Its juice is used to treat freckles

59. Botanical name: *Ricinus communis* L.  
 Local name: Arand  
 Family: Euphorbiaceae  
 Locality: Chaii  
 Status: Shrub  
 Part used: Seed  
 Herbarium No: MUH-1262  
 Ethnomedicinal uses: It is used for hair growth, pneumonia, cough and toothache

60. Botanical name: *Rosa indica* L.  
 Local name: Gulab  
 Family: Rosaceae  
 Locality: Chaii  
 Status: Shrub  
 Part used: Flower  
 Herbarium No: MUH-1263  
 Ethnomedicinal uses: It is used against constipation, skin and eye irritation as well

The ethnic survey demonstrated that various languages are frequently spoken in the area. The common linguistics noted were: Gujar, Pahari, Kashmiri, Urdu, English, Saraykee, Pashto and Punjabi. This represents LD in study area which is LD=8. The number of religions/ sects practiced in the Samahni valley was: Islam, Christian, Sikh, Sun, Shya, Wahabi and Deyoband (RD=7). The number of ethnic groups residing in study zone was: Gujar, Jat, Syed, Mughal, Mirza, Kamhar, Butt, Kashmiri, Pakhtoon, Sunyara and Moochi (ED=11).

$$CD = (LD+RD+ED)/3$$

$$CD = (8+7+11)/3 = 8.66$$

The various biodiversity aspects were determined for calculation of Biological diversity (BD). The number of plant species was determined by field surveys and previous literature exploration. The plant species were found to be 362 which is indicator of PD of area (Ishtiaq, et al., 2004). The types of fauna and its different species were calculated by forest and domestic expeditions, which are called mammal diversity (MD) with value of 60.

$$BD = (PD+MD)/2$$

$$BD = (362+60)/2 = 211$$

IBCD was determined by using formula as described in the methodology section of the paper.

$$IBCD = (CD+BD)/2$$

$$IBCD = (8.66+211)/2 = 109.83 \text{ and it is higher than Pakistan's IBCD which is 75 (Anon., 2010)}$$

## Discussion

Human beings are stewards of the land and that is why he should take some processes which are not drastic to the nature and which are religious based thinking. In Samahni there is diverse vegetation but with passage of time it is diminishing due to different factors. Plants are basic need of life. The life on earth is due to plants. Plants

are playing important role in providing healthy environment. They are important source of food, fruit and medicines (Ahmad et al., 2008b; Ahmad et al., 2009; Ishtiaq et al., 2009). In this study, an exploratory survey of Samahni valley was conducted in year 2011. The purpose of this study was multifarious including to document flora of the area and impact of anthropogenic activities on it and to define correlation between culture and biodiversity in the area.

Plants are used in different folklore therapies by communities named under umbrella of ethnomedicine, which is basically study of direct interaction between diseases and their treatment in different cultures (Ishtiaq et al., 2006; 2007a). Basically ethnomedicine is medical belief and practices of indigenous cultures. Life and diseases stand side by side, where there is a life, diseases are bound to exist. Dependence and sustainability of men, women, children and animal life were revolving to exit. Traditional uses of natural plants remedies provide potential indicators for biological activities. In the last few decades, there is a resurgence of public interest in medicinal plants and their role in primary health care (Haq, 1983). The study revealed that *Anethum graveolense* is used to treat insomnia and pimples by people of area. The paste of buds of *Bombax ceiba* is used against baldness. The plant *Carissa opaca* is used in snake bite. The roots of *Cynodon dactylon* are used in skin disease and spleen enlargement. To treat diabetics people use *Embllica officinalis* with *Ajuga bracteosa* roots (Ishtiaq et al., 2007b).

Total 20 different categories of diseases have been studied during the survey of selected area for both tribe's populations individually and then for community (Table 1). Species percentage and use citation percentage have been calculated by Informant Consensus Factor (ICF) method. The highest occurrence of species percentage is 4.98% while lowest occurrence is 0.33%. Similarly, the highest value of ICF is 0.53 for diabetics which depicts prevalence of diseases in the area and lowest value of use citation percentage is 0.23%. It is coincidence with previous findings that large populations or communities originating from two different cultures demonstrate more use and ultimately production, protection and preservation of natural biodiversity. Hence these findings corroborate that biocultural values do assist in flourishing of biodiversity of plants which definitely boost fauna and avian generations in the ecosystems (Mafi, 2001).

Data Matrix Ranking (DMR) of medicinal plants with different uses other than medicinal value was calculated. Ranking shows that *Acacia arabica* is at first number which is frequently being used as fencing, timber, fuel, fodder and furniture. The lowest rank is of *Carrisa opaca* (Table 2). These results present some contradictory scenario as compared with ICF findings, in it community structure analysis revealed that amalgam of two tribes definitely produce biotic pressure on the flora and biodiversity consequently that is supporting the literature (Ishtiaq et al., 2007b; 2012). However, these communities have positive role too for propagation and protection of specific species (Fig. 1). The people of Jat tribes totally



relay on agriculture and wait for good yield on mercy of rains. The local plants are used for different purposes such as fodder, fencing, and sheltering and which exert biotic pressure on biodiversity (Table 3). Indigenous biocultural heritage means a wide range of traditional resources that

may be tangible or intangible consisting of land, biogenetic resources, traditional knowledge, customary law, spiritual values and landscapes that are transferred from preceding generations and confer to current values (Premchandar *et al.*, 2003).

**Table 1. Informant consensus factor (ICF) of Jat & Gujar Tribe population in Samahni.**

S. No.	Category	Species (nt)	All species %	Use citation (nur)	% use citation	I.C.F nur-nt /nur-1
1.	Asthma	5	1.66%	6	1.39%	0.20
2.	Epilepsy	3	0.996%	5	1.15%	0.50
3.	Hair growth	4	1.33%	6	1.39%	0.40
4.	Sore throat	6	1.99%	8	1.85%	0.29
5.	Constipation	13	4.32%	15	3.46%	0.14
6.	Diabetes	9	2.99%	18	4.16%	0.53
7.	Blood pressure	4	1.33%	6	1.39%	0.40
8.	Cholera	4	1.33%	6	1.39%	0.40
9.	Paralysis	1	0.33%	2	0.46%	1.00
10.	Flu	6	1.99%	11	2.54%	0.50
11.	Vomiting	4	1.33%	5	1.15%	0.25
12.	Bald	5	1.66%	6	1.39%	0.20
13.	Obesity	3	0.996%	3	0.69%	0.00
14.	Stomach problem	15	4.98%	22	5.08%	0.33
15.	Skin infection	10	3.32%	16	3.70%	0.40
16.	Jaundice	9	2.99%	13	3.00%	0.33
17.	Heart diseases	7	2.33%	11	2.54%	0.40
18.	Headache	1	0.33%	2	0.46%	1.00
19.	Gastric	6	1.99%	7	1.62%	0.17
20.	Rabies	1	0.33%	1	0.23%	0.00

**Table 2. Data Matrix Ranking (DMR) of medicinal plants with different uses other than medicinal value (total score of 10 informants) in the study area (Samahni).**

S. No.	Plant species	Fencing & hedging	Timber	Fuel	Fodder	Fruit/ food	Furniture	Total	Rank
1.	<i>Acacia Arabica</i>	3	7	10	6	0	9	35	1 <sup>st</sup>
2.	<i>Zizyphus numularia</i>	2	7	7	5	7	6	34	2 <sup>nd</sup>
3.	<i>Mangifera indica</i>	4	4	7	5	10	2	32	3 <sup>rd</sup>
4.	<i>Pinus roxburgii</i>	2	8	7	0	5	10	32	3 <sup>rd</sup>
5.	<i>Eucalyptus citriodora</i>	4	10	8	2	0	6	30	4 <sup>th</sup>
6.	<i>Dalbergia sisoo</i>	6	7	8	0	0	8	29	5 <sup>th</sup>
7.	<i>Acacia modesta</i>	10	3	5	8	0	2	28	6 <sup>th</sup>
8.	<i>Albizia juliberism</i>	2	6	9	3	0	6	26	7 <sup>th</sup>
9.	<i>Melia azedarach</i>	2	4	5	8	0	6	25	8 <sup>th</sup>
10.	<i>Carrisa opaca</i>	6	3	5	4	6	0	24	9 <sup>th</sup>

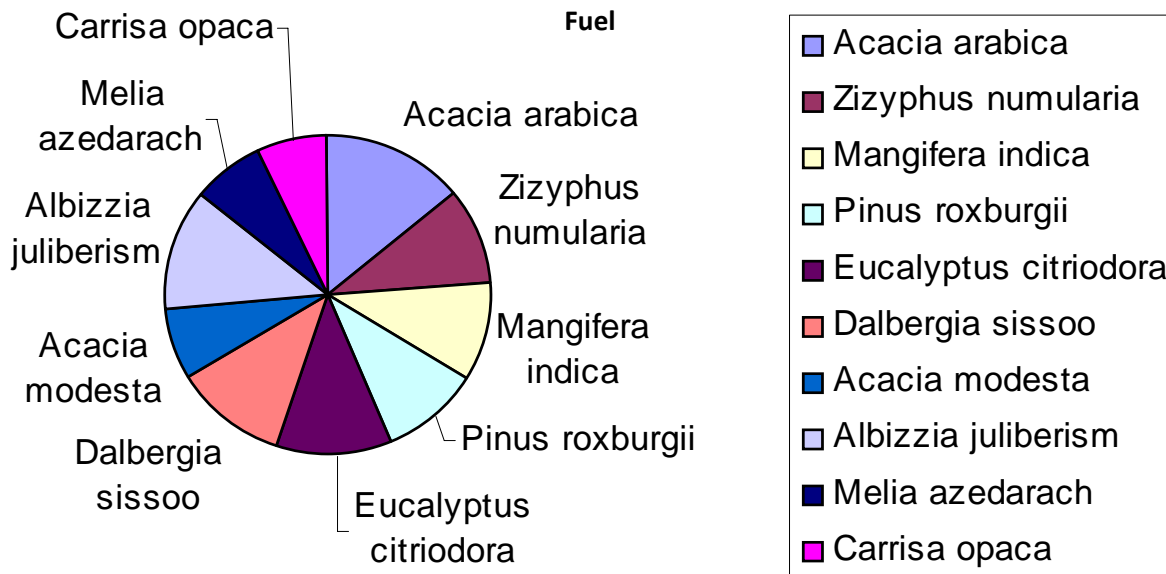


Fig. 1. Plants used as fuel in communities of Samahni Valley.

Table 3. Priority Ranking of factors perceived as threats to medicinal plants based on their level of destructive effects in the study area, Samahni ( values 1-5 were given ).

S. No.	Threat factors	Respondents					Total	Percentage	Rank
		R1	R2	R3	R4	R5			
1.	Grazing	4	3	2	1	4	14	17.95	4 <sup>th</sup>
2.	Fire wood	5	3	4	2	4	18	23.08	1 <sup>st</sup>
3.	Construction	5	3	2	1	0	11	14.10	5 <sup>th</sup>
4.	Urbanization	5	4	3	2	1	15	19.23	3 <sup>rd</sup>
5.	Medicinal uses	5	3	4	2	3	17	21.79	2 <sup>nd</sup>
6.	Hailing	1	0	2	0	0	3	3.85	6 <sup>th</sup>

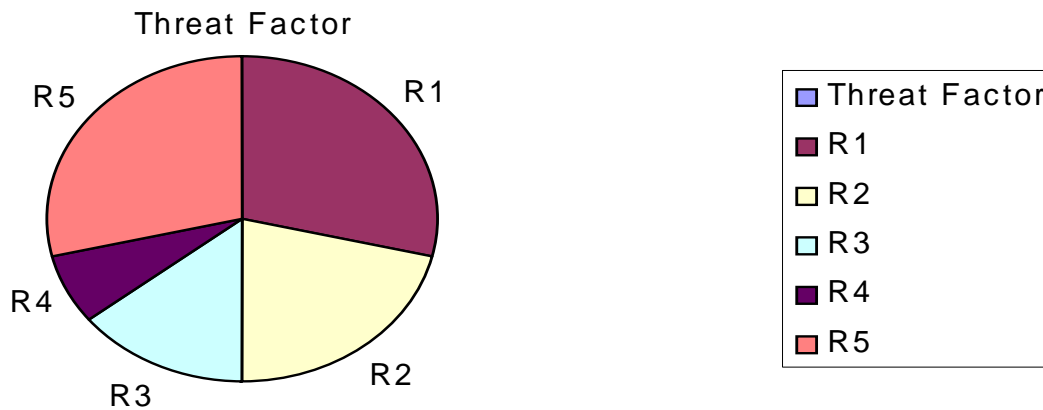


Fig. 2. Percentage of threat factors.

Priority Ranking (PR) of factors perceived as threats to medicinal plants based on their level of destructive effects in the study area was calculated. It shows that the most destructive factor for forest is fire wood with highest percentage of 23.08%. This demonstrates that there are no fuel resources other than wood of forest or vicinity, which

exert pressure on some species too much thrilling to threatened or endangered species zone. Second most destructive factor is collection of plants for medicinal use with 21.79%. Urbanization, grazing and construction are also contributing well with 19.23%, 17.95% and 14.10%, respectively. However, hailing is less destructive because

it occurs rare with heavy rains and percentage of hailing is 3.85% (Table 3). This study is proved by previous work descriptions and it was found that when there is huge number of individuals in an area there is definitely more requirements of daily subsistence which are ultimately obtained from the forest and other biodiversity of the nature. Hence, we found that there is reverse correlation between community density and plant biodiversity, and community do have threats on BD of the area (Fig. 2) (Ishtiaq *et al.*, 2010).

The IBCD index of any country and its ranking plays a vital significance for knowing biodiversity (Harmon and Loh, 2004). The Cultural diversity of the area was found 8.66, and we studied spatially two tribes in the area. The BCD value ranged 211 in the research area which is higher than Pakistan's BCD, because this is dense Pinus forest zone, however many factors are impeding limits on BCD. Some factors like natural, historical, cultural and other anthropological factors such as rituals and customs are modifying the use of flora and fauna in the area. Ipso facto, CD has been shedding its impacts on type and propagation of BD in the area (Fernandez, 1998).

The paper demonstrates that loss of BCD is prevailing in the area and is mainly due to migration of different communities from the area due to various factors (Ishtiaq *et al.*, 2010). The loss of BD is posed by fragmentation, degradation, direct loss of forests, wetland's destruction, man made artificial systems, urbanization, agro-expansion and aquatic ecosystems misuse. Some other unseen parameters such as global warming and thinning of ozone layers are causing huge silent damage to BD gradually and will lead the species over the brink. The pinpoints of this loss are due to (1) habitat destruction and (2) invasion of exotic species in an area. Furthermore natural catastrophes are also boosting these parameters of BD destruction such as huge earthquake of 2005 in Azad Kashmir and KPK areas (Cao, *et al.*, 2003; Ishtiaq, *et al.*, 2010).

It will culminate into food species damage and loss and cause famine leading to massive migrations and death of human and animals too. The knowledge and experience of agrosystems of the community (Jat & Gujar tribes) can be employed in protection and conservation of BD in natural ecosystems (forests) of Samahni.

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