Phyto-cultural diversity of the Shigar valley (Central Karakorum) Baltistan, Northern Pakistan

Zaheer Abbas, Jan Alam, Said Muhammad, Rainer W. Bussmann, Shujaul Mulk Khan, Manzoor Hussain

Research

Abstract

Background: An ethnobotanical field study was conducted in 17 villages of the Shigar valley (Central Karakorum Ranges), northern Pakistan to explore the phyto-cultural diversity related to non-ethnomedicinal uses.

Methods: Eighty-four (84) interviews were conducted in seventeen villages, yielding 52 plant taxa species of 25 families and 46 genera.

Results: The family Asteraceae was dominant followed by Lamiaceae, Rosaceae and Tamaricaceae. The lower temperate zone was used most, with 27 (51%) species while 18 (48%) and 7 (13%) species belonged to the sub alpine and alpine zone respectively. Herbs were used most frequently with 27 (51%) species, followed by shrubs (21, 40%), trees (4, 07%) and shrub lets (2, 2.85%). These plants were collected from six types of habitats: viz., moist slopes (17), dry rocky slopes (14), mesic slopes (8), valley waste lands (7) riverbanks (5) and dry sandy plains (1). We also observed particularly interesting usages of the plants in the community of Baltis. The plant uses were grouped in three main categories on the basis of their utilization: viz. food and beverages (4 uses), handicraft and dyeing (9 uses), and rituals (6 uses).

Conclusions: The ample utilization of plants demands effective strategies for sustainable management and conservation. Creeping urbanization and population emphasize the preservation and retention of the bio-cultural diversity in the Shigar valley which is crucial for the biodiversity development at national and international levels.

Key words: cultural diversity, conservation, ethnobotany, wild plants, Baltistan

زدوسپی خپرونگ

پاکستانی ګین فیوخسینګ یودپی شګری سہ کھید پنګ (قراقرمی ریونګ) ګرونګ چوبدوننیګ میونی کولبی سنوژیونګنیکھہ ژلژل خلونګ خلونی لس کن بیاس۔ دی لس پوبی چھوغو تونګو سمنی فری لسینګ می کھیونګمی ایژوک کولبی سنوژیونګنیکھہ ژلژل بیو ان پا۔ دی لس پووی فری می نیشوبجی نا بجی (84) لہ تری سد کن بیاس۔ دی لسینګنو ہنوہرژیونګنی ژھر نیشوہرژہ غا (25)، ژھونژے ژھر نیشونیس نا تروک (46) دے کھنہ غفچونا نیس (52) ژھونژے سنوژیونګ نوزن سونګس۔ سینګ پا چھوغو ژھر پو ایسٹریسی ان سوک۔ لیمیسی، روزے سی، دے کھنہ ٹیمیریکیسی خسوم پو سا مینګ بیونګ ژھر کن ان سوک۔ ریونی چوقپا ببسے یودپی ملسونی سنوژیونګ ایشین کولیدسک (نیشوہرژابدون ،27)، ری سکیلی ہنورژیونګ چوبګید (18) دے کھنہ ری ګوے ہنوہرژیونګ سینګ پا یونژے لسینګ کھیونید سوک (بدون (7)۔ سینګ پا ژھونژے سنوژیونګ (herbs) نیشو ہرژابدون (27)، ژھونژے ستاقجیونګ (shrubs) نیشو نا بجی (24) ، دے کھنہ چھوغو ستاقجیونګ (trees) بجی ژا کولید سوک۔ دی سنوژیونګ ، ژھونژے ستاقجیونګ نہ چھوغو ستاقجیونګ فروما چک ملسونګنی کھنہ چقسے تھوسے کھیونګمن سوک ۔ شلمونیکہنہ چوبجی (14)، چھونچی خشیرفا ملسونی کھنہ بګیاد (8)، سکیدے خشیرفا ملسونی کھا نا چوبدون (17)، ژګیامژونی فیوخکونینګ نا غہ (5)، ګژونی می تبی ملسونی کھنہ بدون (7) دے کھنہ سکمبو بینګ تھنګ کونینګ نا چک کھیونید سوک۔ نیا لہ دی بلتی شربونی برینګ سنینګ لہ بیربی فژومچک ہنوہرژیونګنی کولیزونګ تھونګس۔ دی ہرژوا نا ستقجیونګ فژوسنہ خسومینګ پو تانګس، زاچیس، تھونګچیس فژوسنہ بجی، لق یسنا رنګ تنګمی سنوژیونګ فژوسنہ رګو (9) دے کھنہ اے کولیزونګ فژوسنہ تروک

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(6) یود سوک۔
دی لسینگ کھیونگمی ستقجیونگ نا سنوژیونگ مچھمفی دہنہ سترونگمی فری لسکن بیو لیگی ژھہ ژھہ یود۔ اشین تہلین یود پی میژہونگ دہنہ چھوغو گرونگ کن فچوے سنیدی کھہ دی بلتی یولی کولبزونگ لوپہ لو چھمسین یود ۔ دو بی فری شگری ژگیہ ستريد پوے سنوژیونگ نہ میونی کولبزونگ سترونگمہ لہ چھوغو ژھونژے میولی میونگلا لس بیو لیگی ژھژھ یود۔

སྐྱས་པི་གཔེ་རོང་།

པ་གིས་ཏའི་ གེན་ཕིཡོག་ཞིང་ ཡོད་པི་ཤི་ག་རི་ ས་ཁྲིད་པིང་ (ཀ་ར་ཀ་ར་མི་རི་ཡུང་) གྲོང་ བརྩུབ་དུ་ཞིང་ མི་ཡུ་ངི་ ཀོ་ལ་པི་ སྔོ་ཏྲ་ཚེ་ཡུ་ངི་ཁ་ ཙལ་ཙལ་ གསོང་གསོ་ངི་ ལས་ ཀུན་ བྱས། དེ་ ལས་པོ་པི་ ཚོ་གོ་ རྟོན་གོ་ རྟོན་གོ་ སྨིན་ ཕ་རི་ ལ་ཞིང་ མི་ཁྲུང་མི་ འཚུག ཀོ་ལ་པི་ སྔོ་ཏྲ་ཚེ་ངི་ཁ་ ཙལ་ ཙལ་ བྱོ་ འཞིན་པ། དེ་ ལས་པོ་ལ་ ཕ་རི་ མི་ ངེས་བརྩུན་ངེས་ [illegible] ལ་ ཏི་སད་ ཀུན་ བྱས། དེ་ ལཞིང་ནུ་ སྔོ་ཏྲ་ཚེ་ཡོ་ངི་ ཙེར་ ཏྲ་ཚེག [illegible] ཚུན་ཚེ་ ཆེར་ ངེས་བརྩུན་ཏུག [illegible] ཁ་ན་ ལགབ་བརྩུ་ ན་ ངེས་ [illegible] ཚུན་ཚེ་ སྔོ་ཏྲ་ཚེ་ཡུང་ ཏྲ་ཞིན་ སོང་ས། ཞིང་པ་ ཚོ་གོ་ ཆེར་པོ་ འིས་ཏྲེ་ཞི་ འཞིན་སུག། ལིམ་སི་ རོ་ཟེ་སི་ དེ་ཁ་ན་ ཏེ་མ་རེ་ཀ་སི་ དི་ གསུམ་པོ་ ས་མིང་པིཡུང་ ཙེར་ ཀུན་ འཞིན་ སུག། རི་ཡུ་ངི་ ཙཱ་ཀ་པ་ བབ་སེ་ ཡོད་པི་ མལ་སོ་ངི་ སྔོ་ཏྲ་ཚེ་ཡུང་ འེ་ཤིན་ ཀོ་ལེད་ སུག ཏེས་བརྩུན་བདུན་ [illegible] རེ་སྨི་ཡི་ སྔོ་ཏྲ་ཚེ་ཡུང་ བརྩུ་བརྒྱད་ [illegible] དེ་ཁ་ན་ རི་ གུ་ཡེ་ སྔོ་ཏྲ་ཚེང་ ཞིང་པ་ ཡུན་ཚེ་ ལ་ཞིང་ ཁྲོ་ཡོ་ངེད་ སུག ཞིང་པ་ ཚུན་ཚེ་ སྔོ་ཏྲ་ཚེ་ཡུང་ (herbs) ངེས་བརྩུ་ཏྲ་ཚེ་རྒྱན་ [illegible] ཚུན་ཚེ་ སྐཱ་ཞུང་ (shrubs) ངེས་བརྩུན་བཞི་ [illegible] དེ་ཁ་ན་ ཚོ་གོ་ སྐཱ་ཞུང་ (trees) བཞི་ ཙ་ ཀོ་ལེད་ སུག། དེ་ སྔོ་ཏྲོང་ ཚུན་ཚེ་ སྐཱ་ཞུང་ དེ་ཁ་ན་ ཚོ་གོ་སྐཱ་ཞུང་ གྲོམ་ ཅིག་ མལ་ཚོ་ངི་ ཁ་ན་ ཙཱ་སེ་ བུ་སེ་ ཁི་ཡོང་མེད་ སུག། ཤལ་མོ་ངི་ཁ་ན་ རྟུབ་ཞི་ [illegible] ཚུན་ཚེ་ གཤེར་པ་ མལ་སོ་ངི་ཁ་ན་ བརྒྱད་ [illegible] སྣི་དེ་ གཤེར་པ་ མལ་སོ་ངི་ ཁ་ན་ རྟུབ་དུན་ [illegible] རྒྱམ་ཚོ་ངི་ ཕྱོག་ཀུ་ཞིང་ ན་ ལག [illegible], གྲོ་ངི་ མི་ཏ་པི་ མལ་སོ་ངི་ ཁ་ན་ བདུན་ [illegible] དེ་ཁ་ན་ སྐམ་པོ་ ཕྱི་ཐང་ ཀུ་ཞིང་ ན་ གཅིག [illegible] ཁིའོ་ ངེད་ སུག། ངཡུང་ ལ་དི་ སྟལ་ཏའི་ ཤར་པོ་ངི་ བ་རིང་ སྣང་ལ་ ཕྱར་པི་ གྲོམ་ཅིག སྔོ་ཏྲ་ཚེ་ཡུ་ངི་ ཀོ་ལ་བཟོང་ ཐོང་ས། དེ་ ཟླ་ ན་ སྐཱ་ཞུང་ གྲོས་ན་ གསུ་མིང་ པོ་ ཏང་ས, ཟ་ཅས, ཐུང་ཅས གྲོས་ན་ བཞི་ , ཡཱ་ཤེས་ ན་ རང་ ཏང་མི་ སྔོ་རྩེ་ཡུང་ གྲོད་ན་ དགུ་ [illegible] དེ་ཁ་ན་ འེ་ ཀོ་ལ་བཟོང་ གྲོས་ན་ གཏུག [illegible] ཡོད་ སུག།

དི་ ལ་ཞིང་ ལ་ཞིང་ ཁིཡོང་མི་ སྐཱ་ཞུང་ ན་ སྔོ་རྩེ་ཡུང་ མི་ཆམ་པི་ དེ་ཁ་ན་ སྐྱོང་ངེ་མི་ ཕ་རི་ ལས་ཀུན་ པི་ཡོ་ ལེ་གི་ ཚ་ཚ་ཡོད། འི་ཤིན་ ཐ་ལེན་ ཡོད་ཨིཔི་ མི་ཚོང་ དེ་ཁ་ ན་ ཚོ་གོ་ གྲོང་ ཀུན་ ཕཙོའི་ སྐྱིད་ཁ་ དི་ སྟལ་ཏའི་ ཡུལ་ ཀོ་ལ་མབཟོང་ ལོ་པ་ ལོ་ ཆམ་སེན་ ཡོད། དོ་པི་ ཕ་རི་ ཤི་ག་རི་ རྒྱ་སྐྱིད་ ཕུའི་ སྤྱི་རྩེང་ ན་ སུ་ཡུ་ངི་ ཀོ་ལམབཟོང་ སྐྱོང་ མལ་ ཚོ་གོ་ ཚུན་ཚེ་ ཡུལ་ ན་ སུ་ཡི་ སྒྲོང་ ལ་ ལས་ བྱོ་ཚ་ཚ་ ཡོད།།།

Background

Baltistan is a typical mountainous territory in the northern Pakistan surrounded by the giant Karakorum and Himalayas ranges. It displays a diverse and unique geology, topography, ethnography, ethnobiology and biological diversity and has often been referred as “Western Tibet” or “Little Tibet” in history. Baltistan covers an area of about 26000 km^2 with the average elevation limits of 2100 m (Afridi 1988). The area is popular for its picturesque valleys for instance Skardu, Rondu, Shigar, Khaplu, Kharmang. However, the remoteness from the country’s capital and other large urban areas, difficult accessibility, underdeveloped infrastructure and deficient funding may have always hampered research in the area.

Floristically, Baltistan is included in the Irano-Turanian Region (Ali & Qaiser 1986, Takhtajan 1986). Being a mountainous region Baltistan harbors a taxonomically unique montane flora. Phytogeographically the entire Karakorum is situated at the junction of the Western and Central Asiatic regions of the Tethyan Flora and the altitude greatly effects the relative precipitation and consequently a distinct vegetation zonation formation (Dickoré 1995, Seong *et al.* 2007). The valley floors show scarce vegetation but with species surrogacy with respect to elevation. The plant species found at Karakorum are taxonomically complex and their distribution is influenced by topography and elevation (Dickoré 1991, Peer *et al.* 2007).

Previous studies in Shigar include research on local folklore (Hanson 1989, Schuler 1978), geology and glacial history (Seong *et al.* 2007, 2009), and social settings, socioeconomics and cultural practices (Kreutzmann *et al.* 2008, Schmidt 2004, 2008). Hartmann (1968) was the first botanist who documented indigenous flora of Biafo glaciers. The ethnomedicinal plants and native flora were explored by Abbas et al. (2017a, 2019). Baltistan is dominated by the Balti people (about 375000), of which about 75000 reside in the Shigar valley. The culture of the Balti community is closely linked to the local plants and their products. Our study focused on the non-medicinal indigenous uses of the local flora.

Methods

Research Area and Field Work

The Shigar valley (commonly known as the valley of K2-Peak) is located in the north of the Baltistan region at the right bank of the Indus river. It runs in east-west direction with two sub valleys - Basha and Braldo in the Central Karakorum Ranges covering an area of 4373 km^2. It is located at 25˚ 25’32” N and 75˚ 42’59” E in the elevation range of 2260 to 8611m (K2 Godwin Austin). Administratively, it is a newly created district and borders with China (north), Skardu town (south), Nagar valley (west) and Ghanche (east). It exhibits unique physical characteristics with regard to elevation and encompasses highest mountainous ridges, towers and peaks above 6000 m, including mighty K2 (6811m), Broad Peak (8047m), Angel Peak (6858m) and Skil Brum (7360m). The valley bottom shows moraines, gorges, and fluvial processes (Abbas *et al.* 2017b, Schmidt 2004). The sub valleys (Basha, Braldo) extend roughly from 2500-3050m in elevation and villages are mostly found on rugged, stony edges of the Shigar, Basha and Braldo rivers (Fig. 1).

More than 30 glaciers over 20km in length are found in the Central Karakoram Ranges (Owen 1989, Seong *et al.* 2007), which represents the largest glacier systems outside the polar regions (Biafo glaciers 63 km, Baltoro 63 km, Chogho Lungma 45km) (Mayer et al., 2006; Quincey *et al.* 2009). Climates is very hostile and dry (Derbyshire *et al.*

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2001) and the research area experiences short, dry, hot and sunny summer with intensive radiation providing a very short growing season for native flora. The entire Baltistan region is located in the rain shadow of Himalaya mountains and the monsoon does not reach the territory (Afridi 1988). Early spring and late summer receive scanty rain (15 mm per annum) at the valley floor, while at high altitude (above 4500 m) precipitation exceeds 200mm, and permafrost areas exists. Circadian and seasonal temperature fluctuate extremely and rises up to 38ºC in summer and in winter temperatures fall below 0º, and -15º in mid-winter (Owen 1991).

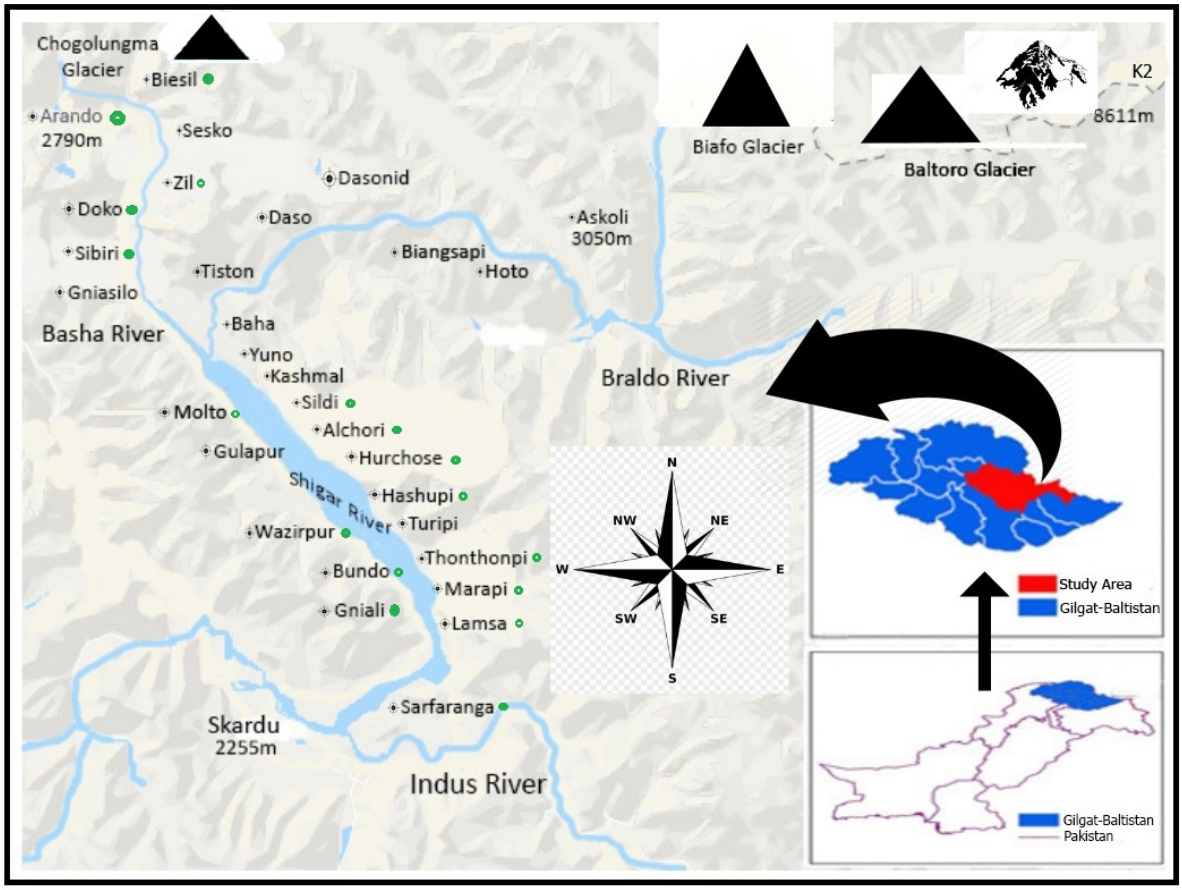

Fig. 1. Map of the study area depicting visited localities.

Until the middle of 19th century the entire Baltistan was governed by local autocratic Raja sovereigns (Maqpoon, Amacha and Yambgo dynasties) (Khan 1987) locally called Chou-Tus (Means: Raja period) and the Shigar was ruled by Raja dynasty known as Amacha. The population of Baltistan migrated from different valleys of the area and from different regions, e.g. Ladakh, Gilgit, Tibet, Hunza, Nagar (Zakir 1991). The Shigar population must probably have migrated from Ladakh, Tibet, Hunza and Nagar. Their cultures intermixed and created a single Balti ethnic group dominated by Ladakhi and Tibetan Balti speakers. The population speaks an archaic non-written Tibetan dialect called Balti (Sprigg 2013). The Balti population has a number of sub-groups (Clan). The population is distributed in villages scattered on alluvial fans, terraces and gentle slopes above the rivers (Shigar, Basha and Braldo), with the main villages located at 2300m (Marapi), 2790m (Arando) and 3050m (Askole) (Schmidt 2000). Small and seasonal settlement are found in the high alpine zones and comprised of shepherds' houses and cattle homes.

The villages have congested houses and narrow streets in order to save more and more land for agricultural activities. The local people are traditional and tightly immersed in Balti culture, which is reflected in construction, designs of houses and cattle stables, dress, agricultural activities, domestic and farming tools, games and pastoral practices. The recent census of Pakistan conducted in 2017 recorded 75000 people in the project area. Agriculture, animal husbandry, wood cutting, fodder and mining are most common subsistence sources (Abbas *et al.* 2017a, Kreutzmann *et al.* 2008). On main valley floor wheat and barley are cultivated with

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different varieties as first crop, followed by corn, millet or buckwheat in July (Kreutzmann 2004). At high altitudes only a single crop reaches maturity, normally buckwheat, potato, pea or beans. The vegetation is dry temperate type (Champion *et al.* 1965).

Ethnobotanical data collection

The field study was carried out from 2013-2016 in 17 villages (Fig. 2; Table 1) from valley floor to elevated zones at altitudes of 2300-3000. The hamlets situated at the lowest and highest elevation were Sarfarangah and Askole, respectively. The data about useful plants were collected by using semi structure interviews (Cotton 1996, Martin 2004). Participants were selected randomly but the authors preferred people indicated by villagers to have more indigenous knowledge. Interviews were conducted mostly by the first author in local dialect. Communications were mostly made in houses, gathering place of village, mosques and Jamias, (Islamic schools), forest, alpine pastures, shepherd's homes during plant collections trips. All interviews were only conducted after receiving prior informed consent from each participant. Eighty-four participants of ages ranging from 20 to above 60 were interviewed, including 62 men and 22 women. In local culture women avoid interactions with visitors/tourists and are mostly confined to household and agricultural activities.

Most participants were of an age between 40-60 years (47), followed by 20-40 years (21) and above 60 years (16). About 75.4% were illiterate, while 24.6% was educated mostly to secondary school level or below. The participants engaged in agriculture (56), livestock keeping (7), wood cutting (4), mining (9), were healers (4) and government employees (4) (Table 2).

Respondents were asked about the vernacular names of plants and their etymology, ethnobotanical use(s), part(s) used, availability, distribution and harvesting places. The total ethnobotanical plants were classified according to (Alves and Albuquerque, 2016; Marques, 1995). The specimens were properly pressed, dried and poisoned according to herbarium techniques described by (Jain and Rao, 1977). Plant species were identified by Taxonomists of Hazara University Herbarium, Mansehra Khyber-Pakhtoonkhwa Pakistan, and with the help of available nomenclatural literature (Flora of Pakistan, Ali & Nasir 1970, Nasir *et al.* 1972) and flora of china (www.efloras.org/flora_page.aspx?flora_id=2). The botanical names and respective families follow Angiosperm Phylogeny Group (APG 2009) and The Plant List (2010). The plant specimens were given voucher numbers and stored at the Herbarium of Hazara University Mansehra, Pakistan.

Fig. 2. A topographic view of the study area

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Table 1. Description of visited villages and number of interviews

Villages	Households	Altitude(m)	Latitude	Longitude	Interviews
Sarfarangah	40	2217	N 35 20.595	E 075 40.208	7
Lamsa	40	2256	N 35 22.933	E 075 44.967	5
Kothang	22	2260	N 35 25.420	E 075 44.967	8
Thonthonpi	50	2345	N 35 27.778	E075 42. 857	5
Hashupi	260	2360	N 35 30.461	E 075 40.502	6
Hurchose	17	2403	N 25 31.592	E 075 39,719	5
Alchori	170	2381	N 35 81.424	E 075 39.049	6
Sildi	80	2332	N 35 34.121	E 075 35.461	3
Zil	70	2623	N 35 46.601	E 075 23.650	4
Molto	80	2355	N 35 39.191	E 075 28.171	2
Wazirpur	70	2203	N 35 390.923	E 075 35.953	5
Bundo	50	2276	N 35 29.410	E 075 38.820	6
Gniali	60	2276	N 35 26. 877	E 075 41.811	5
Sibri	55	2580	N 35 47.399	E 075 23.845	3
Doko	60	2649	N 35 47.699	E075 23.683	6
Biesil	65	2698	N 35 52.415	E 075 23.891	4
Arando	120	2799	N 35 51.953	E 075 20.079	4
17					**84**

Table 2. Demographic features of interviewees

	Number	Percentage
Sex Ratio		
Men	49	80.33%
Women	12	19.67
Total	61	
Age Groups		
Between 20 - 40 years	18	29.5
Between 40 - 60 years	28	45.9
Above 60 years	15	24.59
Education Level		
Illiterate	46	75.4
Primary	3	4.92
Middle	4	6.55
High School	3	4.92
Graduate	2	3.28
Masters	3	4.92
Social Livelihoods		
Farmers	38	62.29
Shepherds	5	8.19
Wood cutters	4	6.55
Gemstone workers	8	13.11
Healers	3	4.92
Job Holders	3	4.92
Life type		
Town area	26	42.62
Elevated areas	35	57.37

Result and Discussion

Diversity of ethnobotanical plants

Our interviews yielded 52 species in 25 families and 46 genera. Asteraceae was recorded as the prevalent family with 5 species. Lamiaceae, Rosaceae and Tamaricaceae followed with four species each. These families were commonly used in other mountain areas like Tuchal, Zagroz, Hindukush, Himalaya and Karakorum Mountains (Akhani *et al.* 2013, Chawla *et al.* 2008, Khan 2007, Noroozi *et al.* 2008). Asteraceae is considered highly advanced and specialized in morphology, occupying many ecological niches (Barreda *et al.* 2012, Xiaoping & Bremer 1993). The species of Rosaceae and Lamiaceae are also found in many mountain systems (Nasir *et al.* 1972) (Table 3).

Local nomenclature

The vernacular nomenclature gives accounts about the local names in Balti dialect of plant species used for cultural, food and medicinal purposes. In some cases, pronunciation and spelling differed for the same species. For instance, the local name of *Thymus linearis* was recorded as “Tumburuk” while few respondents used “Tumburu”. The local name of *Datura stramonium* was “Datura” but in few cases noted as “Isman Datura”.

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Table 3. Phyto-cultural diversity of the Shigar valley Central Karakorum Ranges, Northern Pakistan

Family / Botanical name family	Local name	Zone/Habit	Harvesting area	Part(s) used	Traditional uses	No. of uses	Use description
Alliaceae / *Allium carolinianum* DC.	Broq chong	Alpine/herb	Moist slopes	Bulbs	Condiment	1	Bulbs are cut and fried with oil and used in culinary. Being an alpine species, it is used mostly by shepherds and wood cutters in the elevated areas
Amaranthaceae / *Chenopodium album* L.	Snio	Temperate/herb	Valley waste lands & in cultivated fields	Whole plant	Wild vegetable	1	The collected fresh plants are cooked and used as vegetable.
Amarantnaceae / *Chenopodium foliosum* (Moench) Asch.	Spang Osae	Temperate/herb	Mesic slopes	Fruits	Wild fruit	1	The fruits are picked and eaten in the sub alpine areas.
Apiaceae / *Carum carvi* L.	Thalae	Subalpine/herb	Moist slopes	Seeds	Condiment	1	used in local sweat and salty cookies called *Kulcha.*
Apiaceae / *Pimpinella diversifolia* DC.	Kohniod	Subalpine/herb	Moist slopes	Seeds	Drinks	1	Seeds are boiled to make local drink called qehva.
Apiaceae *Pleurospermum candollei* (DC.) C.B. Clark	Braq / Shundun	Alpine/herb	Moist slopes	Whole plant	Wild vegetable	1	Branches are collected, boiled in water and fried in oil to make a local vegetable called *sonma.*
Asteraceae / *Artemisia absinthium* L.	Khampa	Temperate/herb	Valley waste lands	Branches	Bio repellent	1	Branches are cut and keep in the house or shake to get rid of common domestic flies.
Asteraceae / *Artemisia brevifolia* Wall ex DC.	Bustae	Temperate/shrub	Dry rocky slopes	Whole plant	Fuel wood	1	Very common plant and profusely distributed in the area. Whole plants are uprooted and burnt for heating purpose in winter or cooking purpose.
Asteraceae / *Cichorium intybus* L.	Shantha	Temperate/herb	Valley waste lands	Whole plant	Wild vegetable	1	Gathered materials cooked and fried and used as vegetable.
Asteraceae / *Erigeron flaccidus* (Bunge) Botsch.	Ghzima	Alpine/herb	Moist slopes	Flowers	Affection	1	The flowers are collected by shepherds, wood cutters and by alpine visitors given to lower villagers as affection.

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Asteraceae / *Taraxacum officinale* Weber	Shantha	Temperate/herb	Valley waste lands	Whole plant	Wild vegetable	1	Plants are collected and cooked as vegetable.
Berberidaceae / *Berberis brandisiana* Ahrendt	Skiorbu	Subalpine/shrub	Mesic slopes	Whole plant	Fence, hut, wild, fruit & fuel wood	5	Spiny branches are used as fence around gardens, house and hut material. Whole plant is also used as fuel wood. Fruits are eaten.
Berberidaceae / *Berberis orthobotrys* Bien ex Aitch.	Skiorbu	Subalpine/shrub	Mesic slopes	Whole plant	Fence, hut, wild fruit & fuel wood	5	Spiny branches are used as fence around gardens, house and hut material. Whole plant is also used as fuel wood. Fruits are eaten.
Berberidaceae / *Berberis pseudumbellata* R. Parker	Skiorbu	Temperate/shrub	Riverbanks	Whole plant	Fence, hut, wild fruit & fuel wood	5	Prickly branches are used as fence around gardens, house and hut material. Whole plant is also used as fuel wood. Fruits are eaten.
Betulaceae / *Betula utilis* D. Don.	Staqpa	Subalpine/tree	Moist slopes	Whole plant	Tools, handles, fuel wood, huts, fences, spiritual healing, thatching, polo sticks & building materials	10	Branches are used to make, polo sticks, tools, tool handles. Long and straight logs used as building materials in roof. Small flexible shoots are used to thatch grass carriers (locally chorong) and fruit baskets. The periderms is also used to write few verses and hanged in neck after protecting in the piece of clothes and string
Boraginaceae / *Arnebia guttata* L.	Thangmarsi	Temperate/herb	Dry rocky slopes	Root	Dye	1	The roots are used to colour wool clothes.
Boraginaceae / *Myosotis alpestris* F.W. Schmidt	Mandaqskor	Subalpine/herb	Moist slopes	Flowers	Dye & affection	2	The flowers are used to dye local wool clothes while flowers are collected by forest visitors and bring to family or villagers to express their love.
Boraginaceae / *Onosma hispida* Wall. ex G. Don.	Kangmar	Alpine/herb	Moist slopes	Whole plant	Wild vegetable & dye	2	The collected fresh plants are cooked and used as vegetable.
Caryophyllaceae / *Cerastium dichotomum* L.	Broqbloghar	Subalpine/herb	Mesic slopes	Whole plant	Wild vegetable	1	Whole plants are cooked as vegetable.
Crassulaceae / *Haloteliphium ewarsii* (Ledeb.) H. Ohba	Gonchu	Subalpine/herb	Mosit slopes	Flowers	Affection	1	The flowers are collected by shepherds, wood cutters and by alpine visitors given to lower villagers as affection.
Cupressaceae / *Juniperus communis* L.	Spangla	Subalpine/shrub	Dry rocky slopes	Whole plant	Fuel wood & hut	4	Whole plants are burnt as for domestic heating. Due to prostrate nature used in hut walls.

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Cupressaceae / *Juniperus excelsa* M .Bieb.	Shukpa	Subalpine/tree	Dry rocky slopes	Stem & branches	Fuel wood, hut, rituals & building materials	5	It is one of the principal fuel wood wild trees in the area next to birch. Shoots are used for hut making and logs used in roofing.
Elaeagnaceae / *Hippophe rhamnoides* subsp. *turkestanica* Rousiss	Karxoq	Temperate/shrub	Moist slopes	Friuts & branches	Wild fruits, fence, hut & fuel wood	4	The taxon is widely distributed shrub used for different purpose. Due to its prickly nature ideal for fencing and hut. The wood is perfect for winter heating and coal. Fruits are eaten fresh and considered medicine. Local jams and scarp are made.
Fabaceae / *Astragalus polemius* Boissier.	Biowa chrachu	Temperate/herb	Dry rocky slopes	Whole plant	Bio epellent	1	The whole plant are uprooted and kept in the hole of kitchen and store rooms in order to avoid worms and rates to keep healthy foods and grains.
Fabaceae / *Cicer microphyllum* Benth.	Broq pokhstran	Temperate/herb	Moist slopes	Whole plant	Wild vegetable	1	The whole plant is used to make local vegetables
Fabaceae / *Colutea paulsonii* ssp. *paulsonii* (Shap. ex Ali) Ali	Rbana	Temperate/shrub	Dry rocky plains	Whole plant	Thatching & brooms	2	The flexible branches are used to thatch local grass carriers and makebaskets, thatched walls. ong and straight branches are used as brooms.
Fragaria nubicola (Hook.f.) Lindl.ex Lacaita / Rosaceae	Spang Osae	Subalpine/herb	Mesic slopes	Fruits	Wild fruit	1	The fresh fruit are eaten.
Grossulariaceae / *Ribes alpestre* Decne.	Askuta	Temperate/shrub	Dry rocky slopes	Stem, branches & fruits	Fence, hut, fuel wood, & wild fruit	4	Fruits are eaten as wild fruits. Branches and stem are used for different purposes like fencing, hut and fuel wood.
Grossulariaceae / *Ribes himalense* Royle ex Decne.	Askuta	Subalpine/shrub	Dry rocky slopes	Stem, branches & fruits	Fence, hut, fuel wood, & wild fruit	4	Fruits are eaten as wild fruits. Branches and stem are used for different purposes like fencing, hut and fuel wood.
Grossulariaceae / *Ribes orientale* Desf.	Askuta	Subalpine/shrub	Dry rocky slopes	Stem, branches & fruits	Fence and hut, fuel wood & wild fruit	4	Fruits are eaten as wild fruits. Branches and stem are used for different purposes like fencing, hut and fuel wood.
Lamiaceae / *Dracocephalum nutans* L.	Shundun	Alpine/herb	Mesic slopes	Whole plant	Wild vegetable	1	The fresh branches are collected and used as vegetable.
Lamiaceae / *Isodon rugosus* (Wall.ex Benth.) Codd	Fiangma	Temperate/herb	Dry rocky slopes	Whole plant	Broom	1	Whole plant is uprooted and used as broom in houses.
Lamiaceae / *Mentha royleana* Benth	Foling	Temperate/herb	Moist places	Leaves	Condiment	1	The leaves were collected and used in salads, curd and curries.

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Lamiaceae / *Thymus linearis* Benth.	Tumburu	Subalpine/herb	Mesic slopes	Whole plant	Drinks & condiment	2	It is a commonly used plant. The decoction is used as local coffee. In addition, used as condiments in curries.
Loniceraceae / *Lonicera microphylla* Willd. ex Schult.	Shotong	Temperate/shrub	Dry rocky slopes	Fruits	Wild fruit	1	The fresh fruits are picked and eaten
Oleaceae / *Fraxinus xanthoxyloides* (G.Don.) DC	Khara	Temperate/tree	Dry rocky slopes	Branches	Handles	1	The wood is considered to be tough and rigid. People preferred its branches to make tool handles like hammer, axe etc.
Papaveraceae / *Papaver nodicaule* L.	Kialbu Mandoq	Alpine/herb	Moist slopes	Flowers	Affection	1	The plant is believed to be poisonous. However, people used its flower the sigh of affection because not easily available in lower villages.
Rhododencraceae / *Rhododendron hypenanthum* Balf. f.	Broqcha	Alpine/shrub	Alpine slopes	Leaves	Beverage	1	The leaves are gathered and boiled to make coffee.
Rosaceae / *Rosa webbiana* Lindl.	Sia morpho	Temperate/shrub	Dry rocky slopes	Branches & root bark	Drinks, fence & hut	3	Due to prickly nature plants are uprooted to use as fence and hut wall. The roots bark is peeled and boiled to make local coffee.
Rosaceae / *Sorbus tianschanica* Rupr.	Dhundus	Subalpine/tree	Moist slopes	Leaves	Poisonous	1	The leaves are considered as poisonous locally.
Rosaceae / *Spiraeae hypericifolia* L.	Khsiber	Subalpine/shrub	Moist slopes	Stem & branches	Thatching, tools, handles, polo stick & weaving	5	The flexible branches are used to make local grass carriers and baskets, thatched walls. Long and straight branches are used as brooms. The straight branches are also used to make polo sticks, tool handles and wool weaving tools.
Salicaceae / *Salix karelinii* Turcz.	Khlangma	Subalpine/shrub	Moit slopes	Stem & branches	Fuel wood	2	It is the companion taxon with birch tree in sub alpine area to timberline. Used as fuel wood
Saxifragaceae / *Bergenia stachye* (Hook.f. & Thorns.) Engl.	Schapur	Subalpine/herb	Moist slopes	Root	Local drink	1	The fresh roots boiled with water and used as local coffee.
Solanaceae / *Datura stramonium* L.	Isman Datura	Temperate/shrub	Valley waste lands	Seeds & leaves	Poison & rituals	2	The seeds and the leaves are thought to be poisonous for both cattle and men. The seeds are used also used in hamlets for spiritual healing.

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Solanaceae / *Solanum nigrum* L.	Drumba shokhlo	Temperate/herb	Valley waste lands	Fruits	Wild fruits	1	The fresh fruits are eaten as wild.
Tamaricaceae / *Myricaria germanica* ssp. *pakistanica* Qaiser	Ongbu	Temperate/shrub	Riverbanks	Branches	Wool weaving, fence & hut	3	The small branches are made hallow by putting the soft internal tissues. As a result, wooded small tubes are formed called *Purik* used in wool weaving.
Tamaricaceae / *Tamaricaria elegans* (Royle.) Qaiser & Ali	Chu shuk	Temperate/shrub	Riverbanks	Branches	Fence & hut	1	Branches are used to make hut and fence around home garden and houses.
Tamaricaceae / *Tamarix leptostachya* Bunge	Shuk	Temperate/shrub	Riverbanks	Branches	Fence & hut	1	Branches are used to make hut and fence around home garden and houses.
Tamaricaceae / *Tamarix ramosissima* Ledeb.	Shuk	Temperate/shrub	Riverbanks	Branches	Fence & hut	1	Branches are used to make hut and fence around home garden and houses.
Thymeleaceae / *Daphne mucronata* Royle.	Angaru	Temperate/shrub	Dry rocky slopes	Leaves & flowers	Poisonous	1	The leaves and flowers are thought to be poisonous.
Urticaceae/ *Urtica dioca* L.	Khaeshing	Temperate/herb	Valley waste lands	Whole plant	Wild vegetable	2	Whole plants are cleaned, cooked and fried and used as vegetable.
Zygophyllaceae / *Peganum harmala* L.	Isman	Temperate/herb	Dry sandy plains	Seeds	Spiritual healing	1	Sees are burnt and incense the houses to get rid of bad evils and wellbeing. The evil caught person is also smoked. Seeds is also used in hamlets and hanged in the neck. These activities considered as spiritual healing.

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Artemisia absinthium was called Kho bustae and Shadi bustae in the local community. Kho bustae is the name of *Artemisia santolinifolia* derived from its bitter taste (Kho:bitter, bustae any species of *Artemisia*). It was also called Shadi bustae (monkey like plants) referring to its dense indumentum.

In some cases, local names referred to growth habit, myths, social associations, habitat type, stem structure, fruit characters and medicinal uses. For instance, the vernacular name of *Arnebia guttata* is "Thangmarsti or thangmarsi" (pronounced thang-mar-sti from thang:dry or desert area, mar derived from morpho:red, sti:ink). The name is given due to its distribution in dry and arid areas, and its use for producing red dye from the roots. Broq chong (broq:forest, chong:onion) is the local name of *Allium carolinianum* because of its occurrence in the forest, but not in the lower valley bottom. The fruits of *Solanum nigrum* resemble grapes (*Vitis* sp.) and the local name is drumba shokhlo (from drumba:homegarden and shokhlo:type of grape). The local name of *Pleurospermum candollei* is braq shunadun (from braq:rocky, type of shundun which grows in rocky areas) because it grows in rocky habitats. Likewise, kangmar (from kangma:foot and marfo:red) is the name of *Onosma hispida* i.e. plant with red "foot" as its roots are red in color. *Astragalus psilocentros* is used to trap rats and locally called Biowa-charchu (from biowa:rat). This species prevents rats from nesting in stores, homes, cattle barns etc. Spang-osae (from spang:grassy habitat and osae:mulberry) is the name of *Chenopodium foliosum* which has mulberry like fruits and grows on grassy slopes.

Plant collection and habit

Herbaceous species were most frequently used (27 species, 51%) followed by shrubs (21, 40%), trees (4, 7%) and sub-shrubs (2, 2.85%). In the mountain habitats the harsh environmental condition supports the growth of herbaceous species (Chang 1981, Körner 2000). As a result, herbs succeeded in any type of floristic studies in the montane system (Mahdavi *et al.* 2013). Plants were collected from six types of habitats:dry rocky slopes (14), mesic slopes (8), moist slopes (17), river bank (5) and valley waste lands (7).

Plant-people interaction

There is an inextricable link between the biological diversity and human culture (Barbier *et al.*, 2011, Cocks 2006). The altitudinal distribution of plant species showed a maximum use of species from lower temperate zones 27 (51%) species, while 18 (48%) and 7 (13%) species were found to occur in the sub alpine and alpine zone respectively. The diversity of ethnobotanical plants showed a clear inverse relation with altitude also described by Saqib *et al.* (2011) in the Himalayan range.

Every ethnic group has culture and possesses tales about its ethnology, linguistics and social system. Plant uses were grouped into three categories 1) food and beverages (beverages, condiments, wild food, wild vegetables), 2) handicrafts and dyeing (dye, brooms, fence, handles, hut, polo sticks, thatch, tools, weaving), 3) rituals (affection, bio-repellent, fuel, building materials, poisons and spiritual healing). The number of plants used for certain purpose was recorded as plants for affection (4 species), bio-repellent (2 species), broom (2 species), building materials (8 species), condiments (9 species), fence (12 species), fuel (14 species), dye (3 species), handles (5 species), hut (14 species), local dish (6 species), local drinks (4 species), poisonous (3 species), polo stick (4 species), thatching (4 species), tools (5 species), weaving (5 species), ritual (6 species) mystical healing, wild fruit (11 species) and wild vegetable (7 species). The largest number of species was using as fuel wood, for the construction of huts, as wild fruits, fencing and wild vegetables. These varied traditional uses represent an interesting bio-cultural diversity but can trigger a decline in biodiversity due to unsustainable utilization. In many mountain communities, people's first priority is to cover their day to day needs, and knowledge about the intrinsic value of biological diversity is limited. Consequently, many plant species are always under anthropogenic pressure. A number of studies advised the need for more sustainable utilization of local resources due to profusely increasing global population along with climate change (Pimentel and Pimentel, 2006).

Detailed plant uses

Food and beverages

Wild edible plants are consumed in different ways (Fentahun and Hager 2009, Pieroni 2000) and many populations in the world use wild plants as vegetable, fruits, condiments, and beverages, providing minerals, vitamins and trace elements (Pieroni *et al.* 2017, Rasingam 2012). In the study area indigenous food selection was classified into four sub-categories i.e. beverages (5 species), condiments (9), wild fruits (10) and wild vegetables (9). In the study area *Pimpinella diversifolia*, *Thymus linearis*, *Rosa webbiana*, *Bergenia stachye* and *Carum carvi* were used to make local tea. Some of these beverages were used as medicine.

The local perception is that herbal teas serve for relaxation of muscles after laborious work. Kurppa *et al.* (1983) found that herbal teas can be very effective for female reproductive disorders, and such decoctions are rich in natural antioxidants (Pieroni *et*

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al. 2017). *Allium carolinianum*, *Carum carvi*, *Mentha royleana,* and *Thymus linearis* were used as spices and flavoring in curries and local dishes (Prdapu, Kisir, Khanda, Muskut, chol, Tro bhalae) on daily basis. The seeds of *Carum carvi* were used in local cookies (Azoq, Kulcha, Khurba and Zdairchung). *Berberis brandisiana*, *B. orthrobotorys*, *B. pseudoumbellata*, *Chenopodium foliosum*, *Fragaria nubicola*, *Hippophe rhamnoides*, *Lonicera microphylla*, *Ribes alpestre*, *R.himalynse*, *R. orientale*, *Rhamnus prostrata* and *Solanum nigrum*. In Zimbabwe wild fruits are the only fruit source and considerable income is generated by its trading (Campbe 1987). *Urtica dioca*, *Pleurospermum candollei*, *Taraxacum officinale*, *Onosma hispida* and *Dracocephalum nutans* were frequently used as wild vegetable species. These were cooked separately or mixed with other species and might be adding micronutrients to the diet (Ogle *et al.* 2001) and alleviate the dietary deficiency (Flyman & Afolayan 2006).

Handicrafts and dyeing

Plants produce natural dyes and the practice of dying is common among indigenous people (MacFoy 2004). Woolen clothes are one of the cultural expressions of the study area. The wool of local sheep and ewe is used to design caps, clothes and waist coats. In order to color the white wool *Myosotis alpestre* (whole), *Onosma hispida* (root), and *Arnebia guttata* are used as dyees. Nowadays these clothes are however used only by old people of the local area. The knowledge of plants for dye use are also common in other communities e.g. in Turkey (Doğan *et al.* 2003) and in the valleys of India (Kala 2009).

Small branches of *Colutea paulsenii, Kochia prostrata,* and *Isodon rugosus* were used to make brooms, like in other areas of Pakistan (Panhwar & Abro 2007). The construction of huts mostly used in summer is a common tradition in mountain regions. Balti people migrate to these huts to care for their livestock. The twigs, branches and stem of certain plant species are used to build huts, and the walls are often made from woven branches instead of other materials (Fig. 3). This construction is called *Shaq*. Fences are built around home gardens, vegetable fields and other crop fields to protect these for herbivorous animals. The most commonly used species for the construction of *Shaq* were *Betula utilis*, *Juniperus excelsa*, *Juniperus communis*, *Ribes alpestre*, *R. himalense*, *R. orientale*, *Myricaria germanica*, *Tamaricria elegans*. Plants with straight branches with hard and tough wood are selected in order to make agricultural tools and their handles and ploughs. *Betula utilis* and *Fraxinus xanthoxylioides* were the most used species.

Fig. 3. A typical house with woven walls (shaq nang)

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Polo is the common game in entire region of Baltistan and is played at special occasions and cultural days. The species which are selected for polo sticks and balls were *Spiraea hypericifolia* and *Betula utilis.* The small twigs and branches of *Betula utilis, Spirarea hypericifolia* and *Colutea paulsenii* were used to make baskets (*Tondol*), manure carriers (*Chorong*) and grass carrier (*Chura*) (Fig. 4). *Tondol* is used to collect fruits like apricot, grape and mulberry and for safe storage. Baskets are made of different sizes and shapes and used to collect fruits directly from trees in order to prevent squeezing/pressing and for transportation. *Chorong* is commonly used to transport cattle manures to agricultural fields. *Chura* is longer and bigger and is used to bring grass, braches and hay/straw from agricultural fields. Similar baskets are used in other regions of Pakistan (Ahmad et al. 2010). Livestock is one of the income sources of indigenous people particularly in high altitude villages, and Balti people keep especially goats and sheep. The wool is used for clothes, local blanket, carpets and caps. In order to weave these, looms (*Threesa*) with various accessories are made by local carpenters using the wood of *Myricaria germanica*. The weaver is known as *Thaqskan* locally. In Baltistan these cultural expressions are in danger however, especially due to increasing accessibility to modern markets, where varieties of local and imported clothes and blankets are available. These skillful weavers are unfortunately usually not supported and encouraged by villagers. It was also indicated by the villagers that the livestock wool now is sold in local markets and used for quilt. The preservation of these cultural practices may be possible if vocational centers at village level are developed.

Fig. 4. A man carrying woven baskets for sale

Ritual uses

Flowers are believed to be the sign of love and are given to someone to express love and affection in many cultures. In the study area especially *Haloteliphium ewarsii*, *Papaver nuadicaule*, *Myosotis alpestre*, *Primula warshenewskiana* and *Erigeron flaccidus* are collected to be given to beloved family members. *Astagalus psilocentrose*, *Artemisia absinthium*, *Ribes orietale*, *Berberis pseudoumbellata* were used to repel rats, snakes, insects, centipedes, millipedes and other insects. These species act due to their prickles, bitter taste and pungent scent (*Abbas et al.* 2016, Isman 2000). The house design in mountain regions tends to reflect the challenging climate (Ooka 2002). In the lower parts of the study valley house are mainly built using cultivated timber species *Populus alba*, *Populus nugra*, *Plantanus orientalis*, *Prunus Armeniaca*, *Salix alba* etc. In the upper valley, *Betula utilis*, *Juniperus communis*, *Juniperus excelsa*, *Salix karnelii* and *Fraxinus xanthoxyloides* were used for construction. *Hippophae rhamnoides, Artemsia brevifolia*, and *Kochia prostrate* were often used as firewood at lower altitudes, while *Betula, Juniperus, Berberis*, *Ribes* and *Rosa* were used at higher altitudes. Like in other areas, the consumption of wood for domestic fuel and construction purpose greatly influences the population of shrubs and tree species, and may lead to erosion (Ogunkunle & Oladele, 2004). This urges the implement an

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effective conservation and management plans (Heltberg *et al.* 2000, Rawat *et al.* 2009).

Datura stramonium, *Daphne mucronata* and *Sorbus tianschanica* are believed to be poisonous, as they are not eaten by any animal.

Ailments of unknown origin are believed to be caused by the devil or by spirits, and plant species like *Betula utilis*, *Juniperus excelsa*, *Peganum harmala*, and *Datura stramonium* were used to treat such ailments. These beliefs and practices are centuries old and it is very difficult to trace their history. The practices transfer from generation to generation and only older participants practiced the custom. The spiritual healing potential by plants was also reported by other authors (Aldridge 1991, Giday *et al.* 2016).

Multiuse plants

The valley inhabitants were using plants for wide range of purposes. Thirty-one plant were used for single use, seven species had two uses, three had three, 5 species had 5 uses, and only one species (*Betula utilis*) had more than 5 uses and was under severe anthropogenic pressure. The highly utilized species were *Betula utilis* (10 uses), *Berberis species* (5), *Juniperus excelsa* (5), *Ribes species (5)*, *Spiraeae hypericifolia* (5), *Hippophae rhamnoides* ssp. *turkestanica* (4) and *Juniperus communis* (4) (Fig. 5).

Fig. 5. Two multi-purpose of the study area - *Betula utilis* (left) and *Spiraea hypericifolia* (right)

Novelty of the study

The study is the first of its nature from the region and explored the extensive relations of the indigenous flora and the Balti community. Species used for beverages, e.g. *Pimpinella diversifolia*, *Thymus linearis*, *Rosa webbiana*, *Bergenia stachye* and *Carum carvi* have been reported for the first time. The first two species are also used as condiments in the Himalayan belt of Pakistan (Abbasi et al. 2012). Similarly, among wild fruits the species, *Berberis* sp., *Ribes* sp. and *Rhamnus prostrata* were recorded for the first time. *Myosotis alpestre*, *Onosma hispida* and *Arnebia guttata* were originally reported for medicinal purposes, but here were reported as dye for the first time. *Betula utilis*, *Juniperus excelsa*, *Juniperus communis*, *Ribes alpestre*, *R. himalense*, *R. orientale*, *Myricaria germanica*, *Tamaricria elegans* are common species for fencing, hedge and hut making and are common in the whole region of Baltistan, including the study area. *Betula utilis* and *Fraxinus xanthoxylioides* were reported for medicinal importance for the first time in this study, and only from the study region. Similarly, the use of *Spiraea hypericifolia, Colutea paulsenii* and *Betula utilis* for thatch were reported for the first time from the study area. *Haloteliphium ewarsii*, *Papaver nuadicaule*, *Myosotis alpestre*, *Primula warshenewskiana* and *Erigeron flaccidus* were recorded by Abbas et al. (2016) from the same community. Similarly, the plants of spiritual healing i.e. *Betula utilis*, *Juniperus excelsa*, *Peganum harmala* and *Datura stramonium* were also reported for the first time from the region.

Conclusions

The population of Shigar valley presented an interesting phyto-cultural diversity that needs to be conserved. The younger generations have unfortunately little interest in such activities, because they are engaged in modern businesses and endeavors. Their thought and priorities focus on

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modern markets for their necessities, and since cultural practices are time taking and laborious activities these are no longer valued. Consequently, the number of experts of handicrafts, e.g. weaving, thatching and dyeing is decreasing with the passage of time. Local vocational centers for indigenous handicraft would be an effective effort for the retention of phyto-culture and profitable for locals to generate income without complex and expensive machineries. The processes of urbanization and modernization are increasing in the area leading to a loss of indigenous knowledge with the passage of time. Establishing handicraft shops and centers in the valley may be helpful for the retention and restoration of these interesting cultural practices. Nurseries of ethnobotanically important plants may be an effective tool to foster sustainable utilization. Therefore, the current study encourages governmental, non-governmental organizations and national institutes to protect the biodiversity, cultural diversity and ethnobiology. A dedicated and effective management plan for the preservation of ethnobotanical knowledge and practices is needed.

Declarations

Abbreviations: N/A.

Ethics approval and consent to participate*:* Consent was obtained from all participants before conducting interviews. No further ethics approval was required.

Consent for publication: N/A

Availability of data and materials: N/A

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Authors' contributions: ZA designed the survey, conducted field work, data collection and wrote the manuscript, JA identified the collection, SMK and MH were the supervisors of the PhD work of ZA, SM helped in herbarium techniques and data computation, RWB revised and improved the manuscript. All authors read, corrected, and approved the manuscript.

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