Peatlands of Broghil National Park, Pakistan: Human Use and Management Strategy

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A study was carried out in Broghil National Park in Chitral District of Khyber Pakhtunkhwa Province in Pakistan to assess the situation of the peatlands in the park, the trends in peatland use, and the pressure on the peatlands and to recommend a strategy for peatland conservation and management. Field data was collected through semi-structured interviews, focus group discussions, and direct observation through transect walks. Herders, farmers, peat block extractors, and village elites were prioritized as informants. Participatory Rural Appraisal/Participatory Learning and Action (PRA/PLA) tools were also used to assess the situation in the area. Information related to the peatlands was collected on demography, education, socioeconomic factors, livestock holdings, peat utilization, and occupation.

The peatlands in Broghil National Park have been overextracted, resulting in shrinkage of grazing lands and degradation of wildlife habitat. Burning of peatlands causes emission of fumes which ultimately results in respiratory diseases. Exploitation of peat as a fuel for domestic use began about 75 years ago. The pressure on these resources is increasing with the increase in population. Some villages have already used 90% of their peat. If peat consumption continues at the present rate, it is estimated that in 20-30 years time, all the peatlands will have become a wasteland.

Conservation of existing peatlands and restoration and rehabilitation of the degraded peatlands through community participation is important to minimize pressure. Detailed scientific research is vital to obtain complete data on the available natural resources and prepare a strategy for ensuring sustainability.

Keywords: Broghil National Park; Khyber Pakhtunkhwa; peatlands; rehabilitation

Introduction

Peatlands are natural systems with local, regional, and even global functions, but they mean different things to different people. They can be considered as land, wetlands, geological deposits, water bodies, and natural habitat. In many cases, they may be all of these. Human influence on peatlands and their surrounding landscape can affect their form and function. Peatlands are an important interface between water bodies and rangelands.

Peatlands cover only a small portion of the Earth's surface, estimated at between 2 and 3% (Charman 2002; Gorham 1991), but they contain a large accumulation of terrestrial organic matter, fixed from the atmosphere by photosynthesis. Peatlands are an important carbon store, and contain up to one-third (between 250 and 450 Pg[1]) of the world's terrestrial carbon pool (Gorham 1991). They represent an important long-term sink for atmospheric carbon dioxide (CO_2) (Gorham 1991; Roulet et al. 2007) and have the potential to moderate concentrations of atmospheric CO_2 (Moore et al. 1998). However, many northern peatlands, including many in the United Kingdom (Holden et al. 2007), have been disturbed by drainage, agricultural improvement, peat cutting, afforestation, burning, and increased atmospheric deposition. Disturbance can significantly alter carbon cycling within peatlands (e.g., Roulet et al. 2007) such that they can become a large and persistent source of carbon, both to the atmosphere as CO_2 and to aquatic ecosystems (Dawson and Smith 2007). The biodiversity value of peatlands demands special consideration in conservation strategies and land use planning.

Use of peatland in Broghil Valley

Historically, the most common use of peatlands in Broghil Valley, besides the use as grazing land, has been as a primary source of fuel. The exploitation of peat as a fuel for domestic use began around 75 years ago when locals came to know through a migrant from China that peat can be used as fuel. Since then peat has been the traditional domestic fuel in Broghil Valley. The peatlands also perform some crucial ecological roles like water storage, offering habitat for migratory birds, as a source of fodder for livestock and wildlife, and as the major carbon sink at that altitude. Peatlands are sensitive to climate change. In the last 40 years, the peatlands ecosystem in Broghil Valley has been under tremendous pressure due to overexploitation to meet household energy needs of the communities that live permanently at high altitude (around 3,700 masl).

The Study

A study was carried out in Broghil National Park with the following objectives:

- to know the existing status of the peatlands,
- to assess trends in peatlands use,
- to assess the usage and pressure on the peatlands, and
- to formulate a long-term strategy for peatland conservation and management in the Park.

The study was carried out in 12 villages in Broghil Valley that depend on peatlands to fulfil their energy and fodder needs. Field data were collected using a combination of semi-structured interviews, focus group discussions, and direct observation through transect walks. The interviews and informal discussions were conducted mostly with herders, farmers, peat block extractors, and village elites. Participatory Rural Appraisal/Participatory Learning and Action tools were also used to assess the situation in the area. Information was collected on demography, education, socioeconomic factors, livestock holdings, peat utilization, and occupation.

Results

Broghil Valley

Broghil Valley is the northern-most valley in Chitral District in Khyber Pakhtunkhwa Province of Pakistan, and lies 250 km to the northeast of Chitral town. Broghil is one of the most important valleys in the region by virtue of its strategic location; it borders the famous Wakhan Strip of Afghanistan, and is connected to Afghanistan in the northwest via the famous Broghil Pass and Darwaza. Broghil National Park (BNP) has an area of 1,348 km^2 comprising Broghil valley and a small part of Yarkhun Valley, and has been declared a National Park under Section 16 of the Khyber Pakhtunkhwa Wildlife (Protection, Preservation, Conservation and Management) Act, 1975, vide notification No. SO (Tech) Envt/viii-10/2005/kc dated 25-08-2010. It has a number of peatland areas. Located above 3,000 masl, Broghil has relatively harsh climatic conditions. The climate of the area is characterized as dry-temperate. It is hot in summer (July-August), ranging from very hot in the lowlands to warm in the uplands and cool at higher elevations, and has an average annual precipitation of about 1,000 mm.

The forests are very limited and mainly consist of birch, poplar, juniper, willow, and small shrubs. The valley is rich in medicinal plant resources and has more than 80 medicinal plant species. However, the local people lack the capacity to identify, process, and market these valuable plant species.

The alpine pastures and rocky slopes are interspersed with wetlands and provide a congenial habitat for many mammals, some endangered, such as snow leopard (*Uncia uncia*), Himalayan ibex (*Capra ibex sibirica*), brown bear (*Ursus arctos*), blue sheep (*Pseudois nayaur*), wolf (*Canis lupus*), red fox (*Vulpus vulpus*), golden marmot (*Marmota caudata*), and lynx (*Felis lynx*). The small mammals include insectivores, bats, lagomorphs (rabbits and pikas), rodents, and mustelid carnivores. Rock lizards and frogs are found everywhere in the valley. The valley is of global importance as it is the gateway of the Indus flyway to South Asia. WWF-Pakistan and the Pakistan Wetlands Programme identified a total of 83 species of birds in 30 families and 13 orders in the Broghil Valley.

Broghil Valley is characterized by the presence of more than 30 small and large lakes, the peatlands areas, Broghil River, and glaciers. The valley has tremendous potential for ecotourism. There are famous historical passes towards Gilgit-Baltistan and neighbouring Afghanistan, which leads to Tajikistan and China.

The valley has 12 villages and hamlets with 143 households and around 1,489 individuals, 53% male, and an average household size of about 10 (Table 19).

The overall literacy rate is only 10.7% and the number of graduates is negligible, but present school enrolment is encouraging (Table 20).

Table 19: **Population in Chitral District and Broghil Valley**

Name	No. of HH	Males	Females	Total
Villages in Broghil Valley				
Lashkargaz	16	108	92	200
Garil	10	80	70	150
Chilmarabad	27	160	140	300
Ishkarwaz	18	100	90	190
Medan	3	15	15	30
Arquan	3	12	11	23
Chikar	20	120	100	210
Garumchasma	30	135	125	260
Vadinkhot	3	13	7	20
Kishmanja	3	17	15	32
Jungle	3	7	5	12
Koi	7	32	30	62
Total (estimated)	**143**	**799**	**700**	**1,489**

Table 20: **Education levels in Broghil Valley (enrolled)**

Education level	Primary	Middle	Secondary	Inter-mediate	BA/BSc	MA/MSc	Overall literacy rate
No. of individuals	49	65	14	4	2	0	10.7%

There are only two dispensaries available to provide health services to the local communities, both run by Aga Khan Health Services (AKHS). Opium addiction is one of the main health problems. Only 0.37% of the total area is available for agriculture, and even this is poorly productive due to climatic, edaphic, and topographic factors. Buckwheat, potato, alfalfa, and wild beans are grown to supplement nutritional needs and fodder production, mostly in the lower villages.

Livestock raising and animal husbandry are by far the most important sources of livelihoods, contributing about 90% of total income. Livestock are an important source of protein (milk and meat) and cash income. Residents also use animal dung as fertilizer and as a source of household energy.

The seasonal calendar of occupation and income shows that May to November is the peak season for intra- and inter-village activities like agriculture, livestock, and localized trade, while the period from December to April supports off-farm labour outside Broghil (Table 21).

Table 21: **Seasonal calendar of occupations and income**

Livelihoods	J	F	M	A	M	J	J	A	S	O	N	D
Agriculture							High	High	High	High		
Livestock	Constant	Constant	Low to moderate	Low to moderate	Low to moderate	High	High	High	High	High	High	Constant
Services	Constant	Constant	Constant	Constant	Constant	Constant	Constant	Constant	Constant	Constant	Constant	Constant
Off farm labour outside Broghil	High	High	High	Constant	Constant	Constant	Constant	Constant	Constant	Constant	High	High
Tourism					Low to moderate	Low to moderate	High	High	High	Low to moderate	Low to moderate	
Localized trade					High	High	High	High	High	High		

High Low to moderate Constant

Human dependence on peatlands

Figure 18 shows the contribution of different sources of energy to household fuel in the valley.

Peatlands are by far the most important natural resource used by the local communities as fuel, contributing 75% of total requirements. Use of peat as domestic fuel started around 75 years ago when a migrant from China, Mirza Rai, demonstrated the burning properties of peat to the people of Broghil. June, July, August, and September are the main months for peat extraction, and October to March and the main months for peat burning for cooking and heating. The timing of natural resource use and supply in Boroghil Valley is shown in Table 22.

A significant proportion of the peatlands have been used up and cutting peat is increasing with the increase in population. The ever-increasing pressure on the remaining peatlands ecosystem is also affecting the natural habitat of the associated wildlife. Some of the villages in Broghil Valley, including Chikar and Iskarwaz, have extracted almost 90% of their share of the communal peatlands. Now these villages are fulfilling their fuel requirements from the government-owned peatland areas. The seasonal trends in peat use vary considerably. During summer (May-September), the daily consumption of peat per household is around 100–150 kg; in winter this jumps to 200–300 kg. In summer, household energy

Figure 18: **Contribution of different sources of energy to household fuel requirements in Broghil National Park, Pakistan**

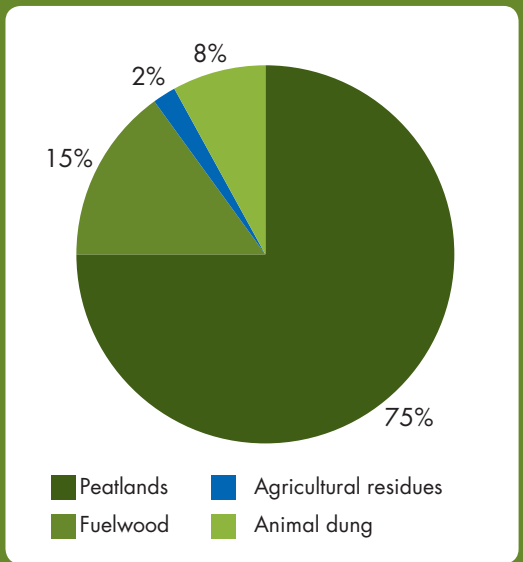

Table 22: **Annual timing of natural resource use in Boroghil valley (intensity of use/ supply on a scale of 1 [lowest] to 3 [highest])**

Month	J	F	M	A	M	J	J	A	S	O	N	D	Critical months
Fuelwood													
Use	3	3	3	2	1	1	1	1	1	2	3	3	Nov to Mar
Supply	1	1	1	2	2	3	3	3	3	2	1	1	Jun to Sep
Water													
Use	1	1	1	2	1	3	3	3	3	2	1	1	Jun to Sep
Supply	–	–	1	1	2	3	3	3	3	2	1	1	Jun to Sep
Peat													
Use	3	3	3	2	2	2	1	1	2	3	3	3	Oct to Mar
Supply	1	1	1	1	2	3	3	3	3	3	2	1	Jun to Sep
Medicinal plants													
Use	3	3	2	2	2	1	1	1	2	2	3	3	Nov to Feb
Supply	–	–	–	1	1	2	3	3	3	2	1	–	Jul to Sep
Hunting													
Birds	2	3	3	2	1	1	1	2	3	2	2	2	Feb to Mar, Sep to Oct
Mammals	3	3	3	2	2	1	1	1	1	1	3	3	Nov to Mar
Grazing													
Fodder collection	–	–	1	1	2	2	3	3	3	2	1	–	Jul to Sep
Pasture use	–	–	1	2	2	3	3	3	3	2	1	1	Jun to Sep

Source: PLA and questionnaire survey.

requirements are supplemented through other means, e.g., fuelwood, animal dung, and agricultural residues. But in winter, heavy snowfall and low temperatures impair the mobility of local communities and people remained confined to their houses. This increases the demand for energy, which is often met by burning peat.

The use of peat varies from hamlet to hamlet within the valley. In villages at lower elevation such as Kismanjha, Jungle, Pechuch (Garamchasma), Koi, and Vadinkhot, the primary sources of energy are fuelwood, animal dung, and agricultural residues; peat is a secondary source. This is because there are some remains of birch, willow, and juniper forests in these villages or nearby areas.

Excessive utilization of peatlands is leading to loss of habitat for key wildlife species, a decline in both covered area and productivity of grazing lands, enhanced emission of greenhouse gasses (GHGs), and increased respiratory problems within the human population as a result of using peat as a source of domestic energy. According to one estimate, if peat consumption continues at the present rate, in 20-30 years time all the peatlands will be severely degraded.

Recommendations

- Restoration/rehabilitation of the degraded peatlands through community mobilization
- Conservation of the existing meagre peatland resources through collaborative methods
- Development a proper mechanism for marketing of resources, including medicinal plants, livestock byproducts, and gemstones, to supplement income
- Awareness raising in the community with regard to the limited sustainable use of peatlands and associated resources
- Identify and introduce alternative sources of fuel to reduce the pressure on the threatened peatlands
- Design proper fuel efficient stoves in consultation with local communities to minimize the daily use of peat
- Detailed scientific research is vital to develop a complete database on available natural resources, CO_2 emissions, carbon stocking rate, and biodiversity value, and to develop a peatland/rangeland/pasture management plan. The plan should be implemented by involving the local community at the grassroots level.
- Look for options for this community to benefit by linking the peatlands with the REDD+ mechanism

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