2 The Himalayan-Karakoram-Hindu Kush Region

2.1 Natural Resources

Northern Pakistan, including the Himalayas, the Karakoram, and the Hindu Kush (HKH), presents a unique and formidable arrangement of mountain ecosystems. This region provides the basis for the country's life support systems like the water cycle, climate, air quality, consumption of natural resources, and watershed characteristics. As a result of various factors, the natural resources in the HKH that have been in use for millennia are no longer being sustained. The human population in these mountain ranges is fragmented and has increased greatly during this century, which has resulted in tremendous pressure on the natural resources. It has only recently been realised that appropriate and sustainable management of these natural resources will only be possible if the communities associated with the resources participate actively in their management.

2.2 Soil

Soils are generally gravelly with a coarse to moderately coarse structure, with a good humus content with one to two per cent organic matter, and more dense in cooler and wetter places. Isolated alluvial soils are found in long narrow strips along rivers. The soils in piedmont deposits are shallow to moderately deep (20-70 cm) with 0.9 per cent organic matter and a low water-retaining capacity. Moraine deposits contain unsorted material of all sizes, and the soil is moderately deep (50-120 cm) with a moderate water-retaining capacity. Depending on the thickness of the soil, these areas can be managed as pastures, fruit orchards, or forests. Soil erosion is widespread because of improper land use, little vegetative cover, and increased surface runoff.

2.3 Water

Pakistan receives 468 billion cu. m. of available fresh water annually. Much of this is being consumed by the growing population in downstream areas. Water consumption was 50 billion cu. m. in 1960, 118.1 billion cu. m. in 1990, and is projected to rise to 259.6 billion cu. m by 2025. The prospects of finding new sources of water in the region are negligible, and strategies need to be developed for improved efficiency and water conservation.

2.4 Forests and Forestry

The status of forests is closely linked to socioeconomic factors and other land uses. The Pakistan Himalayas contain a mix of wooded and wood deficit areas. Forests decrease from east to west and from lower to higher altitudes. About 25 per cent of the area in the active monsoon region has natural forest cover and another 25 per cent that is currently being used as grazing land is suitable for tree culture (Ahmad 1995). The HKH region of Pakistan has a dense population with a high rate of unemployment. These people are dependent on the scarce land resources and this has led to over-use of the forests. The mountain forests offer many intangible benefits in addition to the more obvious ones, and their contribution to food security, livestock production,

hydropower generation, and maintenance of environmental quality is often grossly underestimated. The role played by the forests in soil conservation, employment, regulated flow of water for downstream agricultural productivity, outdoor recreation, and maintenance of ecological balance far exceeds the direct economic benefits realised from the sale of timber and other wood products.

In the NWFP and AJK, forests are harvested by public sector corporations (the Forest Development Corporation in NWFP and the Azad Kashmir Logging & Saw Milling Corporation [AKLSMC] in AJK). The operations of these corporations are slow, inefficient, and wasteful. A total of 38.1 million cu. ft. of timber was obtained from the HKH forests in 1994-95: 10.8 million cu. ft. from Hazara; 9.1 million cu. ft. from Malakand; 6.1 million cu. ft. from AJK;4.2 million cu. ft. from the Northern Areas; and 0.7 million cu. ft. from the Murree Hills.

In the dry areas of the mountains, forest resources are limited and usually far removed from human settlements, indicating high pressures in the past. There is an acute shortage of wood and leaves for fuelwood, shelter, and animal fodder. Pressure on natural forests, pastures, and other natural resources are threatening the fragile geo-physical environment and biodiversity of the region. The forests are being depleted because of complex social, economic, and administrative factors (Ahmad 1995).

2.5 Rangelands

There are three types of rangelands in the HKH eco-system: alpine pastures; trans-HKH grazing lands; and forest grazing lands.

In this region, pastoralism is an important land use and economic pursuit. Most of the rangelands are common village or tribal property and are not subject to regulated grazing. Coupled with nomadic grazing, the alpine pastures and other grazing grounds have been ruthlessly exploited. As a result of constant slippage of glaciers, soil erosion, mud creeps, movement of boulders, compaction of soil, and trampling of seedlings, the land in the Hindu Kush mountains is losing its regenerative capacity. The transhumant herders, despite being major beneficiaries, make no effort to improve the depleting rangelands.

The estimated forage production in the mountain rangelands is summarised below (Muhammad 1989).

Area	Dry Matter kg/ha
Hazara (meadows)	1240
Hazara (shrub meadows)	2660
Kagan Valley	700
Khunjerab National Park	370
Bar valley	585
Gilgit	500 to 700
Siran,Kaghan,Neelum, Jhelum	200 to 3000

2.6 Wildlife and Biodiversity

To the east of the Indus, the Himalayas support 113 mammalian species, belonging to 92 genera, 24 families, and nine orders, as against Pakistan's total of 174 species. Among the birds, 525 species belonging to 242 genera, 76 families, and 22 orders are found in the Himalayas compared to Pakistan's total of 668 species. Fifteen of the 21 amphibian species reported in Pakistan, were found in the Himalayan region; as were 90 of 177 native fresh water fish species, 29 of which are endemic to the area (M. R. Mirza, personal communication).

The Himalayas include elements of four phyto-geographic regions: the Sino-Himalayan, Indian, Euro-Siberian, and Mediterranean regions. Four monotypic genera and around 400 species (7.8%) are endemic to Pakistan. Most of the endemic species are found in the Sino-Himalayan region. Almost 80 per cent of Pakistan's endemic flowering plants are confined to the Himalayas. The Kashmir Himalayas in particular have been identified as a global centre of plant diversity and endemism.

Families with more than 20 recorded endemic species include Papilonacae (57 spp), Compositae (49 spp), Umbelliferae (34 spp), Poacae (32 spp), and Brassicacae (27 spp). New endemic species are still being discovered (R. Rafiq, personal communication).

Most of the areas in the Pakistan Himalayas remain unexplored, and the full range of biodiversity has yet to be studied. Flora are incomplete; and the distribution of mammals and bird species can only be inferred from extrapolations of distribution range and preferred habitats. Two main gaps were identified in the Biodiversity Assessment and Gap Analysis of the Himalayas, the first in the coverage of protected areas and the second in knowledge. The protected area coverage in the mountain ecosystem is poor, and, even within the protected areas, management is inadequate or poor.

2.7 Agriculture

The Pakistan Himalayan-Karakoram-Hindu Kush region can be divided into five agro-ecological zones.

- The **Barani** (rainfed) zone comprises the outer Himalayas or Murree Hills, and the foothills in Haripur, Attock and the adjoining areas. The main land use is rain-fed agriculture with crops of wheat, millet, rice, maize, oilseeds, pulses, and fodder.
- The **Wet Mountain** zone includes the Murree (Punjab), Hazara, and Mansehra Districts (NWFP) and adjoining areas of AJK. About 25 per cent of the area is under rainfed agriculture and the remaining under different types of forest. The main crops cultivated are maize, wheat, rice, and fruit. Various species of conifers are found depending on the altitude.
- The **Northern Dry Mountain** zone encompasses the whole of Chitral, Dir, Swat, and the Tribal Areas of NWFP. Land use is mainly pastoral. Maize and wheat are cultivated under rainfed conditions on the lower slopes and in the valleys. Rice and fruit orchards are cultivated along the streambeds.
- The **Northern Moist Mountains** in AJK are similar to the Wet Mountains but agro-pastoralism dominates.
- The **Snow-Capped Mountains** support wildlife and livestock grazing on the lower fringes when snow recedes during the summer.

In the upland region, average landholdings are as small as 2.5 ha per family. Draught power is used for tillage. Cultivation is carried out on terraced fields with wheat in the winter and maize, millet, potatoes, and vegetables in the summer. Apple, walnut, apricot, peach, plum, and mulberry trees are planted along the borders of fields and in home gardens. Soil is fertilized with farmyard manure. Chemical fertilizers are used when they are easily available and farmers can afford them. Most of the farmlands in the region are irrigated by a network of channels run on gravity flow.

2.8 History of Forest Management

In the HKH mountain range, the climax species of the natural plant succession is oak and other broad-leaved species, with conifers as pre-climax. As a result of the sparse mountain population and lack of road network, these forests were not managed on scientific lines. In the absence of land settlements or demarcation of forests, the local population enjoyed the privilege of cutting down trees for timber and household fuel. The main economy in the mountain area revolved around keeping large herds of sheep, goats, and cattle. Transhumant movement of herds is still a common phenomenon with the change in seasons. At the start of winter and spring, forests and meadows along migration routes were, and are, open for nomadic grazers, as well as local communities to graze cattle. To increase fodder production, people set the forest and grazing grounds on fire. This has resulted in loss of regeneration of fire-sensitive climax species, which were replaced by fire-hardy conifer species as post-climax.

The post-climax conifer trees established themselves as forest stands of *Pinus roxburghii* (800 to 1,500 m), *Pinus wallichiana* (1,500 to

2,500 m), *Cedrus deodara* (2,500 to 2,700 m), *Abies pindrow* and *Picea morinda*, (2,700 to 3,200 m), and *Juniperus macropoda* in alpine meadows (3,200 to 3,400 m). There was no traditional silvicultural system for regeneration, but as a result of their gregarious nature and profuse seeding the conifer trees regenerated themselves.

At altitudes below 800m, the forests are mostly scrub forests of *Acacia modesta, Olea cuspidata,* and *Dodonaea viscosa*. These forests have been used traditionally by local villagers for livestock grazing and cutting of trees for fuelwood and small timber.

In ancient times, the local communities lived in harmony with rich forests in both the plains and the mountain areas. After the Aryan invasion, much of the land was cleared of forests for agriculture and the natives took refuge in the inaccessible hill areas. A low population and subsistence economy exerted minimal pressure on the mountain forests. The Mughals introduced a land settlement arrangement to guarantee a regular system of revenues based on taxation. Vast tracts of land were given as *jagir* to the village notables so that they would support the monarchy, maintain law and order, and collect revenue. The local fiefdoms enjoyed the privilege of owning large areas of forest from which they earned income from the sale of forest trees and by allowing grazing. But they did not follow any system of management for improvement and regeneration. There is little documented evidence of the impact of land settlement on the forests. Anecdotal evidence suggests that the Mughals had a strong interest in hunting, which meant preservation of natural game sanctuaries.

After 1850, when the British came to rule this part of the country, the forests were cut ruthlessly to earn revenue, provide support for the naval industry, and to bear the cost of the local administration. The forests were looked after by the deputy commissioners and revenue collectors of the districts. The Deputy Commissioner in Rawalpindi promulgated rules for conserving trees and brushwood in 1856. Similarly, the Deputy Commissioner in Hazara promulgated rules for forest conservation in 1857, and at this time all forests were declared the property of the government. Looking at the plight of the forests and the pace of degradation, many groups voiced a great concern. As a result, the First Inspector General of Forests, India, was appointed in 1873 and the Indian Forest Service was established. To control logging, the first forest legislation was promulgated in 1878. The Indian Forest Act 1878 brought the major part of the forests under government control and limited rights were given to local people. This resulted in resentment. The villagers were granted more control in 1923, and a new Forest Act was promulgated in 1927.

Guzara forests remained under the control of the district administration. *Guzara* Rules for Rawalpindi and Hazara Districts were enacted in the latter part of the nineteenth century to regulate their management. According to the *Guzara* Rules, the revenue earned from resin collection from *Pinus roxburghii* and tree harvests is apportioned in percentages: 12.5 per cent to the Village *Guzara* Fund, 12.5 per cent to the Government Treasury, and the remaining 75 per cent distributed among the rightholders. According to the Book of Rights maintained by the Revenue Department, a rightholder in these forests is entitled to receive *three pine trees* for construction or repair of his house and one pine tree at the time of burial of a family member, to cut dry trees for fuelwood, and to have open access to free grazing. Despite population pressure, communal forests, village *guzara*, and *shamilat* have been catering successfully to the needs of local communities without any measures to give a rest to the areas. Hardly any programmes were developed in the past to rehabilitate these forests.

2.8.1 Traditional/Indigenous Forest Management Approaches

Oak Forest Management

Oak forests in the Dir, Swat, and Chitral districts are traditionally managed by local inhabitants for use as fodder and fuelwood and are kept

open for free grazing throughout the year. When there is snow, livestock, and especially cows, are stall-fed. In summer, cutting oak trees is totally banned (*Naga*). In winter, villagers regulate the cutting of wood and branches of oak trees by dividing the forest into blocks. However, individual livestock owners, irrespective of the ownership rights in these forests, are allowed to cut the branches they need for cattle fodder, and the remains (twigs) are used as firewood. Surplus twigs are sold as firewood by individuals within the confines of their villages. The surplus oak fodder areas are leased out for cash or kind to the nomadic grazers who migrate from the alpine pastures, a form of *Qalang*.

Shrub Forest Management

Various varieties of shrubs like *Dodonaea viscosa* and *Indigofera* spp are found throughout the Malakand Division and managed by different indigenous systems. In some villages, communities impose a ban (*Naga*) on the cutting of shrubs from hill sides for a specific period, normally three to four years, to provide a rest and allow rehabilitation of the degraded area. A certain area is kept open for cutting shrubs to meet urgent needs. A system of fines is commonly used to regulate the *Naga*. Villagers also hire the services of a person called a *Kahay* who is paid in cash or kind to ensure implementation of the *Naga* in a specified area. The period and area of *Naga*, the portion of the forest opened for shrub cutting, and the penalty for violations, are determined by the village *Jirga* (Council of Elders). Every villager, irrespective of the ownership, can cut shrubs from the permitted areas to satisfy his or her *bona fide* domestic needs, but sale outside the village is not allowed. In some villages, the individuals who cut shrubs are required to pay a nominal charge per head-load to the community to finance village welfare activities.

Traditional Grazing Management Practices in Malakand Division

There are two types of pastures in Malakand Division that are managed traditionally for grazing and grass collection: alpine pastures and lower hillsides.

Alpine pastures are found above the tree line along the hill slopes in the upper reaches of Dir, Swat, Chitral, and the Northern Areas. These areas are normally covered with snow from November to April. At the beginning of spring and summer, after the snow melts, grass comes up naturally and the areas are used as grazing grounds by the village communities and nomadic grazers. Each owner grazes his/her livestock in an area defined by traditional ownership or use rights. A month before snowfall starts, the people move back to the villages in the lower valleys. Sometimes the cattle are left unattended during the summer, and only herded together at the end of the grazing season. Occasionally, individually owned pastures are leased out to nomadic grazers (*Bakarwals*) who migrate during summer to the hilltops and pay the owners in cash or kind (called '*Qalang*').

The areas in the lower hillsides or foothills are used for grass cutting and grazing by the local communities. Restrictions called *naga*. are imposed on grass cutting in the foothills during the summer and monsoon season after the cattle have been moved to the high pastures. When the cattle start descending from the higher elevations, the owners of the areas lift the restrictions to allow grazing. Hay is harvested and stored to stall-feed the cattle during winter. After the hay harvest, the area is opened for grazing until the winter ends. The surplus grass is sold within and outside the villages.

2.8.2 Water Utilisation and Distribution System

In the high hills, there are two main types of water use.

- **Irrigation**–In villages where water is available from springs, rivers, or small streams, the communities jointly construct and maintain canals and water channels for irrigation. In general, construction materials like sand, mud, and stones, and if necessary land, are provided free of charge by the users and then held as common property. Water distribution is determined by the amount of

potentially irrigated land owned, and the amount is calculated in terms of the number of hours and days.

- **Water Mills**–When it is feasible, communities sometimes construct water mills as common property, with the land and construction materials being provided free of cost by the users. All the villagers can use the mill to grind grain, for a nominal charge (usually 1/10th of the grain) used to meet the maintenance cost of the mill, the salary of the mill operator, and community work.

2.9 The Role of Forests in the Livelihood Strategies of Mountain People

Historically, 400 to 500 years ago, the lower slopes in the mountain watersheds were heavily forested. In the last hundred years or so, tree cutting for such things as railway sleepers, mining struts, fuelwood, and construction material has accelerated the process of degradation.

Most of the upland watershed areas (moist temperate zone) are densely populated with both people and livestock. The average landholdings for a family of five to seven members is far below the subsistence level of five ha and poverty is widespread. The need for land is great, with the result that food crops are cultivated on steep slopes, and clearance of communal and private *Guzara* forests and encroachment of state forests are on the increase. Cutting trees from natural forests for fuelwood and timber is growing at the same rate as the population, 2.7 per cent per year. Improper land use practices are the major factors contributing to soil erosion in watershed areas.

More than 300,00 people in the mountain areas are directly involved in forestry operations like sowing, planting, harvesting, transporting, and marketing of timber. Women are directly involved in the collection of fuelwood, grazing of livestock, grass cutting, and the collection of wild mushrooms, fruit, and nuts. The harvest from commercial forest is an important source of revenue for the state. According to the agreement with the forest-dependent communities, the Provincial Forest Department of NWFP pays a fixed percentage of timber sale proceeds as a royalty, 80 per cent in Dir and Chitral, and 60 per cent in Swat. The royalties are distributed equally among the male members, including children. Sometimes people agitate vociferously when there is a bureaucratic delay in the payment of royalties - a situation exploited by profit motivated forest contractors. As a result of the strong link between politicians and forest contractors, unscrupulous elements indulge in illegal trafficking of timber, sometimes even taking timber to Afghanistan to re-import to Pakistan. The tie between politicians and contractors is known as the 'Timber Mafia'.

Each household keeps livestock, mostly sheep and goats, which graze in forests and community grazing grounds. These meet the family's needs for dairy products and meat and any surplus is sold in the peri-urban areas. For centuries, nomads (Gujars from the NAs and AJK and Koochies from Afghanistan) have migrated annually from the highlands to the lowlands and back with flocks of sheep and goats that graze on alpine meadows and grazing areas of state, *Guzara*, and private forests. The raising of sheep and goats and selling and trading of animal products, forms the basis of a strong and well-established pastoral economy. The nomads pay a fee to the owners of forests and/or villagers in cash or kind for permission to graze their livestock.

2.10 Indigenous Management Institutions

The local decision-making institutions are usually composed of selected, respected members of the community. Some of the more common ones are described briefly in the following sections. The institutions play a significant role in settling conflicts and disputes. The aggrieved parties or person may ask for a meeting of the institution, at which members will consider the dispute. Once a decision has been taken by consensus, the conflicting parties are morally bound to settle the dispute. If any

of the parties does not agree with the decision, they may request an appellate body to be set up, which may include members from diverse localities and/or tribes, to consider the different views and give a final verdict. Besides resolving local conflicts, these institutions may take up any issue of prime importance that directly or indirectly affects the community as a whole, for example a tree planting campaign, regulation of grazing, distribution of water, or construction of a village mosque, school or roads.

The different types of indigenous institutions are described below.

2.10.1 Bradari

The *Bradari* system is mostly found in rural areas of Punjab Province and a few of the hilly areas of NWFP where there are small hamlets belonging to a clan with a single genealogical origin, for example Gujar, Arian, Jat, and Mughal. It is one of the simplest forms of institution.

2.10.2 Jirga

The *Jirga* system is practised in the tribal areas of NWFP and Balochistan provinces. The area of influence of the institution can extend from as little as one tribe to the whole of the province. Geographical origin is the only factor defining membership of a tribe in a *Jirga*.

Traditionally, the Pukhtoon tribes in Malakand Division, i.e., the Yousafzai, Tarkalani, and Utman Khail, settled in their own areas. These tribes are further divided into sub tribes and *khan*, each settled in a separate village with a specified village boundary. The village area is divided into *tall* on the basis of land quality. The hillsides and plains are further divided on an individual family basis for cultivation of agricultural crops. The concept of the tribe, sub tribe, *khail* , and family defines the land settlement, i.e., *tall* pieces of land belong to a specific kinship or *khail*. These are the units that define the socioeconomic life of the individual members of Pukhtoon society. Interaction is regulated by the Pukhtoon code of life (unwritten constitution) and implemented by the head of the family, the family *mashak* or elder. Disputes within a *khail* are settled by the *Khail Masharan* (elders), those within a village by the *Kali Masharan* (village elders), and those within an area by the *Ilaqa Masharan* (elders) of the area.

The meeting of the *Masharan* or elders is called a *Jirga* (Elders Council). The *Jirga* is important for decision making and regulating the socioeconomic affairs of Pukhtoons. The joint family system determines the socioeconomic role to be played by specific family members to maintain the power and economic well-being of the family. Benefits are shared equally by all family members. The family head, usually the father or elder brother, or mother in absence of the father, ensures balance and equality among the family members irrespective of sex and actual contribution. Any disputes are resolved with equity and justice by the head of the family in consultation with other family members.

2.10.3 Parya

The *Parya* system is found in rural areas of the Punjab and AJK. It's scope is limited to a village or cluster of villages. A *Parya* is formed at the instigation of, and by the mutual consent of, the aggrieved parties. A *Parya* from one village may act as an arbiter in another village, if a particular village community so requests.

2.10.4 Panchayat

A *Panchayat* is a semi-official institution mostly found in the province of Punjab. It consists of elected members of local bodies and/or union councils. This institution may conduct summary trials and give verdicts that receive due weight even in courts of law. A *Panchayat* may take up more than one issue at a time.