

Highland Rangelands of Afghanistan: Significance, Management Issues, and Strategies

Aziz Ali¹* and Yi Shaoliang^{1,2}

¹ Aga Khan Foundation, House 41, Street 2, Qala-e-Fatullah, Kabul, Afghanistan

² International Centre for Integrated Mountain Development, GPO Box 3226, Kathmandu, Nepal

* aziz.ali@akdn.org

Approximately 70-85% of Afghanistan's territory is used as rangelands. The rangelands in the Central Highlands of Afghanistan form the major summer pastures for a great number of livestock and are thus crucial for country's farming system, which is based on a combination of sedentary farming and migratory livestock keeping. They are the source areas for some of the major rivers in the region, including the Amu, Kabul, and Helmand rivers. In addition, the highland rangelands are key habitats for Afghanistan's rich biodiversity.

Owing to their crucial importance for the farming system of the country, as well as other historical and contemporary reasons, the rangelands have often been the site of ethnic and communal conflicts. Converting the rangelands into areas for rainfed crop cultivation decreases rangeland availability and reduces pasture connectivity, which creates both ecological and social problems. At the same time, rising temperatures mean that high pastures are now used some 10-20 days per year more than in the past, resulting in greater pressure on the rangeland ecosystem.

Strategies and actions for sustainable management of the highland rangeland resources of Afghanistan should focus on creating an enabling policy environment for community-based management, promoting sustainable rainfed cultivation practices, intensifying fodder production, diversifying rural energy options, enhancing climate change adaptation, assessing and monitoring rangeland resources, and strengthening transboundary conservation initiatives.

Keywords: biodiversity; central highlands; climate change; farming systems; rainfed cultivation; rangelands

Introduction

Regardless of the different and sometimes contradictory definitions of the term 'rangeland', and different assessment of the extent of distribution, rangelands clearly occupy the single largest proportion of Afghanistan's land. Around 45% of Afghanistan's total area of approximately 650,000 km² is classified as rangeland, compared to 12% of arable land and 2% of forest (AIMS and FAO 2003). Moreover, large areas classified as 'barren land' or

'waste land' are also used for opportunistic grazing, particularly in winter or in years with high precipitation. The total area used for extensive grazing is estimated to be between 70% and 85% of the total land area.

The primary and direct use of these rangelands is for livestock grazing. In Afghanistan, livestock are mainly managed through three basic systems: sedentary, settled transhumance, and nomadic pastoral (Fitzherbert 2006). Livestock raising based on the extensive use of the rangeland resources is an essential component of the local farming system and a livelihood strategy for over 80% of Afghanistan's households. It is estimated that there are around 1.5 million Kuchis, or nomadic pastoralists, in Afghanistan, who depend entirely on mobile livestock raising for their livelihood. According to the latest survey conducted in 2002/03 (FAO 2003), the country has 3.72 million cattle, 8.77 million sheep, 7.28 million goats, 1.59 million donkeys, 0.18 million camels, 0.14 million horses, and 12.6 million poultry. However, the livestock numbers are highly variable due to the frequent occurrence of drought, especially in recent years.

Besides providing fodder for livestock, Afghanistan's rangelands are also an important or sole supplier of some critically important ecosystem goods and services. They provide fuelwood and medicinal plants for people; habitat for wildlife and pastoral culture; preserve soil and water; and help regulate the climate. This multiple functionality of rangelands is gaining increasing recognition by the users. Proper management of the rangeland resources in Afghanistan will be critically important for sustainable development, improving the overall quality of life, and ensuring food security.

This paper discusses the highland rangelands of Afghanistan, focusing on their social, economic, and environmental roles, the major issues and challenges for management and sustainable use, and the priority areas for management and future research.

Highland Rangelands of Afghanistan

Afghanistan has a very diverse terrain, which extends from the deserts of the Kandahar region through the western-southwestern lowlands to the Turkestan plains in the north, and through the lower central mountains and high mountains in the northeast. The Hindu Kush and its subsidiary ranges divide Afghanistan into three distinct geographical areas: the Central Highlands, the Northern Plains, and the Southwest Plateau. Approximately 80% of the country is either mountainous or desert. The altitude ranges from about 470 masl along the southwest border with Iran, to over 6,000 masl in the eastern mountains. Most of the country lies between 600 and 3,000 masl.

The Central Highlands of Afghanistan, which include the main Hindu Kush range, is an extension of the Himalayan mountain chain. This area of about 414,000 km² is a region of deep, narrow valleys and lofty mountains, with some peaks above 6,400 masl. The area extends from Uruzgan, Ghazni, and Ghor, through Bamyan and Samangan, to Takhar and

Badakhshan, ending in Little Pamir. It contains most of the highland rangelands, the 225,000 km² of summer pasture. Within the region, the valley bottoms are usually used for cereal and horticultural production and human settlements, and the mountains, as well as high-elevation plateaus, as pasture. These pastures are used by both local communities and nomadic pastoralists (Kuchies) from afar. The major highland pastures include the Nawur pasture in northern Ghazni and the Shiwa pasture and Little Pamir in Badakhshan. Nawur pasture is an area of around 600 km² in northern Ghazni with an elevation up to 3,350 masl. Shewa pasture lies in northeast Badakhshan and is a major destination for summer migration of animals from Kunduz, Takhar, Baghlan, and Badakhshan, herded by Arab, Pashtun, Tajik, and Uzbek shepherds, as well as being used by local communities. Little Pamir pasture lies above 4,000 masl and is used exclusively by Afghan Kirgiz communities who raise fat tailed sheep, goats, and yaks.

The vegetation types depend on the annual precipitation and altitude, which increase from central to northeast Afghanistan. According to Freitag (1971), the potential natural vegetation in the highland rangeland areas comprises the following types: (1) thorny cushions, sub-alpine and alpine semi-deserts, and meadows; (2) steppe and semi-desert vegetation; (3) pistachio woodlands; (4) dwarf *Amygdalus*- semi-desert; (5) sub-nival vegetation; and (6) azonal vegetation (saline flats). Most of these vegetation types have been heavily impacted by human activities such as grazing, agriculture, and irrigation as well as deforestation. It is believed that much of the *Artemisia* steppe of the central highlands was originally a grass steppe which has been converted to *Artemisia* steppe by centuries of heavy grazing. Many original vegetation types are left only in a few spots in remote places and they have been replaced by substitute associations poorer in shape, diversity, and productivity. The soils are often degraded, eroded, or totally exposed.

The floristic composition and the state of the grazing lands of Afghanistan are not well documented and there is little or no up-to-date information. In general, the western part of the Central Highlands is drier and *Artemisia* steppe is by far the predominant grazing vegetation, while grasses and sedges increase in the northeast. For example, the most common rangeland type in the central Bamiyan region is *Artemisia-Acantholimon* steppe, with major species including *Artemisia* spp., *Acantholimon* spp., *Astragalus* spp., *Festuca* spp., *Stipa* spp., *Poa*, and many others. In the Wakhan Corridor to the northeast, the most dominant rangeland plant communities are alpine grasslands, sedge meadows, and *Artemisia* steppe, with major species including *Carex* spp., *Bromus* spp., *Kobresia* spp., *Astragalus* spp., *Oxytropis* spp., and *Elymus* spp. The species diversity is much higher in the northeast.

Highland Significance of Highland Rangelands

The high-altitude rangelands of Afghanistan provide a wide range of ecosystem services, the importance of which extends far beyond their geographical boundaries. They are critical resources for the country's socioeconomic development, habitats for biodiversity conservation, sources of water, and corridors for cultural exchange.

Supporting the Afghanistan farming system and rural livelihoods

Afghanistan's farming system is characterized by a mixed farming system with close coupling between crop cultivation on irrigated or rainfed land and a pastoral component, which relies on extensive use of rangeland resources at different elevations. Highland rangelands are the major grazing resources in the summer months, not only for those who live in immediate proximity but also for communities outside the Central Highlands. The fodder resources of the highland rangelands are essential for sustaining livestock management, which is an important undertaking for more than 85% of Afghanistan's nearly 30 million people. Problems with these resources that affect livestock management would affect crop production in the lowland areas and the whole livelihood system, especially the food security of rural communities. Thus the quantity and quality of fodder on the highland pastures, which is often dictated by the precarious rainfall, has a great bearing on the overall socioeconomic situation of the country. Furthermore, around 1.5 million Kuchis (nomadic pastoralists) in Afghanistan depend entirely on the alpine pastures in central and northeast Afghanistan to complete their annual migration cycle and ensure their subsistence (Kreutzmann 2011).

Sources of water for the region

Afghanistan's high-altitude rangelands are mostly found within the Central Highlands, which is the meeting place for all five of the country's major river basins, namely the Amu Darya, Northern, Harirud-Murghab, Helmand, and Kabul-Eastern basins. About 80% of Afghanistan's water resources originate in the Hindu Kush Mountains at altitudes above 2,000 masl. Amu Darya is the largest river in Central Asia region that originates in the highlands of Afghanistan and flow all the way through Afghanistan, Tajikistan, Turkmenistan, Uzbekistan, and Kazakhstan to the Aral Sea. The Kabul river is a major tributary of the Indus. A big natural challenge facing Afghanistan is its uneven distribution of water resources in both temporal and spatial terms. The climate is desert, and Mediterranean types, with a very long dry season from May to October and a cold rainy season from November to April. The rainy season of Afghanistan falls in the winter season and does not coincide with the agriculturally active season. Agriculture is totally dependent on irrigation. The capacity of the highland rangelands to conserve water is thus essential for the continuous water supply to downstream areas during the dry season and the loss of such capacity of the rangelands due to degradation could have grave consequences on the food security of not only Afghanistan but the whole region.

Important habitat for biodiversity

The highland rangelands are the major habitats for Afghanistan's rich biodiversity. Afghanistan is one of the most significant centres of origin of domestic plants and animals, as evidenced by the numerous local landraces of wheat, other crops, nine local breeds of sheep, eight of cattle, and seven of goats. The principal plant species whose wild ancestors are still found in Afghanistan are the pistachio (*Pistacia vera*, *P. khinjuk*), pear (*Pyrus* spp.), apple (*Malus* spp.), plum (*Prunus* spp.), almond (*Prunus dulcis*), and cereals (e.g., *Triticum*) (Saidajan 2012).

Afghanistan has some 3,500 to 4,000 indigenous species of vascular plants of which 20% to 30% are endemic (about 700-1,200 species) (UNEP 2008). In a rapid survey, Bedunah and his team (Wildlife Conservation Society 2010) recorded more than 600 plant species in the alpine rangelands of the Wakhan Corridor. Many of the larger mammals in Afghanistan are categorized by the International Union for Conservation of Nature (IUCN) as globally threatened (UNEP 2003). These include the snow leopard (*Uncia uncia*), wild goat (*Capra aegagrus*), markhor goat (*Capra falconeri*), Marco Polo sheep (*Ovis ammon polii*), urial (*Ovis orientalis*), and Asiatic black bear (*Ursus thibetanus*). Other significant mammals include ibex (*Capra ibex*), wolf (*Canis lupus*), red fox (*Vulpes vulpes*), golden jackal (*Canis aureus*), caracal (*Caracal caracal*), manul or Pallas's cat (*Otocolobus manul*), striped hyena (*Hyaena hyaena*), rhesus macaque (*Macaca mulatta*), and brown bear (*Ursus arctos*). The highland rangelands provide the habitat for all of these species.

Many important landscapes, national parks, protected areas, and wetlands are located in the highland rangeland area, notably the Wakhan Corridor, Bamiyan National Heritage Park, Pamir-i-Buzurg Wildlife Reserve, Band-e-Amir Lake, and Shewa Lake.

Sociocultural Significance

Afghanistan's highland rangelands are the homelands of Kirgyzs, Wakhi, Tajiks, Hazaras, Uzbeks, Pashtuns, and many other ethnic groups. This cultural diversity is clearly reflected in language, religious beliefs, costumes, food customs, and indigenous knowledge about the environment. The highland rangelands are also a venue for cultural exchange between local inhabitants and nomadic pastoralists from the lowland areas. Maintaining the quality of the highland rangeland resources with sustainable utilization is crucial for preserving local cultures. Historically, the highland rangelands have been an important corridor for exchange between eastern and western civilizations. The Ancient Silk Route linking China and Europe passes through all the highland rangeland areas from Pamir and the Wakhan Corridor in the northeast, to the Bamyán Plateau in the centre of the country. The scale and grandeur of the Buddhist site at Bamyán and the countless historical sites in the region testify to the glory and prosperity of the civilizations once supported by the highland rangeland ecosystem.

A less discussed but very important dimension of Afghanistan's highland rangelands resources is their role in domestic and regional politics. The highland rangelands are key to supporting the country's overall economic system and rural livelihoods, and they have frequently become a bone of contention between different users, which easily develops into ethnic conflicts. The conversion of highland pastures by local communities into rainfed cropland result in a decrease in available pasture and/or blocking of the migration routes of nomadic pastoralists. Conflict between local sedentary communities and nomadic herders over the use of highland pastures has been common in all the major pastures in the country (Kreutzmann 2011; Wily 2004). The rangelands of the purely pastoral Little Pamir area are the sole resources for Kirgыз communities, and the stability of these communities can have cross-boundary consequences in Tajikistan, Pakistan, and China.

Major Issues and Challenges

Owing to the overwhelmingly important role of rangelands in the socioeconomic development of Afghanistan, issues and challenges related to their status have been discussed intensively in a wide range of documents from very different perspectives and disciplines. This section highlights the major issues specific to the highland rangeland resources.

Conflicts over land tenure

Highland rangelands are the most contested resources in Afghanistan (Patterson 2004; Wily 2004; Kreutzmann 2011). The conflict is multidimensional and often involves people from different ethnic groups. Thus conflicts over rangeland use can develop into ethnic conflicts. In the late 19th century, many highland rangelands were taken forcefully from local inhabitants by the then king of Afghanistan and given to Pashtun pastoralists. This sowed the seed of conflicts between local sedentary communities and nomadic pastoralists which have lasted until today. The lack of any coherent legislation on land rights also generates conflicts between nomads and sedentary farmers, especially related to conflicts of interest between winter grazing and crop cultivation. In some cases, the conflict is between the government, often represented by powerful groups, and local communities, since there is no clear distinction between 'government-land' and 'land owned by the public but under the care of the government'. This facilitates the taking away of common resources from a community by those in power. Conflicts also arise from those who want to convert traditional rangeland into cropland and those who want to keep it as rangeland.

Conversion of rangelands into farmland

Conversion of rangelands into rainfed farmland either for fodder or other production purposes is common across the whole of Afghanistan. This practice has caused a visible decrease in available rangeland area and disturbance to routes of animal migration and is bringing about serious erosion problems. Since rangelands are common resources in Afghanistan, and cultivated land is often privately owned, converting rangelands into farmland is actually converting commons into private land. This land seizure is often done by influential and wealthy families at the cost of the poor.

Overexploitation of rangeland resources

Due to the arid to semi-arid nature of Afghanistan, most of the rangelands have very low and highly variable fodder productivity ranging between 0.4 and 0.8 tonnes/hectare in years with good rainfall (Bedunah 2006). Many studies suggest that in most of Afghanistan, the productivity of the rangelands is so low that an average ewe would need at least 1 ha of all-rangelands and 16.4 ha of one-season rangeland. The number of livestock has fluctuated over the years, but even at its lowest, the number of animals is still very high compared to the total fodder production from the natural rangelands. In 2003, Afghanistan had roughly 44.2 million sheep equivalent livestock units (FAO 2003), well-exceeding the carrying capacity of the rangelands. As a result, most of the rangelands are overused.

Fuel shortage is a critical issue in rural areas of the country. The increasing demand for energy arising from the growing population has created increasing pressure on traditional rural energy sources, particularly on fuelwood and rangeland shrubs. Because of the long winters and cold climate, people need large amounts of fuelwood for survival. The tremendous demand on fuelwood has created serious pressure on the rangelands.

Climate change

Afghanistan is extremely vulnerable to climate change. The temperature in the country has increased by an average of 0.13°C per decade since the 1960s, higher than the world average, and precipitation has decreased by 2% per decade. The number of incidences of rain has decreased by 4-8 times per month during the rainy season. Over the last 10 years, summers in the alpine regions have become longer and winters shorter. Fruit trees now begin flowering 10-12 days earlier on average than in the past, and the fruit ripening time has advanced accordingly. Visible changes have also been seen in the flora and fauna of the high pastures. It is projected that Afghanistan will experience an average temperature increase of 2.0 to 6.2°C by the 2090s (also significantly higher than the global average), and that warming will be most rapid in spring and summer. It is also predicted that in general Afghanistan will become even drier in the 2090s mainly due to a decrease in spring rainfall.

Climate changes, especially rising temperatures and more erratic precipitation, have been felt by the pastoralists and are affecting their livelihood strategies. The increasing frequency of droughts and floods has caused great losses of life and property. Local communities have adapted to these changes, either passively or proactively, by changing the temporal and spatial pattern of seasonal migration, introducing drought-resistant crops or animal varieties, and turning to alternative income-generating activities. However, the adaptive capacity of the pastoral communities to deal with change is severely limited by multiple factors including insufficient information, low economic capacity, lack of modern technologies for farming and livestock management, lack of a risk management system, heavy dependence on rainfed cultivation, and direct use of natural resources.

In general, there is a lack of data on almost every aspect of rangeland management in the area, including climate, soil, vegetation, rangeland resource volume and distribution, and socioeconomics.

Strategies for Management

Creating an enabling policy environment for sustainable use

Many issues related to rangeland management in Afghanistan can be traced to the lack of an enabling policy environment for sustainable rangeland use. Following the disintegration of traditional institutional arrangements due to decades of war, new policies and laws are needed to redefine and clarify the rights of access to the rangeland resources by different users, especially those of the nomadic pastoralists, and to encourage community-based

management. Due to the non-equilibrium nature of the rangeland ecosystem in Afghanistan, it is important that local communities be given the right to own the resources and make decisions on their management so as to cope with uncertainties and increase their incentives for management input and sustainable use.

Promoting sustainable rainfed cultivation practices

If it cannot be stopped, cultivation of rainfed land should be made more sustainable and less damaging to the environment, by introducing non-tillage technologies, perennial crops (e.g., fodder species and cash crops) to replace annual plants, and adopting contour-planting practices. The yield of the current rainfed crops is very low and can be increased by introducing better crop varieties and methods of cultivation. There is also a need to develop locally appropriate models for rangeland rehabilitation. Such models need to take into account both the short-term and long-term interests of the farmers while reconciling ecological and economic efficiencies, for example through the integrated use of fodder plants, short-lived cash crops, and fodder-fuelwood (shrub) and fruit tree models. In terms of revegetation, it is important to remember that tree planting is not always the best choice, especially for highly-degraded south-facing slopes in an arid environment where the temperature is high and soil moisture very low. In such places, it is more realistic to start with grasses or shrubs and; tree planting may be possible after the microenvironment improves.

Intensifying fodder production and developing rural energy

As outlined above, human demand for fodder and fuelwood from the rangelands greatly exceeds the productive capacity. Reducing pressure on the already degraded natural pastures is imperative for the recovery and health of the rangeland ecosystem. Wherever possible, fodder cultivation should be encouraged using drought resistant species (e.g., wild alfalfa). The demand for fuelwood in the target area is huge, and there is considerable potential to meet part of this demand by developing and diversifying rural energy (fuelwood forests and shrubland, smokeless and energy efficient stoves, solar energy) and improving energy efficiency in the local communities. Multipurpose forestry that provides fuelwood, timber, soil and water conservation, bank stabilization, and wind barriers could also have a good potential.

Enhancing climate change adaptation

Afghanistan is very susceptible to climate change. Drought has become much more frequent over the past 20 years and it is believed that drought will become the norm by 2020. Due to the rising temperature, pastoralists are going to the highland pastures much earlier than in the past (Yi et al. 2012), which is likely to have a marked impact on the rangeland ecosystem. Efforts are needed to help local communities develop strategies to cope with the negative impacts of climate change and exploit the opportunities.

Monitoring highland rangeland ecosystems

A nationwide survey of rangeland conditions is needed to establish a baseline condition for the highland rangelands that can be used as a basis for management decisions and to monitor future trends. The study and exploration of the Afghan flora and vegetation started in the middle of the 19th century when some botanists such as Moorcroft and Griffith came to Afghanistan with the British military troops. Since then, a lot of studies have been carried out in Afghanistan till the conflicts started (Breckle 2007). In 1963, Rechinger published the first fascicle of *Flora Iranica* which also covered Afghanistan (Breckle et al. 2010). The most recent systematic study of Afghanistan vegetation was conducted in the 1970s (Freitag 1971) and no longer reflects the reality. The times of war made it impossible for ecological researches and monitoring in Afghanistan. With the downfall of Taliban and unfolding reconstruction of Afghanistan, scholars again turned their interest in Afghanistan flora and fauna. In 2010, a field guide to flora and vegetation of Afghanistan was published by Breckle et al. (2010) that brings together the results of several decades of botanical research in Afghanistan by several renowned international scholars. In the past decade, many isolated studies have been carried out by different organizations for conservation or development purposes. However, the lack of unified sampling methods or spatial and temporal coverage makes it difficult to generate an overall picture. What is more, for a specific network of monitoring is needed to collect timely information on rangelands for proper management.

Strengthening transboundary conservation initiatives

The area from the Wakhan Corridor up to the Little Pamir has a unique biodiversity from species to landscape level. It is the habitat of many endangered wildlife species such as the snow leopard, Marco Polo sheep, urial, and brown bear. The natural habitat of these unique and important wildlife species spreads across the geographical boundaries of four countries, thus protection of the natural habitat to ensure transboundary conservation requires close collaboration and cooperation among Afghanistan, China, Pakistan, and Tajikistan.

References

- Afghanistan Information Management Service (AIMS) and FAO (2003). 'Land cover of Afghanistan' (available at <http://www.fao.org> and at <http://www.aims.org.af>)
- Bedunah, DJ (2006) *An Analysis of Afghanistan's Rangeland and Management Issues for the Development of Policy and Strategies for Sustainable Management*. Chemonics International, Inc., Washington DC, p80
- Breckle, SW (2007) 'Flora and Vegetation of Afghanistan'. *Basic and Applied Dryland Research* 1: 155-194
- Breckle, SW; Dittmann, A; Rafiqpoor, AD (2010) *Field Guide Afghanistan-Flora and Vegetation*. Bonn: Scientia Bonnensis
- FAO (2003) Afghanistan National Livestock Census (Interim Report)
- Fizherbert, A (2006) *Water Management, Livestock and the Opium Economy (Livestock Husbandry)*. Kabul: Afghan Research and Evaluation Unit
- Freitag, H (1971) 'Studies on the Natural vegetation of Afghanistan'. In Davis, PH; Harper, PC; Hedge, IC (eds) *Plant Life of Southwest Asia*. Edinburgh pp89-106

- Kreutzmann, H; Schutte, S (2011) 'Contested Commons-Multiple Insecurities of Pastoralists in North-Eastern Afghanistan'. *Erdkunde* 65(2): 99–119
- Patterson, M (2004) *The Shiwa Pastures, 1978-2003: Land Tenure Changes and Conflict in Northeastern Badakhshan*. Afghanistan Research and Evaluation Unit, Kabul
- Saidajan, A (2012) 'Effects of War on Biodiversity and Sustainable Agricultural Development in Afghanistan'. *Journal of Developments in Sustainable Agriculture* 7: 9–13
- UNEP (2003) 'Afghanistan Post-Conflict Environmental Assessment'. United Nations Environmental Programme, Nairobi, Kenya. <http://www.unep.org>
- UNEP (2008) 'Biodiversity Profile of Afghanistan'. United Nations Environmental Programme, Kabul, Afghanistan. <http://www.unep.org>
- Wildlife Conservation Society (2010) *Rangeland Assessment in Wakhan*.
- Wily, LA (2004) *Looking for Peace on the Pastures: Rural land Relations in Afghanistan*. Kabul: Afghanistan Research and Evaluation Unit
- Yi, SL; Ismail, M; Yan, ZL (2012) 'Pastoral communities' perspectives on climate change and their adaptation strategies in HKH Region'. In Kreutzmann (ed) *Pastoral Practice in High Asia*. Dordrecht, Germany: Springer, pp307–322