Status of Rangelands and Rangeland Development in Pakistan

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INTRODUCTION

Pakistan is located between 24° and 37° north latitude and 61° and 75° east longitude, with a total land area of 87.98 million hectares. The country's diversified relief is rich in agricultural potential given its extensive canal irrigation system. In the southwest of the country, summer temperatures may soar to 45°C, while temperatures are often below freezing in the northern parts of the country. Precipitation also varies from about 100 to more than 1,500mm. Most of the country is classified by arid or semi-arid ecology.

The northwest, west, and southwest of the country are comprised of the large, fertile Indus Plains. The north includes the Karakoram and Himalayan mountain systems, as well as the Hindu Kush, and is one of the most significant mountainous tracts in the world. The unique Karakoram mountains host many glaciers and moraines and contain 100 peaks over 5,400 metres, including K2 (8,563m), the second highest mountain in the world. These mountains form a physical barrier between Pakistan and China, in the north, and Afghanistan and Iran in the southeast. They are also a barrier against westward penetration of the south-easterly monsoon and eastward movement of the northwesternly winds from Central Asia (Sheikh 1986).

The Indus Valley, like the Nile, Euphrates, and Tigris, was home to one of the world's first civilizations. Its fertile soil, plentiful water supply for irrigation, flat lands, and a dry climate creates little erosion and is ideal for cultivation. These hospitable ecological conditions led to a rise in the human population, resulting in deforestation throughout the Hindu Kush and Himalayas. Floods and siltation have also increased. These changes have, subsequently, negatively affected the overall economy and standard of living in the region (Rafi 1966).

STATUS OF RANGELANDS

Types of Rangelands in Pakistan

Five types of rangeland — Alpine pastures, sub-alpine pastures, temperate rangelands, foothill rangelands, and arid rangelands — are found in Pakistan. Alpine pastures are located between 3,500 and 5,200 metres and include continuous meadows that bear grasses, herbs, and forbs. Some bushy vegetation, including *Juniperus* sp, *Salix* sp, and *Betula* sp, can also be found in these areas. The grasses, forbs, and herbs include *Agropyron* sp, *Poa* sp, *Festuca* sp, *Artemisia martimia, Digitaria decumbans, Trifolium repens,* and *Thymus serpyllum*.

Sub-Alpine grazing lands range from 2,500 to 3,000 metres. In these areas, pastures

are located within forests on either moderately level ground or steep slopes. These sub-Alpine grasslands are used during seasonal migration from lower valleys to Alpine pastures in early summer and fall. The rangelands extend from high elevation Alpine pastures in the north to fertile fields in the south (Mushtaq 1989). Common species found include: *Chrysopogon aucheri, Agropyrum* sp, *Potentilla sabaldi, Trifolium repens, Setaria pertusa,* and *Bothriochloa* sp. The introduction of potatoes as a cash crop in the Kalam Valley has considerably reduced the overall area of this pastureland.

Temperate rangelands occur between 1,300 and 3,500 metres. These potential forest lands have degenerated into grassland due to biotic interference. During summer, luxuriant grasses grow in these areas because of monsoon rainfall. The most common temperate grasses are: *Eragrostis* sp, *Aristida* sp, *Chrysopogon montanus, Heteropogon contortus, and Dicanthium annulatum.*

Foothill rangelands include areas below 1,300 metres. In these regions, pastures have been extensively grazed and carrying capacity has declined. These areas are now being converted to agricultural lands. The common grasses found in these pastures are *Desmostachya bipinnata, Saccharum spontaneum, Eulaliopsis binata, and Themeda anathera.*

Arid Rangelands

Arid rangelands are located in Punjab, Sindh, Balochistan, and the North West Frontier Province (NWFP). Shifting cultivation, unregulated grazing, and exploitation of woody vegetation for fuel have lead to increased wind erosion of sand in arid and semi-arid areas. Drifting sand disrupts communication lines, ports, and housing, particularly in Balochistan's Chagai-Kharan districts and on the Makran coast. Afforestation efforts, such as the introduction of mesquite, have been highly effective in counteracting these problems. Large areas can now be effectively treated to prevent further erosion.

Sindh's main rangeland areas are in the sandy Tharparkar region and the non-sandy Kohistan foothills, the latter supporting migratory livestock herds that descend from the Balochistan plateau during winter. The Forest Department has jurisdiction over 490,000 hectares of rangeland, distributed between Kohistan, Thar (Registan), and Nara. Most of this is in scattered desert areas, except for one large sub-mountainous block in Kohistan that includes part of Kirthar National Park. The Forest Department and the Sindh Arid Zone Development Authority (SAZDA) are the main agencies monitoring range management, while research is being carried out by the Pakistan Agricultural Research Council (PARC) and the Arid Zone Research Institute (AZRI).

In Punjab, rangelands cover 2.8 million hectares. Range management policies were introduced by the Forest Department in the 1960s under piecemeal development schemes. Work included reseeding small patches; constructing water ponds, wells and other water retaining devices; and small-scale tree and shrub plantations.

Some of the common species of these rangelands include: *Acacia arabica, Aerva tomentosa, Alhagi camelorum, Albizzia lebbeck, Aristida depressa, Calligonum polygonoides, Leptadenia spartium, Prosopis spicigera, and Salvadora oleoides.* The following species should be introduced for rangeland improvement: *Tamarix*

aphylla, Zizyphus nummularia, Lasiurus hirsutus, Capparis aphylla, Cenchrus ciliaris, Azadirachta indica, and Melia azedarach (Khan 1982).

Alpine Pastures in Kohistan (Dir, Swat, Kaghan Valley, Chitral and Northern Areas)

The Kohistan area is located between 3,500 and 5,500 metres. Rangelands extend over large areas of this land. When snow begins to melt in May, nomads who have spent the winter at lower elevations begin to travel north with their animal herds. These nomads, or *Gujar*(s) as they are locally called, give cheese, butter, or goats, to the tribal *Malik*(s) of these areas in payment for using their grasslands. Sometimes a fee (*qalang*) is levied by tribal heads for access to pasture.

The Alpine pastures in Kohistan include the following species: *Juniperus communis, Saxifraga ligulata, Hyoseyamus niger, Rumexhastatus, Betula utilis, Linum perenne, Chenopodium botrys, Silene moorcroftiana, Lotus corniculatus, Verbascum thapsus, Artemisia scoparia,* and *Linaria lanceolata,* as well as some tree species (*Ulmus wallichiana, Acer caesium, Quercus* spp). All of these species must be conserved. However, heavy grazing beyond carrying capacity has resulted in pasture deterioration. Unpalatable species are invading such areas. Soil erosion has also expanded. These areas should be rotationally grazed and the following species should be introduced to such areas: *Agropyron canaliculatum, Triticum schrenkianum, Agrostis canina, Bromus japonicus, Cenchrus eiliaris, Calamagrostis pseudophragmites* (Khan 1979). Some shrubs, such as *Salix* spp and *Rosa* spp, and Forbs, such as *Polygonum alpinum, Potentilla* spp, *Tamarix officinalis, Astragalus* spp, *Thymus* spp, *Geranium* spp, *Plantago* spp, *Saxifraga* spp, *Galium* spp, *Trifolium* spp, and *Vicia* spp, should also be introduced.

Pasture Utilisation in the Himalayan and Hindu Kush Region

Pakistan's provincial forest departments administer 6.4 million hectares of extensive range throughout the country. Over 60 per cent of the total land area of Pakistan is suitable for range management and plays a vital role in the country's economy (Table 1). Over 50 million hectares of land is classified as range, of which 18.5 million hectares are considered to be productive. Livestock rearing provides 28 per cent of the GNP and more than 75 per cent of the draught power for farm operations. Pakistan is home to more than 92 million head of livestock (54 million animal units), a number that is increasing by about one per cent each year. Goats and sheep are the most abundant domestic animals.

Table 1: Rangeland Distribution by Province (in '000 ha)

Province	All Rangelands	Range under forest control	% under Forest Dept. control
A.K.	600	195	32.5
Balochistan	27,400	787	2.9
Northern Areas	2,100	2,014	95.9
NWFP	6,100	150	2.4
Punjab	8,200	2,722	33.2
Sindh	7,800	490	6.3
Total	52,200	6,358	173.2

FSMP Report 1991

Rangeland degradation has severely limited productivity, specificially in Balochistan and in the Himalayan highlands. Presently, more than 60 per cent of all rangelands produce less than one-third of their poten-

tial. Over-stocking has damaged vegetation cover, which has, in turn, led to wind and water erosion and desertification — changes that are usually difficult to control. The effects of this mismanagement of rangeland resources have begun to show. Nearly half of the rangelands throughout Pakistan's Himalayan range are now gullies, unfit for any use. Hill slopes have generally lost their shallow mantle of soil, exposing infertile mountainous ranges.

The upland forests and rangelands of Pakistan have become severely depleted of many useful 'palatable species'. The principal problems which influence the depletion of Alpine grasslands are government agency, land administration methods and overgrazing. Although most high Alpine grasslands are controlled by provincial forest departments, these agencies do not have the interest, funds, or technical ability to manage these grasslands. Nature conservation, watershed, and commercial management issues are ignored.

In practical terms, local land owners have taken over control of these pastures, leasing out grazing and forest lands. Nomadic tribes with large flocks of domestic stock move into these areas as soon as the spring snow melts and remain there all summer, descending to lower pastures in autumn. This constant grazing pressure is leading to extreme resource depletion. Palatable herbs and grasses are becoming extinct and vegetation cover on highly erodible slopes continues to diminish (Wilkinson and Khan 1991).

As such, two conservation issues emerge. First, grazing royalties should be collected according to a specific range's carrying capacity. Currently, the number of animals on these ranges is unlimited. Second, in order to introduce land ownership concepts to local herders, appropriate technicians should be hired to explain management methods such as those being used in projects such as the Swiss/Pak Kalam Integrated Development Project in the upper Swat Valley, the Malakand Social Forestry Project in Dir and Swat, and the Aga Khan Rural Support Programme (AKRSP) in Gilgit and Chitral. These projects have illustrated that, in many cases, grasses regenerate above 3,000m within three years if grazing is controlled.

RECOMMENDATIONS

Range Management Agency

An independent agency responsible for managing and developing rangelands, as well as devising and implementing sound federal and provincial range policy, should be established (Khan 1972). Range management experts should also be given incentives to carry out their work, as technical expertise is in short supply.

Concept of Social Range Management

The Forest Department has tried to implement improvement activities without consulting range users. The concept of 'Social Range Management' has to be introduced and accepted much in the same way as the concept of 'Social Forestry'. Understanding herders' needs, encouraging their involvement in planning and decision-making, building trust, and encouraging herders to participate and benefit from programme interventions must be prioritised. Concomitantly, Forest Department field staff working on range management should be knowledgeable of elementary animal husbandry practices such as disease prevention.

Selection of Good Quality Animals

Local herders should be educated about the benefits of keeping quality animals in smaller numbers instead of overstocking their pastures with large numbers of unproductive herds. Suitable local and foreign breeds should also be made available for crossbreeding. Payment plans should be devised so the local people can afford to buy these improved breeds.

Grazing Associations

Range management is directly related to the interest and activities of the livestock owners. Their cooperation is essential for successful operation of such programmes. Therefore, grazing associations should be formed and given the responsibility for planning and implementing village-level range management projects.

Education and Training

Training in rangeland administration should be made available to government and non-government bodies. Similarly, training workshops should be provided for herders as a means of discussing issues and introducing services provided by the Forest Department and other line agencies.

Surveys and Analysis

Range surveys should be carried out to evaluate and properly classify area grasslands for sound range management planning. Range analysis should be systematically carried out on different sites in a variety of ranges. Permanent quadrat and line transects should be established. Periodically collected data would increase knowledge about the desirable palatable species and forage production. A livestock census, along with the collection of other needed data on range-dependent livestock should be carried out to ensure correct and scientific management of rangelands.

Links with Other Departments

Informal links with extension units of the Departments of Livestock and Agriculture should be established in order to determine joint approaches and provision of services. If forming these connections prove impossible, the Forest Department should recruit appropriate specialists to do the job. Connections should also be established with existing research and development agencies working on range management issues.

Fodder Banks

Fodder banks should be created for the production and distribution of seeds to farmers or user groups. Farmers should be encouraged to increase production of winter fodder on agricultural lands in order to enable herds to stay longer in the agricultural areas during spring, thereby giving upland ranges adequate time to regenerate.

Marketing

A livestock marketing system should be developed, possibly including market sites, distribution of market information, and the creation of marketing cooperatives. Livestock owners should be assisted in developing alternative sources of income in agriculture or other enterprises in order to decrease overall livestock numbers.

Reseeding Programme

Reseeding is an important range improvement operation and an effective tool to rehabilitate deteriorated rangelands. This specialised and useful operation should be car-

ried out indiscriminately with local and exotic species.

Drought Compensation

Drought, often experienced in semi-arid rangelands, is probably the most difficult problem faced by herders. Droughts are quite common in Thal, Cholsitan, the desert ranges of Punjab, Nara, Tharparkar, and the Kohistan ranges in Sind, as well as the western arid mountain rangelands of Balochsistan and the NWFP. Government action to mitigate the effects of droughts and reserve money for the distribution of subsidised Tacavi loans will help offset local losses from drought. Drought emergency funds should be allocated in advance of the disasters themselves (Khan 1972).

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