

Rangelands and Pastoral Production Characteristics

Rangeland Resources

Rangelands of the Himalayas and Tibetan Plateau are diverse in structure and composition, ranging from cold, steppe-like rangelands, dominated by species of *Stipa* grasses, to mountain desert shrublands with shrub genera such as *Ceratoides*, *Artemisia*, and *Ajania* found with a sparse cover of grasses, to alpine valleys in the Himalayas with a diverse floral arrangement, and to temperate conifer and deciduous forests where forest meadows provide valuable grazing for transhumant livestock herds.

Covering about 2.5 million square kilometres, the Tibetan plateau is one of the world's major rangeland ecosystems. With rangeland covering nearly 70 per cent of the total land area the Plateau is an important pastoral region and a valuable refuge for wildlife. Most of the area is above 3,000 metres and the climate is harsh with a short growing season. Precipitation varies from about 2,000mm annual rainfall in the southern Himalayan ranges to less than 50mm in the far northwestern parts of Tibet.

Vegetation on the Tibetan plateau has been broadly categorised into five major vegetation zones: (a) high-cold meadow in the east; (b) high-cold steppe in the

north; (c) xeric shrubland-steppe in the south; (d) montane desert in the west; and (e) high-cold desert in the northwest (Chang 1981). The structure of plant communities varies considerably throughout the plateau. Rangelands in the *chang tang*, or 'northern plains' of Tibet are dominated by grasses and sedges of the genera *Stipa*, *Carex* and *Kobresia*. Small forbs, especially of the genera *Potentilla* and *Oxytropis*, are important forage plants in *Stipa* rangelands (Miller 1990, Miller and Bedunah 1994). In mountain ranges and in eastern Tibet, *Kobresia* dominated sedge meadows are common.

In the Himalayan country of Nepal, approximately 12 per cent of the total land area is classified as grassland vegetation. These grasslands vary from Tibetan-like steppe in the trans-Himalayan region north of the main mountain ranges, to *Stipa* and *Danthonia* dominated alpine grasslands, to *Andropogon tristis* grasslands in the temperate zone, and subtropical grasslands associated with chir pine (*Pinus roxburghii*) savannahs (Miller 1986, 1987). Large areas of forest and shrubland are also used for grazing by livestock and I estimate that nearly one-third of the Himalayan land area can be considered grazing land. In this paper, grazing lands and rangelands are used interchangeably and refer to grasslands, shrublands, alpine meadows, and forest grazing areas.

Wildlife

The rangelands of the Himalayas and the Tibetan Plateau provide habitats for a unique assemblage of large wild ungulates (Schaller 1977). Although wildlife populations have been reduced throughout much of their range significant herds of wildlife are still found in western Tibet (Schaller and Gu 1994). In some areas, up to seven wild ungulate species coexist in the rangelands (Harris and Miller, in press). In Western Tibet, the Tibetan wild ass (*Equus kiang*) can be seen in herds of over 200 animals. Tibetan antelope (*Pantholops hodgsoni*), which migrate long distances to birthing grounds, still roam the northern plains of Tibet. Tibetan gazelle (*Procapra piticaudata*), probably the most graceful of all Tibetan wildlife, are common in the rangelands of the Tibetan plateau. Blue sheep (*Pseudois nayaur*), are found in many of the mountain ranges in Tibet and the Himalayas. Wild yaks (*Bos grunniens*), which weigh up to a ton and stand two metres at the shoulders are found in the more remote parts of Tibet. No other animal characterises the raw wildness of the Tibetan *Chang Tang* the way wild yaks do. There are an estimated 15,000 wild yaks left on the Tibetan plateau and wild yaks can still be found in large herds.

Other ungulates that inhabit the Tibetan rangelands are the Tibetan argali (*Ovis ammon*), red deer (*Cervus elaphus*), white-lipped deer (*Cervus albirostris*), musk

deer (*Moschus chrysogaster*), Himalayan tahr (*Hemitragus jemlahicus*), and takin (*Budocorcas takin*). In addition, mammals, such as brown bear (*Ursos arctos*), wolf (*Canis lupus*), snow leopard (*Panthera uncia*), leopard, lynx (*Lynx lynx*), fox (*Vulpes vulpes*), marmot (*Marmota bobak*), and pika (*Ochotona* spp.) are found as well as a variety of birds. The preservation of these wild animals and their habitat is essential for conserving biodiversity in the Himalayan and Tibetan rangelands. The future of wildlife will depend on development of proper management policies and programmes (Schaller and Gu 1994).

Pastoral Production Systems

Pastoralism in the Himalayas and on the Tibetan plateau has its own unique identity and is differentiated from the classic examples of nomadic pastoralism such as that found in Africa (Ekvall 1968). Here, altitude and temperatures are the major factors that separate grazing lands from arable lands, quite unlike the situation prevailing in the arid zones of Africa and Central Asia where availability of water is usually the key factor that determines land use. Pastoralists inhabiting the Tibetan Plateau depend primarily upon livestock for their livelihood as the region is generally too high for crop production, except for the eastern and southern regions of the Plateau and in the Himalayas -- here pastoralists have the possibility of complementing livestock production with crop production in the lower-elevation valleys. Pastoralists maintain milking and non-milking herds of yak (*Bos grunniens*), yak-cattle hybrids, sheep (*Ovis aries*), and goats (*Capra hirtus*) which are herded daily. Grazing takes place throughout the year and little forage is conserved as hay. Although the horse makes a minor contribution to the economy of pastoralists in the Himalayas and in Tibet, it does create attitudes and value judgements that are part of a horse-culture modal personality (Ekvall 1968).

Yaks characterise pastoralism on the Tibetan Plateau. Yaks provide milk, meat, fibre, and hides. They are also used as pack and draft animals and for riding. Yak dung is also the source of cooking fuel in most of Tibet. The hair of the yak is also woven into tents for nomads. It is doubtful if man could survive in Tibet without the yak (Miller 1986). Economically, sheep are probably the most important animal for pastoralists in much of the region. Tibetan sheep are renowned for their wool, which is in high demand in the carpet industry. A single nomad family in northern Tibet may keep 400-600 sheep. About 30-40 sheep will be slaughtered every year by a family for their own meat consumption. Pastoralists, especially in Western Tibet, also raise cashmere goats for their valuable fibre. The cashmere or shawl wool produced in Western Tibet has enjoyed a high reputation for centuries. Early British efforts to establish

trade with Tibet in the 18th century were based on their interest in exploiting the profits in the shawl wool trade.

Pastoralism in the Himalayas and in Tibet has evolved through long-term persistence under generally inhospitable conditions. It is unclear when yaks were first domesticated and animal husbandry became a major activity among early Tibetan tribes, but evidence suggests that herding has been common for at least 2,000 years in the northeastern part of the Tibetan Plateau. Pastoralism would certainly have been widespread during the 8th century, which marked the height of Tibetan expansion in Central Asia. In the Nepalese Himalayas, regions such as Dolpo have a recorded history going back to the 10th century A.D., suggesting that animal husbandry is at least 1,000 years old in parts of the Himalayas. Pastoralists throughout much of northern Nepal integrate animal husbandry with agriculture, and livestock provide much needed manure to maintain soil fertility.

Over the centuries, pastoralists have been successful in using multiple species and traditional rotational grazing systems to maintain the productivity of the range resources and to prevent overgrazing (Brower 1991, Ekvall 1968, Goldstein et al. 1990, Miller and Bedunah 1993). Pastoralists also employed opportunistic strategies (e.g., trading, raiding, and subsistence hunting) to complement herding and to survive in a harsh environment. Despite the long history and importance of this pastoral system, ecosystemic dynamics and pastoralist's production strategies are still poorly understood.

The fact that rangelands on the Tibetan Plateau have supported pastoral cultures for thousands of years while sustaining a unique wild ungulate fauna underlies the existence of a remarkably diverse and resilient rangeland ecosystem. The survival today of nomadic pastoralism in Tibet also provides proof of the rationality and efficacy of traditional Tibetan livestock production practices as a means of converting forage from cold, arid grasslands into useable animal products (Goldstein and Beal 1990, Miller and Jackson 1992).

Trade

Trans-Himalayan trade represented an essential element in the economy of many pastoralists in northern Nepal and, for some people, defined the structure of their herding operations as well. Various factors, such as ethnicity, religion, subsistence patterns, and environment, played key causal roles in the development of trading enterprises within each community. In some regions of

northern Nepal, it is still an important way of making a living in high altitude, agriculturally marginal areas (Levine 1988, Ross 1983).

For centuries, this trade linked Tibet, Nepal, and India and both the means of transport and the basic characteristics of this trade remained constant over long periods of time (von Furer-Haimendorf 1975). Trade was based on the exchange of grain from the hills of Nepal for salt in Tibet and the subsequent bartering of Tibetan salt for grain in Nepal again (Fisher 1987, Manzardo 1984). Political changes in Tibet in 1959 brought economic upheaval among pastoralists throughout northern Nepal, completely disrupting traditional trading patterns. These political events beyond the control of pastoralists had effects on the rangelands and livestock production systems as well. In 1959, large numbers of Tibetan pastoralists fled with their livestock into Nepal placing increased pressure on rangelands, which led to heavy grazing and decline in rangeland productivity. Nepalese pastoralists, who traditionally used grazing lands in Tibet during the winter, were denied access to Tibetan pastures, compounding grazing pressures on rangelands in northern Nepal.

Border restrictions with Tibet began to relax in the 1960s and trade was once again allowed, but on a more controlled basis. Improved road infrastructure in southern Nepal has made Indian salt more readily available, and there has been a gradual decline in profits from the salt-grain trade. People in some areas have been more successful in making adjustments than others. For instance, the *Sherpa* in Khumbu were able to capitalise on income-earning opportunities in the emerging mountaineering and trekking industry. Transformations in the livestock production systems and trade arrangements continue to take place today.