

Conserving Biological Diversity in the HKH-Tibetan Plateau Rangelands

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The Hindu Kush-Himalayan-Tibetan Plateau region, as elsewhere in the world, is experiencing a loss of species unprecedented in history. With each species lost, a part of the world's genetic heritage disappears. The innumerable species that make up the Hindu Kush-Himalayan-Tibetan Plateau's biological diversity construct an intricate life support system upon which humans rely.

These mountain rangelands and the biological resources found in them play a critical role in the region's overall economic development and people's well-being. Pastoralists rely directly on plants, water, animals and other natural resources found on the rangelands for their livelihoods. Other people, both those residing in rangeland environments and in adjacent areas, are also directly or indirectly dependent on rangeland resources. The conservation and management of the biological diversity of the Hindu Kush-Himalayan-Tibetan Plateau's rangelands is an essential element of sustainable mountain development.

Rangeland Biodiversity

Stretching for 3,500km from the desert mountain steppes of Afghanistan in the west to the lush, alpine meadows in Yunnan Province of China in the eastern Himalayas, the rangeland ecosystems of the Hindu

Kush-Himalayas-Tibetan Plateau encompass an enormous area, estimated to cover about three million square kilometres. Within such a vast region, rangelands differ considerably in plant community structure depending on altitude, climate, rainfall, soil, and the uses they have been subjected to by humans and their animals. Each different range type has its own unique assemblage of plants and animals.

Situated at the confluence of five major biogeographical subregions — the Mediterranean and Siberian of the Palaeoartic realm and the West Chinese, Indochinese, and Indian subregions of the Oriental realm — the rangeland ecosystems of the Hindu Kush-Himalayan-Tibetan Plateau are rich in biodiversity. In terms of plants, a number of floristic regions are found in the region and the percentage of endemics is large. In some rangelands, the floral diversity is very high. For example, in Alpine meadows of the central Himalayas of India and Nepal, it is not uncommon to find 30 plant species per square metre. These rangelands also possess remarkable resiliency. There are numerous examples where overgrazed ranges have recovered when just afforded some protection from grazing.

Rangelands also provide habitat for a wide variety of wildlife, especially ungulates, or

large grazing mammals. From the Oriental realm came ungulate species such as takin, musk deer, goral, and serow. From the Palaearctic realm in Tibet came the Tibetan antelope, Tibetan gazelle, blue sheep, Tibetan wild ass, and wild yak. From the Mediterranean realm we find ungulates such as urial, markhor, argali, ibex, and red deer. The Himalayan tahr, which probably evolved in India, also inhabits these rangelands. A number of other species from the Oriental realm, more characteristic of subtropical grasslands, can also be found in low elevation rangelands: black buck, nilgai, swamp deer, hog deer, chital, gaur, sambar and muntjac. These ungulate species, of course, share the rangelands with a host of other birds and mammals and a number of the ungulates are important prey species for large predators such as snow leopards, which are endangered.

When considering rangeland biodiversity, one usually thinks of flowering plants and wild animals, yet an important aspect of biological diversity is also the domestic livestock species that are found on rangelands. These animals have evolved over centuries and adapted to the wide range of environmental conditions found there. They exhibit numerous, unique adaptive traits and resistance to diseases, which has enabled man to exploit the rangeland resources.

The genetic diversity of the wild and domesticated plants and animals found on the rangelands is a valuable resource. All of the food that human beings consume comes from wild and domesticated species of plants and animals. The wildlife found on the Hindu Kush-Himalayan rangelands includes the wild relatives of domestic animals that have fundamentally changed human civilization. The genetic pool of species found on the rangelands may hold important keys for improving livestock, de-

veloping new crop varieties, curing disease, and numerous other benefits as yet undiscovered. Certain traits found in domestic livestock breeds may be beneficial in increasing productivity of improved livestock. Finally, much of the tourist industry in the Hindu Kush-Himalayan region is based, in part, on the attraction of the rangeland's wildlife and magnificent mountain landscapes.

Major Issues

Conservation of biological diversity in the rangelands of the Hindu Kush-Himalayas-Tibetan Plateau is confronted with a number of issues.

- First, one of the major issues is loss of wildlife habitat. Habitat loss and degradation have been especially severe in the lower elevation rangelands where human population pressure is the greatest. Much of the original rangeland ecosystem in the subtropical zone has been replaced by agriculture. Where rangelands are still found in subtropical areas, they have been so disturbed by humans and livestock that much of the original vegetation is gone.
- Second, with the loss and degradation of habitat, wildlife populations have also declined. The land simply cannot support wildlife any longer.
- Third, overexploitation of medicinal plants, especially in the Alpine regions, is eroding the biological diversity. Although good data are not available, it is widely believed that in many areas the harvesting of medicinal plants is no longer sustainable.
- Fourth, despite most wildlife being officially protected, illegal killing is still

widespread and greatly threatens remaining populations.

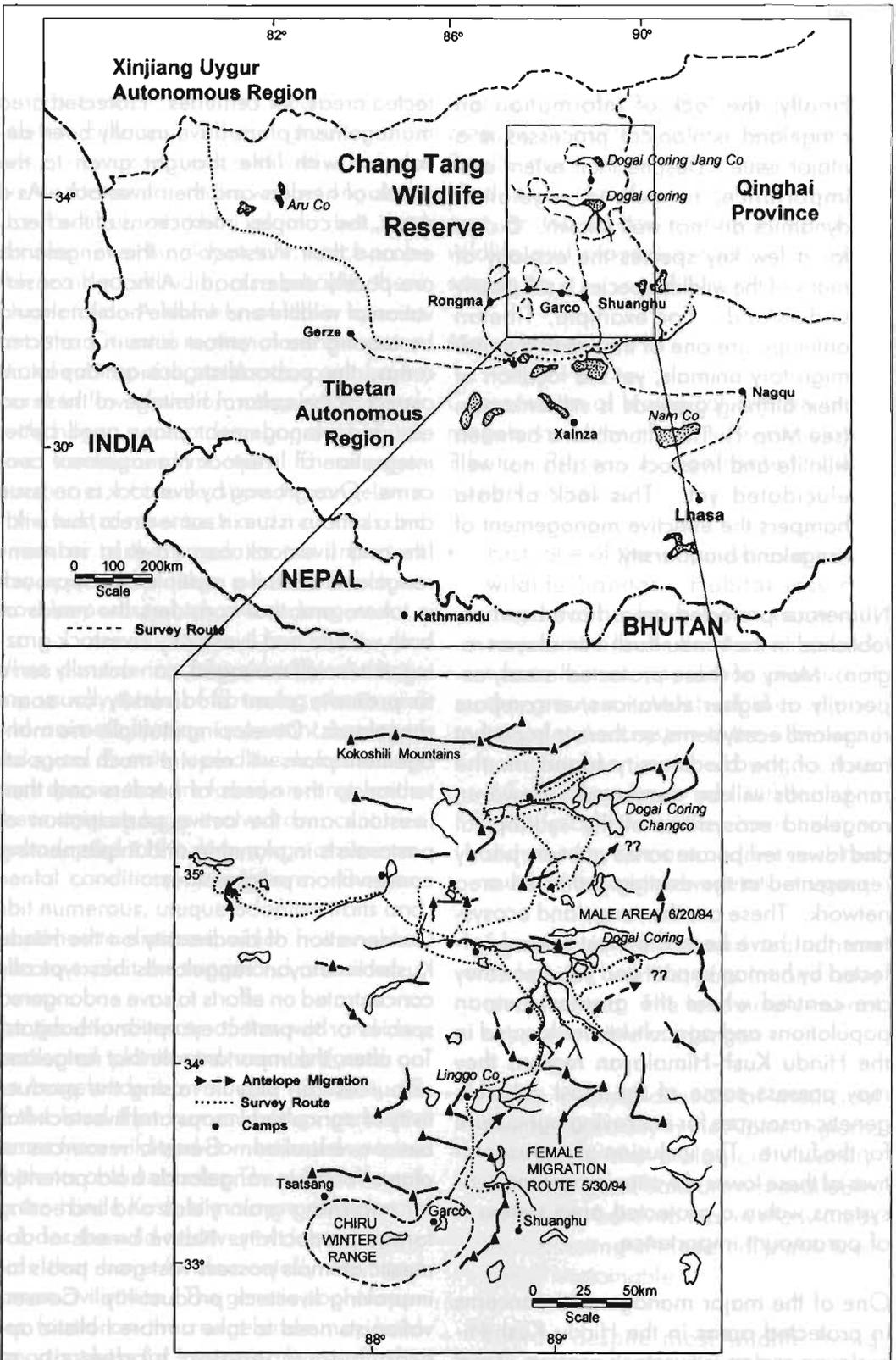
- Finally, the lack of information on rangeland ecological processes is a major issue. Despite their extent and importance, rangeland vegetation dynamics are not well known. Except for a few key species the ecology of many of the wildlife species is still poorly understood. For example, Tibetan antelope are one of the world's major migratory animals, yet the location of their birthing grounds is still unknown (see Map 1). The interactions between wildlife and livestock are also not well elucidated yet. This lack of data hampers the effective management of rangeland biodiversity.

Numerous protected areas have been established in the Hindu Kush-Himalayan region. Many of these protected areas, especially at higher elevations, encompass rangeland ecosystems, so there is hope that much of the biodiversity found on the rangelands will be conserved. However, rangeland ecosystems of the subtropical and lower temperate zones are very poorly represented in the existing protected area network. These are the rangeland ecosystems that have been the most severely affected by human impact and yet, since they are centred where the greatest human populations and agriculture are located in the Hindu Kush-Himalayan region, they may possess some of the most valuable genetic resources for improving agriculture for the future. The inclusion of representatives of these lower elevation rangeland ecosystems within a protected area system is of paramount importance.

One of the major management concerns in protected areas in the Hindu Kush-Himalayan region is livestock grazing. Most

of the protected areas have populations of pastoralists who, with their livestock, have been grazing in areas now set aside as protected areas, for centuries. Protected area management plans have usually been developed with little thought given to the needs of herders and their livestock. As a result, the complex interactions of the herders and their livestock on the rangelands are poorly understood. Although conservation of wildlife and wildlife habitat should be among the foremost aims in protected areas, the pastoralists are an important aspect of the cultural heritage of these areas and management plans need better integration of livestock management concerns. Overgrazing by livestock is an issue and a serious issue in some areas, but wildlife and livestock can co-exist in many rangeland areas if a multiple-use approach is taken, one that considers the needs of both wildlife and livestock. Livestock grazing, if it is well managed, can actually serve to promote plant biodiversity on some rangelands. Developing multiple-use management plans will require much more attention to the needs of herders and their livestock and the active participation of pastoralists in planning and implementing conservation programmes.

Conservation of biodiversity on the Hindu Kush-Himalayan rangelands has typically concentrated on efforts to save endangered species or to protect exceptional habitats. Too often, the important role that rangeland resources can play in raising the productivity of agricultural crops and livestock has been overlooked. Genetic resources of plants found in rangelands hold potential for improving grain yields and increasing forage productivity. Native breeds of domestic animals possess vast gene pools for improving livestock productivity. Conservationists need to take a more holistic approach to managing biodiversity of



Map 1: Tibetan Antelope Winter Range and Migration Routes

rangelands if the entire spectrum of biological diversity is to be adequately considered.

Challenges

Conserving the biodiversity of the rangelands of the Hindu Kush-Himalayas-Tibetan Plateau is a very challenging task. Many rangeland areas are remote and working in them is physically difficult. Information about basic rangelands ecology is limited, yet managers are still required to develop rangeland management plans. Throughout rangeland areas, efforts will need to concentrate on resolving-grazing related issues. This will require sociological skills that biologists often lack. Current policies and strategies for rangelands will also have to be refined as more information about rangeland ecology, biodiversity, and pastoral production systems becomes available.

Policies for more effective conservation of the biological diversity of the rangelands will need to do a better job of demonstrating, in economic terms, the contribution rangeland resources make to the region's overall social and economic development. Economic valuation of rangeland resources will require measurement of both direct and indirect values. Determining the economic value of rangeland biological diversity will require three different but related approaches:

- assessing the value of rangeland products — such as forage and meat, both from wildlife and livestock — that are consumed directly without passing through a market ('consumptive use value');
- assessing the value of products that are commercially harvested — such as

livestock products, wildlife products, and medicinal plants ('productive use value'); and

- assessing indirect values of rangeland ecosystem functions — such as watershed protection, regulation of climate, production of soil, scientific research, and birdwatching ('non-consumptive use value'), as well as the intangible values of preserving options for the future ('option value') and simply knowing that certain species exist on the rangelands ('existence value').

Assessing the benefits and costs of preserving the biological resources of the rangelands provides a basis for determining the total value of rangeland ecosystems. Since the value of rangeland resources can often be considerable, conservation of rangeland biodiversity in the Hindu Kush-Himalayas-Tibetan Plateau should be regarded as a form of economic development.

Making the case for biodiversity conservation on the rangelands is complicated because of the subtle nature of the rangeland ecosystem. To the untrained eye, rangelands appear to just be dominated by an uninteresting cover of grasses. Yet, it is often the intricate differences in the rangelands that help explain ecosystemic processes. Learning to detect these subtle changes in the rangeland landscape requires acute observation and a willingness to spend considerable amounts of time in the field. Finding the time to be in the field observing ecosystemic processes, especially in the remote rangelands in the Hindu Kush-Himalayas-Tibetan Plateau, is a challenge in a day and age when sitting behind a computer working on GIS and remote-sensing analysis of the rangelands is often more interesting to many people.

Rangeland Biodiversity of the Chang Tang Wildlife Reserve in the Tibetan Autonomous Region, China

The Chang Tang Wildlife Reserve of Tibet, encompassing about 300,000 square kilometres, includes one of the last, largely undisturbed rangeland ecosystems in the world and provides habitat for numerous wildlife species, several of which are endangered and endemic to the Tibetan plateau. Rangelands in this Reserve can be categorised into three major types: alpine steppe, desert steppe, and alpine meadow. Rangelands are spatially heterogeneous ranging from patch to landscape scales in composition and productivity. Although limited in overall plant species' richness, the rangelands are nevertheless diverse and provide habitat for six wild ungulate species, as well as a variety of birds, small mammals, and large predators including the snow leopard and Tibetan brown bear. The six wild ungulates include: *chiru* or Tibetan antelope, Tibetan gazelle, Tibetan argali, blue sheep, the *kiang* or Tibetan wild ass, and wild yak. Tibetan gazelle are selective feeders, concentrating on forbs. Tibetan antelope, blue sheep, and argali are mixed feeders, consuming both graminoids and forbs while the wild yak and Tibetan wild ass consume mainly grasses and sedges. The Chang Tang is coming under increasing pressure from nomads and their livestock; illegal hunting, especially of Tibetan antelope; and the threat of oil-drilling and gold mining. Despite these pressures, the rangelands can continue to provide habitats for wildlife as well as pastures for livestock if properly managed. This will require innovative management plans that take into account the needs of the wildlife as well as the needs of the Tibetan herders and their livestock.

Conclusion

The fact that extraordinary wildlife populations still can be found on the rangelands of the Hindu Kush-Himalayas-Tibetan Plateau bears witness to the remarkable diversity and resilience of these ecosystems. Rangelands are coming under increasing pressure from an expanding human and livestock population, but, properly managed, they can continue to provide critical habitats for wild plants and animals as well as grazing land for livestock production. Conservation and development strategies for rangelands must aim to maintain the condition of the rangelands and protect biodiversity. To achieve this

goal, it will be necessary to design development programmes that take into account the needs of wildlife as well as the aspirations of the local people who share the rangelands with wild animals. Developing such programmes requires a much better understanding of the dynamics of rangeland ecosystems, increased knowledge of pastoral production systems, more thorough analysis of the constraints and opportunities for improving rangeland biodiversity, and modifications in policies and current approaches to management. These actions are crucial for conserving biodiversity and ensuring sustainable pastoral development in the face of growing threats from modernisation.