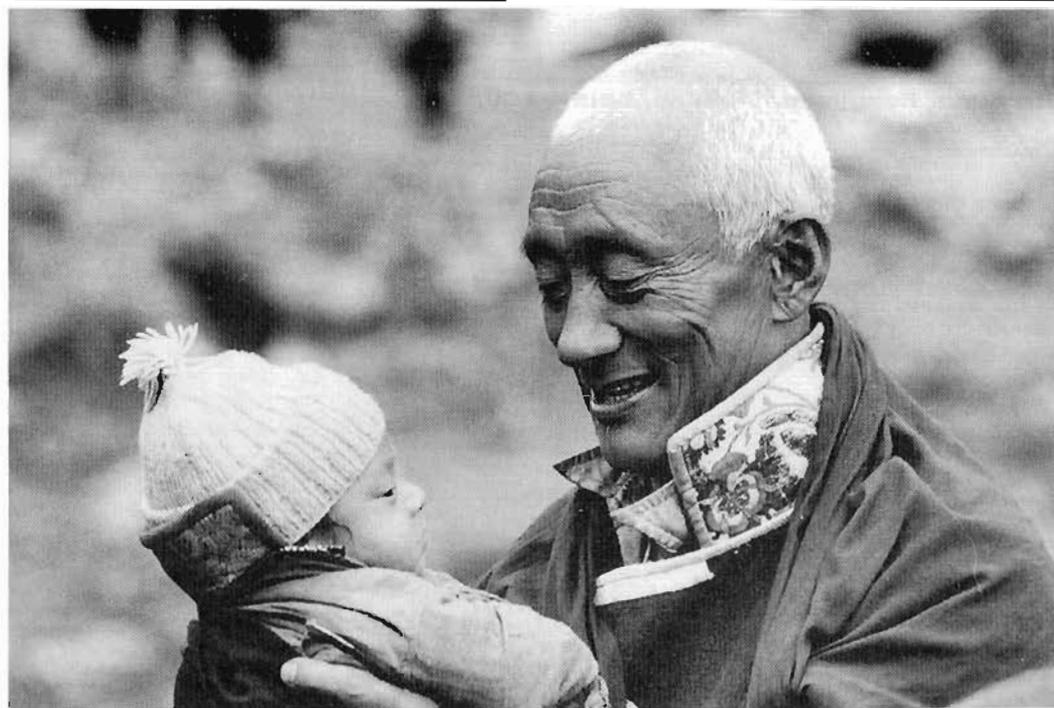
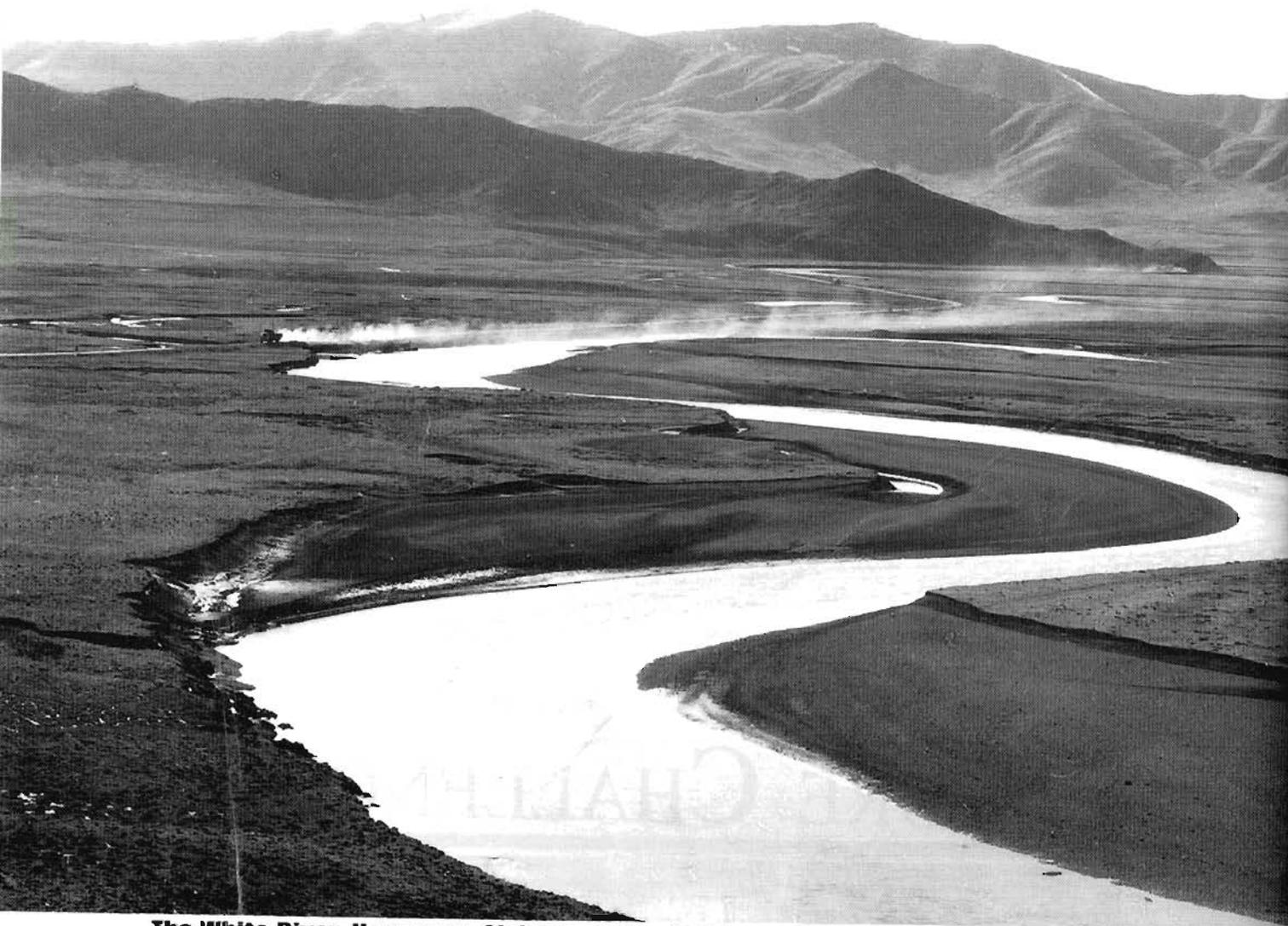
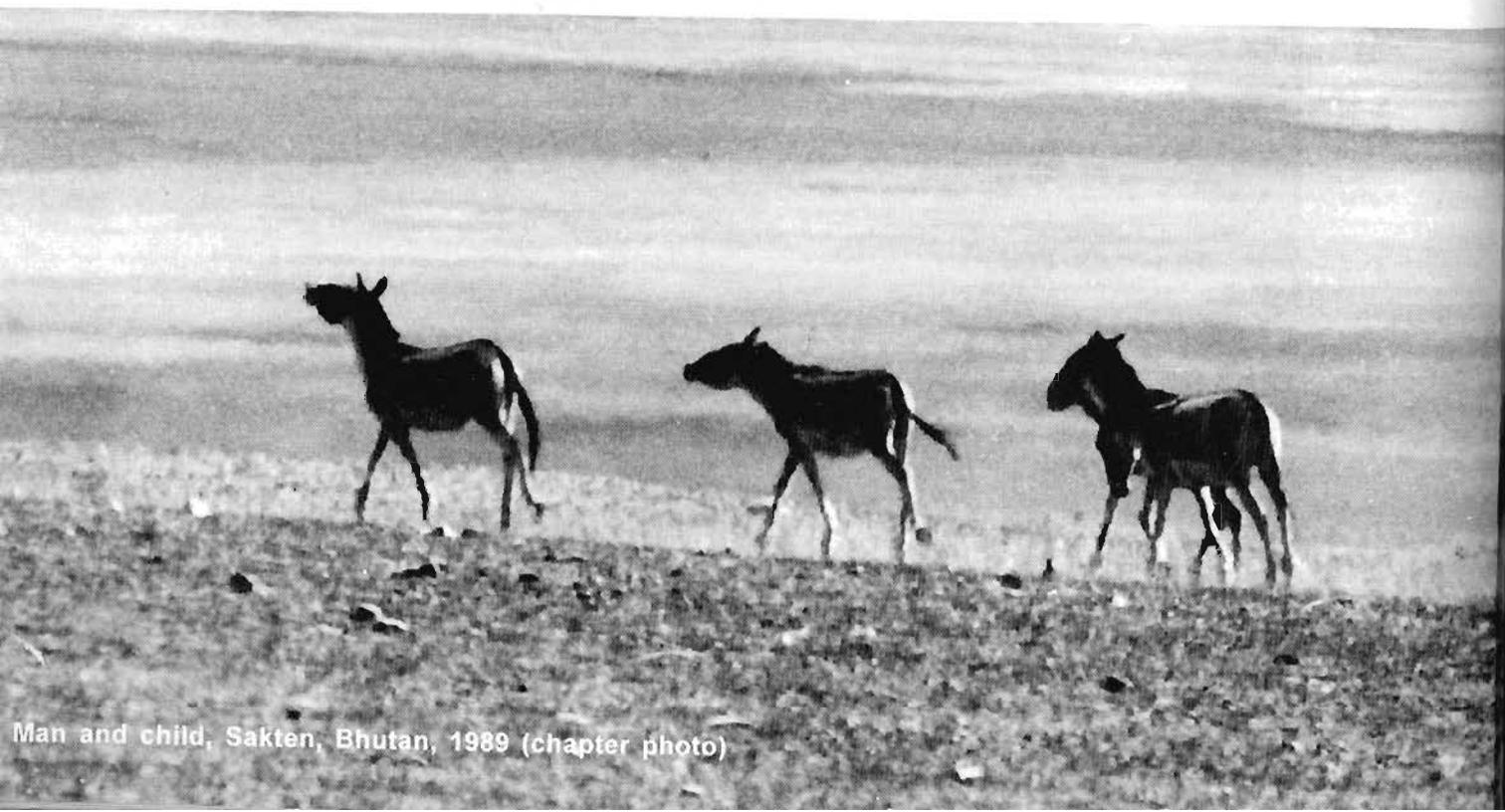


FUTURE CHALLENGES





The White River, Hongyuan, Sichuan, China, 1997



Man and child, Sakten, Bhutan, 1989 (chapter photo)

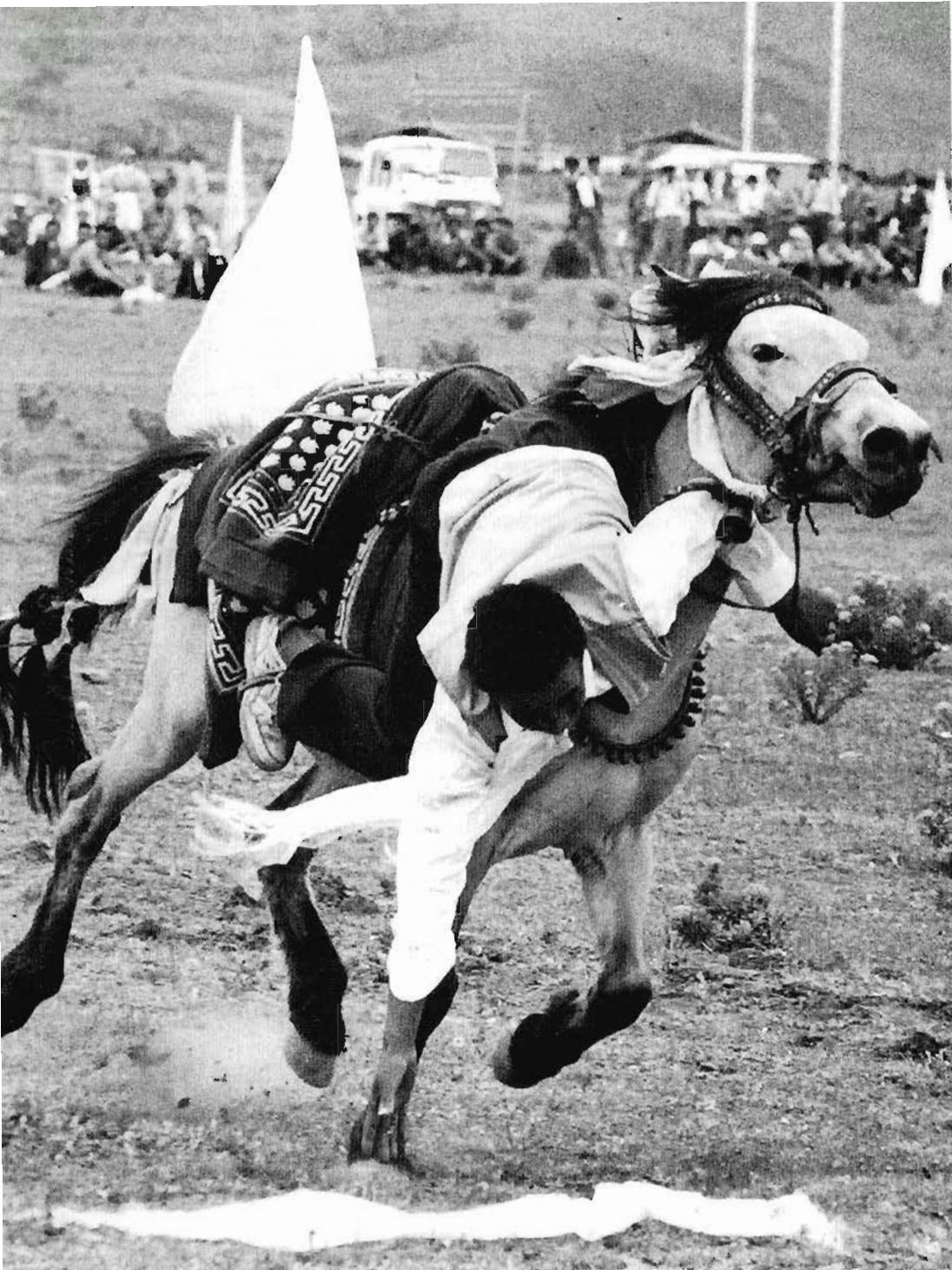


The management of Tibetan rangelands is both a science and an art. It tries to augment the returns from rangeland resources (water, plants, animals) in ways that are desired by the herders who raise livestock on the grazing lands, other people who also make use of the rangelands, and the wider society through the proper use of rangeland ecosystems. Proper management of rangelands combines practices from the physical, biological, and social science disciplines. Since climatic, topographic, soil, and hydrologic factors affect rangelands, physical science skills are necessary. Biological science is required because range management deals with plants and the response of animals (both wild and domestic) that consume vegetation. Social science skills are necessary because the needs and desires of society determine how rangelands are used.

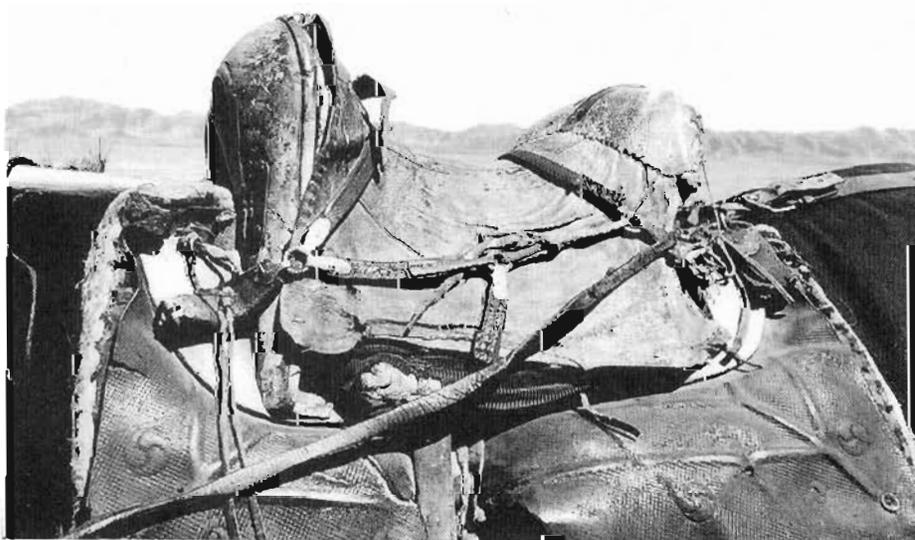
Scientific knowledge of rangeland ecosystems and technical skills are vital to managing rangelands, but range management and pastoral development are more than just a science. They are also an art. The scientific information available on rangelands needs to be synthesised and fabricated into practical and implementable management plans. Creating such plans requires the talents and perception to detect changes in rangeland vegetation that have taken place in the past, how different uses are currently affecting the rangelands, and then the ability to fashion plans to present range use and future demands. This 'feel' for the rangelands can only be achieved by spending considerable time in such areas looking and listening.

Tibetan wild ass (*kiang*), Phala, Tibet, China, 1997

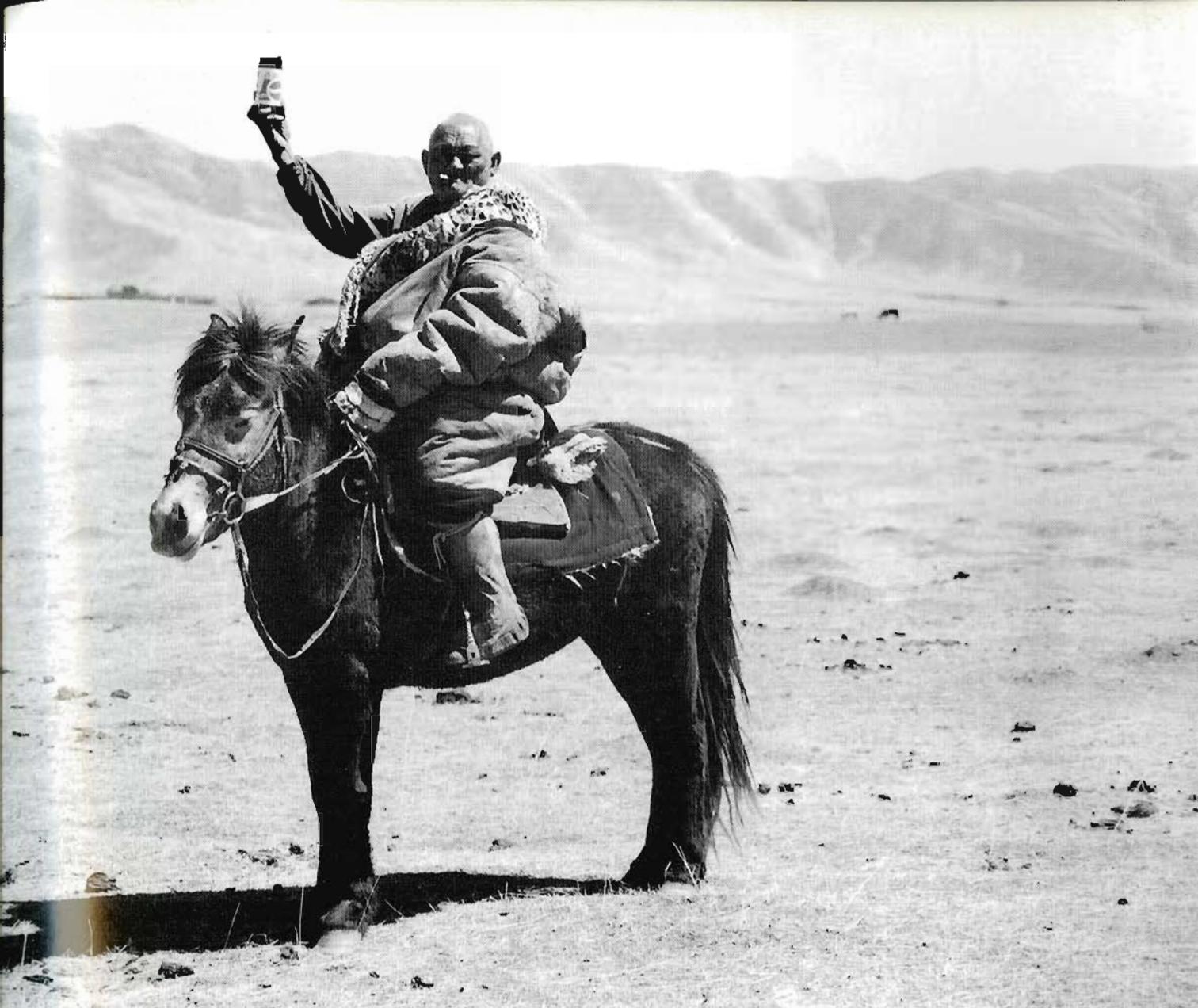




Horse festival, Zhongdian, Yunnan, China, 1996



**Tibetan saddle,
Zoige, Sichuan,
China, 1997**



72-Year old Tibetan nomad, Zolge, Sichuan, China, 1997

The fact that many prosperous nomadic groups remain to this day on Tibetan rangelands bears witness to the extraordinary capacity of these grazing lands, as well as to the sustainability of their resources if used wisely. Maintaining rangeland productivity and biodiversity and, at the same time, increasing livestock off-take to meet growing demands and improve the livelihoods of nomads who depend on the rangelands for existence are challenging tasks.

Sustainable development of the pastoral areas of the Tibetan Plateau and those of the Himalayas requires a better understanding of the complex nature of the rangelands, greater appreciation for nomads and their way of life, and consideration of new information and ideas emerging about rangeland ecosystems and pastoral production systems. It may also require rethinking some existing pastoral policies in light of new information about rangelands, nomads, and range-livestock production practices.



Yak roundup, Hongyuan, Sichuan, China, 1997

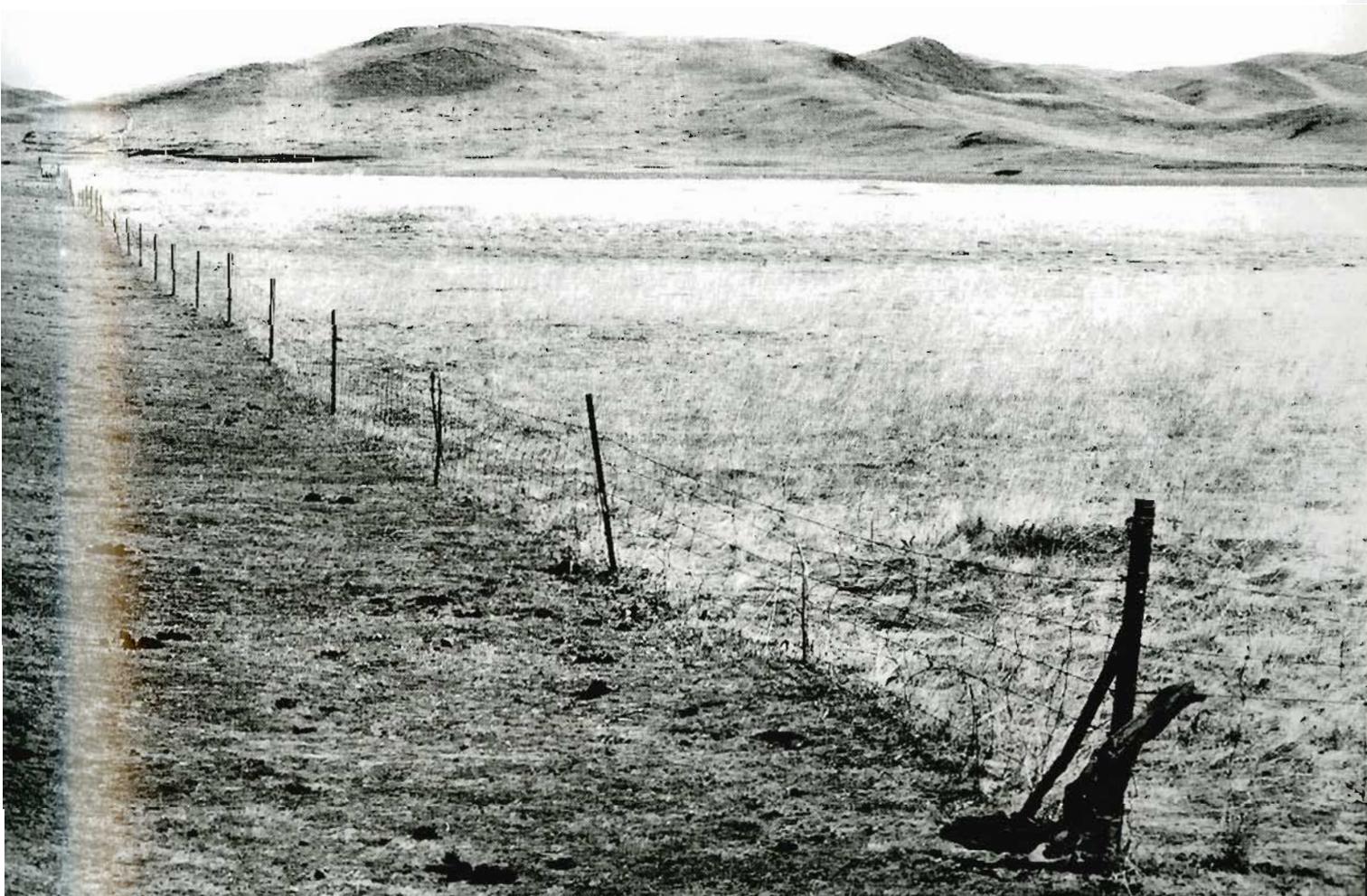
The challenges facing the sustainable development of rangelands in the Himalayas and on the Tibetan Plateau are considerable. These grazing lands, however, do offer numerous opportunities for achieving the twin objectives of conservation and development of rangeland resources. Programmes stressing multiple use, participatory development, sustainability, economics, and biodiversity could be realised through complementary activities in range resource management, wildlife conservation, and pastoral development and livestock production. Properly managed, rangelands can continue to be sources for water, provide habitat for wild animals and grazing land for livestock, and contribute to overall economic development. Rangeland strategies must aim to maintain the condition of the range and to protect biological diversity. Designing more effective pastoral policies and rangeland development strategies requires improved knowledge of range ecosystem processes, better understanding of pastoral production systems, and more thorough analyses of the constraints and opportunities for improving the management of grazing lands.



Resolving rangeland management and pastoral development issues will require policies and approaches that integrate ecological processes of the rangelands with the economic processes of livestock production and biodiversity conservation. Economic valuation of rangeland resources requires consideration of both direct and indirect values. New policies for rangelands will also have to better demonstrate, in economic terms, the contribution grazing land resources make to overall economic development.

Those involved with managing rangeland resources and setting pastoral policies need to make the best use of the latest data available and any new ideas or emerging concepts on rangeland ecosystems and pastoral development. There is also a need to explore beyond the conventional thinking of many of the traditional range management concepts, developed largely in North America, in order to manage rangelands in the pastoral areas of the Himalayas and the Tibetan Plateau, where pastoral history is thousands of years old, more effectively.

Fences on the rangelands, Zolge, Sichuan, China, 1997





Milking goats, north of Rongma, Chang Tang Reserve, Tibet, China, 1993

Animal husbandry will continue to be the main land use in this high plateau environment. Livestock will be the primary source of livelihood for people residing in these pastoral ecosystems for many years to come. As such, much greater effort needs to be directed towards rangeland research and pastoral development. Many of the new perspectives emerging on rangeland ecosystem dynamics and pastoral production systems from other pastoral areas of the world provide fresh approaches and interesting challenges for analysing rangelands and pastoralism in the Himalayas and on the Tibetan Plateau. They also offer valuable, fresh frameworks for designing new, exciting range and pastoral research, suggesting possibilities for more sustainable development and conservation of these unique grazing lands.

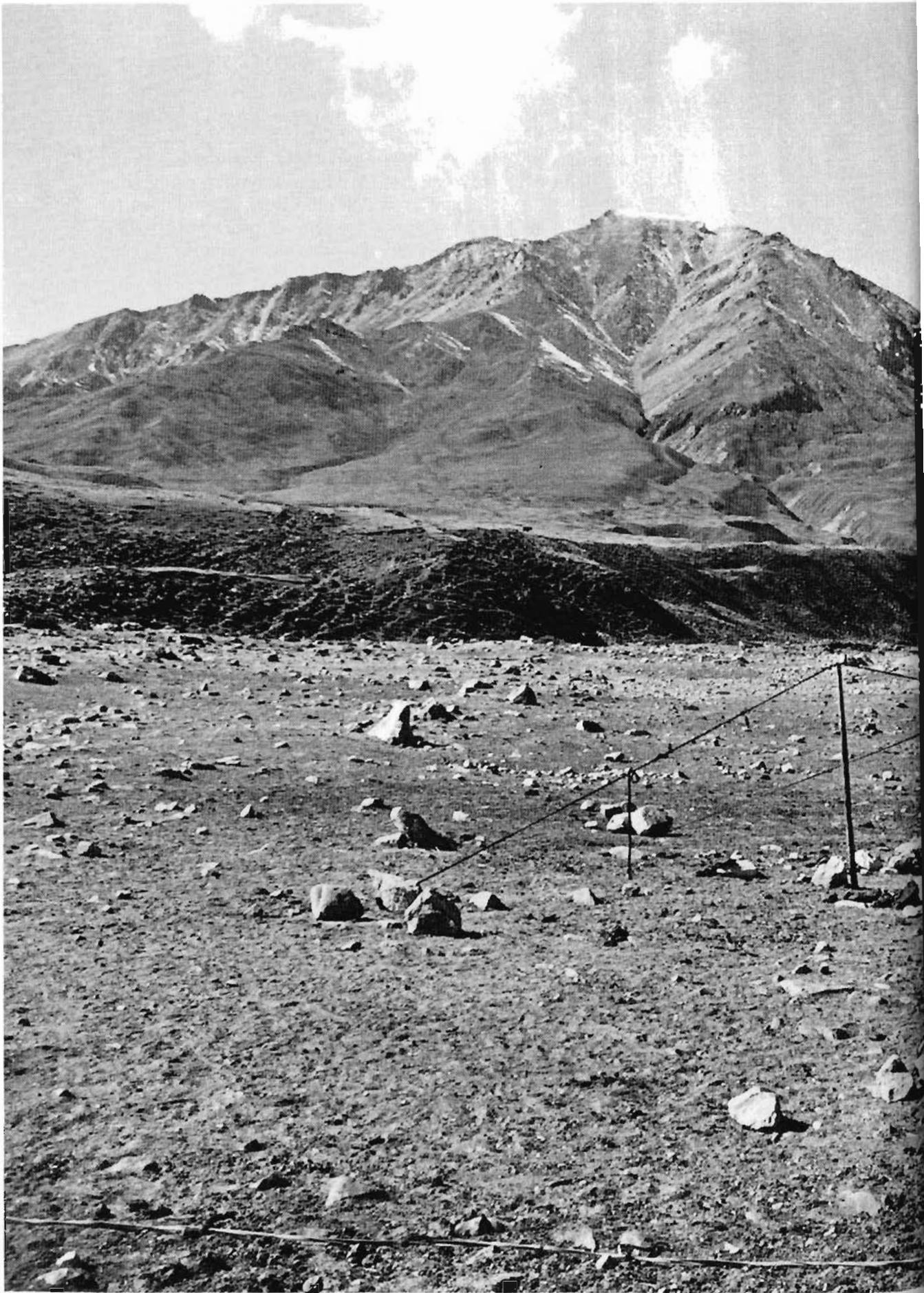




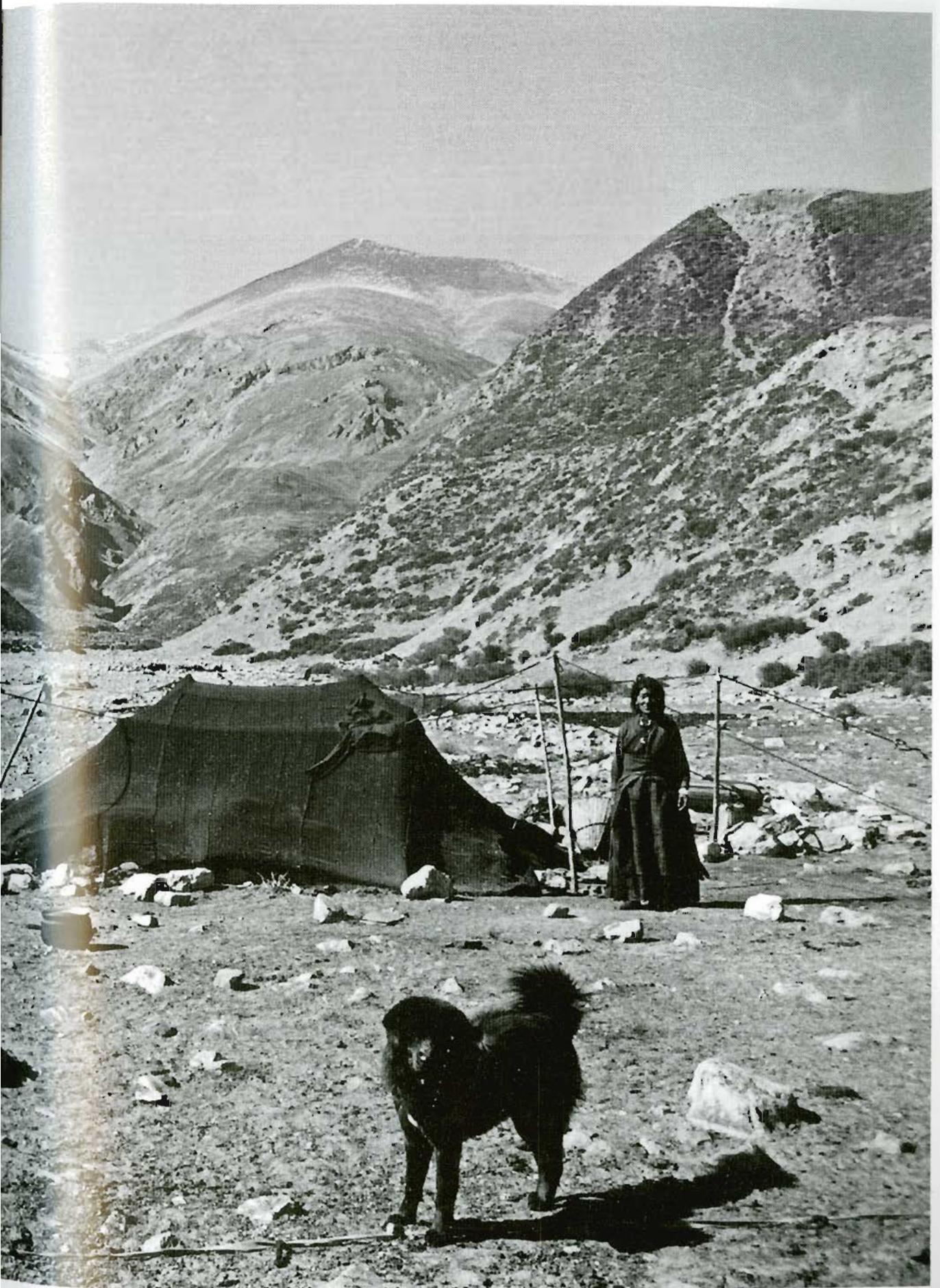
Many pastoral areas in the Himalayas and on the Tibetan Plateau are now included in a greatly expanded protected area system. Balancing biodiversity conservation and pastoral development in these parks and reserves is a major challenge. Innovative models for conservation that promote an integrated development approach offer new opportunities for protecting wildlife while, at the same time, improving people's livelihoods. However, in some key wildlife habitats there may have to be restrictions placed on livestock if wildlife is to survive.

Nomad family, headwaters of Yangtze River, Qinghai, China, 1993





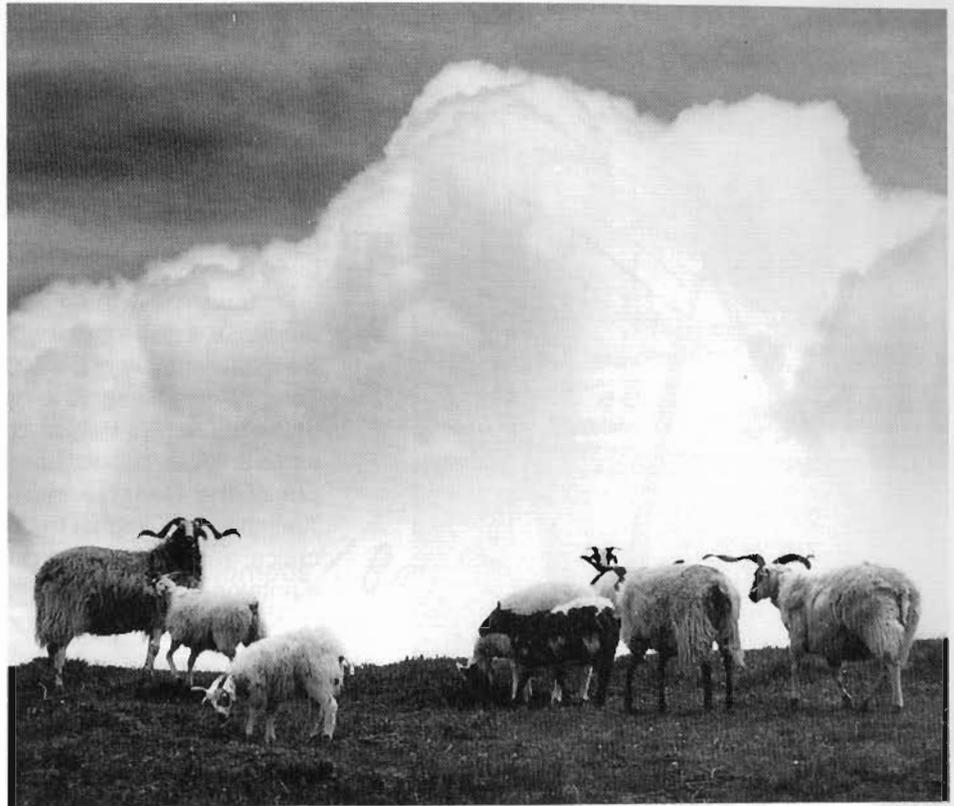
Nomad camp, Mustang, Nepal, 1992





Mountain rangeland, Mustang, Nepal, 1992

There are no simple solutions for addressing range resource management, biodiversity conservation, and pastoral development issues in the Himalayas and on the Tibetan Plateau. Due to the multifaceted dimensions of the problems, action will have to be taken on several levels. Policy dialogue will be necessary to establish appropriate range-livestock development programmes and incentive structures for pastoral areas. Mechanisms for increasing pastoralists' participation in the development process need to be improved. Human resource training and institutional development for organizations working in pastoral development need to be supported. Many of the tools are already available – the knowledge and skills of the herders, scientific data on rangeland resources, new technologies, and information systems – and new information, ideas, and technologies are being generated, but all of this must be integrated into a practical long-term strategy that includes saving rangelands, analysing them, and using rangeland resources sustainably and equitably.



Tibetan sheep, Hongyuan, Sichuan, China, 1996



**Tibetan nomad women,
Zamtang, Sichuan, China,
1996**

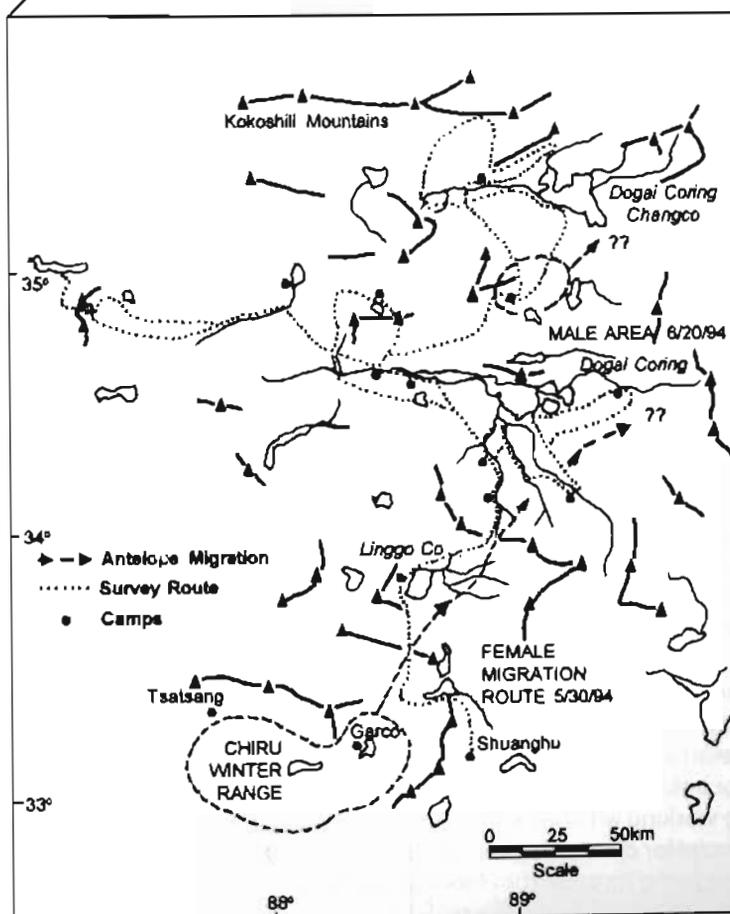
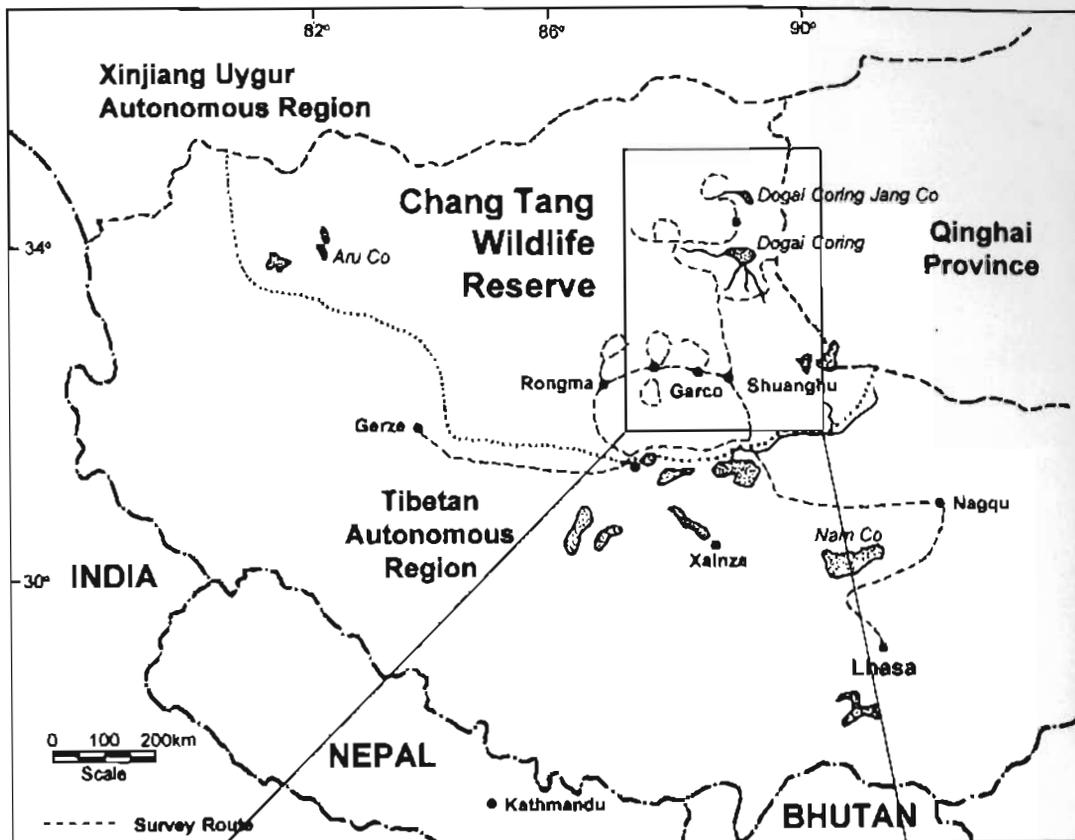


**Tibetan antelope horns
for sale, Zhongdian,
Yunnan, China, 1996**

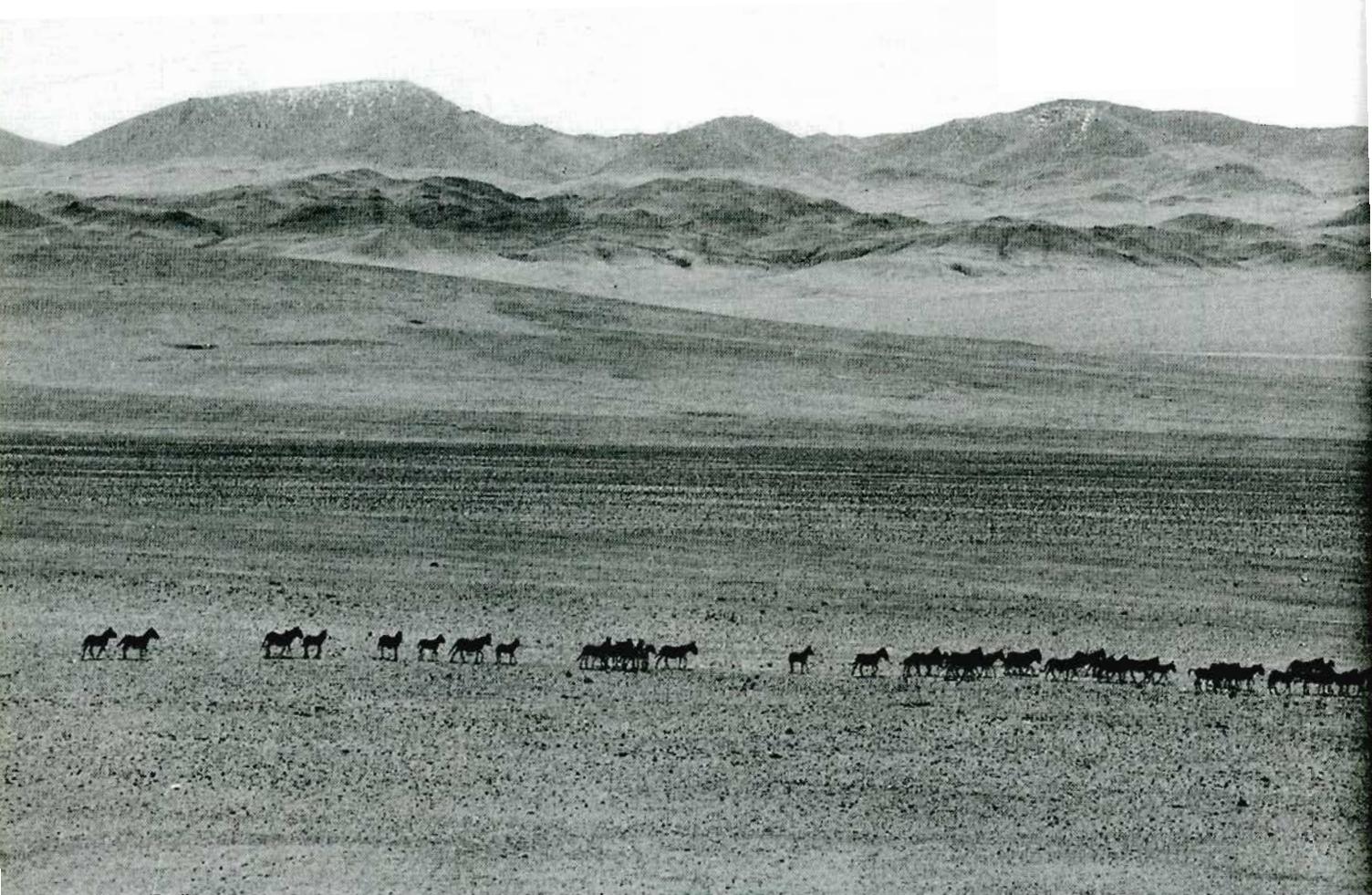
Tibetan antelope define the vastness of the Tibetan wilderness. Like caribou in Alaska and wildebeest in Africa, antelope migrate long distances across the Tibetan steppes. The antelope's migratory habit indicates the need for an enormous territory or home range. Sadly, in spite of being fully protected under legislation, antelopes have been heavily hunted in recent decades for the luxurious wool they produce. Known as *shatoosh*, it is the finest wool in the world. With the establishment of the 300,000 sq. km. Chang Tang Wildlife Reserve in northern Tibet, much of the antelope's habitat is now protected, but some antelope populations are known to migrate out of the Reserve into adjoining areas of Xinjiang and Qinghai to give birth. Protecting critical antelope habitats in these areas is vital if antelopes are to survive.

**Shrine to endangered species,
Lomanthang, Mustang, Nepal, 1992**



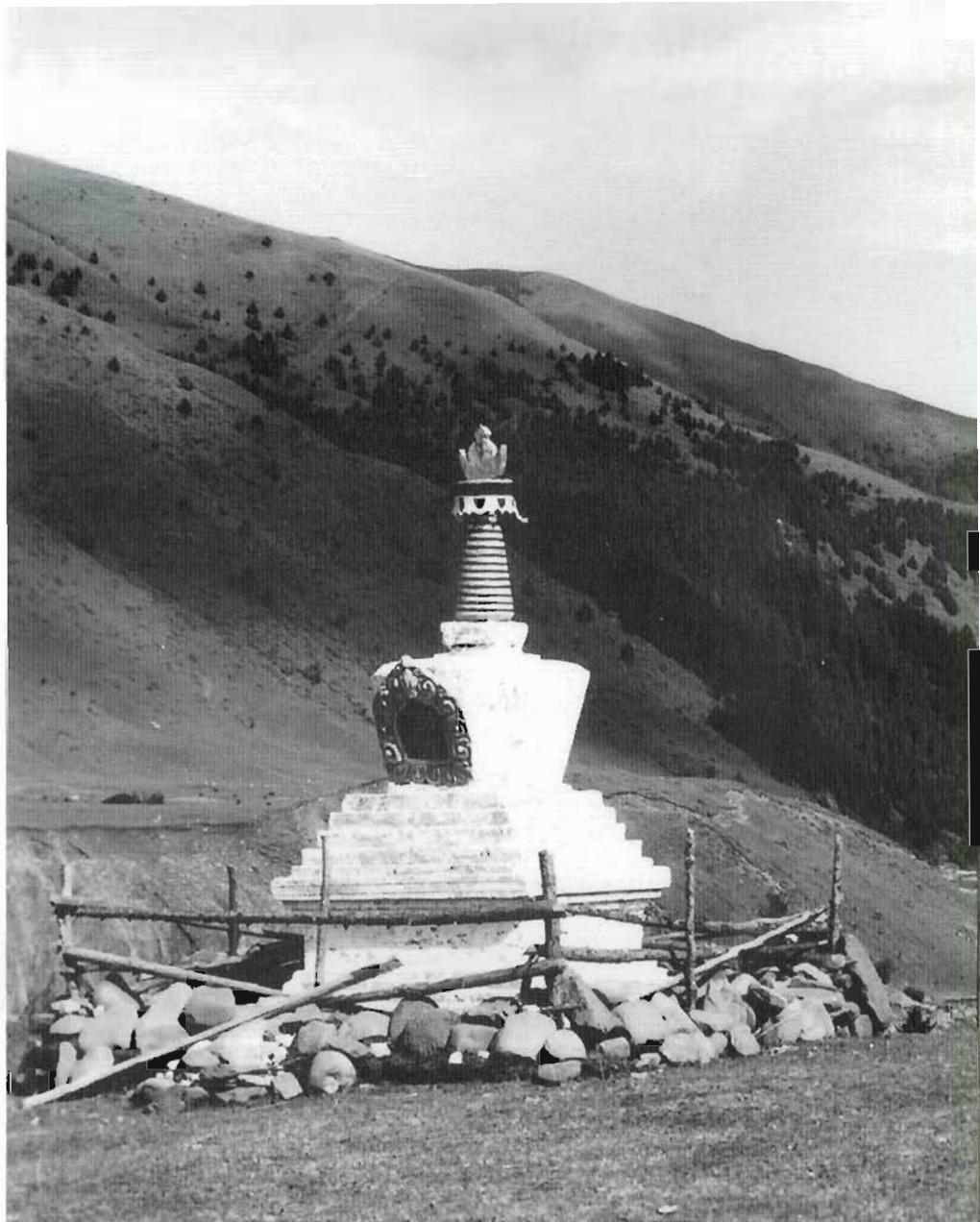


Map of Changtang Reserve



Tibetan wild ass and rangeland, Chang Tang Wildlife Reserve, Tibet, China, 1993

Designing new and innovative conservation and development programmes for rangelands that will protect the remaining herds of wild yaks, Tibetan antelope, and other wild animals requires a number of actions. First, there is a need to develop a much better understanding of rangeland ecosystem dynamics and animal-vegetation interactions. Second, more information on the ecology, status, and distribution of wildlife species is required. Regular monitoring of wildlife populations, especially antelope and wild ass, are also required. Third, there is a need for increased knowledge of pastoral production systems and nomads' use of important wildlife habitats. Such information is necessary in order to design management programmes that address the needs of both livestock and wildlife. Fourth, more thorough analysis of the constraints and opportunities for maintaining and improving rangeland biodiversity needs to be undertaken. Finally, modifications in policies and current approaches to management will have to be made. The illegal killing of wildlife, especially Tibetan antelope, must be stopped. Wildlife authorities will require additional training and support for enforcing wildlife protection regulations and reorientation to more participatory approaches to working with herders on protected area conservation and development. These actions are crucial for conserving biodiversity and ensuring sustainable pastoral development in the face of growing threats from modernisation.



Stupa, near Dawu, Sichuan, China, 1996

Nomad tent and rangeland, Rongma, Tibet, China, 1993

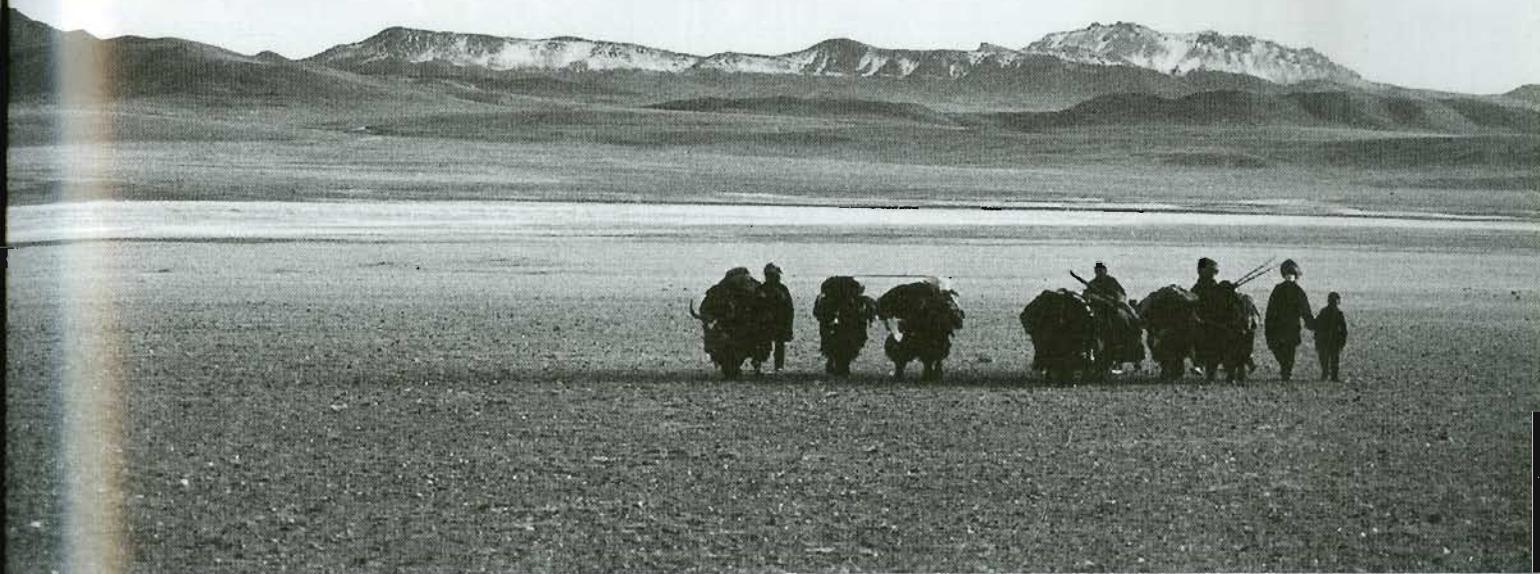




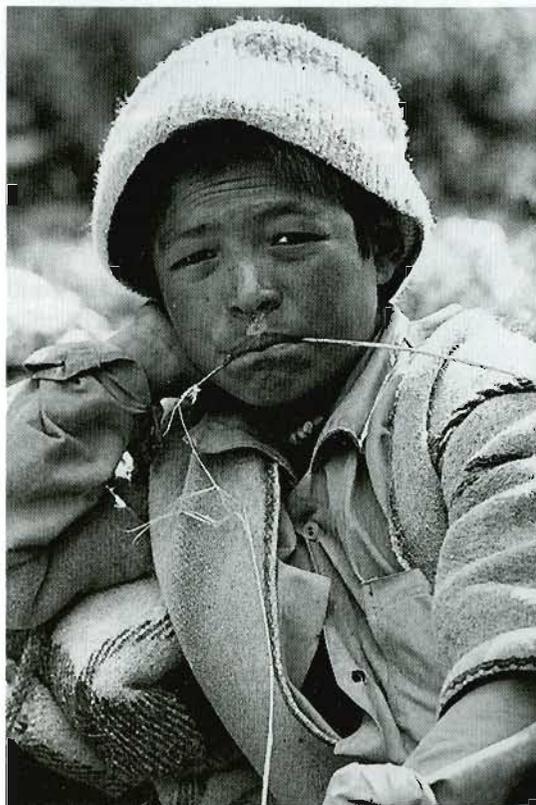
Rangelands with *Caragana* shrubs, Mustang, Nepal, 1992

The conventional concept of carrying capacity in range management is grounded in theories of plant succession and climax plant communities. Range management was built around the concept of range condition class, determining carrying capacities, and the manipulation of livestock numbers and grazing patterns to influence range condition. The relevance of the carrying capacity concept for planning livestock grazing in pastoral systems is being challenged, since it is often difficult to estimate carrying capacity in the highly dynamic ecosystems where pastoralism occurs. The difficulty of applying carrying capacity concepts means the notion of 'opportunism' is gaining favour as a management approach for livestock production in pastoral areas. Instead of considering 'average estimated carrying capacity', an opportunistic approach bases the grazing strategy on that year's forage production. Such an approach allows herders to adjust livestock numbers to the wide spatial variability found in forage production, establish better distribution of livestock to forage availability, and enable increased livestock production.

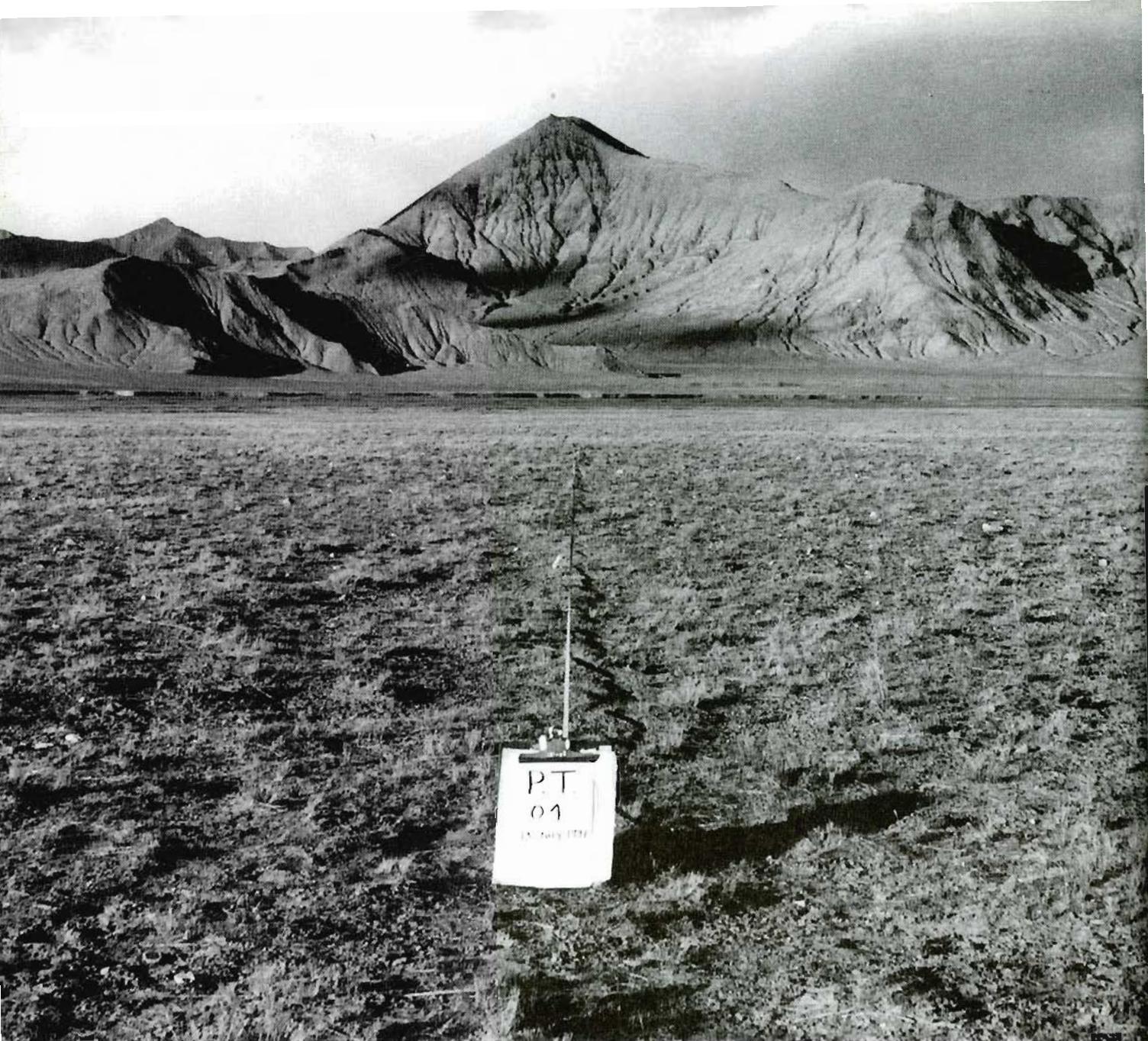
The optimal strategy for herders in highly dynamic environments where pastoralism is commonly practised, therefore, may be to exploit range resources during 'good times', when climatic conditions promote better forage growth, and to capitalise on outside resources during 'bad times' as the need arises. Opportunism is not new to pastoralists; many aspects of traditional pastoral systems embraced such opportunistic strategies. However, the adoption of opportunistic range management strategies on the Tibetan Plateau today has implications for the redesign of pastoral policies, most of which are currently based on carrying capacity concepts. Range research on Tibetan grazing lands needs to investigate further the usefulness of carrying capacity practices and the practicability of new models, such as opportunism, for managing livestock grazing.



Herders returning home, Garco, Tibet, China, 1993



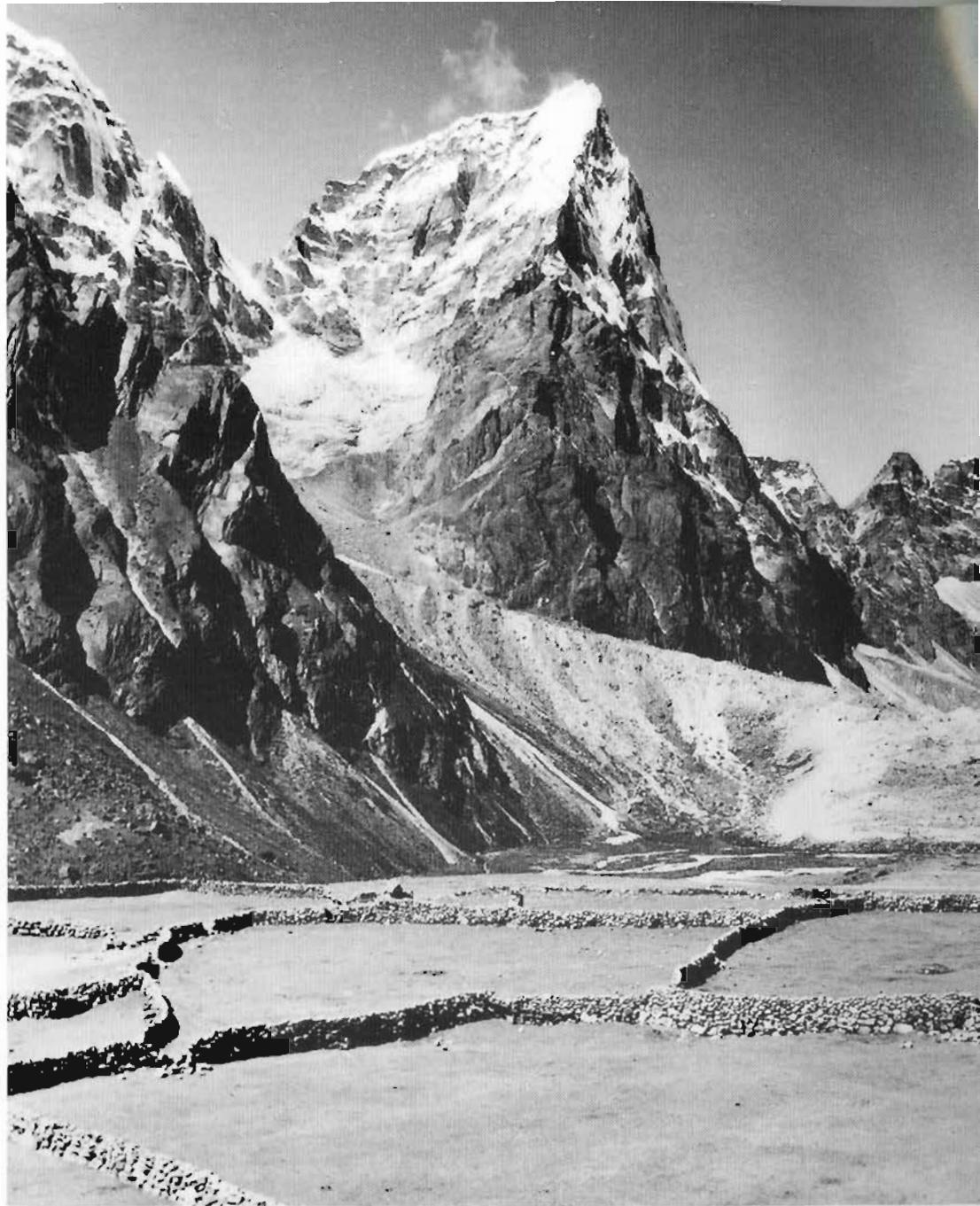
Yak herder, Langtang, Nepal, 1975



Vegetation transect and rangeland, Wild Yak Valley, Qinghai, China, 1991

Strategies for improved management of Tibetan rangelands and more sustainable pastoral development should aim to: maintain rangeland productivity, rehabilitate degraded areas, protect and enhance rangeland biodiversity, promote improved livestock productivity, increase livestock off-take, stimulate economic growth, create employment for nomads, and improve nomads' access to social services. Development strategies for nomadic areas in the Himalayas and on the Tibetan Plateau should also regularly analyse current pastoral policies and, as more information about Tibetan rangelands and pastoral production becomes available, policies should be refined or adjusted.

A key development intervention in many pastoral areas will be the development of hay meadows to provide supplemental forage to livestock in the winter and spring. Many nomads already practice hay-making so it is not a new technology, but the practice will need to be expanded if significant gains in livestock productivity are to be made. Hay can also help to prevent large livestock losses in the event of severe snow storms.



Hay fields and peaks, Pheriche, Khumbu, Nepal, 1992



An important grass, *Elymus nutans*, Khumbu, Nepal, 1992



Yaks and yak herder, Hongyuan, Sichuan, China, 1996

Since many of the yak-raising areas of the Himalayas and Tibetan Plateau are often remote, the yak and yak production systems have not received the attention they deserve from researchers and development agencies. The importance and value of yaks and yak production systems are generally not well appreciated. Yet, the future of the Tibetan pastoral areas, and the improvement in the livelihood and well-being of many Tibetans, will have to depend on yak production. Although, as a global species, yaks are not as important as other domestic animals, in Central Asia, where almost all of the world's 14 million yaks are found, yaks are an important animal, especially to the nomads dependent upon yaks for a living.

Yak research needs to be carried out to measure performance, survival, and reproductive characteristics among the different breeds of yaks that have been recognised. Such work would help determine the extent of yak genetic diversity in the yak population and would provide the basis for improved yak breeding programmes. This could then lead to improvements in yak production in the future. Breeding, nutrition and health, and yak herd management practices are all factors related to improving yak production, however, and superior yak breeding stock will never realise their potential if they are not well fed and managed. Yaks that are in poor nutritional condition have reduced production and fertility and are more susceptible to many diseases and health-related problems.



Yearling yaks, Langtang, Nepal, 1975



Yaks, Hongyuan, Sichuan, China, 1996

Young sheep, Daxue, Tibet, China, 1997



Sheep and nomad camp, Phala, Tibet, China, 1997

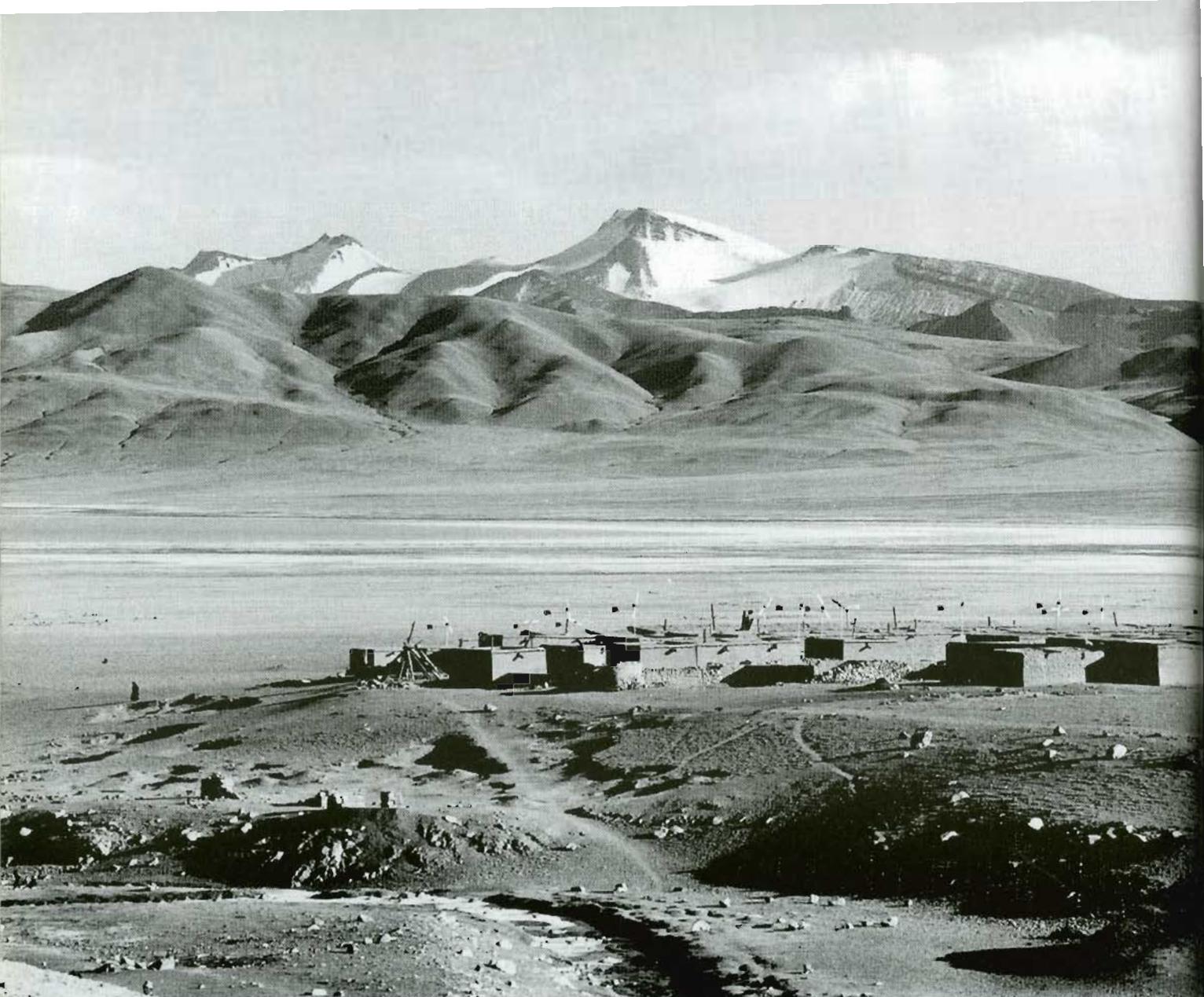
For Tibetan Plateau and Himalayan pastoral areas, it is imperative that greater efforts be directed towards developing a better understanding of current pastoral production systems. Pastoral production systems vary considerably throughout the region, and these differences need to be analysed. Why do herders in different areas maintain different livestock herd compositions? What are current livestock off-take rates and how do increasing demands for livestock products in the market place affect livestock sales? What constraints, and opportunities, for improving livestock productivity are recognised by the nomads themselves? What forms of social organization exist for managing livestock and rangelands? How have these practices changed in recent years and what are the implications of these transformations? Answers to these, and related questions, will help unravel many of the complexities of Tibetan pastoralism, of which we still know so little. Analyses of the socioeconomic processes at work in pastoral areas are a key challenge for researchers. It will also be important to determine which aspects of indigenous knowledge systems and traditional pastoral strategies can be used in the design of new development interventions for pastoral areas.



Nomad boy and goats, Rongma, Tibet, China, 1993



Milking sheep, Phala, Tibet, China, 1997



Settlement of Garco, Tibet, China, 1994

The settling down of Tibetan nomads and the privatisation of rangelands taking place now across much of the Tibetan Plateau present a complex situation. On the one hand, settling the nomads enables the delivery of improved social services to previously remote nomadic areas. Yet, this process also often reduces the spatial mobility of the nomads' herds, increasing the potential for overgrazing and rangeland degradation. Fencing can be a valuable tool for managing livestock grazing, but it is also expensive. The sustainability of many of the current pastoral development programmes on Tibetan rangelands, with their massive investment in fences and buildings, is questionable.

An important intervention for pastoral areas may be to try to reduce the isolationism that exists and to forge better links between nomads and external markets and resources. This means facilitating the movement of goods and livestock through trade or marketing systems and external economies, which can consume and distribute products to and from nomadic areas as they become available. By assisting in the movement of livestock and livestock products to markets, nomads' incomes and access to goods can increase, and their dependence upon the local pastoral environment for subsistence can decrease. With increasing accessibility of many pastoral areas, this is now becoming more feasible.



Oats being cut for hay, Henan Mongol, Qinghai, China, 1997

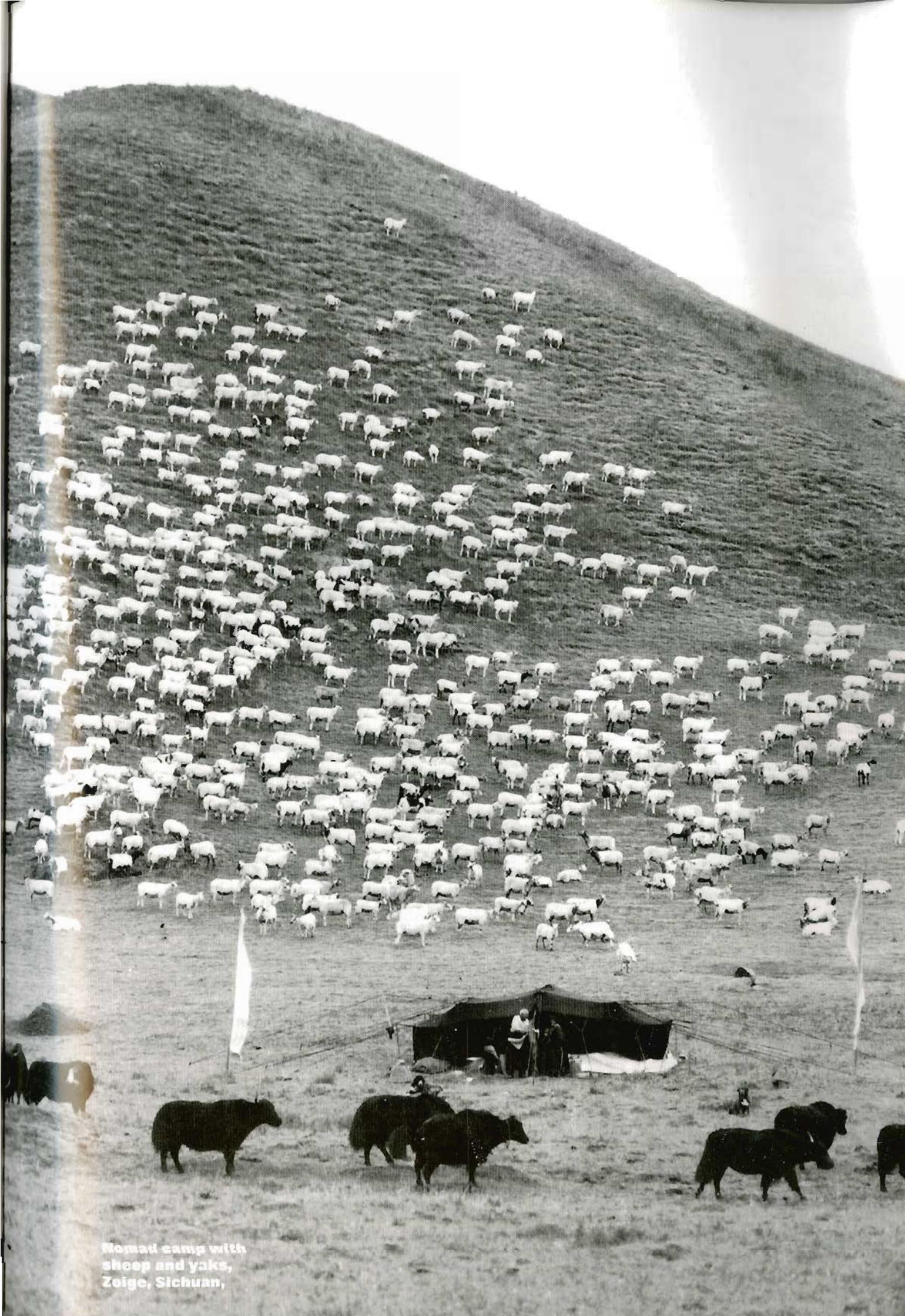


Nomad camp with tents and houses, Zeku, Qinghai, China, 1997

Pastoral development programmes must involve nomads themselves in the initial design of interventions. Herders' needs and desires must be heard and the vast body of indigenous knowledge pastoralists possess about rangeland resources must be put to use when designing new range-livestock development projects. An important message for pastoral policy-makers and planners is the need for active participation by the nomads in all aspects of the development process and for nomads to be empowered to manage their own development. New mechanisms for discussion, negotiation, and common action by all concerned about rangelands may be required in order to realise sustainable development goals in pastoral areas. Rangeland resources must continue to be available for future generations, as much as they should be used to improve people's livelihoods now. Without such provisions, rangelands will not be used in an equitable, sustainable manner.

Milking sheep, Phala, Tibet, China, 1997





Nomad camp with
sheep and yaks,
Zoige, Sichuan,



A Tamang Joke, Dhunche, Nepal, 1975

Nomad children hold the keys to the future wise use and development of the pastoral areas of the Himalayas and Tibetan Plateau. Unfortunately, in many nomad areas of Tibet, only about 25 per cent of the primary school age children currently attend school. Providing improved education for nomad children and vocational training for young adults to teach them new skills are some of the most important challenges facing the development of pastoral areas. While pastoralism will continue as the primary economic activity across much of the Tibetan Plateau and the Himalayas, the rangelands can only support so many livestock and a corresponding number of nomads. In many areas, the limit has already been reached. Since substantial increases in economic growth from livestock will be difficult to achieve in pastoral areas, an increasing number of young nomads will be forced to find employment elsewhere in the future. To be competitive, they will have to be educated and trained in skills other than herding yaks.



Young boys playing, Sakten, Bhutan, 1990



Yak breeding bull, Merak, Bhutan, 1990

The remarkable rangelands of the Himalayas and the Tibetan Plateau will experience a great and tragic emptiness if the productivity and biological diversity of these grasslands diminish. Unique pastoral cultures will be forced into transformation beyond recognition, while wildlife populations will be severely threatened. These consequences can be avoided if timely action is taken to evaluate the rangeland resources, to acknowledge the efficiency of many traditional pastoral strategies, and to appraise development alternatives for conserving and managing the Tibetan rangeland ecosystem realistically. These actions are crucial for ensuring sustainable economic development and environmental protection in the face of growing threats from modernisation. Only then will the long-term viability of the Tibetan fields of grass be secured for future generations.



Stupa and prayer wall, Saldang, Dolpo, Nepal, 1978

Pastoral mother and child, Sakten, Bhutan, 1990





Prayer flags and Yellow River, near Sokstang Gonpa, Hlongyuan, Sichuan, China, 1996

