



present the symposium

WILD RANGELANDS: CONSERVATION IN THE WORLD'S GRAZING ECOSYSTEMS

Organised by Dr Richard Kock and Dr James Deutsch

Thursday 12 and Friday 13 January 2006

**The Meeting Rooms
The Zoological Society of London
Regent's Park
London NW1 4RY, UK**

<http://www.zsl.org>

PROGRAMME: THURSDAY 12 JANUARY 2006

- 9.00 Registration
9.45 Welcome and Introduction (Ralph Armond, Director General, ZSL, UK)

SESSION I: Rangeland Resources

Chair: Richard Kock (Conservation Programmes, ZSL, UK)

- 10.00 **Riding the rangelands piggyback: a resilience approach to conservation management**
Brian Walker (CSIRO, Australia)
- 10.30 **Conservation management and woody plant encroachment: the yin and yang of tree-grass interactions in grazing lands**
Steve Archer (University of Arizona, USA)
- 11.00 *Tea/Coffee*
- 11.30 **Livestock and wildlife management in an hyper-arid environment - lessons from the Ibex Reserve, Saudi Arabia**
Robbie Robinson (Conservation Programmes, ZSL, UK)
- 12.00 **Guanaco management in Patagonian rangelands: a conservation opportunity in the brink of collapse**
Ricardo Baldi (CONICET & WCS, Argentina)
- 12.30 **Identifying the most effective intervention points for rangeland conservation: working across spatio-temporal scales.**
Johan du Toit (Utah State University, USA)
- 13.00 *Lunch*

SESSION II: The Interface of people, wildlife and livestock in rangelands

Chair: Johan du Toit (Utah State University, USA)

- 14.30 **Rinderpest eradication – the end of a long story or birth of a new holistic approach to multi-host disease management in Africa.**
Richard Kock (Conservation Programmes, ZSL, UK)
- 15.00 **Health and disease at the interface: trans-frontier conservation initiatives and the human-wildlife-livestock nexus**
Mike Kock (WCS Field Veterinary Program, South Africa)
- 15.30 **The impact of diseases in the management of Tanzania's National Parks and Protected Areas**
Titus Mlengeya (TANAPA, Tanzania)
- 16.00 *Tea/Coffee*
- 16.30 **Pastoralists and nomads perceptions of wildlife disease and its impact on livestock and people in rangelands of Africa**
Gabriel Turashe (VSF Germany)
- 17.00 **The impacts of veterinary policies and regulations on biodiversity conservation in Zambia: the case of the 2004 Foot-and-Mouth Disease (FMD) outbreak in livestock**
Victor Siamadulla (Zambia Wildlife Authority, Zambia)
- 19.00 *Symposium Dinner*

PROGRAMME: FRIDAY 13 JANUARY 2006

SESSION II: The Interface of people, wildlife and livestock in rangelands

Chair: Johan du Toit (Utah State University, USA)

- 09.00 **Wildlife human conflicts in India: current trends**
M. D. Madhusudan (Nature Conservation Foundation, India)
- 09.30 **Grazing in the wild rangelands and disease a threat to conservation: the Ethiopian scenario**
Fekadu Desta (EWCO)
- 10.00 **Jaguar-Human Conflicts on South American Rangelands**
Alexandra Zimmermann (Wildlife Conservation Research Unit, Oxford University, UK)
- 10.30 **Wildlife in the Trans-Himalayan rangelands: conservation conflicts and challenges**
Yash Veer Bhatnagar (Nature Conservation Foundation, India)
- 11.00 *Tea/Coffee*

SESSION III: Policy, Planning and Economics

Chair: James Deutsch (WCS, USA)

- 11.30 **Land, lifestyle and livelihoods in Northern Kenya**
Hussein Isack (National Museums of Kenya)
- 12.00 **Kenya's Rangelands: an economic perspective**
Mike Norton-Griffiths (Kenya)
- 12.30 **Ecological and social change in Maasailand: implications for conservation.**
K. Homewood (University College London, UK)
- 13.00 **Pastoral land tenure, livelihood diversification, and wildlife conservation: a case study from Northern Tanzania.**
J.T. McCabe (University of Colorado, USA)
- 13.30 *Lunch*
- 14.30 **Animal health impact on the pastoral economy and benefits of truly integrated wildlife livestock systems.**
F. Mituzani (ILRI/UCL)
- 15.00 **The trade effects of epidemic livestock diseases: likely future impact on wildlife conservation in pastoral areas of sub-saharan Africa**
Gavin Thomson (TAD Scientific, South Africa)
- 15.30 **Improving policy process to enable pastoralist community support to natural resource management in rangelands.**
Tim Leyland (Tufts University, USA)
- 16.00 **Closing Remarks**
James Deutsch (WCS, USA)

WILD RANGELANDS: CONSERVATION IN THE WORLD'S GRAZING ECOSYSTEMS

SESSION I: RANGELAND RESOURCES

Riding the rangelands piggyback: a resilience approach to conservation management

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Leaving aside deliberate destruction for short-term profits, most unwanted management outcomes in rangelands stem from a combination of having the wrong mental model of how the system works, and applying partial solutions to perceived problems. Recent findings from comparative studies of regional scale social-ecological systems indicate that systems like “wild rangelands” have a number of alternate pairs of stability regimes (configurations of states), at different scales, each pair separated by a defined threshold. Loss of resilience in a desired regime leads to a ‘flip’ into an alternate, usually undesired, regime, from which it is either difficult or impossible to recover. The thresholds between regimes are marked by changes in feedbacks in the system. The interactions amongst the thresholds strongly determine the future trajectory of the system as a whole.

Because these linked social-ecological rangeland systems behave as non-linear, complex adaptive systems, goals of optimising for particular products or states (a command-and-control approach to management) will very likely fail. Goals that aim to enhance the resilience of desired system regimes (albeit not *the* “best” state) are far more likely to be achieved. Learning to ride the rangelands piggyback, nudging them away from trajectories that are likely to cross undesired thresholds, and allowing them to self-organise within the set of acceptable trajectories, is a much better option than top-down, command-and-control management.

Conservation management and woody plant encroachment: the yin and yang of tree-grass interactions in grazing lands

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In the yin/yang world-view, there are elements in the universe that oppose each other, yet at the same time have an interdependent relationship; and yin and yang must be in balance to maintain health. Tree and shrub life forms markedly contrast that of grasses and these exhibit a yin/yang relationship. However, over the past 100–150 years, the balance between woody and graminoid life forms has shifted, resulting in widespread tree/shrub proliferation in the world's grasslands and savannas. The reasons for this, which are varied and the topic of active debate, will be reviewed. This phenomenon has long been recognized as a threat to livestock production; and managing the woody-herbaceous mixture to balance wildlife conservation and livestock production goals has been a source of controversy. More recently, woody plant proliferation has emerged as a threat to the conservation of grassland and savanna ecosystem types and the plants and animals endemic to them. Furthermore, increases in woody plant abundance in grasslands and savannas may have significant impacts on global biogeochemical cycles

and land surface-atmosphere interactions. Policy and management issues related to grazing land conservation thus extend well beyond the traditional concerns of wildlife conservation and livestock production to include effects on stream flow and ground water, carbon sequestration, biological diversity and impacts on atmospheric chemistry and the climate system. This talk will discuss challenges facing the research community in quantifying and monitoring these varied impacts; challenges facing the management community in achieving woody-herbaceous vegetation mixtures in configurations that satisfy competing objectives and pitfalls facing policy makers that fail to take a wide view.

Livestock and wildlife management in an hyperarid environment – lessons from the Ibex Reserve, Saudi Arabia

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The Ibex Reserve is an unfenced Resource Use Reserve that was established in 1988 to conserve Nubian ibex, representative flora and fauna of the central plateau of Saudi Arabia and provide a safe site for re-introduction of mountain gazelles. People from five villages have communal grazing rights, collect wood and use the Reserve for recreation.

Examples are presented to illustrate (1) features of the ibex and mountain gazelle populations; (2) the complex interactions between resilience of the dominant plants and intensity of use by camels; (3) the synergy and competition between livestock, ibex and gazelles. In addition to these biological issues, features that are specific to Saudi Arabian culture and even specific communities have a major impact on the management of the Ibex Reserve.

Guanaco management in Patagonian rangelands: a conservation opportunity in the brink of collapse

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The guanaco is the only large, widely distributed native herbivore in the Southern Cone. However, during the last 100 years, guanacos have undergone a dramatic population decline from around 10 million to half a million individuals, after traditional sheep ranching overtook most of the Patagonian steppe. Competition with sheep, hunting and habitat degradation due to overgrazing resulted in substantially reduced guanaco densities, local extirpation, restriction to marginal, low-quality habitat and population fragmentation. Protected areas encompass less than 1% of the 600,000 km² of Patagonian steppe. High-density populations are rare and confined to either scarce, small areas, or remote, degraded habitat that is unsuitable for sheep ranching. Today, sheep ranching is still the main economic activity and guanaco poaching continues to be widespread. The few high-density guanaco populations that remain face increasing exploitation for wool production. During the last 5 years, over 25 sheep ranches have begun managing guanacos by conducting live-capture and shearing to produce high-quality wool for export. If properly managed this and other types of use could help maintain and promote the recovery of large guanaco populations in the matrix between protected areas. However, if mismanaged, or if this type of use leads to the development of guanaco farms, as some local agencies and managers advocate, the last opportunity to conserve the dominant

wildlife species of the Patagonian steppe will be lost.

We envisage a network of protected areas within a matrix of sustainable management to ensure the long-term survival of guanacos.

Identifying the most effective intervention points for rangeland conservation: working across spatio-temporal scales

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Conservation practitioners are faced with a common dilemma: how to effectively deploy limited financial and human resources and respond quickly to perceived conservation crises. In the case of rangelands, this dilemma carries a particularly heavy burden of responsibility because many millions of people depend on rangelands for their livelihoods. If conservation practitioners 'get it wrong' they waste time and money, and damage whatever trust may have existed between land users and conservation agencies. To be successful, interventions should be applied at the spatial scale at which the problem is generated, even if the immediate problem was perceived at a different scale. By way of analogy, consider how a microscope is used – the investigator racks up and down using lenses of different magnification before selecting a setting that provides the clearest view – but the final setting could not be arrived at without first racking up and down. In contrast, rangeland conservation interventions are often directed at “pet projects” that cannot possibly lead to long-term solutions because causes of the problem occur at different spatial/temporal scales or levels of institutional organization. Furthermore, the timing of an intervention (initiation and duration) should be considered on the basis of its likelihood of success – if a problem is beyond feasible help then resources should be redirected to more promising projects. Finally, the opportunity costs of imposing a conservation 'solution' on local people should be thoroughly evaluated prior to intervention. Rangeland case studies will be used to illustrate these issues and stimulate debate about the planning of conservation interventions for rangelands.

SESSION II: THE INTERFACE OF PEOPLE, WILDLIFE AND LIVESTOCK IN RANGELANDS

Rinderpest eradication - the end of a long story or birth of a new holistic approach to multi-host disease management in Africa

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Diseases on rangelands over the last two centuries have contributed significantly to their current landscape. The reason is that rangelands have been home to man and his domesticated species alike for millennia.

One consequence of this concentration of communities on open grassland systems, was the regular mixing of wild ungulates and domestic animals, sometimes with catastrophic consequences, as experienced in the rinderpest pandemic in Africa in the late 19th Century.

The reaction of society to these scourges was to attempt to control the diseases and reduce the risk of infection: the arguments were based on the need to improve productivity on rangelands for food security and latterly to be able to trade freely across continents and improve livestock economics.

Considerable progress was made in many grassland systems especially in more economically developed countries such as in southern Africa, whilst traditional rangelands remain a problem. Here, with free movement of animals across vast areas and where national borders have no meaning, a multi-host disease ecology for major infections exists, as has been the experience with two major plagues of cattle and other cloven hoof animals; rinderpest and foot-and-mouth disease.

Considerable investment continues into managing diseases in rangelands and in the case of rinderpest, eradication was chosen as the ultimate method of dealing with the plague. Although considerable progress has been made globally, the last focus stubbornly persists in East Africa, at least this was the case up to 2002.

The complexities involved in dealing with rinderpest (with wildlife in mind) are the subject of this talk, which will illustrate how veterinary scientists have moved away from a narrow consideration of the problems affecting one species or another, and how they are now examining the complex epidemiology of infections to better understand the best disease control practices and to re-examine current dogma. Trends in the animal-disease community are also discussed, highlighting progress in the integration of domestic livestock, wildlife and human health practitioners to deal with disease problems and the continuing importance of disease in shaping rangeland ecosystems.

Health and disease at the interface: Trans-Frontier conservation initiatives and the human-wildlife-livestock nexus.

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Within Africa, the development of Trans-Frontier Conservation Areas (TFCAs) is seen as a positive development, both politically and environmentally, supporting human development and biodiversity conservation. In southern Africa at least seven TFCAs are currently being developed and have political support, with international agreements being developed or already ratified. But many of these initiatives are moving forward, often politically driven, without addressing the potential animal and human health implications and challenges that maybe expected with a significant enlargement of the wildlife-livestock-human interface, especially across national borders with different disease control policies.

Addressing critical factors, such as the provision of ecosystem goods and services, health care and disease management, is essential with the development of these large, integrated landscapes. In fact, these are areas that could determine the ultimate success of a given TFCA. The complexity of the challenges requires a different paradigm, one that challenges the current command and control aspects of disease management in Africa, recognizes the importance of human health and livelihoods, is based on an ecosystem approach, and is holistic in nature.

The impact of animal diseases on the management of Tanzania's National Parks and Protected Areas

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In Tanzania, over 28% of the country is protected (as national parks, game reserves, game-controlled areas or forestry reserves). In large ecosystems, many wild species have been able to tolerate natural disasters and their populations have recovered from a period of ecosystem disturbance. However, growing human populations and their activities in and around protected areas has negatively impacted wildlife, bringing increased risk of disease transmission among wildlife, livestock, and humans. Wildlife diseases are not only important to the management of Protected Areas but also to humans and domestic animals and impact public health, livestock economies, tourism and wildlife conservation. The Veterinary Unit of Tanzania National Parks has been established to monitor disease trends and impacts, and to advise the management authorities on the best course of action.

The ability of the Unit to effectively address many of these issues is limited owing to the vast expanse of the areas involved and the wide-range of species covered. Furthermore, the number of veterinary staff with adequate skills is small, funding and equipment are often unavailable and awareness of the impact of disease on wildlife systems among decision-makers is low. Most emerging diseases affect large ecosystems across countries, so there is a need to strengthen local and regional capacity to detect and identify disease threats, launch efficient reporting mechanisms, and to develop concerted efforts to manage and mitigate effects of disease on wildlife.

Pastoralists and nomads perceptions of wildlife disease and its impact on livestock and people in rangelands of Africa

Gabriel Turashe (VSF Germany)

The impacts of veterinary policies and regulations on biodiversity conservation in Zambia: the case of the 2004 foot-and-mouth disease (FMD) outbreak in livestock

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The Zambian Government, like most governments in southern Africa, has continued to ignore the impacts of veterinary policies and regulations on biodiversity conservation, particularly wildlife utilization. Wildlife practitioners are questioning the 'zero-risk' policy pursued by state veterinarians regarding trade in animal products during disease epidemics in the absence of risk analysis. During disease outbreaks veterinary regulations, initially designed to promote the livestock sector, are 'religiously' enforced in the wildlife sector without technical, economic and socio-political considerations. The 2004 foot-and-mouth disease (FMD) outbreak in livestock in southern and central provinces of the country brought out numerous lessons for both veterinary and wildlife bureaucrats. The trade embargo on animals and animal products in affected areas resulted in loss of income to various stakeholders and deprived rural and urban communities of about 47.7 tons of game meat. The state wildlife agency, Zambia Wildlife Authority (ZAWA), incurred a loss of income of about US\$ 300 000 as it could not complete utilization of the hunting quota for

the Kafue flats. Consequently, funds disbursed to local communities for biodiversity conservation and rural development under the CBNRM programme declined by 40% in affected protected areas compared to the 2003 disbursements. Other impacts include disillusioned and frustrated individuals who subsist on selling (legal) game meat who could not ply their trade. The economic impact could have been minimised significantly had state veterinarians allowed trophy hunting subject to a non-quantitative risk analysis (non-QRA). Previous prejudices against wildlife were rekindled among veterinarians and politicians, with both parties advocating for the fencing off of the protected areas on the Kafue flats as a permanent solution to the control of livestock diseases in the area. Incidentally, the protected areas occupy the major portion of the flats, which are the major grazing sanctuaries for livestock during the dry season. The fence could cut off wildlife from certain ecological resources. Counter proposals to the trade embargo by ZAWA and other wildlife-based stakeholders were not tenable as state veterinarians demanded for a QRA even in the absence of scientific data on FMD in wildlife on which to base the QRA. Investment in wildlife health programmes (WHPs) is virtually absent resulting in patchy and scanty epidemiological data on wildlife diseases. Despite existing information gaps realigning of veterinary policies and regulations to the needs of wildlife conservation is still required. Otherwise existing veterinary policies and regulations do not promote biodiversity conservation, especially consumptive tourism. Government should urgently invest heavily in WHPs to generate data on wildlife diseases required for the QRA in order to promote consumptive tourism.

Wildlife–human conflict in India: current trends

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Under unrelenting pressures from its vast human and livestock populations, India's remaining wildlife is today forced to share space and resources with humans. As a consequence, conflicts between people and wildlife have escalated, undermining both human livelihood and wildlife conservation. Although widespread, wildlife–human conflicts have been particularly serious across India's grazing lands, spanning grassland, scrub and woodland ecosystems. Over the last four decades, designated grazing lands in India have declined by over 25% whereas populations of grazing livestock have risen by 43%. Today, livestock graze in over three-quarters of India's wildlife reserves, frequently in greater numbers than wild herbivores. As a result, livestock seriously reduce the carrying capacity of these habitats for wild herbivores. This, in turn, aggravates the tendency of many wild herbivores to enter adjoining cultivated landscapes, raid crops and come into serious conflict with farmers. Similarly, as domestic grazers out-compete and replace wild herbivore prey species, they also provoke conflict in the form of livestock depredation by large carnivores. Besides livestock grazing, other regimes of extractive natural resource use also aggravate the propensity of large wildlife to come into conflict with humans. Drawing on case studies of conflict from across India, this paper provides a synthetic framework to understand relationships between wildlife–human conflict and regimes of extractive natural resource use in wildlife habitats. Given the wider cultural, socio-economic and political contexts of wildlife–human conflict in India, the paper also suggests broad strategies to manage wildlife–human conflict.

Grazing in the wild rangelands and the threat of disease to conservation: the Ethiopian scenario

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Human population growth has escalated the threat to wildlife resources. In Ethiopia in the last 30 years the human population has doubled from 30 to 75 million and this increment has been associated with increased livestock numbers. Forest resources have declined from 40% of national land coverage to 2.5%. This dramatic population growth brought communal grazing of wild and domestic animals in conservation areas and disease has become the major threat to wild animal species.

Rabies has been a major threat to the endangered Ethiopian Wolf (*Canis simensis*) in the Bale Mountains National Park. The first catastrophic loss was in 1990s, which decimated two thirds of the population and second loss was in 2003 killing 65 wolves. On both occasions, the disease was transmitted by the domestic dogs of pastoralists living in the park and surrounding areas.

Anthrax has also killed more than 2600 wild animals of 21 different species in two outbreaks in 1999 and 2000 in the Mago National Park. Lesser kudu (*Tragelaphus imberbis*) suffered severe losses, amounting to 1531 and 526 animals in 1999 and 2000, respectively. The disease was first observed in livestock surrounding the Park and later transferred into the Park. Walia ibex (*Capra walie*) is a critically endangered caprine confined in the Simen Mountains National Park (170 km²), a world heritage site. Sheep and cattle graze heavily within the Park and recently mullerius spp, lung worm, gastrointestinal parasites and coccidian spp were found in both Walia ibex and domestic cattle. A Walia kid found dead was affected by severe mange infestation.

Conservation without development in Africa has failed and focus must lie on the buffer zone of the national parks/wildlife areas, which often depend on the natural resources of the national parks.

Jaguar–human conflicts on South American rangelands

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The jaguar *Panthera onca* occurs in a variety of habitats throughout Central and South America, including grasslands, wet/dry savannas and areas adapted for cattle ranching. Predation on livestock occurs frequently and conflicts between jaguars and farmers are widespread. Yet with a shortage of undisturbed habitat remaining for jaguars, their reliance on range outside protected areas is inevitable. Many of the major rangelands in South America, such as the Colombian and Venezuelan Llanos, the Bolivian Beni, and the Brazilian Pantanal are prime areas both for jaguars and for cattle ranching. In these human-dominated landscapes, the co-existence is a challenge for which conservation scientists and farmers alike struggle to find solutions. Our paper provides an overview of these major rangelands in the context of jaguar conservation. We then focus on a key case study which, along with the Amazon forests, is believed to be the last remaining stronghold for the global jaguar population: the Pantanal. This predominantly privately owned tropical wet savanna is used extensively for cattle ranching, but also supports a

large biomass of wildlife, including the largest subspecies of jaguar. Depredation of livestock and persecution of jaguars are both common, but often not rationally linked. Our research, observations and work with ranchers in this region over the past years has provided insights into the key variables important for conflict-management strategies. In a rangeland such as the Pantanal, assessments of the ecological needs of jaguar and the relative economics of damage to cattle ranches are important, yet an understanding of sociological variables such as culture, attitudes, and beliefs are an essential and often undervalued component in resolving human–wildlife conflicts.

Wildlife in the trans-Himalayan rangelands: conservation conflicts and challenges

Charudutt Mishra and Yash Veer Bhatnagar

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India possesses over 200,000km² of high-altitude rangelands all along the c. 2,500km sweep of the Himalaya from the eastern state of Arunachal Pradesh, to Jammu and Kashmir in the west. Agro-pastoralists and nomadic communities of different ethnicities have inhabited these tracts for over five millennia. The plant productivity in these dry alpine steppe tracts is low (mean c. 170 kg ha⁻¹) and is limited to the short summer months. Despite this, the region has among the country's richest assemblage of wild ungulates (c. 10 species) including some globally endangered species such as Tibetan argali (*Ovis ammon*) and Ladakh urial (*Ovis vignei*); and carnivores (6 species) such as the endangered snow leopard (*Uncia uncia*).

Both human use and wildlife occurrence are pervasive throughout the landscape, including the c. 15,000km² Protected Area network - the largest for any region in the country. This however does little to conserve the wildlife, the bulk of which occurs outside the network, while human use continues unabated inside. In some areas increased levels of human–wildlife conflicts and overstocking of livestock, amid rapid socioeconomic changes are enhancing threats to wildlife resulting in the decline and local extinction of species such as the Tibetan gazelle (*Procapra picticaudata*) and argali.

The occurrence of wildlife in low densities across the landscape where human use is pervasive and few alternative livelihood options available, throws up numerous conservation challenges. We discuss the need for alternative approaches to wildlife conservation including numerous small community-managed inviolate 'core' areas rather than a few large PAs. We also discuss approaches to implement improved conflict management, livestock husbandry and designation of inviolate areas at both the local and national levels in order to achieve the goal of sustainable conservation of the trans-Himalayan rangelands.

SESSION III: POLICY, PLANNING AND ECONOMICS

Land, lifestyle and livelihoods in northern Kenya

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Pastoralism as a system of livestock production defined by mobility of herds and households is a cultural system. The practice is a form of land use that is dependent on the functioning of customary land tenure that promotes the required mobility and sharing of natural resources.

In Kenya, pastoralists account for about 20% of the total population and occupy most of the country's 80% arid and semi-arid areas. The largely neglected northern Kenya region that is inhabited by cattle, camel and small stock rearing communities covers an area of approximately 50,000 sq km and the last remaining large-scale ecosystem in Kenya. Traditionally, land, which is socially, culturally, spiritually and economically central to the livelihoods of pastoralists is equally accessed by all members of the community, is not seen as a commodity in economic sense and relations to it are chiefly governed by customs and taboos. However, the promulgation of the Trust Land Act that transferred decisions on land from the communities to County Councils and the application of Common law that protects privatization and conversion communal land access systems into public or individual ownership have both endangered the security of pastoral lands as well as alter community's land access and usage. The consequences have been reduction in grazing areas, increased competition, depletion of natural resources, and breakdown of coping mechanisms for drought management, heightened stress and conflicts.

The paper highlights key issues and makes suggestions of policy interventions.

Kenya's rangelands: an economic perspective

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Long-term data sets from Kenya reveal fundamental changes in the production strategies of pastoralist landowners and land users over the last 30 years. The rapid growth in the human population has been accompanied by the expansion of cultivation, the intensification of livestock production and a significant reduction in wildlife density and diversity. Agriculture (cultivated hectares) is expanding at around 8% per annum, returns to agricultural investment remain high and agricultural rents are being rapidly taken up everywhere. While returns to livestock are more modest, the last 30 years has nonetheless seen a year on year increase of 4% in off-take – but from a stable livestock herd. This demonstrates a fundamental shift from extensive to more intensive production systems.

In contrast, returns to wildlife remain low in the face of continuing policy failures (e.g. the continued prohibition of the highest value production through sport hunting); institutional failures (e.g. over reliance on command-and-control rather than on economic incentives to influence wildlife abundance and distribution); and market failures (e.g. continued diversion of wildlife rents to tourism cartels rather than to producers). Accordingly, despite significant tourism revenues in some areas, there has been a >50% eradication of wildlife throughout Kenya's rangelands. Furthermore, population growth is leading to ever increasing

difficulties in the equitable capture of agricultural and livestock rents under group or communal tenure systems. This is in turn precipitating the rapid sub-division of land, an even greater intensification of agricultural and livestock production, and the further marginalisation of wildlife.

From the perspective of the pastoral producer, given the very restricted area suited to wildlife use by tourism, the difficulty of capturing more than 10%–15% of wildlife rents and the 40% of livestock production costs attributable to wildlife infestation, it is in their best interests to disinvest completely in wildlife and eradicate it completely from their land.

These changes in production strategies reflect closely the contemporary relative returns on pastoral lands from agriculture, livestock and wildlife respectively. Pastoral producers are clearly highly responsive to market forces and are demonstrating rational investment decisions in response to current economic and social conditions. Pastoral production is clearly becoming more closely integrated into the national economy, and may even be making a positive net contribution to domestic product.

Ecological and social change in Maasailand: implications for conservation

Katherine Homewood

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Masaailand wildlife supports a major tourist industry in and around protected areas in both Kenya and Tanzania. Many Maasai communities and households focus on extensive pastoral livestock production, and maintain unfenced rangelands compatible with sustainable wildlife populations. However, rapid diversification into farming and other livelihoods is taking place alongside drastic changes in tenure and access to resources. The spread of commercial cultivation and other enterprises increasingly captures key resources impacting on wildlife and local agropastoralist populations. Even where potentially high earning wildlife resources could in theory underpin sustainable development, the poor distribution of returns and the incentives to invest in alternative enterprises undermine conservation, development and equity outcomes. Building on past comparative, cross border work on changing land use, land cover and wildlife populations around the Serengeti-Mara ecosystem, this paper sets out preliminary results from an ongoing major collaborative synthesis study of land use and livelihoods change across Maasailand. Focusing on two of the seven major study sites, Mara in Kenya and Longido in Tanzania, this paper presents data from household surveys documenting the change in land use and livelihoods, and exploring the implications for conservation and development.

Pastoral land tenure, livelihood diversification, and wildlife conservation: a case study from northern Tanzania.

J. Terrence McCabe

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Conservation policy and the establishment of protected areas have impacted the indigenous peoples of eastern Africa for most of the last 100 years. The protection of wildlife is part of a globalized process that involves both the preservation of biodiversity and the generation of revenue from foreign tourists. People who practice nomadic pastoralism have been differentially affected by conservation policy as they live in the

same savanna regions that are important for wildlife conservation. Although conservationists are now more sensitive to reducing negative economic impacts on local communities that can occur with the establishment of a park or protected area, recent changes in pastoral livelihoods pose an unanticipated, and serious challenge to current conservation efforts. Recent research, conducted by colleagues, and myself suggests that people are adopting cultivation and seeking wage labor in response to population pressure, the need for money, uncertain environmental conditions, and the realization that education may hold the key to their children's future. Research that I am currently engaged in further suggests that the rapid expansion of cultivation in the Simanjiro plains, east of Tarangire National Park is a result of people perceiving that their land is at risk due to the fear of Park expansion, and may lead to the islandization of the Park. These rapid and fundamental shifts are seen as incompatible with current conservation policy, potentially precipitating unprecedented confrontations between conservationists and local communities.

Animal health impact on the pastoral economy and benefits of truly integrated wildlife livestock systems.

F. Mituzani (ILRI/UCL)

The trade effects of epidemic livestock diseases: likely future impact on wildlife conservation in pastoral areas of sub-Saharan Africa

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It is widely accepted that greater access to commodity markets of all kinds is an important element in fostering trade that will effectively enable poverty to be ameliorated in developing countries. For countries in the arid and semi-arid areas of sub-Saharan Africa, livestock and products derived from livestock are among the few tradable commodities available. For this reason promotion of livestock-derived exports is an increasing focus of poverty alleviation, particularly for pastoralists.

However, sub-Saharan Africa has a wide variety of infectious agents that have evolved with the diversity of free-living mammals that are endemic to the subcontinent. Some of these agents are capable of causing epidemic diseases of domestic ungulates that have either never occurred in the developed world or have been eradicated. For that reason, inadvertent import or re-importation of such agents is an ongoing concern for agriculturally developed regions and countries and constitutes a constraint to expanding trade in livestock commodities.

A variety of approaches to facilitating safe livestock commodity exports from developing countries have and are being developed e.g. "zonation", "compartmentalization" and "commodity-specific risk reduction". In some East African countries creation of 'disease-free zones' to facilitate trade in livestock commodities has become a political imperative. The presence of wildlife in and around such areas creates a problem in respect of some important trade-sensitive diseases of livestock. For that reason, the possibility arises that wildlife, particularly species such as African buffalo, will be increasingly seen as inimical to rural development.

Improving policy process to enable pastoralist community support to natural resource management in rangelands

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It is increasingly realized that pastoralists have a major role to play as custodians of bio-diversity in rangeland areas. Using examples from Africa, the synergy between pastoralists and conservationists in terms of common goals, areas of operation and the intricate balance between wildlife and livestock are highlighted. Yet pastoralism is livelihood that is in crisis, as is exemplified in Ethiopia, where land-use change, sedentarisation and marginalization all negatively impact rangeland bio-diversity. Central to this problem is the lack of positive policies toward pastoralism that consider the needs of pastoral communities. The nature of policy itself is discussed, to demonstrate that policy process is not linear or rational as commonly assumed but dynamic, messy and complex. Understanding policy process and effectively building the capacity of pastoralists to advocate for their livelihoods is key to speeding up positive change and the sustainable conservation of rangelands. A successful animal health and marketing initiative within the African Union is used to illustrate the range of policy changes that are urgently needed to support pastoralism. Conservation organizations are increasingly embracing the need to support and work with pastoralists. By identifying key players, strengthening networks of policy makers, and improving the understanding of the reasons for change, these organizations have a key role in working at local, national and international levels to promote pastoralism that is viable and therefore supportive of conservation efforts.

Closing Remarks

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