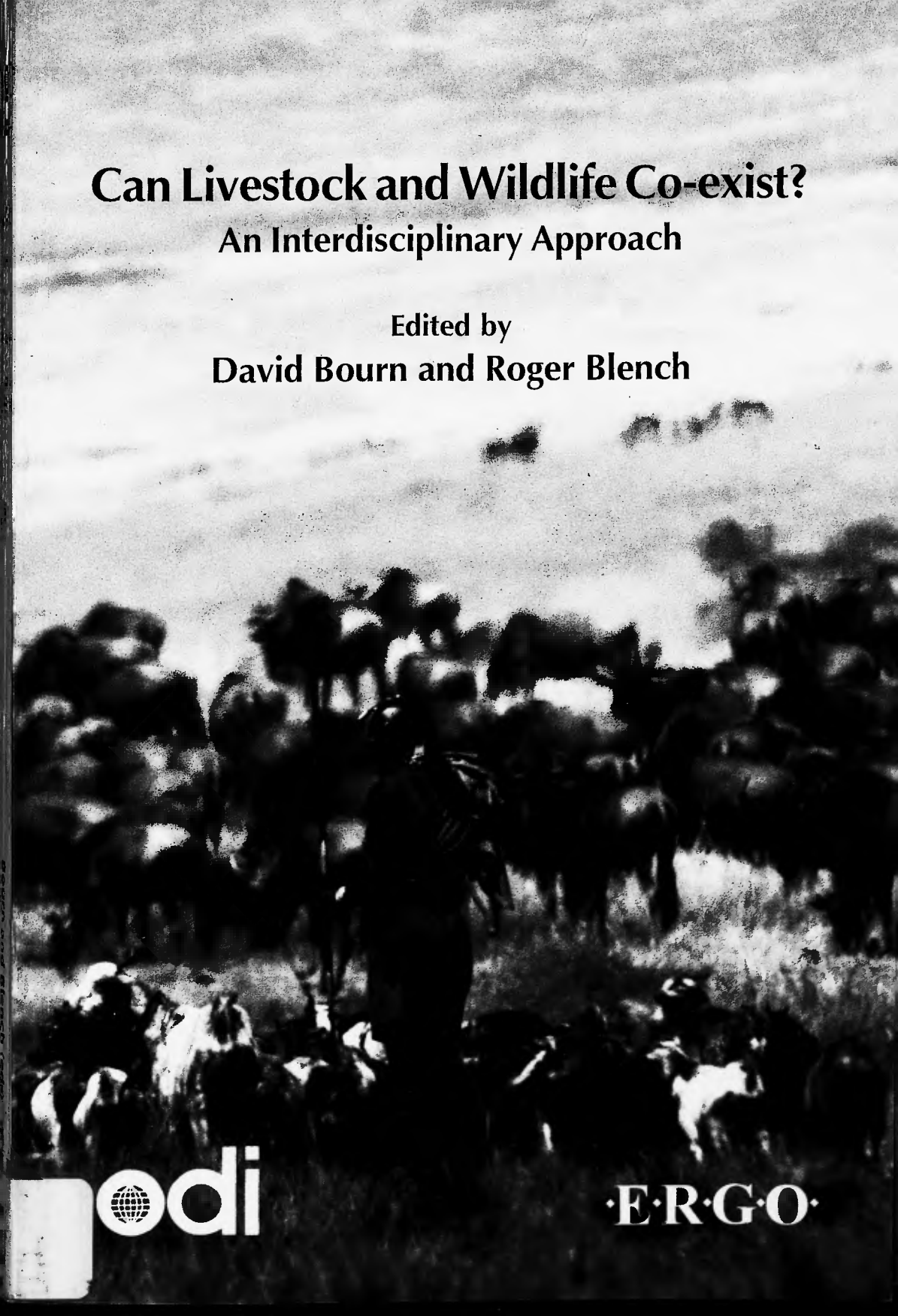
Can Livestock and Wildlife Co-exist?

An Interdisciplinary Approach

Edited by
David Bourn and Roger Blench



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This book grew out of a review commissioned by the Animal Health, Livestock Production and Natural Resources Systems Programmes of the UK Department for International Development's Renewable Natural Resources Knowledge Strategy.

The Environmental Research Group Oxford was established in 1985 to provide consultancy services relating to environmental assessment, planning and management, including natural resource surveys, rural appraisal and geographical information systems.

The Overseas Development Institute is an independent think-tank on international development and humanitarian issues. ODI provides research support and policy advice on development issues to governments, international agencies and non-governmental bodies.

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ODI Research Study

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Livestock, Wildlife and People in the Semi-Arid Rangeland of Eastern Africa

edited by
David Bourn and Roger Blench

with contributions from
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Liz Drake
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The Environmental Research Group Oxford

A CIP Publication data record for this publication may be obtained from the British Library

ISBN: 0 85003 408 6

Published by the Overseas Development Institute
Portland House, Stag Place
London SW1E 5DP

Cover photograph reproduced with permission from Oxford Scientific Films.

Printed by Russell Press Ltd, Nottingham.

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Summary

Population Trends, Environmental Change and Potential Target Zones

1. Human population growth, agricultural expansion, deforestation, hunting and the ramifications of economic development have had profound, cumulative impacts on the environment, natural habitats and wildlife populations all over the world. East Africa is no exception. The number of people in Kenya, Tanzania and Uganda has doubled over the past 20 years, and is set to double again in the next 30-40 years.
2. Settlement and cultivation are concentrated in areas of higher rainfall and greater agricultural potential, around Lake Victoria, in the highlands, and along the coast. Mean population density is highest in Uganda and lowest in Tanzania. Agricultural land scarcity, however, is greatest in Kenya because of generally lower rainfall. Nevertheless, the general trend in all three countries is for agricultural expansion and the transformation of natural habitats to farmland.
3. Extensive habitat conversion and unauthorised hunting, exacerbated by a proliferation of high-powered automatic weaponry in recent years, has hastened the long-term decline and disappearance of wildlife from many areas. Population estimates for the Kenya rangelands indicate that the overall number of wildlife has fallen by a third over the past two decades. Wildlife has been eliminated from much of Uganda, including many protected areas. In Tanzania, wildlife has also declined, but because of the country's size and relatively low human density, substantial wildlife populations survive in the extensive wildlands that still remain.
4. Livestock trends are less clear. Monitoring surveys indicate that cattle and small ruminant populations in the Kenya rangelands have fluctuated widely over time, but no significant long-term trends are evident. Low-level aerial surveys suggest that livestock out-number wildlife by a factor of 10:1. Limited data from the Ngorongoro Conservation Area in Tanzania indicate that cattle numbers have decreased over the past 40 years, whilst there has been a substantial increase in small ruminants. National livestock population estimates for Tanzania indicate increases of between 150-250% from 1971 to 1994.
5. The best prospects in east Africa for demonstrating the sustainable co-existence of livestock and wildlife are: in zones adjoining protected areas; in regions with relatively low rainfall and limited potential for arable farming; where human population density is relatively low; and where livestock owners predominate, or are a major component of local

communities. Potential zones of interest include: Maasai Mara, Meru, Tsavo and Samburu in Kenya; Mikumi, Mkomasi, Ngorongoro, Tarangire, Ruaha, Serengeti and Udzungwa in Tanzania; and Kidepo Valley and Lake Mburo in Uganda.

Disease Risks

1. Diseases need not be a major constraint to wildlife and livestock co-existence in the semi-arid rangelands.
2. Although there are many diseases that can affect both wildlife and livestock, only a few are considered to pose a significant risk to livestock production.
3. The majority of game animals are not involved to any significant extent in the transmission of disease to livestock. Exceptions include the African buffalo and the wildebeest, both of which can, under certain circumstances, transmit serious disease to livestock.
4. With increasing human population, altering land use and changing farming systems, the relevance and importance of diseases involving wildlife and livestock are changing. Strategies to manage the diseases must, in some situations, be altered to take account of these changes.
5. With increasing human populations and encroachment into areas bordering wildlife reserves, there is an increasing risk of disease spreading from domestic animals to wild animals. Strategies to protect valuable wildlife species from introduced disease need to be developed.
6. There is a general scarcity of information on the occurrence and importance of the various diseases affecting livestock and wildlife in the semi-arid rangelands. Better disease surveillance is required, with improved systems of information management and dissemination.
7. In-country expertise on wildlife diseases is limited and resources for research are lacking.

Socio-economic Considerations

1. Increased emphasis on poverty reduction and rural livelihoods within donor agencies and some governments, and greater interest in biodiversity conservation, justifies examination of apparently competing policies for rural development and wildlife management. Recent developments have escalated the potential for conflict as:

    i. Demographic pressure is both pushing pastoralists to gain access to protected rangelands and causing cultivators to farm up to park

boundaries, thereby accelerating the potential for damage to crops and property.

ii. Unauthorised hunting is reducing the attractions of some protected areas. Even where wildlife populations inside conservation areas are well protected, there is a growing recognition that reserves as isolated islands surrounded by wildlife deserts are not sustainable, and that hunting needs to be carefully controlled, both within and outside conservation areas.

2. At the same time, new conservation philosophies concerning community participation in wildlife management are proving to be problematic to implement. An analysis of alternative strategies for resolving these conflicts and enhancing sustainable rural livelihoods through integrated livestock and wildlife management concludes that:

   i. Revenue and resource sharing may mitigate the costs of living alongside national parks, but are unlikely to compensate for loss of access to resources, or provide sufficient incentives for wildlife and habitat conservation outside national parks.

   ii. Commercial ranching, tourism and safari hunting require large land areas and, therefore, tend to benefit wealthier individuals, rather than resource-poor farmers. Whilst privatisation of wildlife and land may resolve some conflicting interests, there is no evidence that it will enhance rural livelihoods for most community members.

   iii. Case studies show that the environmental impact of human population growth and agricultural expansion is concentrated in areas of higher rainfall and greater agricultural potential. Where there are significant wildlife and/or scenic attractions, tourism and safari hunting are options for enhancing rural livelihoods on communal land, especially where the following basic conditions are in place:

      a. International/national legislation that promotes sustainable use of wildlife at the local level, e.g. safari hunting, commercial ranching for meat, hides and live sale; photographic safaris and other forms of non-consumptive tourism;

      b. Land/resource tenure that enables pastoralists and village-based communities to benefit from wildlife, and protects them from incursions by commercial interests;

      c. Initiative built on existing natural resource management structures and livelihood strategies;

      d. The potential for conflicting claims, especially in regions where there are hunter-gather populations is understood and incorporated into project design;

e. Emphasis is placed on habitat management, rather than on a single species, or species group;

f. Full participation of women and other minority groups is assured;

g. Long term commitment to capacity-building and institutional strengthening at community, local, national and regional levels; and

h. Technical support and facilitation of community-based resource assessment, prioritisation and targeting of activities, local area development planning and environmental monitoring.

Recommendations

Co-ordination and Targeting

1. Given the limited research budgets available and the overlapping objectives of the three research programmes, there is a clear need for co-ordinated action in the identification of research priorities, call for concept notes, choice of field sites and research activities.

2. For the most effective utilisation of limited resources, research studies should have clear and unambiguous collaborative links with ongoing programmes, or imminent 'pipeline' field projects.

3. To maximise impact and uptake, research initiatives should be linked closely to bilateral or multilateral assistance programmes, and conform with national priorities and development strategies.

4. Given the arable potential of higher rainfall areas, livestock and wildlife co-existence initiatives should be targeted at drier regions of the semi-arid zone with more variable rainfall, where mobile livestock and wildlife resources have a competitive advantage over static and drought-susceptible crops.

5. Plains game is increasingly concentrated in and around protected areas. The promotion of livestock and wildlife co-existence should focus on adjoining 'buffer' zones.

Collaboration and Co-funding

6. Sources of co-funding for counterpart training and institutional strengthening should be identified and earmarked to enhance the impact and sustainability of research outputs.

7. Emphasis should be given to establishing closer collaborative links with international and regional centres of excellence in animal health and wildlife management, especially in southern Africa.

Research and Training

8. Further studies are required to examine options for integrating wildlife and habitat management into the livelihoods of rural populations living in areas with low tourism and safari hunting potential, and enabling the conservation of a broad range of biodiversity rather than headline species.

9. Case-specific livelihoods analysis is required to evaluate the perceived costs and benefits of integrating wildlife into sustainable rural livelihood strategies from the perspectives of different primary stakeholders (e.g. pastoralists, agro-pastoralists, small-scale farmers) in different areas (different alternative land uses, different types of resource tenure and management structure, different levels of tourism potential) and at different times (wet and dry seasons).

10. Having evolved in situ, indigenous livestock breeds are adapted to local conditions – climate, vegetation and disease. Opportunities for the co-conservation of wildlife and local livestock breeds should be sought and encouraged.

11. Continued technical support is required in the assessment of wildlife and livestock resources, environmental monitoring, disease surveillance and the formulation of coherent community-based natural resource management and disease control strategies.

12. There is an urgent need to develop skills and provide practical field experience for indigenous wildlife biologists/ecologists, veterinarians and social scientists in conservation biology, wildlife management, disease surveillance and community-based natural resource management.

13. Appropriate indices for monitoring the sustainability of proposed initiatives need to be identified.

Consideration should be given to supporting research activities beyond the normal three-year period. Indeed, this is essential for long-term monitoring.

Wider Relevance

Options for enhancing the sustainable co-existence of livestock and wildlife are relevant beyond the confines of eastern and southern Africa, notably the extensive rangelands of central Asia.

Preface

This review[1] was commissioned by the Animal Health, Livestock Production and Natural Resources Systems Programmes of the UK Department for International Development's Renewable Natural Resources Knowledge Strategy (RNRKS). The aim of the strategy, formerly known as the Renewable Natural Resources Research Strategy (ODA, 1994, 1995), is to generate new knowledge in natural and social sciences, and to promote the uptake and application of this knowledge to sustain livelihoods of poor people through better management of renewable resources.

The RNRKS has both bilateral and multilateral components. The bilateral component is organised as twelve research programmes covering livelihood systems in agriculture, forestry, livestock and fisheries. These programmes are managed by UK institutions contracted by the Department to deliver a total of some sixty development objectives during the decade: 1995-2005. The multilateral component entails working with and influencing the international renewable natural resources research community, in particular the Consultative Group on International Agricultural Research, which sponsors sixteen international research centres around the world.

The Animal Health, Livestock Production and Natural Resources Systems Research Programmes have similar, inter-related development objectives for semi-arid regions:

Animal Health Programme, Semi-Arid System Purpose 2:
'Optimal disease management strategies for the sustainable co-existence of livestock and wildlife on semi-arid rangeland adopted.'

Livestock Production Programme, Semi-Arid System Purpose 2:
'Optimal strategies adopted for the sustainable management of livestock on semi-arid rangeland.'

Natural Resources Systems Programme, Semi-Arid System Purpose 3:
'Productivity increased and sustainability enhanced in tsetse-infested areas.'

Terms of reference for the study called for an inter-disciplinary review of the current state of knowledge and future prospects for sustainable co-existence of livestock and wildlife in the semi-arid rangelands of eastern Africa. The review process included a fact-finding mission to east Africa in April and May 1998, focus group discussions, key informant interviews, literature searches, peer reviews and a one-day workshop at DFID in October 1998. Findings are being disseminated through formal publication

[1] A summarised version of this review was recently published as ODI *Natural Resource Perspectives* No. 45 'Reconciling interests among wildlife, livestock and people in Eastern Africa: a sustainable livelihoods approach' by C. Boyd, R. Blench, D. Bourn, L. Drake and P. Stevenson see www.oneworld.org/odi/nrp/index.html.

in both hard copy and digital electronic formats, together with an annotated bibliography of key information sources for ease of reference.

The views and recommendations contained in this report are those of the authors and do not, necessarily, reflect the policy or priorities of the British government, or programme management.

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Abbreviations and Acronyms

AA	Appropriate Authority
ACC	African Conservation Centre
ADC	Agricultural Development Corporation
AHP	Animal Health Programme
AVHRR	Advanced Very High Resolution Radiometer
AWF	African Wildlife Foundation
BP	Before Present
CAMPFIRE	Communal Area Management Programme for Indigenous Resources
CBNRM	Community Based Natural Resource Management
CBO	Community Based Organisation
CIS	Community of Independent States
CITES	Convention on International Trade of Endangered Species
COBRA	Conservation of Biodiverse Resource Areas project
CPR	Common Property Rights
CTVM	Centre for Tropical Veterinary Medicine
CWS	Community Wildlife Service
DC	District Council
DFID	Department for International Development
DRSRS	Department for Resources Surveys and Remote Sensing
EC	European Commission
ERGO	Environmental Research Group Oxford
EU	European Union
FAO	Food and Agriculture Organization
GCA	Game Controlled Area
GEF	Global Environment Facility
GoK	Government of Kenya
GoT	Government of Tanzania
GTZ	German Agency for Technical Co-operation
IIED	International Institute for Environment and Development
ILRI	International Livestock Research Institute
ITDG	Intermediate Technology and Development Group
IUCN	International Union for the Conservation of Nature - The World Conservation Union

KARI	Kenya Agricultural Research Institute
KETRI	Kenya Trypanosomosis Research Institute
KLWF	Kenya Landowners Wildlife Forum
KREMU	Kenya Rangeland Ecology Monitoring Unit
KWMP	Karamoja Wildlife Management Project
KWS	Kenya Wildlife Service
LPP	Livestock Production Programme
LPPB	Linking Policy to Practice in Biodiversity
NARCO	National Ranching Company
NCA	Ngorongoro Conservation Area
NCAA	Ngorongoro Conservation Area Authority
NE	North East
NGO	Non-Governmental Organisation
NORAD	Norwegian Aid
NP	National Park
NR	Natural Region
NRI	Natural Resources Institute
NRSP	Natural Resources Systems Programme
NRT	Natural Resource Tenure
NVRC	National Veterinary Research Centre
OAU/IBAR	Organisation of African Unity Inter African Bureau for Animal Resources
ODA	Overseas Development Administration
ODI	Overseas Development Institute
PARC	Pan African Rinderpest Campaign
PAWM	Planning and Assessment for Wildlife Management
PPP	Purchasing Power Parity
RNRKS	Renewable Natural Resources Knowledge Strategy
SADC	South African Development Community
SARDC	Southern African Research and Documentation Centre
SSA	Sub-Saharan Africa
SWRI	Serengeti Wildlife Research Institute
TANAPA	Tanzania National Parks
TWCMC	Tanzania Wildlife Conservation Monitoring Centre
UNDP	United Nations Development Programme
USAID	United States Agency for International Development

UWA	Uganda Wildlife Authority
WCMC	World Conservation Monitoring Centre
WCST	Wildlife Conservation Society of Tanzania
WD	Wildlife Division/Department
WINDFALL	Wildlife Industries New Development for All
WMA	Wildlife Management Area
WWF	World Wide Fund for Nature

Acknowledgements

Many people have contributed to this review in many different ways, including participating in focus group discussions and key informant interviews in east Africa during April and May 1998, and attending a workshop at the Department for International Development in London in October 1998. We are grateful to them all for their support, shared insights and critical comments. In particular, we wish to acknowledge the assistance of Keith Sones and Mathu Ndung'u. We would also like to thank the following: Bill Adams, Ros Aveling, Ed Barrow, Patrick Bergin, Duncan Brown, Ken Campbell, Emmanuel Chaussi, Chris Daborn, Ezekiel Dembe, Tom Dolan, Keith Eltringham, Chris Field, Lucy Emerton, Iain Gordon, Dawn Hartley, Brian Heath, Jan Grootenhuis, Katherine Homewood, Nigel Hunter, Helen de Jode, Idris Kikula, Richard Kock, Richard Lamprey, Chris Lewcock, Fran Michelmore, Mathew Maiga, Titus Mlengeya, Ireneus Ndunguru, Mike Norton-Griffiths, Robin Reid, Wyn Richards, Alan Rodgers, Peter Toima, Camilla Toulmin, Martin Walsh, John Wambua, David Western and William Wint.

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Introduction

The British Government's White Paper on International Development (DFID, 1997) identifies the elimination of poverty as the top priority for its international development agenda, and commits the United Kingdom to internationally agreed development targets. These targets include halving the proportion of people living in extreme poverty and reversing current trends in environmental degradation by 2015 (OECD, 1996; IBRD, 1998a). In addition, the Natural Resources Policy Advisory Division of DFID has initiated the 'Linking Policy and Practice in Biodiversity' (LPPB) study which is now available in draft form and which considers practical policy aspects of biodiversity maintenance.

Poverty is to be reduced through the promotion of sustainable development and good governance, focusing on the creation of sustainable livelihoods for poor people; better education, health and living conditions; conservation of natural resources and improved management of the environment. Developing countries are biologically rich in species and habitats, but often lack the resources to manage and benefit from that biodiversity (Blench, 1997). The White Paper points out that 'helping to conserve such resources and gain income from them offers benefits both for the alleviation of poverty and the safeguarding of biodiversity'.

Despite rapidly growing urban populations, seven out of ten poor people in developing countries live in rural areas, where the great majority depends on natural resources - land, water, plants and animals - for their livelihoods. Pastoralists and the rural landless are recognised in the United Nations Human Development Report (UNDP, 1997) and in the White Paper as being economically marginalised and amongst the poorest people in the world. The growth of a conservation ethos during the present century as well as a trend to more formal systems of land registration has tended to act against the interests of pastoralists, marginalising livestock producers, even where these make significant contributions to national protein supplies. Pastoralists have simply been excluded from much of their former range often by means of heavy-handed policing.

In recent times there has been something of a realisation that not only do these strategies often not work, promote inequity and social exclusion, but they may also have only a very dubious basis in ecology. New thinking has led to the introduction of participatory schemes, involving local stock producers either in reducing poaching in return for benefit-sharing or giving them some access to grazing. However, the argument is far from won, as there is some evidence that any strategies that reduce policing where there are valuable wildlife resources sees a corresponding increase in poaching no matter whether the community is involved or not. The recent

announcement by Kenya of a return to exclusion strategies is a stark reminder of the high stakes in what is as much a political as a scientific debate.

In view of this, it seems appropriate to review the scientific, socio-economic and ethical issues involved in making policy in this area. This interdisciplinary review examines the interface between pastoral livestock production and wildlife management, and explores the prospects for livestock and wildlife co-existence within a sustainable livelihoods framework (Carney, 1998 a&b). It focuses on the semi-arid rangelands of eastern Africa, as this is the major region of Africa where occupationally specialised pastoralists come into contact with substantial numbers of large mammals. Although pastoralists are abundant in West Africa, large mammals are now rare and this is simply not an issue. Wildlife is common in parts of Southern Africa, but pastoralists absent; moreover tenure systems are very different with a much higher proportion of enclosed land.

Historical and Geographical Perspectives

Livestock and Wildlife Co-existence

In this review, we interpret livestock and wildlife co-existence to mean the joint occupation and utilisation of the same general land area for any period during the course of a year. Livestock includes cattle, camels, donkeys, horses, sheep and goats. Wildlife relates to 'plains game,' including medium to large mammalian herbivores. On the basis of those definitions, pastoralists and their livestock have probably co-existed with wildlife in Africa for some 7000 years (Blench & Macdonald, in press).

The social interactions of human groups during those periods cannot easily be reconstructed, but it is likely that few of the tensions evident today were present. It is clear that pastoralists must have hunted large mammals from the earliest times. Sites in north-east Africa suggest that wild cattle were hunted as part of the megafauna before they were brought into domestication. Pastoral cattle in eastern and southern Africa are in evidence as early as 4000 BP (Marshall, in press).

The general trend over much of the region in this century has been for livestock and wildlife to be managed separately. National parks have been set aside for many reasons, including protection of national assets; conservation of natural resources; recreation and the promotion of tourism; educational and scientific purposes; trans-boundary collaboration; and in response to international influence. Pastoral livestock are excluded from the great majority of such areas in Africa today, although multiple use is allowed in some protected areas, such as Amboseli National Park and the Ngorongoro Conservation Area.

Outside protected areas, wildlife is extensively hunted and predators are considered a pest by many pastoralists. Seasonal migratory movements are

restricted increasingly by agricultural expansion and settlement. The separation of wildlife and livestock has been reinforced by past tsetse and trypanosomosis control policies in some areas, although their effectiveness has declined of late. From the park manager's point of view tsetse are an asset that deters invasion by livestock; but to the pastoralist, tsetse are the vector of a disease that reduces productivity and contributes to their impoverishment.

These issues have come to the fore recently for several reasons:

- Demographic pressure is pushing pastoralists to gain access to protected rangelands, and causing cultivators to farm up to park boundaries, thereby accelerating the potential for damage to crops and property.
- Unauthorised hunting is reducing the attractions of some protected areas; and even where wildlife populations are well protected, there is growing recognition that reserves as isolated islands are unsustainable, and that hunting outside conservation areas must be controlled.
- Increasing international pressure is being exerted on developing countries to strengthen the conservation of their biodiversity.
- Livestock's role in agriculture and the wider environment has been questioned, and doubt has been caste on the wisdom of conventional animal disease control strategies, especially in relation to trypanosomosis.
- new conservation philosophies concerning community participation in wildlife management are proving to be problematic to implement;
- As donor agencies place increasing emphasis on poverty reduction and the promotion of sustainable rural livelihoods, the implications of competing policies must be explored and better understood.

Increasing demographic and economic pressures will exacerbate conflicts over land use. Pastoralists have by no means the same interests as settled village communities. It is usually easier to involve settled communities in schemes intended to return the proceeds of wildlife management to those disadvantaged by the creation of a park or project area. Tourists, wildlife managers and scientists also make very different demands on managed landscapes, and governments are more likely to respond to the interests of the tourism lobby in those countries where it provides a valued source of hard currency. Strategies for addressing these conflicts include integrating wildlife and livestock management, with revenue and resource sharing around national parks, commercial ranching, and tourism and safari hunting on private, communal land or state land.

Where is the Semi-arid Zone?

DFID's Renewable Natural Resources Knowledge Strategy (RNRKS) identifies six commodity/ resource-based production systems for sectoral research support: High Potential; Semi-Arid; Hillside; Forest/Agriculture Interface; Land/Water Interface; and Peri-Urban Interface. These categories bear little resemblance to conventional farming system terminology or

classification, and are more of a reflection of 'emerging indicators of demand and developmental pressure points' (ODA, 1994, 1995).

According to DFID's definition, semi-arid environments are those in which the mean monthly temperature is greater than 18°C; evapo-transpiration exceeds precipitation in one or more seasons; and mean annual rainfall is between 400-1200 mm. This rainfall range, which includes both highland and sub-tropical regions, is indicated in Map 6. The zone extends over about half of Sub-Saharan Africa (SSA) and accounts for 27% of domestic ruminant populations. As such, these areas 'must play a vital part in its [Africa's] economic development' (Kiss, 1990a:156).

This use of the term 'semi-arid' is somewhat confusing because it is also used in more widely recognised classifications, such as FAO's agro-climatological stratification in which the semi-arid zone relates to a plant growing period of between 75-119 days (Map 2). Comparison of Map 6 and Map 2 indicates the rainfall range 400-1200mm extends over two of FAO's agro-climatic zones, the semi-arid and the dry sub-humid, spanning a plant growing period of 75-180 days. Pratt and Gwynne's (1977) eco-climatic zonation of east Africa defines semi-arid lands as those with marginal agricultural potential and a moisture index of -30 to -42, corresponding to an annual rainfall range of 500-1000mm.

Where are the Rangelands?

In terms of vegetation and land cover, DFID's semi-arid zone broadly coincides with bushland and thicket and more open woodland vegetation types shown in Map 3, digitised from the standard vegetation map of Africa (UNESCO, 1981). Satellite derived vegetation zones are depicted in Map 4 from the International Geosphere-Biosphere Program Data and Information System (Loveland and Belward, 1997). The preliminary product shown in Map 4 is based on one kilometre resolution Advanced Very High Resolution Radiometer (AVHRR) data for 1992/93. Nevertheless, there is a good match between the overall extent of DFID's semi-arid zone and the satellite derived distribution of grassland savannah and cropland-savannah mosaic.

Pastoralism and Agro-pastoralism

Pastoral and agro-pastoral communities account for 20 million and 240 million individuals respectively in Sub-Saharan Africa (SSA) (Swallow, 1994, quoted in Holden et al., 1997). Broadly speaking, the economic importance of livestock within total household income rises as rainfall declines, and in desertic regions dependence is near total. Blench (1998a) makes the point that occupationally specialised pastoralists, principally dependent on camels, cattle and sheep, are confined to the region from the equator northwards in semi-arid Africa. Agro-pastoral communities,

owning cattle, sheep and goats, are also found in the northern region, but predominate south of the equator. Whilst some pastoralists may own significant numbers of livestock, the great majority are small-scale producers living in remote semi-arid regions, and are vulnerable to disease, drought and economic marginalisation. Map 5 shows the approximate location of Africa's major pastoral peoples.

Exclusive pastoralists are livestock producers who grow no crops and depend wholly on sales of dairy products and animals to buy grain. In the arid and semi-arid zones, such pastoralists may move very long distances every year. Although it is often popularly supposed that such 'nomads' wander erratically in search of pasture, in general these pastoralists have set migration routes. They usually only diverge from their existing patterns in the face of a drought, a failure of the pasture, or the spread of an epizootic. Most of the populations of northern Kenya fall into this group.

Transhumant pastoralists have a permanent homestead and base at which the older members of the community remain throughout the year. They move in response to seasonal changes in the quality of grazing and the tsetse-fly challenge. Their housing varies in complexity and usually depends on the time they anticipate spending at one particular grazing area. The travelling unit normally consists of a common herd owned by close male relatives. Grain and other basic needs are purchased from the proceeds of selling milk and dairy products by the women in local markets. They grow crops primarily for their own use rather than for sale. The men take away the majority of the herds in search of grazing, but leave the older members of the community with a nucleus of lactating female animals. Cattle-keepers of southern Sudan, such as the Dinka and Nuer, and those along the Angola/Namibia borderland, such as the Himba, can be described as transhumant pastoralists.

Agro-pastoralists have farms on which they depend for staples and where they hold land rights, and use their own or hired labour to cultivate. While cattle are still valued property, their herds are on average smaller than in other pastoral systems, since they no longer solely rely on cattle and the finite grazing area around their village that can be reached in a day inevitably limits herd size. Agro-pastoralists commonly group community animals into manageable herds and send them out with hired herders, or with their own children, often on a rotational system. Most of the settled populations of semi-arid and arid eastern and southern Africa may be classified as agro-pastoralists.

Almost all communities in Africa own some livestock. However, the issue of competing claims on wildlife areas applies to a much smaller region, namely part of the rangelands of eastern and southern Africa. This is because the large mammal fauna has been all but eliminated throughout much of west-central Africa. National parks are few and rarely contain significant wildlife populations; security is correspondingly lax and tourism income low or non-existent.

Map 5 shows as a shaded area the approximate boundary of the region where abundant large mammals and livestock compete for resources. If

conservation initiatives broaden to incorporate a wider range of biodiversity, the area of conflict between livestock-owning communities and wildlife management may be enlarged (Blench, 1998c). The current situation in some regions, notably southern Sudan and Angola, remains largely unknown. Long periods of civil strife have probably had devastating impacts on wildlife and the continuing insecurity means that tourism is unlikely to be a significant economic strategy for the foreseeable future. This study focuses primarily on pastoral and secondarily on agro-pastoral communities, because such communities tend to be poor and suffer from wildlife-livestock conflicts. Examples will be drawn from commercial livestock ranching, but this is not an area of focus.

Document Structure

Following this introduction, the next section sets the scene with an overview of national statistics, population trends and protected area status in east Africa. Section three examines the disease risks associated with livestock and wildlife co-existence, and the decline in state veterinary services. Section four assesses the changing relationship between livestock and wildlife in semi-arid rangelands, the diverse impacts of population growth and the emergence of more community-oriented conservation philosophies. The concept of sustainable rural livelihoods is introduced in section five. The multiple roles that livestock play in achieving this goal are considered, and the costs and benefits to rural communities of living with wildlife are discussed. In the sixth section, the potential for integrating livestock and wildlife management in the sustainable rural livelihood strategies of pastoralists is analysed in relation to different tenure regimes. The final section presents a summary of findings and identifies policy options and technical support priorities to enhance the sustainable co-existence of livestock and wildlife in the semi-arid rangelands of eastern Africa.

An annotated bibliography of key sources of information in the published and informal 'grey' literature is given as an annex to the main text for ease of reference.

2

Regional Setting and Population Trends

East Africa, including Kenya, Tanzania and Uganda, occupies a total area of 1.652 million km^2, two-thirds of which receives a mean annual rainfall of between 400-1200 mm, and thus lies within the semi-arid zone, as defined in DFID's RNRKS (Map 6). Tanzania is the largest of the three countries and much the greater part of it is semi-arid, compared with about half of Kenya and a third of Uganda.

National Statistics and Development Indicators

National statistics and development indicators for the three countries are summarised in Table 1. In common with most other developing regions, east African countries are characterised by fast growing human populations with substantial rural majorities, rapid urbanisation, relatively high levels of poverty and low rankings on the United Nations Human Development Index.

Table 1: Summary of National Statistics and Development Indicators

	Kenya	Tanzania	Uganda
Land Area km^2	569,100	883,600	199,700
DFID's Semi-Arid Zone* %	40-50	80-90	30-40
Nationally Protected Areas km^2**	35,000	139,400	19,100
Nationally Protected Areas %**	6.2	15.7	9.6
Human Population mn (1996)	27	30	20
Rural Population %	70	75	87
Population Density km^{-2}	50	30	100
Population Growth Rate % a^{-1}	3.1	3.1	2.7
Economic Growth Rate % a^{-1}	5.7	4.6	9.4
Per Capita GNP US$	320	170	300
Purchasing Power Parity US$	1130	-	1030
Poverty <US$1/day %	50	11	69
Poverty <US$2/day %	78	46	92
Human Development Index Ranking (out of 175)	134	149	159

*Mean annual rainfall: 400-1200mm
**Most recently reported to WCMC in 1994
Source: IBRD (1998b), UNDP (1997) and WCMC (1996).

The poverty indicators in Table 1 are drawn from IBRD (1998b), which acknowledges that international comparisons of poverty data entail both conceptual and practical problems. Different countries have different definitions of poverty and consistent comparisons between countries can be difficult. The commonly used poverty line standard of US$1 is measured in 1985 international prices and adjusted to local currency using purchasing power parities (PPP). However, these PPP exchange rates were not designed for making international poverty comparisons, but for comparing aggregates for national accounts. There is, therefore, no certainty that the international poverty line measures the same degree of need or deprivation across countries.

Human Population Growth

The total number of people in east Africa was estimated as 77 million in 1996; 30 million in Tanzania, at a mean density of 30 km^{-2}; 27 million in Kenya, at a mean density of 50 km^{-2}; and 20 million in Uganda, at a mean density of 100 km^{-2} (IBRD, 1998b).

Growth rates have begun to decline in all three countries, partly as a result of AIDS, and this trend is likely to continue. Nevertheless, populations have doubled over the past 25 years and are likely to double again over the next 30-40 years. Projected growth rates for the period 2000-2005 are 2.14% for Kenya, 2.57% for Tanzania and 2.47% for Uganda; declining to 1.25%, 1.71% and 1.87%, respectively, by 2020-2025. HIV/AIDS has spread widely in Sub-Saharan Africa over the past two decades. Major preventative programmes have been launched in Kenya, Tanzania and Uganda. Nevertheless, until these campaigns become more effective, it is probable that life expectancy will fall (IBRD, 1998b; and UNDP, 1997).

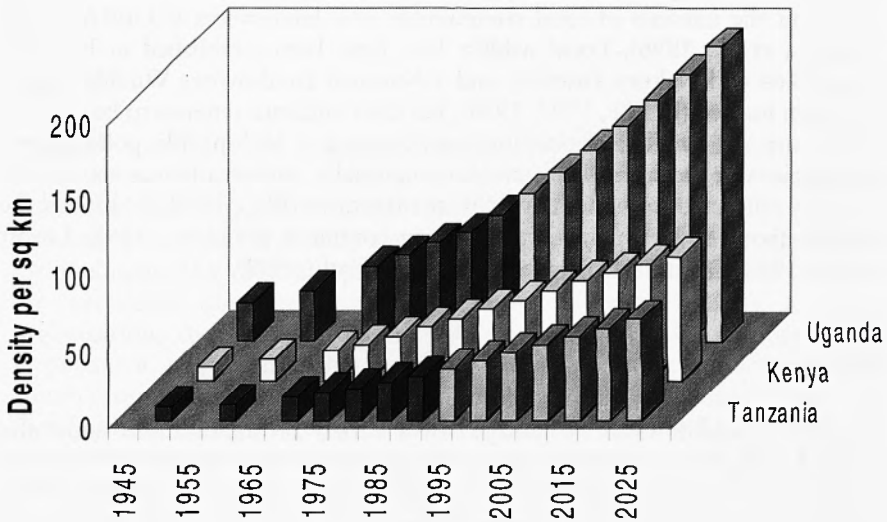
The growth and increasing density of human populations in east Africa from 1950 to 2025 are shown in . A striking contrast between the three countries is evident, with Uganda having twice the mean density of people in Kenya, and thrice that of Tanzania. In 1996, mean densities were 100, 50 and 30 people per square kilometre, respectively. People are very unevenly distributed across the region, with major concentrations around Lake Victoria, in the highlands and along the coast, as indicated in Map 1. The map also shows the extent of east Africa's protected area network and the conjectural limits of tsetse distribution as assessed for 1973 by Ford and Katondo (1977).

Nationally Protected Areas and Management Authorities

Nationally protected areas are defined as 'totally or partially protected areas of at least 1000 hectares that are designated as national parks, natural monuments,

nature reserves or wildlife sanctuaries, protected landscapes and seascapes, or scientific reserves with limited access'. Sites protected under local or provincial law and game controlled areas are excluded from this definition (IBRD, 1998b; based on information provided by the World Conservation Monitoring Centre, Cambridge). East Africa's national protected area network extends over some 193,000 km^2, or 12.7% of the region. Tanzania undoubtedly has the lion's share, with a total area of 139,400 km^2 (15.7%), compared with 35,000 km^2 (6.2%) for Kenya and 19,100 km^2 (9.6%) for Uganda. The level of protection provided, however, is highly variable, both within and between countries.

Figure 1: Human Population Density Trends: 1950-2025



Source: derived from (IBRD, 1998b) and UNDP (1997)

Kenya

Kenya's protected areas come under the overall authority of the Kenya Wildlife Service (KWS), a state corporation with responsibility for conservation and management of wildlife resources throughout the country, as directed in the Wildlife (Conservation and Management) (Amendment) Act of 1989. KWS's mandate covers 56 protected areas, although it only has direct jurisdiction over National Parks. Hunting and trade in trophies have been banned since the late seventies, although limited game cropping is authorised under licence. Unauthorised hunting is illegal, but is, nevertheless, common and widespread. Conflicts between wildlife and people are a complex and increasingly contentious socio-political and economic issue (KWS, 1996), the resolution of which is fraught with difficulties (BBC, 1999a). Wildlife policy has been reviewed many times over the years, but opinions are so polarised that proposed reforms have stalled.

In examining the economics of living with wildlife in Kenya, Byrne et al. (1996) draw attention to 'the devastating implications of human population growth .... and the inevitable rise in poverty as the fundamental, negative force militating against conservation and wildlife utilisation'. In desperation, they comment that 'action dissolves into frustration in the face of government's politically motivated unwillingness to accept and implement hard solutions.'

A Community Wildlife Service (CWS) has been established in KWS for Districts such as Kajiado, Laikipia, Narok, Samburu and Taita Taveta, where wildlife is still reasonably abundant. The USAID-funded Conservation of Biodiverse Resources Areas (COBRA) project supports this service and has recommended devolution of wildlife rights to landowners on private land; lifting the ban on hunting; and formation of local and national wildlife associations, to represent the interests of local communities and landowners (COBRA, 1995; Makilya et al., 1996). Local wildlife fora have been established in Laikipia, Machakos and Nakuru Districts, and a National Landowners Wildlife Forum has been formed (KLWF, 1997, 1998), but their influence remains to be seen.

To sum up, wildlife conservation in Kenya is a high-profile political and economic issue, both nationally and internationally; conservationists are divided over the efficacy of community wildlife management (BBC, 1999a & b); and the debate about officially sanctioned hunting continues (Johnston, 1998; Lovatt Smith, 1998; Overton, 1998; Georgiadis and Heath, 1998).

Tanzania

Tanzania's wildlife estate is managed by a variety of organisations under the general umbrella of the Ministry of Natural Resources: the Wildlife Division (WD); Tanzania National Parks (TANAPA); Ngorongoro Conservation Area Authority (NCAA); and the Forestry Division. The work of these agencies is supported by the Serengeti Wildlife Research Institute (SWRI) and the College of Wildlife Management at Mweka (Boshe, 1996).

The goal of Tanzania's new Wildlife Policy (GoT, 1998) is to maintain biological diversity and 'increase its contribution to the county's economy from the present level of about 2% to 5% of GDP by the year 2017'. Emphasis is to be given to 'maintaining and developing the wildlife PA network and involving all stakeholders in the conservation and management of the resource, especially the local communities, and the private sector'. A new category of Wildlife Management Areas (WMA) is to be established, 'where local people will be given full mandate of managing and benefiting from their conservation efforts, through community based conservation programmes. The private sector will be encouraged to invest in the wildlife industry, taking advantage of the prevailing political stability and sound investment policies.' Nevertheless, a variety of long-standing and increasingly bitter disputes relating to land rights, adequacy of compensation and distribution of tourism-generated benefits persists, including high-profile cases relating to pastoral communities in the NCA and around the Mkomazi Game Reserve (BBC 1999b).

Tanzania has received a wide range of donor support for wildlife

conservation since 1990, increasing emphasis has been given to involving local communities in the process, and exploring ways in which the benefits of maintaining wildlife can be more equitably shared. GTZ has been active in and around the Selous; NORAD and the EU in the Serengeti and Ngorongoro region; and DFID in and around the Ruaha. USAID supported the Planning and Assessment for Wildlife Management (PAWM) project in the early nineties (Leader-Williams et al., 1996a&b; Leader-Williams and Tibanyenda, 1996); and will be backing a forthcoming programme for the Tarangire-Manyara complex. DFID's experience of community wildlife management in Tanzania has been reviewed by Hartley (1997); and Hartley and Hunter (1998) have examined how the gap between policy and practice might be narrowed.

Uganda

Political instability in Uganda resulted in decades of uncontrolled exploitation of wildlife, leading to the depletion of what were once significant resources. Wildlife fell under the Ministry of Tourism, Wildlife and Antiquities (MTWA) with the Game Department nominally responsible for managing PAs. With the passing of the Uganda Wildlife Statute in 1996, the protected area network should now be managed by a single organisation, the Uganda Wildlife Authority (UWA). The former Game Department has been disbanded and the UWA is responsible for the conservation and management of all wildlife within and outside National Parks, Game Reserves [now Wildlife Reserves], Animal Sanctuaries and Controlled Hunting Areas [to be eliminated through upgrading to PAs, transformation into Community Wildlife Management Areas or degazetting]. By far the single largest area for wildlife conservation is Karamoja, with 36% gazetted as government land and the remaining 64% as Controlled Hunting Areas (de Jode, 1998). See Section 2.4.3 for an assessment of wildlife and protected areas in Uganda.

Livestock and Wildlife Population Trends

Kenya

Monitoring mobile animal populations, widely scattered over vast tracts of land, is not a trivial exercise. To be effective, it requires sustained technical, logistic and financial support. Very few monitoring studies have been conducted over extended periods of time in east Africa. A notable exception, however, is the work of the Kenya Rangeland Ecological Monitoring Unit (KREMU), established in 1975 as a bilateral project between the Kenya Government and the Canadian

Table 2: Kenya Rangeland Livestock and Wildlife Population Estimates, 1970's to 1990s

	1970s		1990s	
Species	Estimate	Standard Error	Estimate	Standard Error
Buffalo	35,453	6,060	30,187	4,197
Camels	551,462	24,636	651,254	33,209
Cattle All	3,319,749	157,958	2,911,496	83,333
Donkey	95,059	10,884	85,350	5,021
Eland	25,775	3,376	19,123	1,242
Elephant	39,108	6,008	14,923	1,808
Gazelle, Grant's	247,491	12,407	103,208	3,915
Gazelle, Thompson's	87,086	14,766	31,259	4,269
Gerenuk	42,918	1,820	21,418	1,282
Giraffe	62,255	2,808	50,080	2,337
Greater Kudu	233	99	45	25
Impala	116,177	8,930	67,934	3,194
Kongoni	29,606	2,533	18,521	1,054
Lesser Kudu	17,468	1,214	7,751	710
Oryx	53,653	3,571	25,824	1,950
Ostrich	25,716	1,772	33,871	2,798
Topi	93,822	10,977	92,934	18,139
Sheep & Goats	6,473,519	263,793	5,696,021	173,426
Waterbuck	12,309	1,476	5,260	733
Wildebeest	224,404	49,582	173,354	38,918
Zebra, Burchell	138,448	12,643	146,093	9,549
Zebra, Grevy	10,364	1,355	4,868	871
Total Wildlife	**1,262,227**		**846,652**	
Total Livestock	**10,439,789**		**9,344,121**	

Including: Baringo, Garissa, Isiolo, Kajiado, Kilifi, Kwale, Laikipia, Lamu, Mandera, Marsabit, Narok, Samburu, Taita, Taveta, Tana River, Turkana and Wajir Districts

International Development Agency, CIDA (Clarke, 1986). The unit has since become the Department of Resource Surveys and Remote Sensing (DRSRS) in the Ministry of Planning and National Development and continues to monitor rangeland resources.

The Department has a thorough assessment of long-term livestock and wildlife population trends in the Kenya rangelands, based on a series of low-level aerial surveys carried out from 1977 to 1994 (GoK, 1995a&b, and 1996; see also Norton-Griffiths, 1998). With periods of drought and insecurity, population estimates have fluctuated erratically over time, and from region to region. Nevertheless, the analysis indicates major changes in

Table 2: (continued)

Species	1970s to 1990s Numerical Difference	1970s to 1990s Proportional Difference	Statistical Significance (p=0.9)
Buffalo	-5,266	-15%	
Camels	99,792	18%	positive
Cattle All	-408,254	-12%	negative
Donkey	-9,710	-10%	
Eland	-6,652	-26%	negative
Elephant	-24,185	-62%	negative
Gazelle, Grant's	-144,283	-58%	negative
Gazelle, Thompson's	-55,827	-64%	negative
Gerenuk	-21,500	-50%	negative
Giraffe	-12,175	-20%	negative
Greater Kudu	-188	-81%	negative
Impala	-48,243	-42%	negative
Kongoni	-11,085	-37%	negative
Lesser Kudu	-9,716	-56%	negative
Oryx	-27,829	-52%	negative
Ostrich	8,154	32%	positive
Topi	-888	-1%	
Sheep & Goats	-777,498	-12%	negative
Waterbuck	-7,049	-57%	negative
Wildebeest	-51,050	-23%	
Zebra, Burchell	7,645	6%	
Zebra, Grevy	-5,496	-53%	negative
Total Wildlife	**-415,634**	**-33%**	**negative**
Total Livestock	**-1,095,600**	**-10%**	**negative**

Source: GoK 1996

population levels over the past two decades, which are summarised in Table 2 and Figure 2.

Key conclusions to emerge from this assessment are that:

- Total wildlife numbers have decreased by a third.
- Total livestock numbers have decreased by 10%.
- Rates of decline were steepest between the 1970s and 1980s, and have moderated since then.
- Camels and ostriches are the only species to have increased significantly.
- Whilst wildlife numbers have decreased in most Districts, with Narok

(including the Maasai Mara) experiencing the greatest reduction, numbers in some Districts, such as Kajiado, Laikipia and Marsabit, have increased substantially.

- One quarter of Kenya's wildlife lives within protected areas and a further 25% are found within 20 kilometres of protected areas.
- Half of Kenya's wildlife is concentrated in and around protected areas, although these occupy only 10% of the country.
- Livestock outnumber wildlife by about ten to one.

Outside protected areas, land is either adjudicated, with property rights assigned to an individual or group of landowners, or unadjudicated, with land held in trust by government on behalf of local land users. In Kenya, land has been adjudicated in only four rangeland districts: Kajiado, Laikipia, Narok and Taita Taveta (Norton-Griffiths, 1998). The great majority of wildlife and a high proportion of the national cattle herd are found in these four Districts, which include Amboseli and Tsavo National Parks, the Maasai Mara Game Reserve and the Laikipia National Reserve. Camels, donkeys, sheep and goats are more evenly spread (GoK, 1996).

Wildlife losses have been significantly greater outside protected areas than inside (48% compared with 31%); higher on unadjudicated trust land than on adjudicated land (50% compared with 30%); and higher still in regions rarely visited by tourists than more popular areas (55% compared with 32%) (Norton-Griffiths, 1998). Interestingly, the only species to have increased significantly, ostriches and camels, are well adapted to arid and semi-arid conditions. The increase in camels from 555,000 to 650,000 is attributed to an influx of herds from neighbouring Somalia, and the increase in ostriches from 26,000 to 34,000 may reflect the rise in commercial ranching of this species.

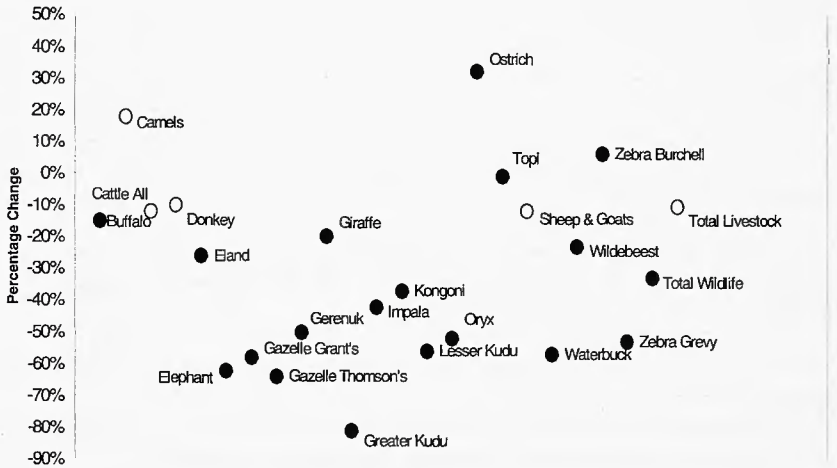
Conditions prevailing around the Maasai Mara Reserve are symptomatic of more general competition for land resources that can only increase in years to come. Wildlife populations within the Mara have remained relatively stable, but have declined in adjacent ranch lands, where livestock numbers have been more or less steady (Broten and Said, 1995). With the introduction of mechanised farming and extensive wheat production in higher rainfall areas to the north of the Mara during the seventies, arable farming and settlement have spread southwards, encroaching extensively on former rangelands. Grazing potential around the reserve has been reduced, competition has increased and wildlife has declined.

Tanzania

Until recently rangeland monitoring studies in Tanzania focused primarily on the Serengeti ecosystem (Malpas and Perkin, 1986; Sinclair and Norton-Griffiths, 1979; Sinclair and Arcese, 1995) and Ngorongoro (Homewood et al., 1987; Homewood and Rodgers, 1987, 1991; Thompson, 1997). The Tanzania

Wildlife Conservation Monitoring (TWCM) programme formally came into existence in 1989, with a mandate to gather information on wildlife within, and adjacent to, protected areas for management and planning. TWCM is supported by the Frankfurt Zoological Society and the European Union, and since 1996 has been based in Arusha.

Figure 2: Changes in Kenyan Rangeland Livestock & Wildlife Populations: 1970s-90s

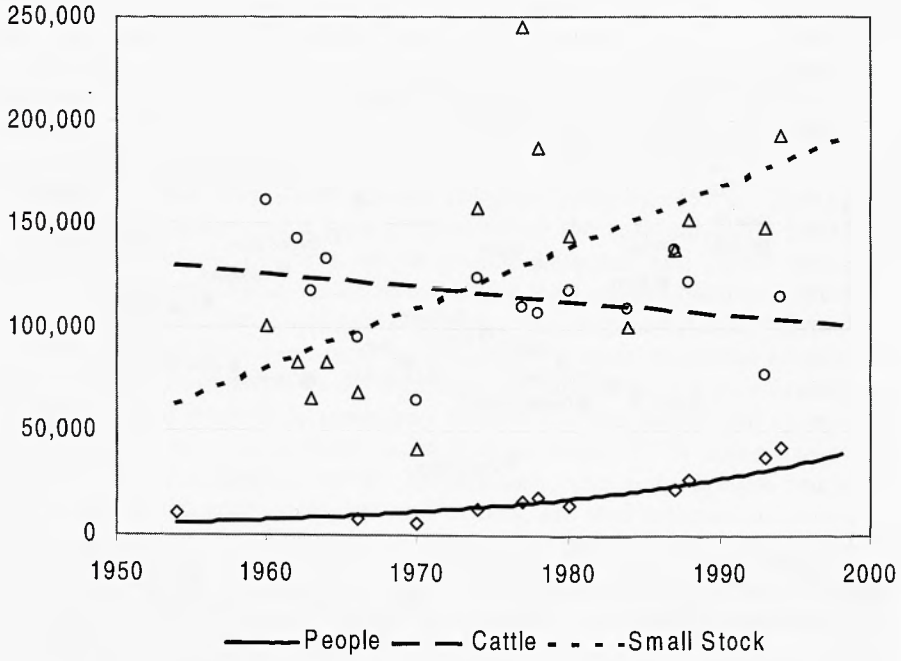


Campbell and Borner (1995) concluded that for most of the commoner species in the Serengeti ecosystem, there is little evidence of significant changes in resident wildlife densities since the early seventies. The dramatic increase in the wildebeest population that started in the sixties effectively ceased in the seventies and had stabilised, until recently. To the west and north of the national park, however, non-migratory wildlife has been subject to intensive hunting. Rhino have been eliminated from most areas, and the buffalo population in the northern Serengeti has been greatly reduced, although elsewhere numbers have remained relatively stable. Since 1995, wildlife populations in the Serengeti have declined, in some cases significantly, due to the combined influence of low rainfall and increased illegal hunting resulting from crop failure and reduced harvest (Kenneth Campbell, pers. com.).

Wildlife populations within the confines of Ngorongoro crater have been monitored annually since 1963 (Runyoro et al., 1995). Maasai livestock were banned from the crater in 1974. Since then, overall wildlife biomass has remained more or less stable, but the relative abundance of species has changed. Wildebeest, kongoni, Thompson's and Grant's gazelle, eland and rhino have all declined significantly, whilst there has been a marked increase in buffalo. Ngorongoro crater itself occupies only 4% of the Ngorongoro Conservation Area (NCA), which covers a total area of 8292 square kilometres, and has received disproportionate attention in terms of resource monitoring and scientific study. With a few notable exceptions, such as Homewood et al.,

1987; Homewood and Rodgers (1987, 1991), NCAA (1996), Potkanski (1997) and Thompson (1997), the de facto co-existence of wildlife, livestock and Maasai pastoralists appears to have received relatively little attention.

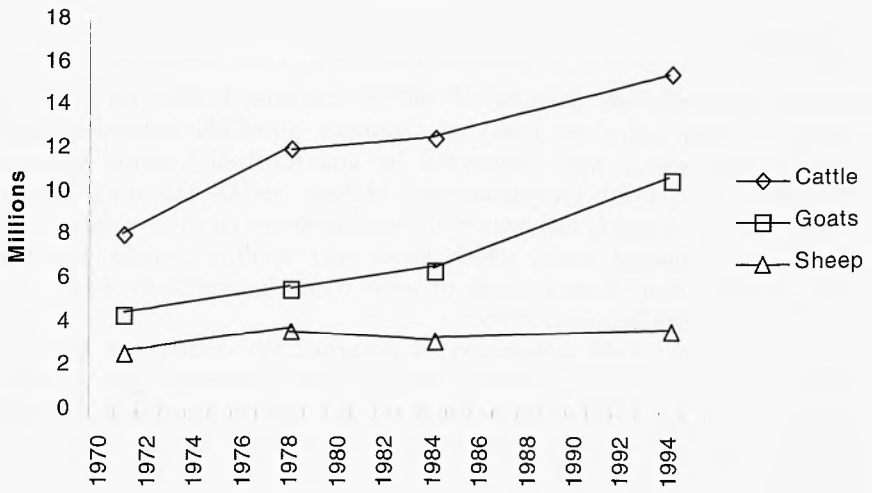
Figure 3: Population Trends in the Ngorongoro Conservation Area



Source: Homewood and Rodgers, 1991; and Thompson, 1997

Given that the NCA was established some forty years ago and is one of the few designated multiple land use pastoral zones in east Africa, this oversight is somewhat surprising. Population estimates have varied considerably from year to year, but long-term trends for the NCA and Tanzania as a whole are shown in Figure 3 and Figure 4. The Maasai population declined during the sixties, but has increased progressively since the early seventies. Livestock numbers followed a similar pattern, declining during the sixties to recover during the seventies. Whereas cattle outnumbered small ruminants during the sixties, small ruminants have predominated numerically since 1970. There has also been a substantial increase in cultivation in parts of the NCA, alongside livestock, wildlife and tourism.

Figure 4: Tanzanian Livestock Census Population Estimates: 1971-1994



Source: GoT (1994 and 1996)

Elsewhere in Tanzania, wildlife have come under increasingly severe pressure from human population growth, agricultural expansion and unauthorised hunting (Borner, 1985; Lamprey, 1995; WCST, 1995; Leader Williams et al., 1996b; GoT, 1997a & 1998). Compared with Kenya and Uganda, Tanzania has a much lower human population density and a relative abundance of land, with extensive areas of wilderness remaining.

As in Kenya, wildlife is likely to be concentrated in and around protected areas, particularly in the drier and less densely populated semi-arid zone, including: Serengeti, Ngorongoro, Manyara and Tarangire. Many of these peripheral areas adjoining Tanzania's national parks and game reserves are designated Game Controlled Areas (GCA), an ambiguous land use category that does not exist in Kenya. Settlement, farming and hunting are all permitted in GCAs. Many have been extensively cultivated and little wildlife remains. The prospects for sustainable co-existence of livestock and wildlife in GCAs with arable potential are therefore somewhat limited.

The potential for sustainable co-existence of wildlife and livestock is not confined to the well-known pastoral rangelands of Kenya and northern Tanzania. There has been, for instance, a progressive southward dispersal of Il-Parakuyu Maasai pastoralists into the Lunda-Mkwambi GCA bordering the Ruaha National Park in southern Tanzania. Members of the clan first began to settle in the area in the early 1950s and since then have become agro-pastoralists. Over the past decade or so other agro-pastoral groups, such as the Barabaig and Sukoma, have moved into the area with large herds of cattle, attracted by the availability of water from the Mtera dam and crop residues. The GCA supports an estimated 40-60,000 head of

cattle, according to season (Walsh, 1995; and Hartley 1997).

Uganda

During the turbulent decades of the 1970s and 1980s, farming and settlement encroached on many of Uganda's protected areas, and their wildlife populations were decimated by unauthorised hunting (Douglas Hamilton et al., 1980; Eltringham and Malpas, 1983). The sorry state of conservation in Uganda has been confirmed by more recent low-level aerial surveys of protected areas, which show that wildlife populations have declined from their former levels or even been eliminated in many areas (Lamprey and Michelmore, 1996).

With the widespread acquisition of firearms, the destruction has been particularly severe in Karamoja, where wildlife numbers have declined drastically since the previous survey in 1983. Significant wildlife populations are now found only in the Kidepo Valley National Park, the southern section of Pian-Upe Game Reserve and possibly in some of the mountain Forest Reserves that could not be surveyed safely from the air. The rest of Karamoja is now largely devoid of all large wildlife species.

Recent ground studies by the Karamoja Wildlife Management Project have confirmed these aerial observations, and examined the historical background and underlying causes for the general decline in wildlife (KWMP, 1996; de Jode, 1998). Hunting by the Karamoja has been the primary cause, but various external factors, including the expansion of agriculture, famine, food insecurity and problematic relations with central government have exacerbated the problem.

The protected areas of north-western Uganda have been particularly hard hit by the poaching from the late 1970s. The large mammal populations of the parks, reserves and sanctuaries of this region were virtually annihilated by the armies of Amin and Obote when they retreated through the area. The residual elephant and buffalo populations, for which the region was well known, represent only a fraction of their former abundance.

The protected areas of south-western Uganda retain their great diversity, and the wildlife populations of Queen Elizabeth National Park appear to be recovering. However, poaching remains a problem and there are few large mammals north of Lake George. The impala population of Lake Mburo National Park also appears to have been severely depleted by intense hunting on adjacent ranch lands. Wildlife populations in the Toro Game Reserve show little signs of recovery, and recent investigations have confirmed high levels of poaching. The absence of large mammal populations in Katonga Game Reserve is indicative of continued poaching. The recent deliberate targeting of tourists for execution will almost certainly have a long-term impact on the potential income from visitors in this region.

Despite this generally bleak assessment and delays in establishing the new Uganda Wildlife Authority, potential exists for applied research and the

promotion of multi-species production systems adjacent to protected areas. A wide swathe of semi-arid land, known as the 'cattle corridor', links south-western and north-eastern Uganda (Kisamba-Mugerwa, 1997). Sites include the Kidepo Valley National Park in northern Karamoja on the border with Sudan, and Lake Mburo National Park in Mbarara Division of southern Uganda (de Jode, 1998; Kamugisha and Stahl, 1993; and Kamugisha et al., 1997).

3

Disease Risks Associated with Livestock and Wildlife Co-existence

Pastoralists' Strategies for Limiting Disease Risks to Livestock

The pastoral way of life has adapted over the centuries to the risks and uncertainties of living in the rangelands of tropical Africa, but nowadays is increasingly threatened by demographic pressures, environmental changes and the vagaries of socio-economic transition (Homewood and Rodgers, 1991; Behnke et al., 1993; Behnke, 1994; Scoones, 1995; Leach and Mearns, 1996; Lane, 1998; Blench & Marriage 1999; Blench, in press, a). Pastoralists have an intimate and extensive knowledge of their surroundings and are well aware of the diseases affecting their livestock, as evidenced by extensive vernacular vocabularies of generalised conditions and disease-specific symptoms (ITK/IIRR, 1996; Wanyama, 1997; Brightwell et al., 1998). Ticks, tsetse and various troublesome biting flies are also widely recognised as risk factors associated with disease.

Mobility and the maintenance of good physical condition are key elements of animal disease control. The ability of pastoralists to track the seasonal availability of resources is of fundamental importance in determining the nutritional status and the capacity of animals to resist and overcome infection. Mobility also enables pastoralists to manage disease risk by avoiding known areas of vector infestation, or, at least, minimising the period of contact (Roderick et al., 1998).

Disease avoidance strategies, however, are not always successful. A wealth of ethno-veterinary knowledge exists and a variety of traditional remedies is in common usage (ITK/IIRR, 1996; Wanyama, 1997; Brightwell et al., 1998). Where available, manufactured veterinary products are also widely used, including antibiotics, trypanocides and anthelmintics, although these are not always applied according to manufacturer's recommendations.

Changing Circumstances

In assessing the disease risks associated with livestock and wildlife co-existence, it is important to recognise that pastoral conditions in east Africa are changing, and that pastoralism is in a state of transition. A recent review of livestock development in the Ngorongoro Conservation

Area (NCA) in Tanzania (Field et al., 1997) drew the following conclusions:

- Since 1966 there had been a three-fold increase in human population, without a corresponding increase in livestock numbers.
- The incidence of some diseases had increased and 'new' diseases had entered the area, some with devastating consequences e.g. East Coast Fever – 'olmilo', Malignant Catarrhal Fever, Foot and Mouth Disease, Nairobi Sheep Disease and Contagious Bovine Pleuropneumonia.
- Livestock health services had deteriorated, dips had broken down and it had become more and more difficult for livestock owners to obtain acaricides and veterinary drugs.
- Infrastructure, particularly water supplies and roads, had deteriorated.
- Wildlife in general, and wildebeest in particular, had increased in number, and livestock owners blamed this for the increase in livestock diseases.
- Herd size had decreased because of disease and stock had to be sold to buy food.

Whilst the changes observed in the NCA may apply to some other areas, they are not necessarily representative of pastoral conditions throughout east Africa. There have, for example, been significant declines in wildlife populations outside protected areas in Kenya over the past two decades (Section 2.4.1; GoK 1995a&b, 1996), and the risk of disease spreading from wildlife to livestock in these regions has diminished. With the decline in wildlife and the expansion of agriculture, tsetse numbers have been reduced in some areas and trypanosomosis is no longer such an important disease. Nevertheless, tsetse will persist wherever wildlife survives and suitable habitats exist and trypanosomosis will remain a serious constraint to livestock production in such areas for the foreseeable future.

Over the years pastoral mobility has been reduced in many areas by the conversion of extensive areas of rangeland to farmland, and by the general tendency towards more sedentary life styles. Thus pastoralists, who would previously have moved their cattle to avoid a seasonal risk of disease, may be unable do so once settled. Livestock of settled pastoralists in some areas may, therefore, be exposed to the virus that causes Malignant Catarrhal Fever (MCF) when wildebeest are calving; or the risk of trypanosome infections when tsetse populations increase and spread after the rains.

The control of animal diseases in east Africa has suffered from major financial constraints for many years, and government veterinary services to many rural areas have collapsed, especially in the remoter rangelands. On the other hand, improved methods for controlling animal diseases and disease vectors have been developed. Examples are pour-on insecticides for the control of tsetse and trypanosomosis, and East Coast Fever

immunisation. Alternative forms of private sector and non-governmental animal health care delivery are also emerging. On balance, however, with the decline in veterinary services, reduced drug availability and resurgence of previously controlled diseases, livestock producers in the semi-arid rangelands of east Africa are facing increasingly severe disease problems.

Animal Diseases of Current Concern

Many diseases have the potential to affect both wildlife and livestock in east Africa (OAU/STRC/IBAR 1986; Grootenhuis, 1995). Whenever wild and domestic animals share the same environment, there is always a risk of disease transmission from one to the other, but how serious that risk is very much depends on specific circumstances. Some diseases are uncommon, or are rarely recognised; some are common, but have little impact. Relatively few animal diseases are considered to be of major economic importance. The main diseases of current concern, relevant to livestock and wildlife co-existence in east Africa, are identified in Table 3. Further details of these and other potentially problematic diseases are given in Appendix I.

The resurgence of livestock diseases that were formerly controlled, or restricted to certain areas, is a cause for serious concern. One such disease is Contagious Bovine Pleuropneumonia (CBPP), which is on the increase in many parts of east Africa (Masiga et al., 1996). Previously the disease had been confined to the north of Kenya, but is now widespread. Symptoms are severe and mortality rates are high in herds with no previous exposure. CBPP is considered to be one of the most important disease problems currently facing the veterinary authorities in Kenya and Tanzania.

Another disease that has recently returned to areas where it had been controlled is trypanosomosis. In the past, the tsetse fly vector of the disease was effectively controlled in the Lake Victoria region of western Kenya, largely by the use of selective ground spraying of insecticides along the rivers and streams. In the 1970s, this region was considered to be free of tsetse, apart from some relatively small, defined areas, such as the Ruma National Park. In the last ten years, however, as tsetse control activities by the veterinary authorities have declined, the vector has re-established itself throughout much of the region. Tsetse infestation is now reported as far north as Bungoma District. Farmers have lost many cattle to trypanosomosis; a disease that had not been seen for so long that it had been largely forgotten, and was often not recognised when it reappeared.

Disease Information and Monitoring

Information concerning the occurrence, epidemiology and economic

importance of most of the diseases common to both wildlife and domestic livestock in the rangelands of east Africa is fragmentary and of limited value. The need for accurate, reliable and up-to-date information on many of the diseases is widely recognised.

As an example to illustrate this point, MCF is considered to be a problem for livestock owners in areas where wildebeest occur, but it is not possible to find accurate information on the number of cattle actually at risk. In areas of known risk, such as Kajiado District and the grazing lands around the Serengeti and the Maasai Mara, the number of cattle exposed to infection and the incidence of disease is not known. If research on, for instance, vaccine development is to continue, then it is important that the magnitude of the problem is first understood in order to determine whether there is economic justification for further research. The National Veterinary Research Centre (NVRC) at Muguga in Kenya is beginning to address this question with a project that has started to examine the economic impact of MCF on the Maasai people.

One disease where a more substantial amount of information and data has been collected is rinderpest. Through the PARC programme, co-ordinated from the OAU/IBAR office in Nairobi, it has been possible to build up comprehensive information on the occurrence of the disease. Collaborative links are maintained and encouraged with organisations involved in veterinary disease control and research in the region. Vaccine improvement and the development of easier and more convenient diagnostic tests are priority areas of research, but wider aspects of rinderpest control are also being investigated.

For example, an assessment of the socio-economic impact of rinderpest in the border Districts of West Pokot and Turkana is being undertaken by KARI, supported by DFID. This has the practical objective of making recommendations on strategies for participatory and sustainable vaccination programmes for rinderpest in these areas. PARC is starting a project specifically looking at the epidemiology of rinderpest in wildlife, and there should be opportunities for collaborative research in this area. With international interest in the disease and with substantial funding, largely from the EU, good progress can be expected.

In contrast to the situation with rinderpest, very little is known of the true incidence of most other livestock diseases in the rangelands. Detailed information relating to specific areas is sometimes collected, but often as a result of a response to what is seen as an emergency or crisis situation. For instance, a substantial amount of data is now available on rabies and canine distemper in wild carnivores in the Serengeti and Mara from studies that were initiated following the devastating effects of recent epidemics of the diseases (Woodroffe et al., 1997; Cleaveland, 1998). With the lack of a properly functioning and reliable surveillance system for veterinary diseases in Kenya and Tanzania, prioritising diseases for research or control will continue to be dependent largely on limited information and informed guesswork.

Table 3. Some Animal Diseases of Current Concern in East Africa

Disease	Type	Transmission Routes
African Malignant Catarrhal Fever	Virus	Inhalation, or ingestion, of virus excreted by young wildebeest.
African Trypanosomis	Protozoa	Tsetse and, less importantly, other biting flies
Anthrax	Bacterium	Ingestion of contaminated soil, food or water; inhalation; or through the skin
Bovine Cysticercosis	Tape-Worm	Ingestion
Canine Distemper	Virus	Inhalation of aerosol; or through contaminated objects
Contagious Bovine Pleuropneumonia	Bacterium	Inhalation of infective droplets from active, or carrier cases
East Coast Fever, Corridor Disease	Protozoa	Ticks
Foot and Mouth Disease	Virus	Air-borne spread and inhalation, or ingestion, of infective material
Rabies	Virus	Bite from an infected animal
Rift Valley Fever	Virus	Mosquito bite; inhalation of aerosol
Rinderpest	Virus	Close contact and inhalation of aerosol; or ingestion of contaminated feed
Tuberculosis	Bacterium	Inhalation; ingestion

Table 3 (continued)

Disease	Animals Affected	Control in Domestic Animals
African Malignant Catarrhal Fever	Cattle, wildebeest	Separation of cattle from calving and young wildebeest
African Trypanosomis	Domestic livestock and man. Wildlife reservoir of infection	Trypanocides; vector control; trypanotolerant livestock
Anthrax	All mammals, especially herbivores	Vaccination; careful disposal of infected carcasses
Bovine Cysticercosis	Cattle, rarely wild antelope (larval tapeworm). Man (adult tapeworm)	Meat inspection and thorough cooking
Canine Distemper	Domestic and wild dogs; lions and other carnivores	Vaccination
Contagious Bovine Pleuropneumonia	Cattle, possibly buffalo	Vaccination, quarantine and removal of infected animals
East Coast Fever, Corridor Disease	Cattle, buffalo	Tick control; immunisation and treatment method
Foot and Mouth Disease	All cloven-footed domestic and wild animals	Vaccination; quarantine; slaughter policy
Rabies	All warm-blooded animals, including man. Carnivores most important in spread	Vaccination; control of domestic dog population
Rift Valley Fever	Wide range of domestic and wild animals and man	Vaccination; vector control
Rinderpest	Domestic and wild ruminants; pigs	Vaccination and movement controls
Tuberculosis	All domestic livestock, man and many wildlife species	Testing and slaughter policy

Status of Livestock/Wildlife Disease Research

Only very limited research is being undertaken in east Africa on diseases involving both wildlife and livestock. There are few scientists with expertise in diseases of wildlife, and there is a chronic shortage of funding to the research institutes.

The national organisations in Kenya that are involved in wildlife disease research are the Kenya Wildlife Service (KWS) and the Kenya Agricultural Research Institute (KARI), through the National Veterinary Research Centre at Muguga (NVRC). The specialised wildlife disease section (the Wildlife Disease Research Project) at KARI, previously involved in much of the wild animal disease research in Kenya, has now devolved its activities to the NVRC. The Veterinary Unit at KWS, that has recently received substantial support from DFID and the Zoological Society of London, has a staff of five veterinarians and two technicians. Research on trypanosomosis takes place at the Kenya Trypanosomosis Research Institute (KETRI), although there are no current projects specifically investigating the wildlife aspects of trypanosomosis. The institute is, however, involved in the testing of control methods, that could be relevant to tsetse-infested areas where wildlife and livestock co-exist.

In Tanzania, the recently established Veterinary Section of the Serengeti Wildlife Research Institute, in the Serengeti National Park with a laboratory at Seronera, has responsibility for monitoring wildlife diseases and developing control strategies. The section has received support from TANAPA, but also obtains outside assistance from the Global Wildlife Trust and the Frankfurt Zoological Society. The section is small, with only two veterinarians, one laboratory assistant and one technologist, and is, therefore, very limited in its capacity to undertake research. Sokoine University of Agriculture has maintained an interest in wildlife diseases for some years and is collaborating with the NCA to undertake a survey of wildlife/livestock diseases. Trypanosomosis research takes place at the Tropical Pesticides Research Institute in Arusha and at the Animal Diseases Research Institute in Dar-es-Salaam, but neither institute has an on-going research programme.

4

Pastoral-Wildlife Relationships: Past and Present

Changing Conceptions of Rangeland Ecology

Almost all of semi-arid Africa consists of rangelands with a greater or lesser extent of woody vegetation (see maps in Appendix 1). Although commonly used for nomadic and transhumant pastoralism, African rangelands contain by far the widest variety of extant large and medium-sized herbivores. The distribution maps in Kingdon (1997) and IAE (1998) suggest that the rangelands of eastern and southern Africa shelter the greatest diversity of large mammals found anywhere on the continent, although Madagascar and Ethiopia are notable for their high degree of endemism. The floral diversity of Africa's rangelands is also relatively high. The average areal richness of savannah (c. 1750 species) is not far below that of rain forest (c. 2020 species) (Menaut, 1983). The richest zone - the Somali-Maasai Region - contains some 2500 plant species, 50% of which are endemics (Bourlière, 1983).

The ecology of the semi-arid rangelands (with a coefficient of variation of annual rainfall of 30%) is best understood in terms of non-equilibrium dynamics (Ellis et al., 1993; Sandford, 1995). For further discussion of non-equilibrium theories of ecology and their implications for pastoral rangeland management see: Holling (1973); Noy-Meir (1975); Wiens (1977, 1984); Walker and Noy-Meir (1982); Frost et al. (1986); de Angelis and Waterhouse (1987); Coppock (1987); Caughley (1987); Ellis and Swift (1988); Westoby et al. (1989); Behnke et al. (1993); Behnke, (1994); Solbrig and Young (1993); Scoones (1995); Swift (1995); Leach and Mearns (1996)

The primary and secondary productivity of the semi-arid and arid rangelands is now thought to be constrained more by density-independent factors, such as climatic variability and 'external shocks' to the system, rather than density-dependent factors, such as stocking rates and grazing pressure. Livelihood strategies that can adapt to spatio-temporal variation are, therefore, more likely to be sustainable. This suggests a need to support diversity in livelihood strategies (or diversify livelihood strategies), in order to promote and support opportunism, flexibility and adaptability, which are now cast as 'rational', risk-averse strategies for survival in uncertain environments (Behnke et al., 1993; Behnke, 1994; Scoones, 1995a, 1996; Blench and Sommer, in press). This approach contrasts with more conventional ecological concepts of fixed carrying capacity for rangelands.

The mutual influences of livestock and wildlife upon rangelands which have been managed for pastoral grazing, have been documented in regions

such as the Ngorongoro Conservation Area and Amboseli National Park (Homewood et al., 1987; Homewood and Rodgers, 1987, 1991; Machange, 1997). Grazing by horses and cattle in the highlands of the Simyen Mountains National Park in Ethiopia has been shown to be a major determinant of pasture species composition (Infield, 1996). In the Central Complex reserve of South Africa, human interventions are needed to replicate management practices that have been practised for thousands of years; the removal of woody vegetation to create the mosaic of habitats which led to the reserve being established in the first place (Infield, 1996).

Traditional livestock breeds are well adapted to these environments. There is a growing realisation that it is not only wildlife that needs to be conserved; the genetic heritage of Africa's domestic animals is increasingly coming under threat from imported exotics. Traditional breeds are disappearing, either because they are no longer kept, or through introgression of exotic genes (Blench, ined.). Such breeds are usually under pressure because their annual productivity is poor compared with exotics. However, in times of drought stress, local breeds often survive better than crossbreeds, as they are co-adapted to the vegetation and are more resistant to pathogens.

The notion of co-conservation has hardly been developed in Africa, but in many cases, just as systems of integrating pastoral interests with wildlife are being developed, so it may be possible to simultaneously conserve rare breeds of cattle, sheep and goats within pastoral systems. For example, many breeds of African cattle have relatively low outputs, in terms of meat and milk, but survive preferentially in regions of poor vegetation and high levels of disease challenge. It might, therefore, be possible to support the conservation of such breeds by integrating them with wildlife management.

Diverse Impacts of Demographic Pressure

The total human population in the east African region continues to increase, although the rate of growth has declined in recent years (UNDP, 1997). Pressure on rangelands has induced a shift from pastoralism towards agro-pastoralism in much of semi-arid eastern and southern Africa; a transition supported both by colonial and post-independence government policies (Anderson and Grove, 1987; Homewood and Rodgers, 1987; Leach and Mearns, 1996; Brockington and Homewood, 1996; Neumann, 1992; Scoones, 1996). Conflicts over land use are set to intensify if rural poverty and dependency on land increases, or through economic stagnation and rural population growth (Zimyana, 1995).

Contrasting Examples of Landscape Change

Recent investigations by the Kenya Trypanosomosis Research Institute (KETRI) provide an insight into the impact of human population growth on the east African environment (Bourn, 1998). Land cover changes and local histories were examined in four semi-arid case study areas, using a combination of comparative air-photo interpretation and participatory rural appraisal. Busia District on the border with Uganda and Olambwe valley near Lake Victoria are densely populated regions of western Kenya with relatively high rainfall. At the other extreme, Galana Ranch, east of Tsavo East National Park, and Nguruman, in the southern Rift Valley, are thinly populated, low rainfall rangeland areas. Case study characteristics are summarised in Table 4.

Table 4: Characteristics of Case Study Areas

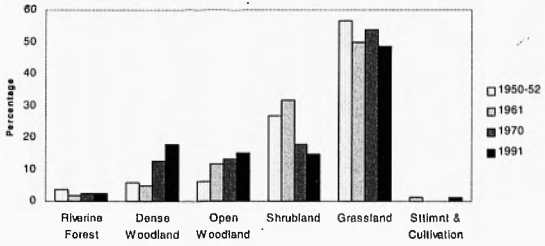
Name	Busia	Galana	Nguruman	Olambwe
Land Area	1,700 km^2	6,000 km^2	600 km^2	1,400 km^2
Annual Rainfall	750-2,000 mm	400-600mm	400-600 mm	1,000-1,400 mm
Farming System	Mixed	Commercial Ranch	Pastoral Group Ranch	Mixed
Human Density 1989	230 km^{-2}	<1 km^{-2}	5 km^{-2}	110 km^{-2}
Cattle Density 1996	87 km^{-2}	2 km^{-2}	15 km^{-2}	c75 km^{-2}

The scale and variability of human impact on the local landscapes are illustrated in Figure 5. In higher rainfall mixed farming areas there has been a massive expansion of agriculture over the past fifty years, with three-fold increases in both Busia District and Olambwe valley. This expansion has been largely at the expense of woodlands and riverine forests, which have virtually disappeared from Busia District, where there has been a marked increase in fallow grassland (Rutto, 1998). In Olambwe valley, with somewhat lower human population density, the expansion of agriculture and transformation of natural vegetation has not progressed as far (Muriuki, 1998). Substantial areas of woodland and shrubland still exist, although these too are in decline, and much of what remains lies within the confines of the Ruma National Park. Farming takes place right up to the edge of the fenced park boundary, and is a clear sign of the conflicting land use interests that seem certain to intensify and spread in years to come.

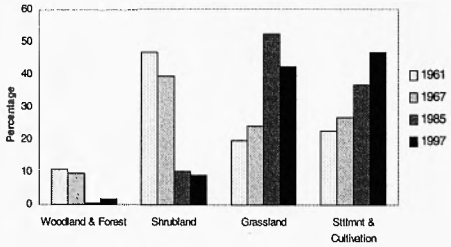
In lower rainfall pastoral areas such as Nguruman, there has been a rapid recent expansion of irrigated horticulture, but this has been confined to a very limited area of perennial water supply (Oloo and Bourn, 1998). Contrary to expectations, woodland vegetation at Nguruman has expanded, and shrubland has declined over the past four decades, with the proportion of grasslands remaining fairly stable. This change in woody vegetation cover is attributed to natural recovery, following

Figure 5: Land Cover Changes in Selected Areas of Kenya: 1948-98

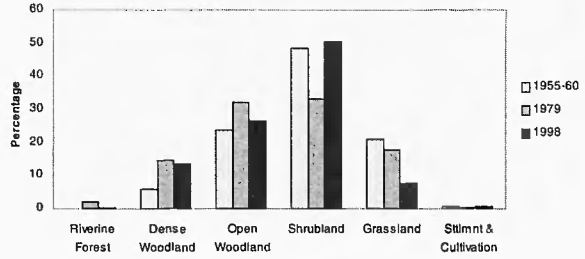
Nguruman in the Southern Rift Valley: 1950-91



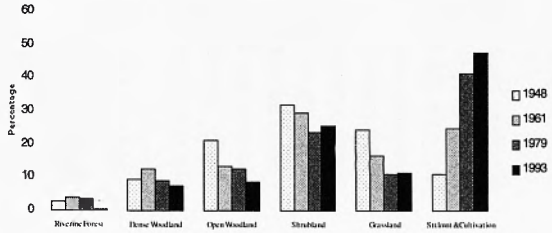
Busia - on the Border with Uganda: 1961-97



Galana Ranch - East of Tsavo East: 1955-98



Olambwe Valley - Lake Victoria: 1948-93



Box 1: Brief History of Galana Ranch

Galana Ranch is currently managed by the Kenya Government's Agricultural Development Corporation (ADC) and has a somewhat chequered but instructive history. The ranch has its origins in the Galana Game Management Scheme, established in 1960 with the support of the Nuffield Foundation, to utilise the elephant hunting skills of the Waata, displaced when Tsavo National Park was created. The scheme failed to receive government support after independence, and in 1967 was taken into private ownership by Galana Game and Ranching Limited. Tourist safari hunting was the primary source of ranch income, until the ban on hunting in 1977.

Studies on the domestication of buffalo, oryx and eland were also carried out during the early years (King and Heath, 1975; King et al., 1975, 1977, 1978; Lewis, 1975, 1977, 1978; Stanley-Price, 1985a and 1985b). These experiments highlighted the problems of treating wild species as domesticated animals. Many of the apparent advantages of wild species disappear when subject to typical livestock husbandry practices. Subsequently, attention focused on livestock production, and by the late eighties the ranch was running some 28,000 head of cattle.

That period coincided with a massive increase in poaching, adverse publicity and general intrigue, which resulted in revocation of the lease and sale of the ranch to ADC in 1989. Since then Galana has been de-stocked and run down, and once again is being considered for privatisation. With the current ban on hunting and decaying infrastructure, the future of the ranch remains uncertain, but past experience has demonstrated Galana's potential for multi-species ranching and sports hunting.

Source: Bourn and Wilson (1998)

cessation of fuel wood collection by the Magadi Soda Company in 1949. Company records confirm that at least 190,000 tons of firewood were extracted from the area to fuel production during the period 1935-1949 (Hill, 1964).

Arguably, Galana is a special case because it is a 600,000 hectare (sic) ranch on the eastern boundary of Tsavo East National Park, with no settled farming population, although Orma pastoralists have recently moved into the northern sector (Bourn and Wilson, 1998). There is, as yet, no agricultural expansion to drive environmental change, but wildlife, fire, flood and, to a lesser extent, ranch management have all played a part in vegetation dynamics. Major concentrations of elephants in the early seventies resulted in a reduction of woodland, and an increase in grassland in the western ranch. With the virtual elimination of elephants from Galana Ranch during the eighties (Douglas-Hamilton et al. 1996), woodland and scrub cover have increased, and grassland has declined. In the eastern

ranch, woody vegetation cover has expanded progressively over the years into former grassland areas. Fire, both deliberate and unintentional, has also been an important factor in controlling the spread of woody vegetation. Occasional massive floods can also be highly destructive of riverine vegetation, as recent experience has shown.

These case studies demonstrate that the environmental impact of human population growth and agricultural expansion is concentrated in areas of higher rainfall and greater agricultural potential. Elsewhere, land cover changes are less obvious and do not necessarily conform to expectations.

Alienation of Grazing Lands

Rangelands, which have been treated predominantly as common property resources (CPR) by pastoralists, are increasingly being expropriated through privatisation by élite interests for commercial agriculture and ranching, in conjunction with state nationalisation of land for protected areas (Scoones, 1995a, 1996; Brockington and Homewood, 1996; Leach and Mearns, 1996; Palmer, 1997; Thompson, 1997; Lane, 1998).

This alienation of grazing lands has profound socio-economic ramifications for pastoralists. In one division of Tanzania, 79% of pastoral land is under application for alienation: Barabaig pastoralists in Tanzania have been discouraged from exploiting their dry-season grazing lands in favour of Canadian-sponsored wheat growing schemes (Lane and Pretty, 1990). In southern Africa, the Tribal Grazing Lands Policy in Botswana led to the fencing of communal areas, with those landowners who could afford boreholes being able to requisition the best grazing lands, thereby accumulating a greater share of the national herd (White, 1992). Similar problems have been noted in Kenya and Tanzania (Lane and Swift, 1989; Barbier, 1990; Pointing, 1991; Lane and Moorehead, 1994, 1995; Joekes and Lane, 1998). Fenced farmland and government legislation to enforce sedentarisation, such as Tanzania's former villagisation policy, reduces herd mobility and limits productivity in non-equilibrium environments. These factors can force those who are already 'resource-poor' into more marginal areas, potentially reinforcing intra-societal, intra-communal and socio-economic inequities (Abel and Blakie, 1990; Scoones, 1995a, 1996; Cousins, 1996).

The nationalisation of land by the state to establish game reserves and national parks enables it to be exploited for tourism opportunities and earn foreign exchange, while simultaneously appeasing international and, to a lesser extent national, pressures to conserve biodiversity (Parkipuny 1997). Conflicts of interest over such land use arise because pastoralists view the conflict largely in economic terms – the loss of grazing land, whereas wildlife conservationists perceive it in environmental terms – protection of habitat from degradation by increased human and livestock populations. When the opportunity costs of production foregone are calculated,

pastoralists' negative perceptions of wildlife can be appreciated. Norton-Griffiths (1996) and Norton-Griffiths and Southey (1995), estimate the opportunity costs of biodiversity conservation in the Mara region of Kenya at $203 million, some 2.85% of GDP. In 1995, the combined net revenues from wildlife tourism and forestry were just $42 million, excluding consideration of indirect benefits, such as ecosystem functioning, which thereby significantly under-estimates the conservation value.

Since many of the benefits are indirect and external to African countries which protect biodiversity, the pressures and conflicts between pastoralists and wildlife are likely to increase if there is a lack of incentives (economic or otherwise) for pastoralists to invest in wildlife conservation. At the national level, governments need to recognise that most of the benefits from conservation (through nature tourism) currently accrue outside the host communities. At the international level, the Global Environmental Facility (GEF) provides a mechanism for supporting national governments to invest in conservation activities whose benefits accrue outside the host country: the concept of funding additional activities that provide incremental benefits.

Evolution of Conservation Philosophies

Early Period of Exclusion

State intervention to create exclusive wildlife reserves and laws to prohibit or control the killing of wildlife were originally motivated by the colonial intention to control the use of tradable commodities and harvest hunting trophies. For example, the Maasai in east Africa originally occupied a region encompassing some 80,000 square miles, but the colonial government expropriated much of this land and apportioned it to white settlers. The Serengeti-Ngorongoro area was designated as a 22,860km^2 Game Reserve in 1929 and given National Park status in 1951. Subsequent disputes resulted in its reduction to 14,746km^2 in 1959 and, in exchange for evacuation of this area, and the establishment of an adjacent 8,292km^2 Ngorongoro Conservation Area, with joint land use status for both wildlife conservation and pastoralism (Homewood, 1995).

Increasing competition for limited land resources in the general region erupted as physical violence when pastoralists, excluded from watering points in Amboseli, responded by spearing rhinos (Lindsey, 1987). As poaching continued unchecked, conservation philosophies gradually evolved from traditional colonial approaches, based on protectionism, exclusion and policing, to incorporate ideas from rural development experiences, emphasising the provision of alternative income-generating strategies. Excluding people from the wildlife-derived benefits and management of wildlife resources is now regarded as the root cause of antagonism.

At the same time, there has also been a realisation that relying solely on protected areas to conserve biodiversity is insufficient. Wildlife is a fugitive resource, with some species migrating seasonally, ignoring boundaries delimited by protected areas. For example, in Kenya three-quarters of all large mammals are found *outside* protected areas for at least part of the year. Conservation and wildlife management must, therefore, be extended beyond the protected areas. Wildlife is a major tourist attraction and foreign exchange earner for countries such as Botswana, Kenya (40% of foreign exchange generated via tourism), South Africa, Tanzania, Zambia and Zimbabwe (Pearce, 1997). Hence, extensive land areas have been set aside in these regions for some form of conservation management (e.g. as much as 25% of Tanzania; 30% of Zambia; 12% of Zimbabwe and 10% of South Africa). In South Africa, private game reserves and integrated livestock-wildlife ranches are common, accounting for almost half the total conservation area. Game ranching is also rapidly increasing in Zimbabwe and Namibia (Cumming, 1990a,b&c; Cumming and Bond, 1991; Ellis, 1991; Winrock International, 1992; Child, B., 1995; Child, G., 1995).

Although contested by Barrett and Arcese (1995), the future of wildlife conservation in Africa is widely perceived to lie in devolution of authority from central government, and the closer integration with development outside protected areas. For conservation to be sustainable, it is argued that affected people must receive an equitable share of wildlife-derived benefits and be encouraged to participate in community-based natural resource management programmes (CBNRM), as is the case with Zimbabwe's well known Communal Areas Management Programme for Indigenous Resources (CAMPFIRE). A vast literature has accumulated over the last few years on this emotive subject, including: Adams and Hulme, 1998; Akama et al., 1995, 1996; Anderson and Grove, 1987; Archabald, 1996; Barrow and Elliott, 1997; Berger, 1993, 1996; Brockington and Homewood, 1996; Child, B., 1995; Child, G., 1995a&b; Cumming 1990a,b&c; Enghoff, 1990; Hall & Blench 1998; Homewood and Rodgers, 1987, 1991; Hulme, 1997; IIED, 1994; Kiss, 1990; Lewis et al., 1990; Lindsey, 1987; Makombe, 1993; Martin, 1986; Murphree, 1993; 1995; SARDC, IUCN, SADC, 1994; Talbot and Olindo, 1990; Thompson, 1997; Wells et al., 1992, 1996; Western, 1993; Western and Wright, 1994.

Chronology of Donor Initiatives

During the 1990s, the countries of eastern Africa have been undergoing a slow and tortuous process of structural adjustment, including re-examination of their wildlife policies and reform of their wildlife services. A chronology of donor support to the wildlife sector is given in Table 5.

The process continues, but there is a clear trend away from the preservationist policies of the past, towards the more utilitarian, community-oriented conservation approaches of the future. This is not to say that protected areas are to be abandoned, but that more emphasis is to

Table 5: Chronology of Donor Initiatives

Date	Programme/ Country/ Donor
1989-99	Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) in Zimbabwe; US$33 million; USAID, EU, UK, Norway, Netherlands, Germany and Japan
1987-02	Selous Conservation Programme - Tanzania
1987-97-03	Serengeti Regional Conservation Strategy - Tanzania; TANAPA, NORAD
1989-98	Tanzania Wildlife Conservation Monitoring; Frankfurt Zoological Society and EU
1992	*Animal Agriculture in Sub-Saharan Africa* published by Winrock International; wildlife and integrated wildlife-livestock production systems identified as having potential for unique and important contributions to food production and income generation
1990-93	Protected Areas and Wildlife Services (PAWS) - Kenya; DFID, EU, World Bank
1993-97	Conservation of Biodiverse Resource Areas (COBRA) project - Kenya
1998	COBRA II; USAID, Kenya
1990-95	Planning and Assessment for Wildlife Management (PAWM) Tanzania; USAID, AWF and WWF
1992-97	Ruaha Ecosystem Wildlife Management Project; TANAPA, WD, DFID
	Whose Eden? Published by IIED. Review of community approaches to wildlife management in Africa, commissioned by ODA
1995-97	Livestock and Environment Study by FAO and World Bank
1996	ODA hosts African Wildlife Policy Consultation, Sunningdale Park
1997	*Take only Photographs - Leave Only Footprints.* Published by IIED and DICE. Review of eco-tourism commissioned by ODA
1997	Tanzania Environment Policy approved and published
1997-01	MBOMIPA Sustainable Utilisation of Wildlife Resources Project; TANAPA, WD, DFID
1998	New Tanzania Wildlife Policy approved
1998-02	East African Regional Highland Biodiversity Conservation Programme; UNDP-GEF
1998-03	Tarangire-Manyara Complex - Biodiversity Conservation - Tanzania; TANAPA, WD, AWF, WWF, Milan University, USAID

Box 2: Views of the African Wildlife Foundation

Innovative Management Systems for Livestock and Wildlife

Pastoralism is an integral and highly specialised part of a complex system of natural resource use. Innovative approaches to the promotion of livestock and wildlife co-existence are required, which must build on indigenous knowledge of semi-arid rangelands.

Thresholds of Use

Research is required to assess thresholds of economic and ecological productivity under different conditions. This research needs to combine modern knowledge about animal nutrition and markets, as well as indigenous knowledge about risk management, resilience and long-term changes in the conditions of savannah ecosystems.

Pastoral Reserves / Wildlife Corridors

For an overall sustainable land use system, including wildlife conservation and pastoralism, to work, it is important to be aware of the adverse impacts of encroachment on any part of the overall pastoral resource-use system. Agricultural encroachment tends to target key resource areas, such as riverine forests and seasonal flood plains. This conversion breaks the integrated use over time and space of pastoral systems, resulting in large parts of the system becoming largely useless in productive terms. Land and resource tenure rights, or co-operative land use, are essential to both pastoral and wildlife management regimes. For this reason, AWF is working with pastoral groups to promote identification and acceptance of controlled, open access areas, which are critical for sustaining seasonal movements of both livestock and wildlife. In these pastoral reserves, or wildlife corridor areas, agriculture would be controlled in favour of livestock and wildlife.

Impact Indicators and Monitoring Systems

The integration of conservation and livestock production requires monitoring systems that are designed to track conservation, production, economic and social indicators. Collaboration between different disciplines and links between scientists and field practitioners are needed to develop appropriate indicators and test their application.

Disease Issues

An increasingly important aspect of livestock and wildlife interactions is that of disease. In recent years, Maasai dogs have been suspected of introducing canine distemper into the Serengeti ecosystem causing an epidemic and the loss of many lions. The resurgence of rinderpest in east Africa and its control raises many issues of wildlife-livestock interaction. Wildlife, as a non-vaccinated control, is providing vital information on the pattern and spread of the disease. Malignant catarrhal fever, for instance, which remains contagious in the afterbirth of wildebeest, is a constraint to cattle grazing in the Simanjiro plains of Tanzania. More resources need to be invested in understanding and minimising the negative aspects of disease transmission between wildlife and livestock for their mutual benefit.

Economic and Cultural Incentives

In order for wildlife conservation to fully complement pastoralism and to reduce the risk of pastoralism as a single economic activity, it is necessary for wildlife benefits to pass through monetary mechanisms and to be transferred into food, medicines or livestock services. Thus, the success of this partnership between pastoralism and conservation may depend upon the efficiency and accountability of these conversion systems. Further work is necessary on the incentives which determine land and resource-use decisions, and effort must also be applied to enhancing the incorporation of such data into government planning, as well as local decision-making processes.

Source: Aveling et al., (1998)

be given to involving and sharing benefits with communities living in the neighbourhood, the strategy being to try and establish mutually beneficial alliances with local communities for tolerance and co-existence with wildlife in buffer zones around protected areas.

Use It, or Lose It ?

The African Wildlife Foundation (AWF) is an international non-governmental organisation, based in Washington and Nairobi, working for conservation and development in Africa. AWF was established in 1961 as the African Wildlife Leadership Foundation, and is a leading proponent of the argument that wildlife must pay its way in developing countries, or be lost (Baskin, 1994). The Foundation is a strong advocate of community-based conservation (Barrow, 1996) and wildlife utilisation (COBRA, 1995; Vorhies, 1996), and has taken an active role in the formation of community conservation services in Kenya, Tanzania and Uganda (Barrow et al., 1996a; Dembe and Bergin, 1996). AWF has also supported the recent establishment of an independent Community Conservation Service Centre in Arusha, to provide technical expertise and information, matching resources to stimulate community conservation initiatives and to facilitate links between communities, government and the private sector.

A paper reflecting AWF views on the roles of livestock and wildlife in the environment and the diversity in pastoral ecosystems in east Africa was presented by Aveling et al. (1998) at the 1997 International Conference on Livestock and the Environment (Nell, 1998). Their conclusions and recommendations are endorsed by the reviewers and are reproduced in Box 2.

5

Livestock and Wildlife in Sustainable Rural Livelihoods

Sustainable Rural Livelihoods

Sustainable rural livelihood (SRL) strategies are defined as those that comprise the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base (Carney, 1998b). The SRL perspective is used for understanding the costs and benefits for pastoralists of interacting with wildlife.

Role of Livestock

Livestock products are relatively expensive compared to other food and they have a high income elasticity of demand when compared to crops in developing countries. In comparison to staples and cereals, the demand for livestock products increases significantly as incomes rise (Holden et al., 1997). However, livestock fulfil many functions above and beyond the production of food. Meat and milk constitute on average of just 6% of dietary energy in Africa (Holden et al., 1997). The cultural significance of livestock, for example in terms of bridewealth or dowries, has also influenced the relationship between livestock and pastoralists and wildlife. Many pastoralists in eastern and southern Africa, such as the Maasai, Rendille, Karimojong, Barabaig and Tswana, regard livestock as culturally more important than wildlife or indeed, land (Galaty et. al., 1990).

Holden et al. (1997) note that some of the most important contributions of livestock to the sustainable rural livelihood strategies of pastoralists concern the way in which livestock help people produce more crops and provide cash for other essential purchases. Livestock transform biomass from primary production into high-value products that can be used by people: they convert grazing from common property resources (CPR), into private goods (meat, wool, milk), for the individual. Throughout eastern and southern Africa (Kenya, Somalia, Sudan, Ethiopia, Botswana, Angola), women undertake many livestock-related activities and milk can be an important source of income (Holden and Coppock, 1992; Holden et al., 1997).

Livestock concentrate nutrients in the form of urine and manure which

can be used to maintain or enhance soil fertility (Tiffen et al. 1994) or, in the case of manure, provide fuel or indeed food for other livestock (Holden et al., 1997). Livestock are also a source of draught power, ploughing and transporting goods to market and being used to enhance soil conservation and harvest water. Since livestock are a mobile asset, subsistence is not necessarily tied to local conditions and instead can track seasonal variations in vegetation and water supply (Jahnke, 1982).

Livestock and their products may be sold or traded to meet other cash needs, irrespective of the production cycle. Hence the value of livestock can be realised at any time and invested capital is, in theory, easy to access; at times of household crisis, the sale of small livestock can be an important survival strategy to meet immediate needs. However, prices fall catastrophically when a large number of households sell, for example in response to drought; a household with only a few animals may be reluctant to part with such essential reproductive assets. As livestock reproduce, productive animal assets accumulate over time if properly managed. Investment in stock is often compared to banking cash reserves, and in countries where the currency is unstable may well be a better investment. For instance, during a six-year study in Lesotho, farmers investing in cattle earned the equivalent of 10% interest, whilst bank accounts lost 10% due to inflation (Swallow and Brokken, 1987). Nonetheless, the risks associated with livestock, such as drought and epizootics, are generally outside producers' control (although they can often make informed assessments of individual national veterinary services).

Livestock are often distributed among producers to reduce the risks of loss from epizootics, and the loaning of animals (particularly from richer to poorer households) can be a way of exchanging productive assets such as labour. Loans may also be a way of assisting kin relations back a sustainable household enterprise. Mixed herds are also divisible by species according to cash needs; goats and sheep, constituting the small change, as it were, of everyday transactions. Livestock products account for approximately 25% of agricultural production in Sub-Saharan Africa. If contributions from animal traction and fuel are incorporated, then the combined contribution from animal agriculture would increase still further (Holden et al., 1997).

Grandin (1985) has shown that in response to increased population pressure on a decreasing land base, Kenyan Maasai will increase their smallstock holdings (sheep and goats). This increases a component that exploits different forage resources from cattle while remaining in the same grazing space. Infield (1993:141) argues that 'there is every reason to suggest that, with appropriate government policies, adequate extension support and marketing channels, both pastoralists and settled farmers would diversify their production systems to include wild herbivores.' However, the general emergence of such enlightened policies is difficult to envisage in present circumstances.

Wildlife/Livestock Interactions

Costs to Communities

Competition for resources such as grazing and water is another major concern of pastoralists, especially where the aim is to maximise returns from livestock in terms of protein production/herd size, and wild animals are seen as direct competitors for resources. Conservationists argue that livestock tends to displace wildlife from grazing areas and convert habitat to less productive and biologically diverse states (Coe et al., 1976). Homewood and Rodgers (1987, 1991) deny this; eliminating livestock grazing and pastoral management practices, such as burning, from areas in Ngorongoro Conservation Area, has detrimentally altered vegetation for wildlife, favouring less nutritious and less palatable species. Livestock and wildlife exploit different (but overlapping) ecological niches in time and space and have evolved different physiological and behavioural strategies to reduce competition. As 'no single species can fully exploit the rangeland resources.... these adaptations and specialisations can thus be exploited by farmers to increase the level of efficiency with which they exploit their land' (Infield, 1996: 136).

A major cost to any community of integrating wildlife and livestock is disease. The direction of disease transmission between them and degree of resistance is a critical issue. Disease transmission may be seasonal, as with Malignant Catarrhal Fever which is transmitted by wildebeest calves in the calving season. Many diseases affect both livestock and wildlife. Rinderpest devastated both livestock and wildlife populations at the end of the 1890s when it was introduced to the continent through imported livestock.

The incidence and transmission of disease can be mitigated through habitat management to discourage breeding habitats of known disease vectors. Vegetation can be burnt seasonally in tsetse infested areas; livestock health campaigns which target rural areas initiated, where there is a high level of contact between domestic livestock and wildlife; veterinary care improved with increased inoculations of livestock (Turton, 1995) and wildlife reservoirs segregated at critical transmission times (Infield, 1996; Machange, 1997).

Predation of livestock and humans is often cited as the major risk by pastoralists (and indeed non-pastoralists) who live near wildlife, particularly women (Nabane, 1995, 1996), although it is argued that such perceptions are exaggerated (Infield, 1996). Damage to crops and infrastructure by wildlife are also key issues. Simple protective fencing is easily destroyed by elephants, buffalo and zebra. In theory, both predation and infrastructural damage can be limited through improved physical protection. However, this is usually costly at the individual level, even though it may result in better health and performance of livestock overall.

Although wildlife constrains land use for pastoralists, the concept of integrating wildlife into their sustainable rural livelihood strategies holds

considerable theoretical appeal for marginal semi-arid lands. These areas are less productive for rainfed agriculture and wildlife is arguably better adapted to semi-arid conditions than livestock, which is more dependent on water and susceptible to trypanosomosis (Jansen et al., 1992; Infield, 1996; Cumming, 1990b; Cumming and Bond, 1991). Therefore, the sustainable utilisation of wildlife may be the most effective way of exploiting Africa's comparative advantage in this area and can also benefit pastoralists (Makombe, 1993; Winrock, 1992).

All strategies for integration rely on the benefits of diversifying livelihoods through non-consumptive or consumptive sustainable use (e.g. photographic safaris, education, safari hunting, hides, live cropping and trade). Such strategies include: commercial game ranching (single or mixed enterprises); sharing resources with local communities around national parks and community-based wildlife management strategies, such as CAMPFIRE in Zimbabwe.

6

Integrated Management of Livestock and Wildlife

Tenure and Access Rights

Tenure and rights of access form an essential component of the analysis of alternative land uses for pastoralists and agro-pastoralists, especially in non-equilibrium environments where the availability of grazing and water varies. The regime experienced by a given stakeholder affects the pattern of the costs and benefits of incorporating wildlife into their livelihood strategies.

The pre-colonial system in eastern Africa, was open-access, based on a virtually chronic state of warfare (Bol Aken 1991; Bolling 1990; Markakis 1989; Mawson 1991; Perner 1993; Fukui and Turton 1977). Pasture and grazing rights were sustained by military force rather than any type of consensual system. Continuing inter-group raiding was as effective in building up herds as investing in improved livestock productivity, at least as far as the victors were concerned. Where arms have become widespread among pastoralists, as in Somalia, southern Sudan and adjacent regions of Ethiopia and Kenya, violent conflicts are continuing to the present.

Clearly, there is no merit in perpetuating these systems, and the relative long-term security in the regions further south suggests that innovative strategies must be sought. The literature divides sharply into two camps; those proposing that all non-reserved land be converted into private ownership and those proposing communal tenure systems of different designs. There is now considerable experience of both types of strategy over the region as a whole. The form of land tenure has significant implications for tenure over other resources, such as wildlife.

Land tenure regulations in Tanzania are in a state of disarray (Shivji, 1994). Compared with Kenya, very few ranches have been established in Tanzania. One of the few still operating is Mkwaja Ranch on the coast near Tanga, owned by Amboni Holdings Limited. The southern part of the ranch, which was more of a wilderness area with abundant wildlife and tsetse, has recently been sold to the Wildlife Division to expand the Sadaani Game Reserve.

National Ownership

Models of Resource Transfer

Since colonial times the tenure regime for wildlife in Sub-Saharan Africa has been largely one of nationalised wildlife, the King's game or the wife's farm – *shamba ya bibi*[1], on nationalised land, such as national parks and reserves (see section 4.3 for more detailed discussion). Even outside such protected areas, on private or communal land, wildlife has been treated as the property of the state. However, more recently, conservation philosophies have evolved to recognise that people who pay the costs of wildlife conservation, in terms of land alienation and competition for resources, disease transmission to domestic stock, predation and crop damage and so on, must also receive some wildlife-derived benefits if this model is to be sustainable (see Chapter 5). The main mechanism explored for providing benefits, from national wildlife to local communities, has been revenue and resource-sharing around national parks.

Revenue and Resource Sharing Around National Parks

Revenue-sharing mechanisms which devolve a proportion of protected area profits to local communities may be conceptualised as a form of rent for the land occupied, or as compensation for the costs of living next to a protected area. However, these mechanisms suffer from a number of problems. In many cases, protected area management is severely under-resourced and therefore extremely reluctant to part with even a small share of revenues. This issue is mitigated where tourism activities associated with the protected area are run by private operators, and a bed night levy, or equivalent, can be channelled directly to local communities.

Revenue-sharing also suffers from a number of problems discussed in greater detail in relation to CAMPFIRE-type activities below, in particular identification of beneficiaries, low marginal returns to beneficiary households, dependence and volatile tourism markets. Revenue-sharing is usually combined with improving access for local communities to scarce resources found inside protected areas, such as fuelwood and thatching grass. Low-impact sustainable use such as bee-keeping, caterpillar collection, thatch-cutting and collection of dead wood can be developed in national parks, as in for example Kasungu National Park in Malawi and Pilanesburg National Park in South Africa (Makombe, 1993).

Despite high-sounding pronouncements, the amounts returned to either the Widlife Services or the adjacent communities remains small in relation to overall income. For example, of the $400 million generated annually by wildlife-related tourism in Kenya, just 3% is returned to the Kenya Wildlife

[1] Referring to the Kaiser Wilhelm's gift of Tanganyika game sanctuaries to his wife.

Service, with which it has to run the parks as well as compensate the Maasai for loss of access to their traditional lands (Pearce, 1997). It is unlikely that these percentages are more favourable elsewhere in Africa and still less likely that they will improve, given the general collapse in hard currency earnings throughout much of eastern and southern Africa.

If households invest their wildlife income in livestock production/ownership in regions where wildlife enterprises have reduced the land or water available for grazing and increased the risk of livestock predation, further costs are imposed upon the household. These are likely to be borne preferentially by those members of the community whose tenure rights are less secure or have small livestock reserves and thus less livelihood security. Livestock plays a complex, integrated role in the rural livelihoods of both pastoralists and agro-pastoralists, which cannot simply be substituted by revenue or resource-sharing, or other income-generating activities. From the perspective of local communities, allocation of land for the sole use of wildlife and tourists will be regarded as a suspect and inferior form of land use, unless adequately compensated for loss of access and utilisation.

Private Ownership

The Argument for Investment

In theory, private ownership of land and wildlife creates incentives to invest in resource management and enhance the benefits accrued from that resource. Contrary to experiences in the agricultural sector (Lane, 1998; Platteau, 1996; Cornia, 1994), Hunt (1996) maintains that in semi-arid areas with low population densities, titling can offer people the long-term incentives to invest in resource conservation. Hence, private ownership of land has been hailed as a panacea for wildlife management (Kiss, 1990; Cumming 1990b).

Large tracts of land are necessary to support most of the commercially valuable species, such as large mammals. In certain specific circumstances, privately-owned wildlife can be run on communally-owned land, as in the case of reindeer in Scandinavia[2], but this is not a model which can be easily transferred to semi-arid rangelands in SSA. In these rangelands, private ownership of wildlife implies private ownership of large commercial ranches. This model is not considered appropriate to enhancing the rural livelihoods of the poor, as it tends to benefit wealthier individuals and élites, although it might be applied in specific circumstances on some group ranches in Kenya, e.g. in Laikipia and Samburu Districts.

One of the 'costs' of maintaining wildlife is increased predation. The degree of tolerance to predation can be related to proprietorship, i.e. the

[2] Although the Swedish government has recently changed the regulations to exclude reindeer.

economic effects of attacks on livestock may be offset by benefits from privately-owned wildlife. In Namibia, cheetahs were tolerated on private farms despite the loss of livestock because farmers could capture and sell cheetah for profit, thereby offsetting their losses. However, international bans on this trade led to a decline in cheetah populations. In Kenya, leopards were tolerated by the colonial government since it was estimated that the value of damage to crops from bush-pigs and baboons outweighed losses caused by leopards (Infield, 1996). However, 'people are unlikely to be convinced of the desirability of living with dangerous carnivores by economic arguments' alone (Infield, 1996: 134-5). Exactly similar arguments are being played out in Europe with proposals to re-introduce wolves and bears into their former habitats.

Commercial Ranching

Commercial game ranching has grown out of livestock ranches established in the early colonial period, especially in Kenya and Zimbabwe (Field, 1979). Most such ranches were established on an experimental basis, rather than for strictly economic purposes. However, Winrock (1992) argues that integrated wildlife-livestock production systems have the potential to make unique and important contributions to food production, employment and income generation opportunities throughout Sub-Saharan Africa. Multi-species systems involving mainly game or mixed ranching, safari hunting and tourism are increasing on private and communally owned land in parts of eastern and southern Africa. It has been estimated that 10-20% of commercial ranches in Botswana, Kenya, Malawi, Mozambique, Namibia, South Africa, Tanzania, Zambia and Zimbabwe are involved in game ranching (Cumming, 1990b).

The dual use of livestock and wildlife spreads the economic and financial risk associated with their management, as well as making more efficient use of forage in areas less suitable for livestock ranching. Depending on marketing arrangements, wildlife can generate greater wealth at lower economic and environmental costs than livestock and arable agriculture and thus be a profitable rural sector (Kiss, 1990; Jansen et al., 1992; Cumming and Bond, 1991; Game Ranching Limited, 1995). Table 6 provides a tentative listing of multi-species ranching operations in Kenya.

Financial and economic efficiency is related to the absence of competition from other types of land use. In Zimbabwe better returns on investment are found in Natural Region V (where rainfall is lowest) than in NRs III and IV (Jansen et al., 1992; Kreuter and Workman, 1992). The relative economic efficiency of game ranching to livestock production improves with the introduction of safari hunting to game ranches e.g. Iwaba in the Midlands, the Matesi Area in NR IV, Buffalo Range and Limpopo Intensive Conservation Area in NR V (Kiss, 1990; Jansen et al., 1992; Child, B., 1995; and Child, G., 1995).

Table 6: Multi-Species Ranching in Kenya

LAIKIPIA - Virtually all ranches run mixed wildlife livestock operations

Livestock with Game Cropping:
Ol Maisor
Kisima Rumuruti
Sosian
Chololo
Mutara
Lolldaiga Hill
Lollomarik
Thrana

More Wildlife than Cattle:
Lewa Downs
Ol Jogi

KAJIADO
Tourism and bird shooting on some Group Ranches

RIFT VALLEY
Delamere Estates - Soysambu includes livestock, cropping and tourism
Hopcraft - livestock, agriculture and tourism
Marula - livestock and cropping

MAASAI MARA
All Group Ranches have wildlife

Cattle, Camels and Research:
Mpala and Lolldaiga

With Tourism:
Laikipia Ranching
Borana Ranch
Colccecio Ranch
Ol Pejeta
El Karama

Livestock without Wildlife:
Mogwooni
Tharua

MACHAKOS
15 commercial ranches with game cropping licences:
AMK
Astra
Braemar
Game Ranching
Kapiti
Katani
Kathkakai
Konza
Lukenya
Maanzoni
Machakos
Malili
Malinda
Portland
Stanley

Sources: Brian Heath, Farm Africa, Kenya; and COBRA (1995).

The National Ranching Company (NARCO) in Tanzania is being privatised as part of a wider government reform programme. The company operates 14 ranches across the country, some of which are reputed to support substantial wildlife populations and have potential for tourism development, including: Manyara (18,000 hectares), Morogoro (near Makumi National Park) and West Kilimanjaro (32,000 hectares).

Safari or Sports Hunting

The safari hunting debate has recently become particularly intense in Kenya where pilot legislation has allowed safari hunting on private land in Laikipia. Tour operators oppose hunting on the grounds that it is incompatible with game-viewing and will reduce the attraction of Kenya as a tourism destination (Elliott & Mwangi, 1997a&b, 1998). Proponents counter-argue that the tourism market is already shifting away from Kenya, because of the current economic situation, in favour of alternative destinations which allow hunting. Hunting therefore does not represent a significant deterrent (Georgiadis & Heath, 1998). One proposed solution is to identify separate zones for consumptive and non-consumptive tourism (Johnstone, 1998).

In Tanzania, safari hunting has long been recognised as an economically viable form of wildlife use capable of providing funds for conservation management and for local communities (Leader-Williams et al., 1996a). Revenue retained from safari hunting in the Selous Game Reserve has financed management of the Reserve. During a hunting ban from 1973 to 1978, the ivory price escalated and poachers moved in. Vigilant safari operators exited and elephant numbers in the Reserve crashed (Lamprey, 1995). Well-managed, tourist safari hunting has a minimal impact on population numbers in comparison with problem animal control and resident safari hunting, although where population numbers are critically low, population viability may be sensitive to the offtake of only a few mature males (ibid.) However, there are widespread concerns that neither Kenya nor Tanzania is currently in a position to manage hunting in a transparent, accountable and sustainable way. Safari hunting also remains politically unacceptable in Kenya because of its colonialist connotations (Johnstone, 1998).

Proponents of safari hunting argue that the most lucrative CBNRM schemes to date have been based on hunting (SARDC, IUCN, SADC, 1994; Kiss, 1990) and it may be viable in areas of low wildlife density where game-viewing is not, and can therefore provide incentives for conservation over a wider area (Georgiadis & Heath, 1998). Lovatt-Smith (1998) counter-argues that game-viewing tourism is more lucrative, but bases his calculations on a 60-bed safari lodge on ten thousand hectares, which would be beyond the scope of most community-based tourism schemes.

Communal Tenure and CBNRM Systems

CPR Regimes

Pastoral areas have been 'traditionally' managed under common property resource (CPR) management schemes, although these are really constructs of the colonial era. CPR areas are increasingly being recognised as complex and highly adaptable systems, involving multi-faceted rights to resources. They vary from open access, to communal use with reciprocal arrangements, to exclusive use and privatisation. In communal areas of Botswana, Namibia, Tanzania, Zimbabwe and Zambia, 12.5% of the land area is designated for wildlife use for the benefit of local communities (Kiss, 1990).

Communal areas in the semi-arid rangelands of eastern and southern Africa are under increasing pressure. Historically, the solution to many of the pressures faced in these areas was thought to lie in privatisation of communal resources. However, in terms of CBNRM, privatisation of resources can increase conflict between wildlife and livestock, increase tenure insecurity and gender-based discrimination (Birgegard, 1993; Hunter et al., 1990; Game Ranching Limited, 1995; Lane and Moorehead, 1994, 1995; Lane, 1998).

Fragmentation of the rangelands complicates the sustainable management of a resource such as wildlife, especially in non-equilibrium environments (Lane, 1998; Lane and Moorehead, 1994, 1995; Scoones, 1995, 1996; Tenga, 1992). The degree of investment/management in a resource is related to its value; this will vary according to when and where it is evaluated, as well as who is making that value judgement. For CBNRM schemes to function, neighbouring landowners may have to organise to join their lands together to manage wildlife and avoid conflicts over identifying producer communities. Strong institutional management, secure rights of tenure that build upon existing frameworks and conflict resolution skills are all likely to be important ingredients for the success of integrating wildlife into the sustainable rural livelihood strategies of pastoralists. These considerations suggest that larger tracts of land, with clearly defined and secure tenure rights, are likely to be easier to develop as wildlife management areas. However, this creates an inherent bias towards nationalisation or privatisation, reinforcing élite interests in commercial ranching or agriculture (White, 1992).

A key factor in maintaining the integrity of resources managed under communal tenure is the establishment of methods (institutional or otherwise), for excluding non-members from the resources altogether, or regulating their use (Scoones, 1995, 1996; Lane, 1998). In communal areas, problems always arise over the identification of 'producer communities'; i.e. who should receive the benefits of managing a fugitive resource (Child and Peterson, 1991). For example, in the Chundu Ward of Hurungwe District, north-western Zimbabwe, the regulation of access to and use of communal

resources, and the receipt of wildlife-derived benefits has been complicated by the influx of Korekore settlers who have been migrating into the area from the north since the 1960s. The settlers were evicted from so called 'wildlands' on which they had settled, when these were returned to the District Council under the CAMPFIRE initiative (see below). This has intensified conflicts over access to resources and who benefits from such programmes in the region (Bird and Metcalfe, 1995; Olthof, 1995; Metcalfe, 1996).

Livestock producers are all those who derive their livelihoods from husbandry of domesticated animals. The pressures faced by transhumant pastoralists are inevitably different to those faced by settled agro-pastoralists, or commercial ranchers. Nor are these conceptual divisions homogenous. External and internal pressures, such as in-migration or clan divisions, may exacerbate existing socio-economic inequities within a livestock-owning community. This will affect their ability to mitigate or enhance the costs and benefits associated with incorporating wildlife into their sustainable rural livelihood strategies (Child, B. 1995). For example, in Chapoto Ward, Guruve District, Zimbabwe, pre-existing social divides between the minority Tembovura and the majority Chikunda have led the latter group to dominate decision-making (Marindo-Ranganai and Zaba, 1993). Lack of functioning economic and management units at the Ward and Village level are perceived to constrain the return of benefits in the Nyaminyami and Guruve District CAMPFIRE programmes. Increasing private/commercial safari interests would improve the subsidiarity and accountability of wildlife-derived benefits to wards and villages in the area (Jansen, 1989, 1990); however, the Zimbabwe Trust (1990) argues that this undermines the transfer of skills to rural communities.

Evidence from CBNRM initiatives in the Caprivi region of Namibia (Ashley and La Franchi, 1997) has shown that although when aggregated across the community, the cash income from wildlife may exceed the costs of damage to agriculture from wildlife, this may not be so for individual households, especially when attitudes to risk are taken into account. Therefore minimising damage from wildlife to an individual's household is as essential as developing cash generation options at the community level.

Similarly, cash needs vary by season and are more acute in drought years. Those CBNRM initiatives that generate most profits around Christmas, in the planting season and in drought years, and require time inputs outside of planting and harvest seasons are likely to have more positive net impacts. Inevitably, the relevance of CBNRM also depends upon the impact on other household strategies as well as other developments, e.g. access to markets and trends in tourism and the degree of community involvement.

The literature calls for increased devolution of resource management to pastoralists and their institutions at the local level. This could be within a hierarchical arrangement with other regional and national institutions in times of crisis, such as drought. The state has an important role to play in maintaining impartiality in conflict resolution between stakeholders and in providing safety nets/contingency plans to support local level initiatives.

The organisation and administration of pastoral and agro-pastoral institutions are bound to be different as their stakeholders are under different pressures with respect to managing wildlife.

However, all local level institutions will have to be built slowly, within pre-existing frameworks. Institutions that aim to integrate wildlife into the sustainable rural livelihood strategies of pastoralists should promote flexibility / adaptability / subsidiarity in their composition and roles, within a supportive regional / national framework (Scoones, 1995, 1996). For example, permanent groups could form around regular/common tasks or needs that are widely felt by the pastoral or agro-pastoral community, e.g. secure access to water or protection of crops; more ad hoc arrangements can be made to tackle more episodic events.

Experience in CAMPFIRE suggests that investment in local institutional capacity-building, especially support to the development of business management skills, has been crucial. This has raised questions about the high institutional costs of CAMPFIRE-type initiatives, which are sustained only by external support and would be inappropriate in areas with lower potential for generating wildlife-related income (Farrington & Boyd, 1997).

On the other hand, a recent review of non-financial benefits from CBNRM in Namibia emphasises the point that institutional capacity-building can 'provide building blocks for local development that go well beyond the initial scope of CBNRM' (Ashley, 1998:i). In particular, communities have developed accountable and participatory processes for decision-making, acquired new skills, and gained experience and confidence in dealing with outsiders which have enabled them to take control of decisions and developments around them.

In conclusion, wildlife management as the preferred form of land use will only survive where it is the best economic alternative (Pearce, 1997). This implies that, for community-based conservation to meet its objectives in the long term, the benefits from wildlife conservation must outweigh the costs, including the opportunity costs of alternative land uses. Furthermore, if benefits are intended to substitute for income from wildlife use or habitat conversion, benefits must be in an equivalent form to the forgone income stream: social infrastructure does not compensate for lost income from poaching (Emerton, 1997, 1998). Alternative income-generating strategies are likely to become additional income-generating strategies, unless they provide a better use for the same scarce resources (Brown, 1998).

Local Hunting

The Selous Conservation Programme in Tanzania was aimed at involving local communities around the Selous Game Reserve in establishing buffer zones and title deeds within this zone; electing wildlife committees and scouts to protect wildlife from poachers and crops from wildlife; allocating annual quotas for consumption and sale of wildlife; and developing other uses for village wildlife, such as safari hunting (Makombe, 1993).

To locals living near game management/controlled wildlife conservation areas in Botswana, Tanzania and Zambia, the costs of hunting amount to only 14% of the market value of the animal, and they thereby obtain a relatively cheap form of animal protein. However, from an economic point of view, it would be more efficient to devolve to communities the right to sell hunting rights to these animals. If the market value better reflects the true economic value of the resource, then discounted values may lead to over-exploitation if a quota is not in place.

CAMPFIRE-Type Initiatives

The Communal Areas Management Programme for Indigenous Resources (CAMPFIRE), originally designed in Zimbabwe, is now being used as a model for similar programmes in a number of other countries in SSA. The idea arose from the mixed results of Project WINDFALL (Wildlife Industries New Development for All), in which cash and products generated by elephant culling in Chrisia Safari Area, in the Sebungwe region of north-west Zimbabwe, were returned to local communities. Lack of community participation in decision making limited its success. In 1982, in response to this, the Parks and Wildlife (Amendment) Act revised earlier legislation to enable District Councils (DC) to become the 'appropriate authority' (AA), for wildlife on their land, devolving the responsibility for management and use to the DC level and thereby facilitating a closer link between wildlife and people. CAMPFIRE was formally incorporated into the National Conservation Strategy in 1985/6. Its rationale is that communities in the communal areas will invest in conservation of natural resources, such as wildlife, if they can use the resources on a sustainable basis. The core principles include:

- initiating locally relevant programmes for the long-term development, management and sustainable utilisation of natural resources in the communal areas
- achieving management of resources by granting 'proprietorship' to 'producer communities' (i.e. those communities that incur the greatest costs from 'living with wildlife'), which are ideally homogenous and of no more than 150 households (Child and Peterson, 1991)
- allowing communities to benefit directly from exploiting natural resources in the area and giving them a choice in how they wish to receive and use revenues
- developing participatory administrative, institutional and decision making and resource management structures at village (approx. 600 households) and ward (approx. 6 villages) level

Over half of the DCs in the country have been granted AA status. In the first two districts to get AA status, Nyaminyami and Guruve districts (75 wards, approximately 56,500 households or 500,000 people), gross income has increased from Z$650,000 in 1989 to Z$10 million plus in 1993

(Child, G. 1995a&b). Four districts in Matabeleland: Binga, Bulilima-Mangwe, Tsholotsho and Hwange generated revenues of Z$3.5 million between 1990-1992, with Z$1.7 Million being distributed at the ward level in these districts. The World Wide Fund for Nature (WWF) estimates that CAMPFIRE has increased incomes in communal areas by 15-25% (Butler, 1995). Others argue that the revenues which are eventually channelled to the household level are insignificant in comparison to total annual income (Patel, 1998).

Revenues are generated from a range of activities including: hunting safaris - substantially the most lucrative form of activity; tourism - photographic safaris; and the sale of skins, hides, river sand, crocodile eggs, firewood, trees, meat and rafting licences (Makombe 1993). Money is being used to fund infrastructural developments to promote more tourism and development in these areas, such as boreholes, education, health clinics, fencing of arable land, road developments, electric fences, anti-poaching patrols, or in the dry season, anti-fire patrols. Safari hunting may also provide alternative sources of protein-rich food. Some communities have also opted to pay dividends at the household level, which can be equivalent to half of a household's annual income.

There are a number of problems with CAMPFIRE that compromise its long-term sustainability. CAMPFIRE is funded by tranches of funding, principally from USAID. This funding is due to end soon and it is unclear whether CAMPFIRE has a revenue-generating structure adequate to support its central bureaucracy. Patel (1998) argues that, in the absence of strong local institutions, CAMPFIRE is not owned by local communities, but by external organisations and safari operators, and different interests within communities are not resolved. The other aspect is the problem of extending the programme in areas where the wildlife resource base is limited. At present, all the most successful CAMPFIRE authorities are in some way adjacent to protected areas. In other words, they rely heavily on a system of game guard protection to allow animals to survive to breeding age. Where there is no such system, hunting is rife and large mammal numbers are correspondingly low (for the example of the Rwenya Basin, see Blench 1998b). However, transforming such reserves, which have few large mammals but some eco-tourism potential, requires longer-term infrastructural investment and is clearly distinct from the present-day CAMPFIRE system.

Women have conventionally played a limited role in wildlife utilisation programmes because they usually do not hunt in African societies. However, women may bear disproportionate costs of wildlife, especially in agro-pastoral communities where crop damage or predators are issues (Hunter et al., 1990). Women go on resource gathering trips and can act as key informants for the location of wildlife. Integrating wildlife management into pastoralism may bring benefits to women in the form of increased cash incomes where they retain some control over domestic finances, and thus greater food and livelihood security, as well as improved community services and infrastructure. Projects in southern Africa that involve the sale

of the Mopane worm (*Gonimbrasia belina*) are an important source of cash for women (Hunter et al., 1990).

Excluding women from the decision-making process in the CAMPFIRE initiative in Masoke village in the Zambezi disadvantaged them. The decision was taken to erect a game fence to protect crops. Women were not consulted and although the fence reduced the amount of time both sexes had to spend protecting their crops, it restricted women's access to other resources, such as fuel wood and water (Nabane, 1995). Hence it is important to promote women's participation in decision making in CBNRM programmes initiated for pastoralists, as well as to target income-generating activities from alternative forms of wildlife at women.

Tourism

Tourism Demand

Tourism is frequently cited as the world's fastest growing economic sector. East African countries possess a comparative advantage in forms of tourism that cater to the widely accepted fantasy of 'unspoiled' natural environments. However, demand is not infinite, and communities, supporting NGOs and donors need to evaluate carefully whether the product they can offer will attract tourists on a sustainable basis.

Tourism Volatility

International tourism demand is highly volatile, and is easily upset by rumours of insecurity or economic down-turns. The number of tourists visiting Kenya has declined markedly in recent years because of an adverse external image, whilst Tanzania has become an increasingly popular destination. It is probably no accident that some of the most chronically insecure areas of Africa are its semi-arid rangelands. Pastoralists in many areas seem to have existed in a state of semi-permanent warfare in pre-colonial times (Fukui and Turton, 1977) and much of the insecurity of the rangelands of east Africa and the Horn derives from old conflicts played out with new weapons. Some of the same rangelands are of course also the habitat of the large mammals favoured by tourists. A single major incident with a party of tourists can result in a significant drop in tourism income and loss of investment. Communities and conservation that become too dependent on international tourism are therefore vulnerable to the whims of political intrigue and media attention. International tourism strongly reflects rumour and fashion, while regional and national markets are better informed and can be less volatile. Small-scale tourism enterprises should therefore target more affluent nationals, expatriates based in-country and visiting businessmen.

Tourism Investment and Management

The successful development of small-scale tourism enterprises requires business management skills and investment. Tourism may be developed at a range of levels, from simple campsites and guided walking trails, to luxurious and exclusive game-viewing lodges. The preferred option will depend on the site itself, business management, investment capital available and the preferred ownership/management structure.

While community-owned and -operated enterprises promote local participation in decision-making, even the simplest enterprises require significant business management skills. On the other hand, the private commercial sector, with access to skills and capital, may provide few benefits to the local community beyond employment. A joint venture approach provides a bridge between these two options, depending on the negotiating power of the local community (Ashley, 1995). A successful arrangement would include local participation in major decision-making, local employment and training for promotion, and local sourcing of inputs such as food, furniture and building materials, and technical inputs to ensure competitiveness in terms of price, quantity, quality and timeliness if required. The probabilities of success will be greatly enhanced where the community has secure rights of tenure over land and other resources used by the tourism enterprise, and the realistic final sanction of removing a private operator which does not co-operate (IIED, 1994). Unlike the CAMPFIRE-type approaches discussed above, non-consumptive tourism may not require proprietorship over wildlife itself.

The amount of capacity-building support which communities may require to get this process right should not be under-estimated (Boonzaier, 1996; Goodwin et al., 1997). Successful tourism development will also depend on the existence of an enabling national policy framework that facilitates investment and skills development (Cater, 1994; Esprit, 1994; ODI, 1997).

Tourism and Communities

Community-based tourism has won favour as an alternative approach, because it is based on community participation and empowerment, rather than on the passive receipt of handouts. However, Khan (1996) considers that there are few examples of successful game-viewing tourism ventures that involve indigenous southern African people on the basis of a fair partnership.

Tourism development should aim to build on and complement existing economic activities, rather than replace them. The extent to which tourism provides genuine benefits to local communities will depend partly on the chosen ownership/management option, and partly on how decision-making and benefit flows are managed within the community itself. Recent literature has expressed marked scepticism about the concept of homogenous and altruistic communities (Blench 1998b). Any community-based tourism enterprise is likely to provide more benefits to some and

more costs to others (Berger, 1996). How equitably these benefits and costs are distributed within the community will depend on how decisions are made within the community. Communities and individuals may need support to realistically appraise the social implications of encouraging tourism in their areas.

Niche Tourism and Habitat Diversity

Tourists are driven by agendas established in other places, at other times. The dominant force applied to the imagination of the typical tourist in the present is television and to a lesser extent cinema. Viewers are treated to an unending stream of documentaries about wildlife, the majority of which, at least in relation to Africa, feature large or spectacular mammals. Ingenious monitoring systems allow the armchair naturalist to be present at a waterhole throughout the day, watching animals come and go. It should therefore not be surprising that tourists come to Africa wanting to reproduce this experience. This is unfortunate for a variety of reasons, not the least being that it takes attention and resources away from the diversity of habitats and smaller, less spectacular species that may inhabit adjacent environments. Unless some sort of resource-sharing operates, it discriminates strongly against communities who have the misfortune to live next to less spectacular habitats. In theory, the 'rich' areas could cross-subsidise the 'poor' ones; in reality this rarely occurs and indeed would undermine the incentives for conservation in the 'richer' areas. Some animals and communities are certain to remain more equal than others.

In areas with low-density wildlife, consumptive tourism (i.e. safari hunting) may be more feasible than non-consumptive tourism (i.e. conventional game-viewing and photographic safaris). An alternative response is to try to diversify tourism by publicising more effectively the interest and attraction of a diversity of habitats and their flora and fauna. Effective marketing of alternative experiences, such as birding safaris, wilderness walks and brown water rafting, might be a valuable way of spreading the tourist impact and the income it produces. Small tourism enterprises will need support from a national tourism strategy, which stimulates a diverse range of tourism experiences to attract visitors to the country, promotes adequate tourism infrastructure (such as reasonably priced transport and accommodation), and provides marketing support.

For community-based tourism to lead to conservation with or without livestock, linkages must be clear and transparent. The perceived benefits from conservation through tourism must outweigh the perceived costs of wildlife for all stakeholders who can affect the conservation process. As mentioned above, benefit and costs are unlikely to be distributed evenly, and it is therefore misleading simply to aggregate total benefits and check that they outweigh total costs. Providing an alternative livelihood source alone will not eliminate the incentives to exploit wildlife (IIED, 1994).

While nature tourism is often assumed to be inherently benign, recent research has highlighted its potential for negative environmental impacts in

the absence of careful management (Roe et al., 1997). Some form of monitoring system or regulations should be in place to ensure that tourism carrying capacity is not exceeded (Eber, 1992). Communities may need support to develop land-use plans that minimise negative impacts of tourism on their own livelihoods and on conservation.

National and International Wildlife Institutions

International legislation such as CITES[3] places constraints on the commercial use of wildlife. At a national level, in Kenya and Uganda, ownership of wildlife on common lands remains with the state, although new policies have recently been formulated in both Kenya and Tanzania, which envisage the transfer of wildlife utilisation rights to eligible land users and landowners. As they stand Kenya's wildlife laws exclude formal marketing possibilities, impose export limitations and ban safari hunting. In South Africa, Zimbabwe, Zambia, Namibia and Tanzania, consumptive utilisation has been promoted on private and state lands in the form of game ranching and hunting safaris. This has since spread to communal lands through initiatives such as CAMPFIRE in Zimbabwe which encourage 'proprietorship' of wildlife at the community level via designation of 'appropriate authority' status to District Councils. Inevitably these differences alter potential costs and benefits, for instance, pastoralists in the communal areas of Kenya and Uganda are inhibited from establishing those CAMPFIRE-style programmes which are based on consumptive use of wildlife as a result of national and international legislation.

[3] CITES entirely bans international trade in species on Appendix I (such as Black Rhinoceros) or monitors the use and international trade in species on Appendix II (such as Elephants). Decisions made in Harare in 1997 permit a controlled trade in ivory, banned since 1988.

7

Conclusions and Recommendations

Population Trends, Environmental Change and Potential Target Zones

Human population growth, agricultural expansion, deforestation, hunting and the ramifications of economic development have had profound, cumulative impacts on the environment, natural habitats and wildlife populations all over the world. East Africa is no exception. The number of people in Kenya, Tanzania and Uganda has doubled over the past 20 years, and is likely to double again in the next 30-40 years.

Settlement and cultivation are concentrated in areas of higher rainfall and greater agricultural potential, around Lake Victoria, in the highlands, and along the coast. Mean population density is highest in Uganda and lowest in Tanzania. Agricultural land scarcity, however, is greatest in Kenya because of generally lower rainfall. Nevertheless, the general trend in all these countries is for agricultural expansion and the transformation of natural habitats into farmland.

Extensive habitat loss and unauthorised hunting, exacerbated by a proliferation of high-powered automatic weaponry in recent years, has hastened the long-term decline and disappearance of wildlife[1] from many areas. Estimates for the Kenya rangelands indicate that the overall number of wildlife has fallen by a third over the past two decades. Wildlife has been eliminated from much of Uganda, including many protected areas. In Tanzania, wildlife has also declined, but because of the country's size and relatively low human density, substantial wildlife populations survive in the extensive wildlands that remain.

Livestock trends are less clear. Monitoring surveys indicate that cattle and small ruminant populations in the Kenya rangelands have fluctuated widely over time, but no significant long-term trends are evident. Low-level aerial survey observations suggest that livestock out-number wildlife by a factor of 10:1. Limited data from the Ngorongoro Conservation Area in Tanzania indicate that cattle numbers have decreased over the past 40 years, whilst there has been a substantial increase in small ruminants. National livestock population estimates for Tanzania indicate increases of between 150-250% from 1971 to 1994.

The best prospects for demonstrating the sustainable co-existence of livestock and wildlife are considered to be: in zones adjoining protected

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[1] In this review the term 'wildlife' is used to denote medium to large mammalian herbivores ranging in size from impala upwards, commonly known as 'plains game'. Livestock refers to cattle, camels, donkeys, horses, sheep and goats, but excludes poultry and pigs.

areas; in regions with relatively low rainfall and limited potential for arable farming; where human population density is relatively low, and where livestock owners predominate, or are a major component of local communities. Potential zones of interest include the Maasai Mara, Meru, Tsavo and Samburu in Kenya; Mikumi, Mkomasi, Ngorongoro, Tarangire, Ruaha, Serengeti, Udzungwa in Tanzania; and Kidepo Valley and Lake Mburo in Uganda.

Disease Risks

Diseases need not be a serious constraint on co-existence of livestock and wildlife in the semi-arid rangelands of east Africa. Although many diseases *can* affect both wildlife and livestock, only a few are considered to pose a significant risk to livestock production. The majority of game animals are not involved to any significant extent in the transmission of disease to livestock. Exceptions include the African buffalo and the wildebeest that can transmit serious disease to livestock. With settlement and agricultural encroachment into areas bordering wildlife reserves, there is an increasing risk of disease spreading from domestic to wild animals. Strategies to prevent this need to be developed. With increasing human population, altering land use and changing farming systems, the relevance and relative importance of diseases involving wildlife and livestock are changing. Disease management strategies may need revision, depending on specific circumstances.

There is a general scarcity of information on the incidence of the diseases affecting livestock and wildlife in the semi-arid rangelands. Better disease surveillance is required, with improved systems of information management and dissemination. In-country expertise on wildlife diseases is limited and resources for research and monitoring are lacking.

Conflict, or Co-existence ?

In marked contrast to the high values placed on wildlife and wilderness in the affluent North, rural communities in east Africa have a long-standing and deep-rooted antipathy towards potentially dangerous and destructive wild animals (KWS, 1996; Western, 1997; de Jode 1998). These opposing views, combined with a lack of economic incentives for sustainable utilisation of wildlife, have been at the root of many conflicts and much heated debate about the priorities and future direction of conservation in east Africa (BBC, 1999a&b). The sustainable co-existence of livestock and wildlife in the east African rangelands is a realistic goal, but only where de facto natural resource managers receive a net benefit from multi-species management, as opposed to other forms of land use.

The livelihoods of pastoralists and agro-pastoralists in the semi-arid

rangelands of Sub-Saharan Africa are vulnerable to drought, epidemics and loss of access to key natural resources. New perceptions of rangeland dynamics and the emergence of more community-oriented conservation philosophies have focused attention on the potential benefits of livestock and wildlife co-existence. Integrated management is an approach that can reduce vulnerability, enhance food security and mitigate the negative impacts of wildlife on the livelihoods of pastoralists and agro-pastoralists.

Interactions between pastoralists and wildlife occur on many levels. The nature and intensity of these interactions are evolving in response to changes in land use and availability. The general trend in higher rainfall areas is for the intensification of livestock production, with smaller herds on smaller tracts of land leading to a movement away from 'pure' pastoralism towards agro-pastoralism (Holden et al., 1997). This is as much the result of political intervention, as pastoralists attempting to avert risk within a diminishing resource base in a non-equilibrium environment, by diversifying income sources. Pastoralists may thus be more willing to incorporate opportunities from wildlife into their livelihood strategies, especially through community-based natural resource management initiatives in areas that possess 'sufficient' wildlife for sustainable use through consumptive and non-consumptive means.

In practice, the potential of wildlife to contribute to the sustainable rural livelihood strategies of pastoralists is constrained by many different factors. Perceptions of the costs and benefits of wildlife and the ability to limit or exploit them vary; national and international wildlife legislation; natural resource tenure; what type of pastoralists are involved; degree of community homogeneity; quality of institutional management; and gender issues etc., all play a part (Arhem, 1984; Child and Peterson, 1991; Dalal-Clayton, 1989; Taylor, 1993; Thomas, 1995a&b; White, 1992).

Policy Considerations

Various policy issues need to be addressed if livestock and wildlife co-existence is to become a realistic option in eastern Africa:

- International/national legislation is required to promote the devolution and sustainable use of wildlife to the local level, e.g. safari hunting, commercial ranching for meat, hides and live sale; photographic safaris and other forms of non-consumptive tourism.
- Community-based conservation programmes need the support of a functional regulatory body (whether government department, or parastatal). Community-based conservation programmes may effectively contain threats to wildlife from the community itself and neighbouring communities, but are unlikely to affect threats from outsiders, such as well-armed commercial poachers, except through enhanced vigilance. A competent and well-resourced law enforcement team is required to meet such threats. Community-based conservation

programmes should be viewed as a supplement and not a replacement of wildlife departments or parastatals.

- Land/resource tenure reform may be required to enable pastoralists and village-based communities to benefit from wildlife, and protect them from incursions by commercial interests.

Priorities for Technical Support and Further Study

The focus of attention for promotion of livestock and wildlife co-existence should be directed at drier regions of the semi-arid zone with more variable rainfall, where mobile livestock and wildlife resources have a competitive advantage over static and drought-prone crops.

For the most effective utilisation of limited resources, research studies should have clear collaborative links with ongoing programmes, or imminent development initiatives. To maximise impact and uptake, research initiatives should be linked closely to bilateral or multilateral assistance programmes, and conform with national priorities and development strategies. Studies should include the identification of appropriate indices for monitoring the sustainability of proposed initiatives and consideration should be given to supporting research activities beyond the normal three-year period.

Livestock and wildlife interactions should be related to a broader biodiversity strategy. Given the uneven distribution of wildlife resources and the widespread and increasing pressure on protected areas, attention should focus on their surrounding buffer zones. Emphasis should be placed on habitat management, rather than a single species or group focus.

Technical support and facilitation are required for the prioritisation and targeting of community-based natural resource management activities, natural resource assessment, local area development planning; disease control strategies and environmental monitoring.

Opportunities should be sought for incorporating the co-conservation of local livestock breeds in project design. Breeds that have evolved in situ are adapted to rangeland vegetation, have evolved in competition with wildlife, and may be tolerant of trypanosomosis.

Case-specific livelihood analysis is required to evaluate the perceived costs and benefits of integrating wildlife into the sustainable rural livelihood strategies from the perspectives of different primary stakeholders (e.g. pastoralists, agro-pastoralists, small-scale farmers) in different areas (different alternative land uses, different types of resource tenure and management structure, different levels of tourism potential) and at different times (wet/dry season). The potential for conflicting claims should be investigated and understood, especially in regions where there are hunter-gatherer populations, notably in central Tanzania, and conflict resolution strategies should be incorporated within project design.

Options for integrating wildlife and habitat management into the livelihoods of populations living in areas with low tourism and safari

hunting potential need to be explored, enabling conservation of a broad range of biodiversity rather than the more notable headline species.

Skills should be developed and practical field experience provided for indigenous wildlife biologists/ ecologists, veterinarians and social scientists in conservation biology, wildlife management, disease surveillance and community participation in conservation planning. Emphasis should be given to establishing closer collaborative links with international and regional centres of excellence in animal health and wildlife management, especially in southern Africa, where there is considerable experience of multi-species management. Sources of collateral funding for counterpart training and institutional strengthening should be identified and earmarked, to enhance the impact and sustainability of research outputs.

Wider Relevance

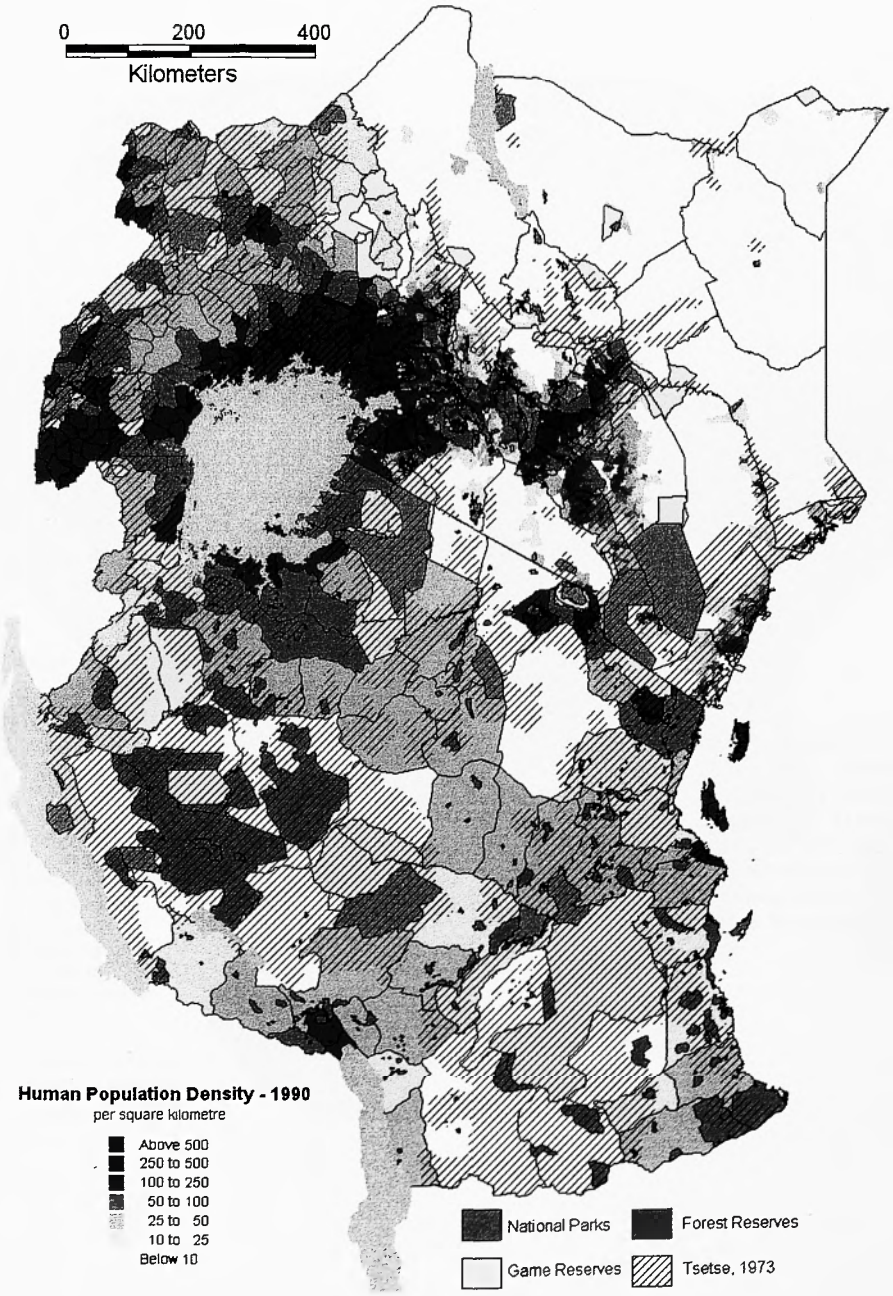
For reasons mentioned earlier, it seems unlikely that the conclusions of this study will have more than limited relevance beyond the semi-arid regions of eastern and southern Africa, since the large mammals so significant for tourism and other types of cash exploitation have largely been eliminated. There is, however, another region of the world where pastoralism and wildlife display very similar interactions, namely the steppes of central Asia, which are predominantly cold semi-arid grasslands. The problems of pathogen transfer, predation and sustainable hunting have long been familiar to pastoral nomads in a wide swathe of land from Mongolia to the Caspian. The tight controls characteristic of the former Soviet system made tourism an extremely limited option while hunting was kept at relatively low levels. As members of the Community of Independent States begin to develop their own windows on the exterior world and explore their economic resources for their potential to generate income, some at least[2] will conclude that tourism and wildlife have considerable potential. As they open their borders to hunters and photographers and mobilise legislation to protect areas from pastoral nomads, many of the same conflicts that are being played out in eastern and southern Africa will occur in central Asia. It would be valuable if the experiences of this region could be synthesised and adapted to assist in policy and planning, rather than the same slow learning curve being repeated in another region of the world.

[2] It seems likely that the crucial factor here will be the presence or absence of easily exploitable mineral resources

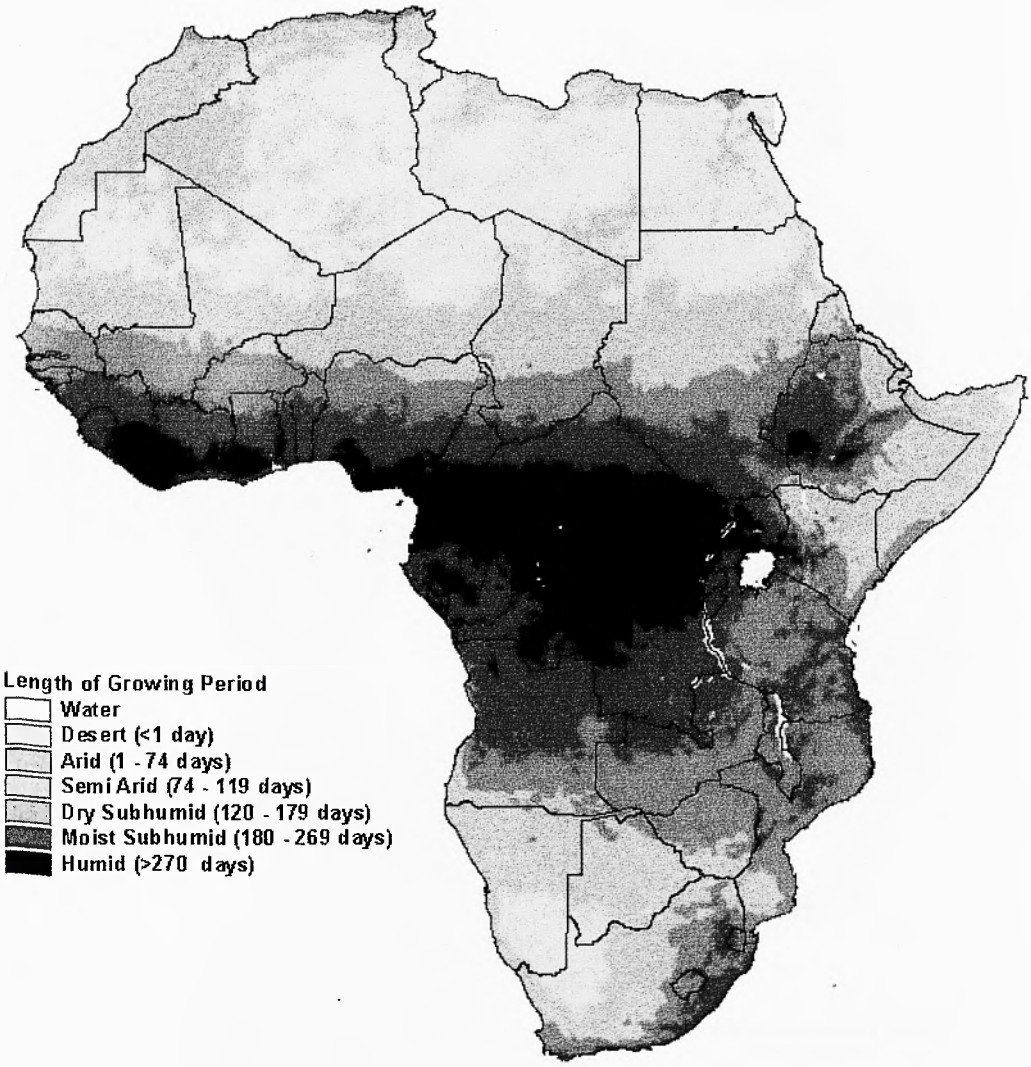
Appendix 1

Maps

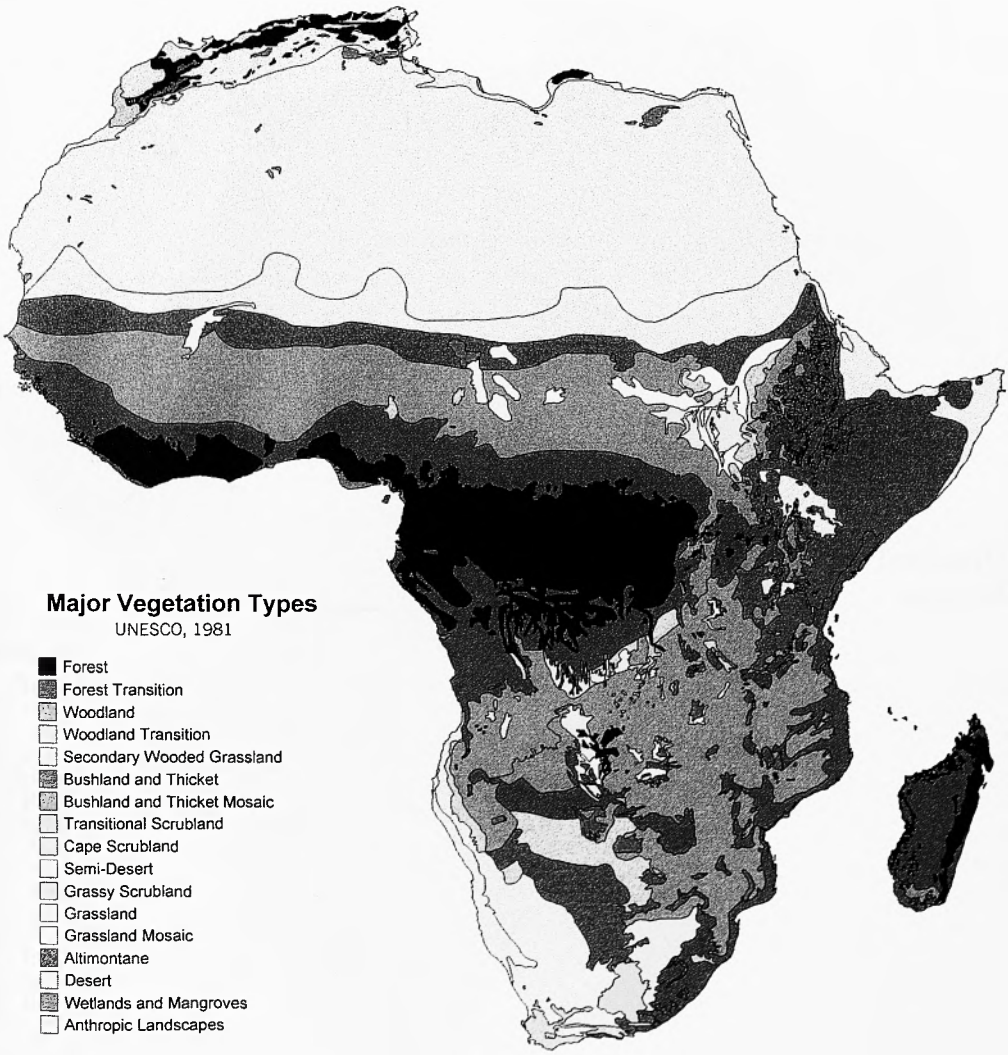
Map 1: People, Protected Areas and Tsetse in East Africa



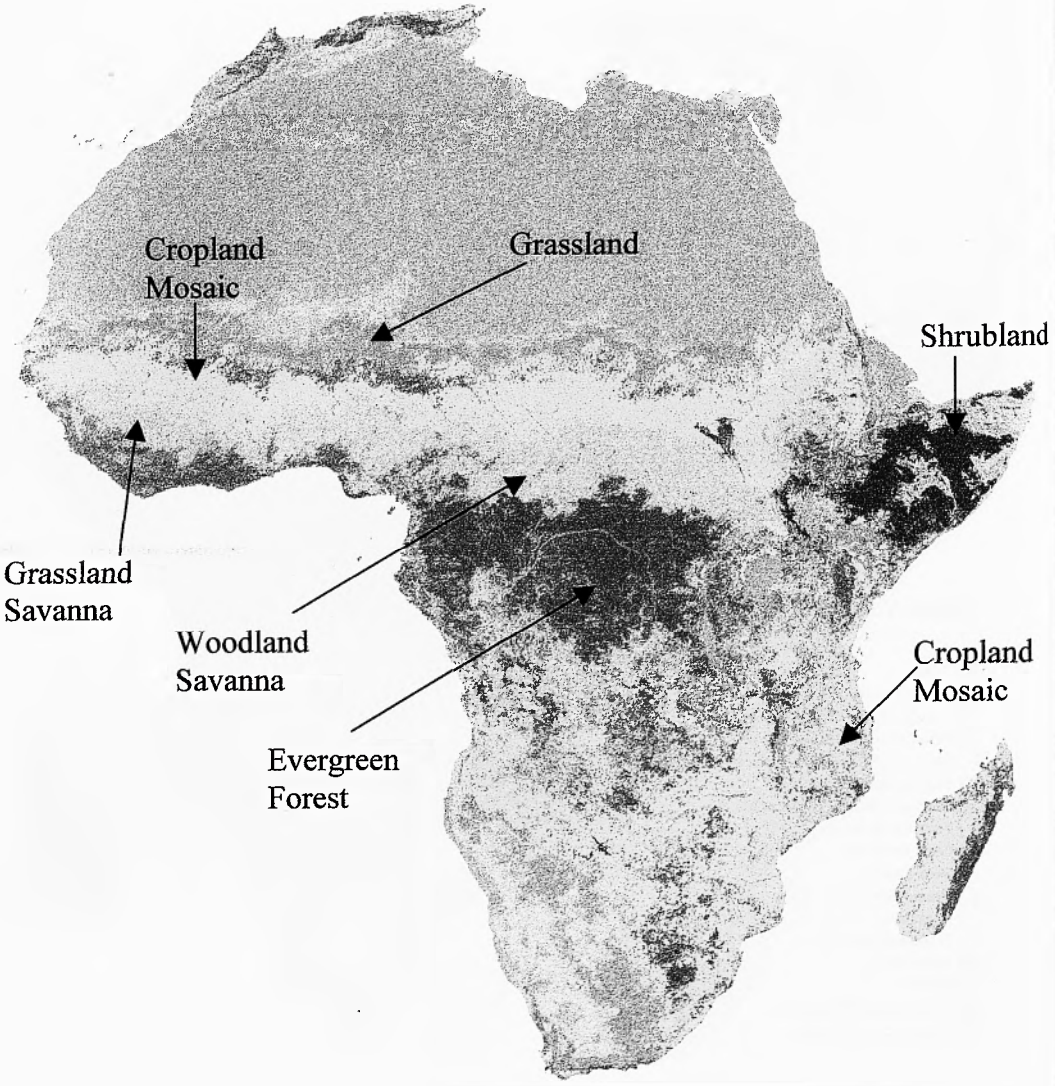
Map 2: Agro-Climatic Zones
Fourier Enhanced Prediction of Plant Growing Period
Source: FAO (1999)



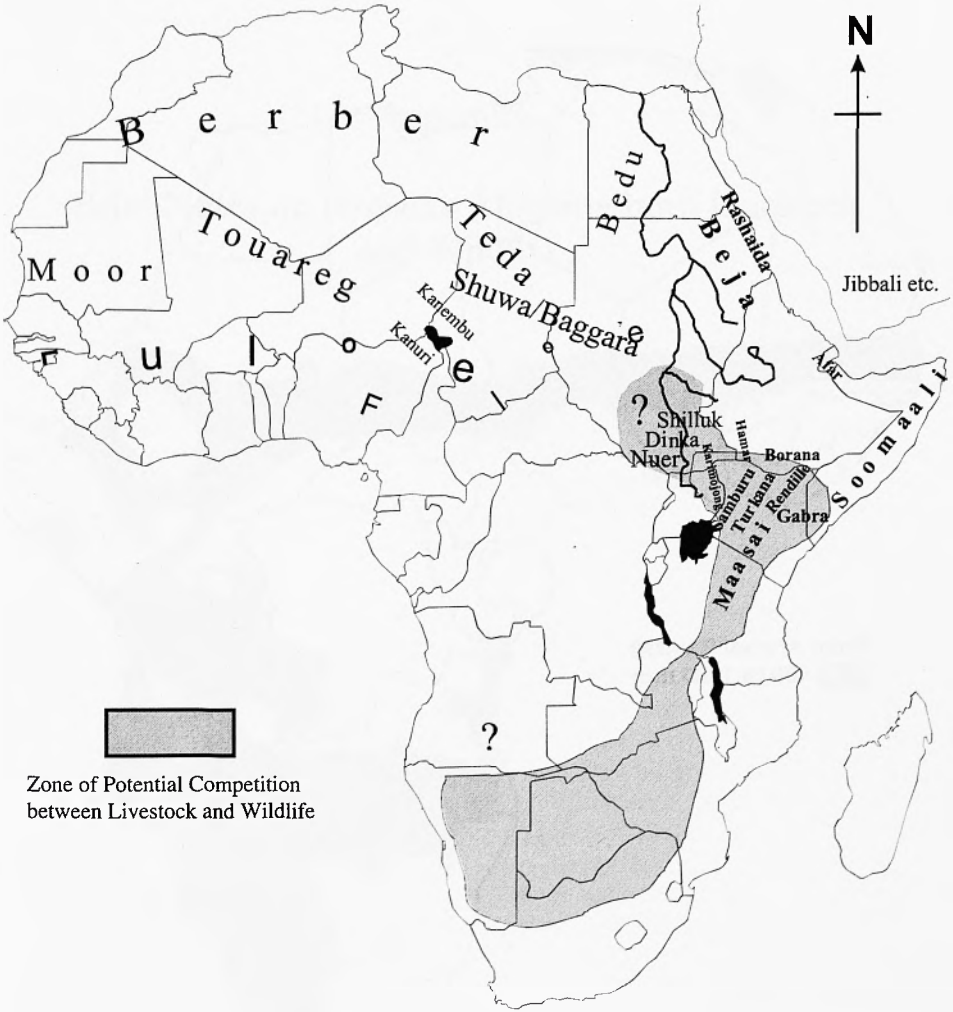
Map 3: Standard Vegetation Types
Source: UNESCO (1981)



Map 4: Satellite Derived Land Cover Classes
Source: Loveland and Belward (1997)

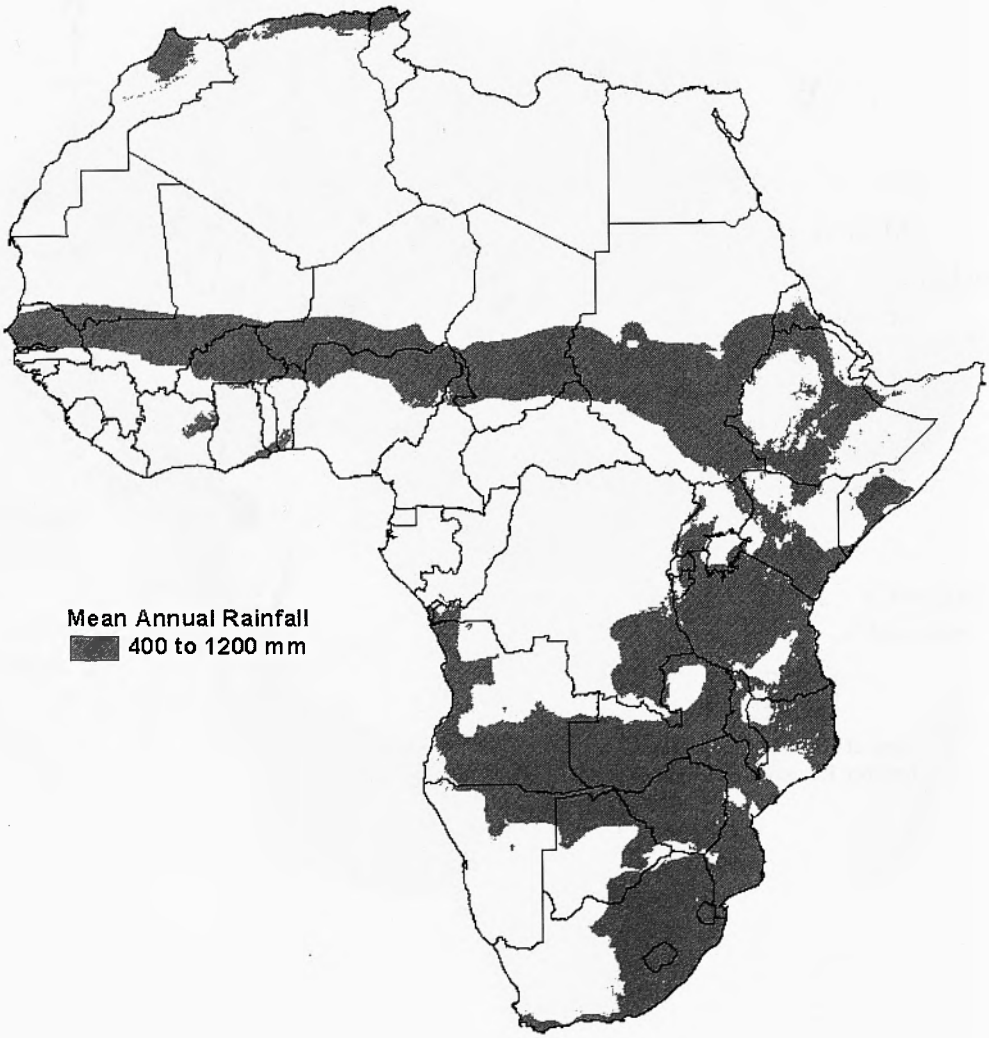


Map 5: Pastoral Peoples of Africa
Source: Blench (1998a)



Map 6: **Mean Annual Rainfall Range: 400-1200mm**

Source: Leemans and Cramer (1990)



Appendix 2

Brief Notes on Diseases Affecting both Livestock and Wildlife

Appendix 2: Brief Notes on Diseases Affecting both Livestock and Wildlife

In reviewing veterinary aspects of relevance to wildlife utilisation in Kenya, Grootenhuis (1995) divided animal disease in Africa into four broad categories:

1. diseases of domestic animals not known to be naturally transmissible to wildlife;
2. diseases of domestic animals that have invaded the African continent and affected the indigenous fauna;
3. diseases of indigenous African fauna, which are transmissible to domestic livestock or man;
4. infections and parasites of indigenous African fauna, which are not known to be transmissible to domestic animals or man.

Diseases in categories 2 and 3 are summarised in this appendix, which draws heavily on Grootenhuis's report.

African Horse Sickness

African horse sickness is a viral disease of horses, transmitted by midges (*Culicoides* spp). It has a seasonal occurrence related to the seasonality of the vector population in response to the rains. The disease is characterised by a pulmonary syndrome, including lung oedema and hydrothorax. The virus is maintained in zebra that are themselves not clinically affected. In addition to equines, dogs can become infected with a highly fatal form of the disease usually as a result of eating infected meat.

The disease can be controlled effectively by vaccination. Horses and zebras exist in close proximity on many ranches in east Africa In some areas vaccination is necessary on a regular basis, in others the disease does not occur because of the absence of the vector.

African Swine Fever

African swine fever is a viral disease of domestic pigs which is maintained in warthogs that are not themselves affected by the disease. The real host is a soft tick (*Ornithodoros moubata porcinus)* and the virus is described as more typical of an insect virus than an animal virus. The disease can be transmitted by night feeding of the infected soft tick host on the susceptible domestic pig. Once established in domestic pigs the disease spreads through nasal pharyngeal excretions, faeces and urine.

The prevalence of this disease is a reason for the poor development of the pig industry in Kenya. Where there are domestic pigs, they are housed so that they cannot have contact with their wild relatives. The virus can persist for months in meat and this will prevent the export of any products from warthogs. When warthog become an entity in the game meat market, they should only be allowed to serve the local market, unless a known disease-free population has been bred and reared in captivity. This disease is one of the rare and typical examples of a real wildlife reservoir host carrying, asymptomatically, a highly infectious and pathogenic virus for domestic pigs.

Anthrax

Anthrax is a usually fatal disease of domestic and wild animals caused by the bacterium, *Bacillus anthracis.* Anthrax can infect a wide range of game animals and sporadic outbreaks of disease have been reported.

There have been recent reports of impala dying in the Serengeti as a result of anthrax. A focus of infection has been reported in the Chyulu/Kilimanjaro area with zebra, elephant and impala being mainly affected (R Kock, personal communication). The epidemiology of this disease in east Africa, especially in wildlife, is poorly understood and the reasons for the sporadic and sometimes large outbreaks of anthrax in game animals are not known. There is always the risk of human infection resulting from the handling or consumption of affected wildlife.

Bluetongue

Bluetongue is a viral disease of domestic and wild ruminants transmitted by Culicoides midges. The course of the infection in sheep can be very variable but acute disease leading to rapid death can occur. African antelopes are susceptible to infection but generally do not show clinical signs. Little is known of their role in the epidemiology of bluetongue in east Africa.

Brucellosis

Brucellosis is a highly contagious disease of domestic livestock caused by the bacterium *Brucella.* Several species of wildlife, including buffalo, eland, impala and hippopotamus, have been found to have antibodies to *Brucella.* Although brucellosis is apparently self-sustained in, for example, African buffalo, there is no evidence that wildlife constitute a risk to livestock.

Contagious Bovine Pleuropneumonia (CBPP)

CBPP is an acute, sub-acute or chronic disease of cattle caused by the bacterium *Mycoplasma mycoides,* characterised by pneumonia, accelerated respiration, coughing, anorexia, a rough coat and a generally dejected appearance. Until recently, the disease was confined to the north of Kenya,

but is on the increase in many parts of east Africa (Masiga et al., 1996). Mortality rates are high in herds with no previous exposure. CBPP is now considered to be one of the most important disease problems currently facing the east African veterinary authorities.

In Tanzania, after 25 years of freedom, cases of the disease began to reappear in 1990. The disease has spread across the country to the Zambian border. Inadequate controls on cattle movement and the poor application of quarantine and testing regulations are largely to blame for the resurgence of this disease. CBPP has already caused the deaths of a large number of cattle in the semi-arid rangelands of Kenya and Tanzania. The OAU Inter African Bureau of Animal Resources (OAU/IBAR) has identified the disease as a priority issue, and control strategies are being introduced co-ordinated through the Pan African Rinderpest Campaign (PARC). Doubts have been expressed about the efficacy of the currently available vaccines, and there is need for further research on the control of this disease, aimed particularly at the development of improved vaccines (Tulasne et al., 1996).

Although CBPP occurs in areas where wildlife and cattle co-exist, there is no evidence that wildlife is involved in the epidemiology of the disease and, as far as is known, there is no wild animal reservoir (Masiga et al., 1996). Earlier studies have reported antibodies to the causative organism, *Mycoplasma mycoides*, in African buffalo and impala and experimental infection of African buffalo has been achieved but, under natural conditions, clinical disease has not been seen in species other than cattle and water buffalo, *Bubalus* spp. (Schneider et al., 1994). During a recent outbreak of CBPP in cattle in the Garissa District of Kenya there was also an outbreak of disease and several deaths in buffalo in the vicinity. CBPP was not confirmed, although there were reports of coughing in the buffalo, and the possibility of the disease affecting this species should probably not be ruled out (R. Kock, personal communication).

Foot-and-Mouth Disease

Foot-and-mouth disease (FMD) is a highly infectious viral disease of domestic and wild even-toed ungulates. Typical signs of the disease are the simultaneous occurrence of lameness and salivation in affected animals. Affected animals have a fever, vesicles on the mucosae of the mouth and on the feet, teats and udder. The disease is known for its rapid spread. From the seven known serotypes of the disease, six are common to Africa, being types A, O, C, SAT1, SAT2 and SAT3.

The disease has been absent, eradicated or controlled in north America, western Europe, Japan, Australia and New Zealand. The virus is resistant to freezing or cooling, and live cloven-hoofed animals or fresh meat from endemic areas are therefore not allowed into these countries. Because Kenya is an endemic area for this disease, there is no trade in fresh beef from Kenya with the EU, North America, Japan and many other countries that are protecting their livestock against FMD.

The disease can be controlled by quarantine of infected areas, by ring vaccination around outbreaks and by a preventive policy of biannual vaccination of cattle. Movement of live wildlife within the country should not cause the spread of FMD, with the exception of buffalo that are a natural disease reservoir for the SAT types of the virus. Clinical cases in free living wildlife have not been reported in Kenya.

In the rangelands of east Africa, FMD is a widespread and common disease. The presence of this disease prevents the export of fresh meat from Kenya and Tanzania to most other countries in the world. African buffalo are a natural disease reservoir for the SAT types of the virus although buffalo herds can sometimes be free of FMD infection. In Kenya and Tanzania it is presumed that buffalo are always reservoirs of infection and thus a potential risk to cattle grazing in the vicinity. There is however a lack of good field evidence that buffalo have been the cause of outbreaks of FMD in cattle. Appearance of FMD in a cattle herd can usually be traced to contact with other infected cattle.

Although it has been stated that FMD can cause high losses, particularly when it occurs during the dry season (Field et al., 1997), the disease is not normally rated as a major problem in cattle by pastoralists and ranchers in the arid and semi-arid rangelands. Other diseases associated with a higher mortality rate are of more concern. It may be that the significance of this disease in the semi-arid rangelands is being under-estimated. There is a need for a better understanding of the epidemiology and importance of the disease in pastoralist livestock.

Malignant Catarrhal Fever

In Kenya and Tanzania, malignant catarrhal fever (MCF) is typically a disease of cattle in grazing contact with wildebeest calves. The cause of the disease is a herpes virus, which is transmitted in stable form in nasal secretions of wildebeest calves and may infect pastures or cause infectious aerosols. Wildebeest calves are the source of infection during the first three months of their life. There is no treatment for the infection in cattle.

Occasionally outbreaks of MCF will occur in cattle herds with a mortality rate that may reach 10%. This disease limits the herding of cattle in areas where wildebeest calves occur. There is no other control method than the separation of wildebeest calves from cattle. No vaccine is available, although research progress is being made.

The discovery of antibodies in Coke's hartebeest, topi and oryx, has led to the isolation of virus strains from hartebeest and topi. These animals have, however, never been implicated in the epidemiology of the disease.

Cattle can become infected with the invariably fatal disease, MCF, when they are in close proximity to wildebeest for a few months following the wildebeest calving season. This disease continues to be reported as an important problem mainly in Maasailand where cattle and wildebeest co-exist. In Kenya, wildebeest are limited mainly to the south-west of the country but in Tanzania they have a wider distribution. There have been

reports that the disease has become more common in some areas such as the Ngorongoro Conservation Area. This is thought to be as a result of increased wildebeest numbers and difficulties livestock owners are now experiencing in ensuring that their cattle are not grazed close to wildebeest during the months of risk (McCabe, 1994). In other areas where fencing of the rangelands has occurred and migration of wildebeest is restricted, the disease has become less of a problem. A better understanding of the prevalence and economic importance of this disease is needed.

Rabies

Rabies is a viral infection of mammals, transmitted in the saliva of an infected animal. The disease is almost always fatal in man and other mammals. Clinical signs occur when the virus has reached the central nervous system travelling along the nerves from the site of bite to the brain. The highly variable incubation period is partly dependent on the distance from the bite site to the brain.

In Kenya and most other African countries, domestic dogs are the main maintenance hosts. In the late sixties there was an active control campaign of destroying stray dogs and vaccination of domestic dogs and cats. These actions led to the disappearance of the disease in large parts of Kenya, showing the important role of domestic dogs as a maintenance host.

As rabies in east Africa is largely a dog-maintained disease, the possible influence of wildlife reservoir hosts will be masked until control in dogs has been achieved. With the availability of efficient vaccines, the control of the disease is not so much a technical as an economic and logistical problem.

Rabies is of little or no consequence for wildlife utilisation because of the low prevalence of the disease. However from a point of view of wild carnivore conservation, rabies can pose a very real threat. There is a need to know much more about the epidemiology of this disease in relation to the different ecological zones of Kenya and Tanzania.

There is good evidence that rabies is increasing in incidence in many parts of Africa (Cleaveland, 1998). This is a result of an increasing dog population, a very limited use of rabies vaccines and a lack of veterinary campaigns to control the problem. Although in most parts of Africa, the domestic dog is responsible for the maintenance of the disease, infection is also seen in a wide variety of wild animals. Rabies is considered to be a major cause of the depletion of the wild dog (*Lycaon pictus*) population in the Serengeti/Mara region that has occurred in recent years. An increasing domestic dog population leads to a greater chance of contact between dogs and wildlife and thus a greater chance of rabies entering the wildlife population. Practical control strategies to minimise this risk need to be developed.

Canine distemper

Although canine distemper is an ubiquitous and common disease of domestic dogs in Africa, it appears to be relatively uncommon in wild carnivores. An outbreak of the disease in lions in the Serengeti/Mara region (Roelke-Parker et al.,1996; Kock et al., 1998) has demonstrated that distemper can, on occasion, be of major importance in wild carnivores. A high mortality rate was seen and it is estimated that around 30% of the lions in the Serengeti and Mara died from the disease in 1994. Other wild carnivore species were also affected. As with rabies, the increasing domestic dog population has increased the chances of wild carnivores coming into contact with infected dogs. Other factors may have been involved in the appearance of the disease and the increase in the lion population that had taken place may have been an important factor in the outbreaks of both distemper and rabies (R Kock, personal communication). Vaccination of domestic dogs in the surrounding areas was suggested as a feasible procedure to control the main reservoir of infection (Harder et al., 1995). A vaccination campaign, largely supported by outside funding, is now being undertaken in domestic dogs in some areas bordering the Serengeti. The main problem is how to ensure that canine distemper virus can be controlled in domestic dogs surrounding game parks and reserves in the future when funding for vaccination campaigns may not be easily available.

Rift Valley Fever

Rift Valley Fever is an acute disease of domestic ruminants in Africa and is caused by a mosquito-borne virus. Man can become infected by contact with tissues from infected animals or by mosquito bites. Outbreaks of the disease are usually associated with years of high rainfall. The virus can infect a wide range of wild and domestic animals but the role, if any, of game animals in the maintenance of the virus is not known.

Between October 1997 and May 1998, there were reports of disease outbreaks in the rangelands of Kenya and Tanzania that were leading to a much higher than expected seasonal morbidity and mortality in livestock. In addition there were cases being reported of a febrile haemorrhagic condition, sometimes leading to death, in people in the remote rural areas. The disease outbreaks coincided with several months of unusually high rainfall in the region. Access to areas where the disease was occurring was generally difficult and usually it was not possible to determine the cause of the deaths.

Descriptions of the outbreaks were symptomatically suggestive of Rift Valley Fever and there is serological evidence to support this. A limited number of post-mortem examinations of affected livestock has demonstrated lesions consistent with the disease. With the weather conditions leading to very high insect populations, there is the probability that other vector-borne virus diseases, such as Bluetongue, were also occurring. Wildlife can be involved in the maintenance of a number of these

infections but their role in the recent outbreaks is unknown. A high mortality was reported in gerenuk and although the cause of death could not be confirmed, post-mortem evidence was highly suggestive of RVF or Bluetongue involvement (R. Kock, personal communication).

The lack of adequate resources for veterinary field and laboratory services makes it impossible to obtain accurate data on the distribution and cause of the recent outbreaks in Kenya and Tanzania.

Rinderpest

Rinderpest has been a disease of major concern to the veterinary authorities in east Africa since the pandemic that swept through Africa in the mid 1890s. Rinderpest or cattle plague is an acute disease in cattle, wild ruminants and pigs, causing a short period of fever, followed by profuse diarrhoea and death. Rinderpest is an example of a disease introduced into Africa from another continent by importation of affected cattle. The highly contagious virus when it first appeared in Africa found a large variety of new susceptible hosts in many species of African wildlife. The disease is a major threat to the cattle and wildlife populations in Kenya and many other African countries.

Rinderpest can be controlled effectively by vaccination of cattle, which results in the disappearance of the virus in wildlife. Rapid diagnosis allows timely ring vaccination to prevent spread of the disease. It will almost never be cost-effective to vaccinate susceptible species of wildlife. Annual antibody surveys in susceptible species such as the buffalo are essential to monitor for the presence or absence of active rinderpest.

A concerted effort based on national programmes of countrywide vaccination, co-ordinated by PARC, has led to the disappearance of rinderpest in many African countries. There have been no reports of rinderpest in West and Central Africa since 1988. In West Africa, 12 countries have stated officially that they have stopped vaccination and eight of these have formally declared 'Provisional Freedom from Disease.' In east Africa, Ethiopia appears to have eradicated rinderpest, the disease having not been reported since 1995, but progress in other parts of the sub-region has been slower than hoped. Sudan remains the main focus of the Lineage 1 type of the virus in Africa and disease is endemic in several parts of southern Sudan. There is a constant risk of Sudan being a source of infection to neighbouring countries. Somalia has had no disease officially reported since 1975, but verifiable disease surveillance data is not always available (Rossiter, 1998). The recent re-appearance of rinderpest in Kenya and Tanzania has, however, caused some alarm. The disease has resulted in a large number of deaths in wild animals, particularly kudu and buffalo, in Tsavo and other game parks but apparently has caused only relatively mild disease in domestic livestock. The source of this latest outbreak is thought to be in the north-east of Kenya or Somalia and the disease has spread over a period of four years through Kenya to northern Tanzania. A major vaccination effort has been made by PARC, together with the Kenyan and

Tanzanian veterinary authorities, and it appears that this outbreak has now been controlled. The disease spread into Tanzania in 1997 and buffalo and kudu in Mkomazi National Reserve were found to be serologically positive. There is no evidence that wildlife west of Mount Kilimanjaro have been affected and the spread of the disease appears to have been halted (Rossiter, personal communication).

Investigations have shown that the rinderpest strain, Lineage 2 type, involved in this outbreak has not been seen in east Africa since the 1960s. It is not clear why it should have reappeared after such a long period of apparent absence (Barrett et al., 1998). It is suggested that the strain may have been circulating as a low-grade infection in cattle in remote areas and was not recognised or reported as rinderpest.

The high mortality rate seen in the kudu population (estimated to be around 80% in Tsavo Park) has demonstrated the devastating effect this disease can have on animal populations. There is however the recommendation (PARC Technical Committee) that no attempt should be made to protect the wildlife populations in the game parks as the wild ungulates can serve as valuable sentinel animals in the event of future rinderpest outbreaks. The PARC programme is now at a stage where the eventual eradication of rinderpest in Africa seems a real possibility and this will be achieved by vaccination of cattle alone.

Ticks and tick-borne diseases

A common belief amongst farmers keeping livestock close to wildlife is that the presence of wild animals leads to an increased problem from ticks. The claim is made that wildlife maintain a tick burden that the farmer is unable to control, whereas the ticks on cattle can be controlled by the use of acaricides. Studies have shown, however, that wildlife species naturally maintain moderate to small tick burdens and their relative contribution to the total tick population in areas of cattle and wildlife coexistence may not be great (Grootenhuis, 1995).

Ticks and tick-borne diseases have been identified to be the most important disease impediment to the economy of livestock production in east Africa. All tick species infesting livestock are also maintained by wildlife. The co-habitation of livestock and wildlife can impede effective tick control on livestock. No major mortality episodes have been reported to occur in wildlife as a result of ticks or tick-borne diseases.

Most wild Bovidae carry *Theileria* parasites but attempts to transmit these parasites to livestock have largely been unsuccessful, with exception of *Theileria* parasites carried by buffalo, eland and waterbuck.

Theileria parva carried by buffalo (Corridor Disease/East Coast Fever)

Although many wild bovidae carry *Theileria* parasites, most species cannot be transmitted to domestic cattle. The buffalo is, however, an efficient carrier of *Theileria parva* transmitted by the tick *Rhipicephalus appendiculatus*. Corridor Disease, caused by buffalo-derived *T. parva (lawrencei)*, is probably one of the diseases causing most concern to

livestock owners in wildlife areas. There can be increased exposure to this infection as cattle move into areas inhabited by buffalo herds. This can sometimes occur inadvertently as a result of successful tsetse control schemes when land that was previously avoided because of high tsetse numbers is opened up for use by cattle. Such land is frequently a suitable habitat for both *R. appendiculatus* ticks and buffaloes.

The actual incidence of buffalo-derived theileriosis is not known and Grootenhuis (1995) has stated that there is a need for the problem to be mapped and defined in order to determine where and what cattle are at risk. In areas where Corridor Disease occurs, the cattle-maintained form of the parasite, *T. parva (parva),* that causes East Coast Fever is also often present and it can be difficult to determine the true role of buffalo in the transmission of disease to cattle. In the Ngorongoro Conservation Area, for example, theileriosis is considered to be the most serious and widespread disease in cattle but it is thought likely that wildlife involvement in the transmission of the disease to livestock is probably minimal (Machange, 1997). An increase in the size of the buffalo population could lead, however, to a greater involvement of buffalo in the transmission of disease to cattle.

Immunological control methods for East Coast fever have been developed and shown to be effective in the field. However, in the presence of buffalo, effective control could only be achieved by employing parasite stocks isolated from buffalo.

Theileria mutans

Theileria mutans is more widespread than *T. parva* and follows the distribution of its vectors, being several species of *Amblyomma* ticks. This parasite is usually considered to be non-pathogenic. However, severe anaemia in cattle as a result of *T. mutans* infection has been described in Kenya and has been associated always with the presence of buffalo.

Babesiosis

Babesia parasites have been found very rarely in wild Bovidae although parasites resembling *B. bigemina* have been seen in buffalo. The tick vector of this parasite, *Boophilus decoloratus*, is uncommon on wild Bovidae and appears to be particularly well adapted to cattle. In view of the low prevalence of *Boophilus* ticks on buffalo, this host is not considered to be an important reservoir for the disease.

Anaplasmosis

Anaplasma parasites are commonly found in wildlife but have not been studied in detail. Preliminary serological studies of an *Anaplasma* isolate from eland appeared to indicate that this rickettsial organism differed from *A. marginale,* the pathogenic parasite of cattle. *Anaplasma* isolated from

eland could only produce a low-grade infection in splenectomised cattle, while such animals would normally develop a severe anaemia and die from an *A. marginale* infection.

Heartwater

Heartwater is a tick-borne disease of cattle, sheep and goats caused by a rickettsia, *Cowdria ruminantium*. Experiments have shown that some wild herbivores can become asymptomatic carriers and thus possibly act as reservoir hosts. Other species appear to be as susceptible as domestic livestock. The role of wildlife in the epidemiology of the disease, or as reservoir hosts, is not fully understood.

Bovine petechial fever

Bovine petechial fever (Ondiri disease) is a disease of cattle, which if not treated, can be fatal. The disease is caused by the rickettsial parasite, *Cytoecetes ondiri*, and causes a haemorrhagic syndrome accompanied by fever in cattle. This disease has a true wildlife reservoir host in the bushbuck (*Tragelaphus scriptus*). Most of the rickettsial diseases are transmitted by ticks but, in this case, no tick or other vector has yet been identified. The disease has a restricted distribution being limited to highland areas of eastern Africa.

Trypanosomosis

Trypanosomosis is a disease of man and animals caused by protozoan parasites called trypanosomes. In Africa, trypanosomes can be transmitted by tsetse flies (FAO, 1999). African wildlife have co-evolved with tsetse and trypanosomes over millions of years, and as a result a host parasite balance has developed. Many wildlife species can harbour trypanosome infections, but show no clinical signs, thus constituting an important reservoir of infection. Wild African Bovidae can thrive under heavy tsetse and trypanosomosis challenge.

The presence of tsetse flies and trypanosomes has limited livestock production in much of Africa. Endemic trypanosomosis and efficient livestock production are generally not compatible.

In the past, clearing of tsetse-infested bush and the destruction of game animals were used as methods of control. In areas of Africa where wildlife is still plentiful, control of trypanosomosis in domestic livestock depends on tsetse control, treatment of affected animals and strategic use of long-acting drugs to prevent infection. The major problems are the cost-effectiveness of the control, the presence of drug resistance and the lack of new drugs for treatment of drug resistant trypanosomes. Many years of research towards the development of immunological control methods have so far not yielded any practical results. A current approach is the search for traits of trypanotolerance in different livestock breeds and the use of trypanotolerant breeds of cattle. Control of tsetse can also be achieved

using trapping techniques or the application of insecticides to cattle.

Most of the semi-arid rangelands of Kenya and Tanzania are infested with tsetse flies that transmit trypanosomes to domestic livestock (Map 1). Wild animals act as a natural reservoir of infection but generally show no disease. Livestock owners in the rangelands usually rely on treatment of infected animals with trypanocidal drugs and avoid areas where tsetse flies are known to be plentiful to minimise problems from trypanosomosis. The recent introduction of pour-on and dip formulations of insecticides that can be applied to cattle provides livestock owners with another approach to disease control. As land pressure increases and livestock owners are more restricted in their freedom to move cattle, they are less able to avoid tsetse areas. Increasing settlement in tsetse-infested areas is also leading to an increased incidence of trypanosomosis under certain conditions. Settled areas bordering game parks or reserves are often particularly affected.

Tsetse control within the large game reserves is not feasible in Kenya or Tanzania but it may be possible in smaller areas of wildlife conservation. For instance, in the Ruma (Lambwe Valley) National Park in western Kenya, tsetse flies have been controlled successfully by the use of insecticide-impregnated cloths (targets) that have been installed in the park (Opiyo et al., 1990). Since 1996, the targets have been maintained by the Kenya Wildlife Services but the long-term sustainability of this approach to tsetse control has still to be proven. In the Ruma National Park there was an added incentive for tsetse control in that historically this area has been one of the foci of human trypanosomosis, sleeping sickness, in the country. In the other game parks of Kenya, the risk of human beings becoming infected with trypanosomes is extremely small.

There is concern that control of trypanosomosis in cattle in rangeland areas may become more difficult as resistance develops to the few trypanocidal drugs that are available. As an approach to reducing the risk of infection, attempts have been made to control tsetse by trapping or target methods in some of the pastoralist and ranching areas of Kenya. Although the schemes have often met with initial success, very few, if any, have been maintained. Some of the possible reasons for the failure of what would seem to be a promising and appropriate approach to tsetse control have been investigated recently (Okali and Barrett, 1998; Barrett and Okali, 1998). There is still a need for field studies to determine the most appropriate and sustainable methods for trypanosomosis control in the semi-arid rangelands.

Tuberculosis

Tuberculosis has been diagnosed in several species of game animal including kudu, buffalo and duiker. Little is known of the epidemiology of the disease in wildlife but, as yet, there is no evidence that wildlife serve as an important source of infection for cattle or man.

Tuberculosis is attracting more attention recently mainly because there is an increasing incidence of the infection in man associated, to a large extent but not entirely, with the increase in HIV infection. Previously, a lack of evidence that it

is of major importance in the rangelands of east Africa has led to tuberculosis in livestock receiving scant attention. Recent tuberculin testing and post-mortem examination of cattle in Tanzania, however, has revealed that bovine tuberculosis is much more common than was generally believed. The results of several thousand tuberculin tests showed positive reactions in 9% to 14% of cattle depending on age and location (C. Daborn, personal communication). The importance of *Mycobacterium bovis* as a serious zoonosis in developing countries is now recognised (Cosivi et al., 1998). Although the disease is known to occur in game animals, the incidence of infection in the wildlife of Kenya or Tanzania is not known. One of the aims of the DFID (AHP) project on *Mycobacterium bovis* infection of cattle and man in Tanzania is to identify sources of *M. bovis* in wildlife.

Wildlife as Reservoir Hosts for Nematodes in Livestock

The potential for wildlife to act as reservoir hosts for the gut nematodes of domestic livestock has been studied by comparing nematode infections of Thomson's gazelle and sheep. Eleven species of nematodes were identified from the gazelle but only three were infective for sheep, *Trichostrongylus probolurus, Cooperia hungi* and the economically most important species *Haemonchus contortus*. The results of studies suggested that sheep are a much better maintenance host and provide the optimum environment for *H. contortus* establishment, growth and reproduction. The gazelle apparently did not pose a threat as a reservoir host of *H.contortus* for sheep.

Bovine and Wildlife Cysticercosis

Bovine cysticercosis is a condition of cattle caused by the intermediate stage of the tapeworm, *Taenia saginata*. The adult stage of the tapeworm is in the small intestine of man who becomes infected by eating raw or poorly cooked infested meat. Infestation is identified by the presence of cysts, popularly called beef measles, in the musculature of infested animals. Under natural conditions this disease does not usually occur in wildlife. When wild animals are exposed to tapeworm eggs excreted by infected human beings, some species have been known to contract bovine cysticercosis, notably wildebeest and oryx. It is considered, however, that bovine cysticercosis is only likely to become a problem in wild herbivores if there is very close contact between them and man.

In almost all cases of cysticercosis in wildlife, the disease is caused by the adult stage of a *Taenia* species harboured by wild carnivores. The intermediate stages of these tapeworms have only been reported to occur in wild herbivore hosts. It is assumed that the intermediate stages of these *Taenia* species do not affect man, but confirmatory evidence can only be obtained from experimental infections in human volunteers. Confirmation that these cysts are not infective for people would justify the passing of low-grade infestations as fit for human consumption. Heavy infestations of cysts would always be condemned for aesthetic reasons alone.

The prevalence of cysticerci of wildlife origin in wild herbivores can vary

greatly depending on predator density, species of predators present and type of land use (farm or protected wildlife area). For instance, in the Serengeti area, a 15-20% condemnation rate as a result of cysticercosis was found to be the norm which meant that a large proportion of lightly infected carcasses would have been passed for human consumption. Infection rates in common species to be harvested (wildebeest, topi, Coke's hartebeest, Grant's gazelle and dik dik) ranged between 60-80%. In Kajiado District in Kenya, 60% of 555 wildebeest harvested had cysticercosis, usually at low infestation rates. In contrast cysticercosis is virtually absent on a game ranch near Athi River. These substantial differences are believed to be due to differences in predator density and composition. The game ranch has few hyaenas, carries a jackal population of unknown size and small groups of cheetah which move in and out of the ranch. The conclusion is that high-class venison for the luxury market cannot be produced efficiently in areas where there is a high predator density.

Both livestock and wild herbivores can harbour the larval form of tapeworms in the form of cysts occurring in the muscles and other organs. Meat inspection regulations that are applied to both livestock and wildlife can result in the condemnation of carcasses infected with cysticercosis. Although the cysts in cattle are infective to man and lead to the establishment of the adult tapeworm, *Taenia saginata*, the cysts in game animals are nearly always of different species of tapeworm that do not appear to be infective to man. At meat inspection, however, it is not possible to differentiate the species of cyst without resorting to microscopical examination. In addition, there are concerns that infection with *Taenia saginata* cysts may become more common as utilisation of game animals intensifies and there is closer contact with people.

Echinococcus granulosus and hydatidosis

This small tapeworm, *Echinococcus granulosus*,that lives in the intestine of carnivores uses a wide variety of animals, including man, as intermediate hosts. The hydatid cysts that develop, often in the lungs or liver of the intermediate host, can cause serious disease in man. Turkana District in Kenya had the world's highest prevalence of hydatidosis in humans with a total of 0.1-0.2% of the human population affected. In contrast, in Maasailand, where hydatidosis occurs both in cattle and in wild herbivores, the prevalence of human hydatidosis is much lower, in the order of 1/100,000 people infected (0.001%). The high prevalence of the disease in Turkana District appears to be a result of the intimate relationship of the Turkana and their dogs and is independent of the jackal that is known to be infected.

Trichinellosis

Trichinellosis is caused by the larvae of the nematode, Trichinella, that

enter the muscles of infected animals. The infection is widespread in the world and man can become infected by eating infected meat, usually poorly cooked pork and sausages. Trichinella is thought to be rare in humans in east Africa but it has been found in bush pig and warthog and thus there is a risk of people becoming infected by eating under-cooked meat from these species. Surveys of wildlife, including a recent one in Tanzania, have found lions, hyaenas and other wild carnivore species to be infected.

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Annotated Bibliography

1. **Adams, W. M. & Hulme, D. (1998):** 'Conservation and communities: changing narratives, policies and practices in African conservation.' Community conservation research in Africa: principles and comparative practice. Working Paper. Institute for Development and Management, University of Manchester.

   Keywords: Africa/ community conservation/ conservation policy /practice/ history/ international dimension

   Authors' Summary: This paper explores the recent shift in narratives about conservation in Africa from state-enforced protection to 'community conservation' which emphasises the role of local people in managing resources and benefiting from them. It is concerned with both the concepts that underpin these narratives and the policy processes that determine how 'relevant' these approaches are for conservation and development goals. Following an historical account of 'fortress conservation' and the rise of community conservation we explore the multiple conceptual roots of community conservation: sustainable developments, notions and the nature and agency of 'community', neo-classical economics and ecology. Subsequently, we explore the context within which the idea of community conservation has prospered, particularly in terms of foreign aid and international relations. Our conclusion points out that an analytical framework that can encompass the mixing of different narratives and policies (rather than the more simplistic 'either...or' version of policy choice) is needed to understand conservation ideology and practice in Africa. It also argues that the 'international conservation community' will need to ensure that it shares the costs of biodiversity conservation with local level 'communities'.

2. **Akama, J. S., Lant C. L., Burnett, G. W. (1996):** 'A political-ecology approach to wildlife conservation in Kenya.' *Environmental Values,* 5, 4: 335-347.

   Keywords: Kenya/ ecology/ wildlife/ underdevelopment/ national parks/ poverty/ nature conservation

   This paper analyses the social factors of wildlife conservation in Kenya, using a political ecology framework. It postulates that 'underdevelopment' is the most significant socio-economic issue affecting the dynamics of wildlife conservation in Kenya. It is argued that underdevelopment manifests itself 'in forms of increasing levels of poverty, famine and malnutrition'. The paper discusses the need for a political ecology approach in examining the perceptions and

praxis of wildlife conservation within protected areas and community development outside these areas. The paper examines the perspectives of different stakeholders in this arena: local peasants and pastoralists, local conservation officials, the state, international conservation organisations, and wildlife and agriculture authorities.

3. **Akama, J. S., Lant, C. L., Burnett, G. W. (1995):** 'Conflicting attitudes toward state wildlife conservation programs in Kenya', *Society & Natural Resources*, 8, 2: 133-144.

Keywords: Kenya/ protected areas / conservation attitudes/ indigenous people/ Nairobi National Park/ conflicts/ Tsavo National Park

This is a case study of the social issues of wildlife conservation in Kenya, based on fieldwork in and near Nairobi and Tsavo National Parks. Surveys of small-scale cultivators and pastoralists (157) and local park officials (44) reveal the widespread negative feelings of local people towards state policies and programmes of wildlife conservation. For instance, 84% of the local people reported that there is a bad relationship between the national park management and the local community; only 10% stated that the park is an asset to them; and 57% asserted that the park should be abolished. Moreover, perceptions and attitudes of local people and park officials differ greatly with regard to the benefits the parks provide for local people, the level of conflict between local people and wildlife, and the future of the parks.

4. **Alexander, K. A., Kat, P. W., House, J., House, C., O'Brien, S. J., and Laurenson, M. K. (1995):** 'African horse sickness and African carnivores.' *Veterinary Microbiology*, 47: 133-140.

Keywords: Carnivores/ African horse sickness

African horse sickness (AHS) is a disease that affects equids, and is principally transmitted by *Culicoides* spp, that are biological vectors of AHS viruses (AHSV). The repeated spread of AHSV from sub-Saharan Africa to the Middle East, northern Africa and the Iberian peninsula indicate that a better understanding of AHS epizootiology is needed. African horse sickness has long been known to infect and cause mortality among domestic dogs that ingest virus- contaminated meat, but it is uncertain what role carnivores play in transmission of the virus. Evidence is presented of widespread natural AHS infection among a diversity of African carnivore species. It is hypothesised that such infection resulted from ingestion of meat and organs from AHS-infected prey species. The effect of AHS on the carnivores is unknown, as is their role in the maintenance cycle of the disease.

5. **Allonby, E. C. (1981):** 'The role of wild ruminants in the epidemiology of nematodiasis in Kenya.' In: Karstad, L., Nestel, B. and Graham, M. (eds): *Wildlife Disease Research and Economic Development*: Proceedings of a workshop held at Kabete, Kenya, September 1980: International Development Research Centre IDRC-179e, 16-18.

   Keywords: Kenya/ wild herbivores/ sheep/ nemetodiasis

   It has been estimated that about 20-40% of the nematode species commonly recorded in wild ruminants are also found in domestic animals. From experiments involving Merino sheep and Thomson's gazelles it was concluded that *Haemonchus contortus* was better established in sheep. Egg output was much lower in the gazelles and it was estimated that little of the strongyle egg output on pasture grazed by both gazelles and sheep would be from the Thompson's gazelles. It was concluded that under existing methods of control they do not play a significant role in the epidemiology of sheep helminthiasis.

6. **Anderson, D. and Grove, R. (eds) (1987): *Conservation in Africa: People, Policies and Practice,* Cambridge: Cambridge University Press.**

   Keywords: Africa/ conservation/ wildlife/ parks/ policy

   This book is a key text describing some of the early work on the social aspects of conservation, looking in more detail at the conflicts between "parks and people" using examples from sub-Saharan Africa. It presents an historical perspective to the debate and examines the shift in conservation philosophies during the past century.

7. **Anderson, E. C. (1981):** 'The role of wildlife in the epidemiology of foot-and-mouth disease in Kenya.' In: Karstad, L., Nestel, B. and Graham, M. (eds): *Wildlife Disease Research and Economic Development*: Proceedings of a workshop held at Kabete, Kenya, September 1980: International Development Research Centre IDRC-179e, 16-18.

   Keywords: Kenya/ wild herbivores/ buffalo/ foot-and-mouth disease

   Serological surveys of wildlife in Kenya and laboratory exposure of selected species to foot-and-mouth disease virus indicated that the buffalo was the only wildlife species likely to be involved in the persistence and transmission of the disease. Impala, wildebeest and eland harboured the virus for a relatively short period whereas the buffalo remained carriers for at least two years and probably much longer. The virus of foot-and-mouth disease circulates readily within

the buffalo population because of their gregarious habits but for them to transmit disease to domestic animals close contact between the species would be necessary to allow airborne transmission to occur.

8. **Anderson, E. C., Foggin, C., Atkinson, M., Sorensen, K. J., Madekurozva, R. L., and Nqindi, J. (1993):** 'The role of wild animals, other than buffalo, in the current epidemiology of foot-and-mouth-disease in Zimbabwe.' *Epidemiology and Infection*, **111**: 559-563.

Keywords: Zimbabwe/ wild ungulates/ foot-and-mouth disease

Between 1989 and 1992, 7970 wild ungulates, comprising 14 different species, were tested for antibodies to types SAT 1, SAT 2 and SAT 3 foot-and-mouth disease (FMD) virus. Of these 1.2% were found to be positive and these included impala (*Aepyceros melampus*), eland (*Taurotragus oryx*), waterbuck (*Kobus ellipsiprymnus*) and sable (*Hippotragus niger*). All the positive animals were either from the wildlife areas where buffalo (*Syncerus caffer*) occur or from ranches where clinical FMD had occurred in cattle. The role of these animal species in the current epidemiology of FMD in Zimbabwe is discussed.

9. **Anderson, E. C. (1995):** 'Morbillivirus infections in wildlife (in relation to their population biology and disease-control in domestic animals).' *Veterinary Microbiology*, **44:** 319-332.

Keywords: Africa/ wildlife/ morbillivirus infection

The three members of the morbillivirus genus that infect wildlife in ecosystems where domestic animals occur are rinderpest, peste des petits ruminants (PPR) and canine distemper. Data on the relative susceptibility of species of the Order Artiodactyla for rinderpest have been obtained from historical records of outbreaks. Rinderpest in wildlife has only occurred in equatorial and eastern Africa since the great pandemic of 1889-1897. The distributions, densities and population dynamics of susceptible species in this region are described. There has only been one recorded outbreak of PPR in wildlife but the possibility of its occurrence in the future now that it is present in many parts of west and eastern Africa is discussed. Wild carnivora are not likely to be important maintenance hosts for canine distemper but the disease is of significance in free-ranging carnivores and particularly in small populations of endangered susceptible wildlife species. It is also of great significance in zoo populations.

10. **Anon. (1997):** Special programme for elimination of eastern African rinderpest. Technical briefing notes and project outline. EMPRES-Livestock Diseases Component, Food and Agriculture Organisation of the United Nations, Animal Health Service, Animal Production and Health Division, Rome.

    Keywords: East Africa/ rinderpest/ control

    The events of recent years once again raise the question of whether rinderpest is maintained for longer periods in wildlife independently of cattle. If so, this could account for sporadic recrudescence of rinderpest disease after years of quiescence. However, unlike foot-and-mouth disease, there is no evidence for a persistent infection (carrier status) in animals. All available data indicate that even in large wildlife populations, the disease eventually dies out once it is eliminated from cattle. This was clearly demonstrated in the Serengeti in the 1960s when rinderpest was continuously present in the large wildebeest population. It died out within a few years once the disease had been eradicated from the surrounding cattle herds. Serological surveys conducted in Kenya provided no evidence that the virus persisted in buffalo populations after epidemics. The 1994/95 Tsavo Park rinderpest episode had all the hallmarks of a virgin epidemic. Buffaloes sampled in advance of the epidemic front were uniformly sero-negative and those left behind were sero-positive. Rinderpest has been successfully eliminated, without subsequent resurgence, from many countries, including the whole of southern Africa and more recently western Africa, by controlling the disease in cattle without attention to wildlife. Thus there is no evidence to suggest that long- term persistence in wildlife is a key issue.

11. **Appel, M. G. and Summers, B. A. (1995):** 'Pathogenicity of morbilliviruses for terrestrial carnivores.' *Veterinary Microbiology*, 44: 187-191.

    Keywords: Tanzania/ USA/ carnivores/ morbillivirus infection

    Many different species of the order Carnivora are susceptible to canine distemper and the mortality rate varies greatly between species. Ailuridae, Canidae, Hyaenidae, Mustelidae, Procyonidae, Ursidae, Viverridae and now Felidae have been reported to be susceptible to canine distemper virus infection. Although distemper outbreaks in dogs, fur farms and in zoo carnivores have been greatly reduced in recent years due to vaccination, there are still regular outbreaks in free-living carnivores. Unexpected outbreaks of canine distemper have occurred in exotic felids in a California wildlife park and in the Serengeti in Tanzania as well as in javelinas (collared peccaries, *Tayassu tajacu*) in Arizona. Although safe and efficacious

in dogs, modified live canine distemper virus vaccines may be dangerous for a variety of zoo and wildlife carnivores, especially red pandas (*Ailurus fulgens*) and black footed ferrets (*Mustela nigripes*).

12. **Arhem, K. (1984):** 'Two sides of development: Maasai pastoralism and wildlife conservation in Ngorongoro, Tanzania.' *ETHNOS,* (Stockholm) **49**, 3-4: 186-210.

    Keywords: Tanzania/ pastoralism/ Maasai/ development

    This paper recounts the evolution of conservation and development in the Maasai Pastoral areas of Ngorongoro in Tanzania and the Maasai Mara area of Kenya. It explores how, after the Rinderpest epidemic of the 1890s, Maasai lands were increasingly alienated under colonial development policies, the encroachment of cultivators and the expansion of wildlife reserves. In Kenya, in order to ensure that the Maasai had freehold tenure over some of their lands, a number of individual and group ranches were set up, particularly in Kajiado and Narok Districts, but these were also the regions of commercial wheat farming schemes. In Tanzania, state policies have by and large undermined pastoral land use and promoted the sedentarisation of mobile populations (e.g. the *ujamaa* village policies in the late 1960s and the Villigisation Act of 1973). Since Tanzanian independence in 1961, livestock development policies have been aimed at large-scale, state-owned commercial beef ranches, with a concomitant decline in resources available to the pastoral sector.

13. **Ashley, C. and Garland, E. (1994):** 'Promoting community-based tourism development: why, what and how?' Research Discussion Paper No. 4. Directorate of Environment Affairs, Ministry of Environment and Tourism, Namibia.

    Keywords: Namibia/ tourism/ community/ development/ tenure/ market

    This paper examines different approaches to tourism in conservancies in Namibia (communal areas where communities have the rights to manage and profit from wildlife as a means to promote conservation and development). The paper considers the potential of community-based tourism (CBT) to contribute to national development objectives, such as 'faster economic growth in the regions, improved welfare and equity, empowerment of local people, improved resource conservation by local people and ...diversification of the higher-paying ecotourism market' (p. 1). It highlights how government policies can promote greater benefits from CBT within these areas.

Three types of 'upmarket' lodges are assessed: one with no community involvement, one which voluntarily shares a percentage of the revenue with local people, and one that is set up as a joint venture and partnership between investor and community. These are also compared to enterprises that are entirely run by communities.

All approaches are seen to boost jobs and growth when reviewed through economic, financial and social analyses. Revenue sharing enhances social welfare, while joint enterprises are seen to achieve much greater increases in community incomes, skills and empowerment. Entirely community-based enterprises can generate similar benefits to joint ventures but on a smaller scale. The authors argue that involving communities in ethical and cultural tourism ventures is the 'greatest opportunity for diversifying the Namibian tourism product'. Cash and non-cash benefits are stressed; in particular the degree of control a community has over tourism and interactions with tourists in a given area. It is recommended that government policy should seek to 'enhance the say that local communities have in the development of regional tourism, increase the number of tourism ventures that involve rather than exclude local people and the degree of community benefit (financial and social) from such ventures.'

Five 'key' policy areas are identified to enhance the potential benefits of CBT at the regional level:

- establishing community rights over resources and revenues
- adapting financial and legal regulations to facilitate CBT
- promoting information, awareness and communication
- developing the ecotourism market
- developing institutions, mechanisms and skills

14. **Ashley, C. (1995):** 'Tourism, communities and the potential impacts on local incomes and conservation.' Research Discussion Paper No. 10. Directorate of Environmental Affairs, Ministry of Environment and Tourism, Namibia.

Keywords: Namibia/ community-based tourism/ development/ economics/ tourism/ environment/ wildlife

This paper documents the potential benefits to promoting sustainable rural livelihood strategies from non-consumptive community-based tourism (CBT) initiatives within four regions of Namibia: Bushmanland, Damaraland, Kunene and Caprivi. The authors conclude that for Namibia, CBT can offer considerable economic and socio-economic opportunities through directly or indirectly increasing income generation through private or community-based operations, increasing subsidiarity of resource control to the local

level, and enhancing opportunities for partnerships between institutions in the private and community-based sectors.

The paper concludes that the total earnings from tourism could triple without an increase in the wildlife base. These potential earnings could outweigh the costs of living with wildlife (e.g. damage to crops, farm infrastructure). It is argued that in 'prime tourism areas' (e.g. the Uniab catchment area outside the Skeleton Coast National Park), these benefits could be sufficient to encourage a switch from agriculture to tourism. In other areas, they could provide a valuable additional income source. Socio-economic benefits are mediated by the extent to which incomes (either wages or community income) are distributed across resource users, the perceived link with wildlife, and whether local residents retain control of funds and enterprises and are able to develop institutions and skills through their participation in tourism. The authors recommend the promotion of joint venture up-market lodges in which the community earns up to 50% of the profits, but success will be dependent on the community in question securing tourism and preferably land rights, which may involve high transaction costs.

15. **Ashley, C. and Barnes, J. (1996):** Wildlife use for economic gain: the potential for wildlife to contribute to development in Namibia. Research Discussion Paper No. 12. Directorate of Environmental Affairs, Ministry of Environment and Tourism, Namibia.

Keywords: Namibia/ tourism/ communal areas/ conservancies

This paper examines the economic gain from the consumptive and non-consumptive sustainable use of wildlife in the communal areas of Namibia. These areas, in the north-west and north east of the country, are considered to be some of the more 'marginal' lands. It is here, on a local scale, that (predominantly non-consumptive) wildlife based tourism can contribute significant economic opportunities by boosting incomes and complementing agriculture in general, and providing a 'highly profitable alternative' at prime sites. Tourism spreads risks in terms of livelihood strategies and also acts as a valuable drought buffer at the household and community level. Significantly, it is argued to have greater potential for growth, in terms of income increases, than the agricultural sector.

Historically, custodial rights to use wildlife for economic gain were limited to private (commercial) landholders. However since 1996, legislation has been passed which enables communal landholders to retain common property rights over wildlife resources in their lands. Rights to the development of wildlife and natural resources have been extended to the local communities in communal areas to manage these areas as 'conservancies.'

Over the past twenty years the economic gains from wildlife (i.e. the net value-added to national income – see p. 6 for details), on private lands have increased from N$31 million in 1972 to N$56 million in 1994. This equates to an increase of N$85 to N$157 in net value-added per km^2.

Private lands: the authors note that on private lands, the numbers of game species have increased by 44% over the past twenty years. Wildlife is largely a supplement to and not a substitute for livestock, but its use has grown faster. As a proportion of all economic value of private rangeland use it has risen from 5% in 1972 to 11% in 1992. This increase is not driven by profit maximisation since the financial profitability of wildlife use is lower than its economic profitability. This implies that incentives for this increase lie in diversifying risk and indirect/ aesthetic values that are not valued in economic analyses. The authors suggest that as the economic profitability of wildlife enterprises increases, the higher value uses of wildlife are likely to increase and can be exploited most profitably by conservancies which generate higher returns (economically and financially) than individual farms. Hence the estimation that the contribution of wildlife on private land to the Namibian economy could double again in the next 10 to 20 years.

Communal lands: Historically, wildlife numbers have been declining. Wildlife on communal lands was classed as state property and the ad hoc nature of tourism in these areas has given local residents little opportunity to benefit from its use and thus little incentive to invest in its conservation. Four regions were studied: Opuwo District, former Damaraland, Caprivi region and former Bushmanland and although the relative potential contributions from wildlife utilisation differs between these regions, the total contribution to net national incomes is around N$7.5 million.

Protected Areas: It is difficult to estimate the value of wildlife in National Parks and game reserves as many of the indirect and non-use values are not easily quantified. The authors estimate that the total contribution of wildlife-based tourism to net national income was approximately N$250 million in 1994.

16. **Ashley, C. and La Franchi, C. (1997):** 'Livelihood strategies of rural households in Caprivi: implications for conservancies and natural resource management.' Research Discussion Paper Number 20. Directorate of Environmental Affairs, Ministry of Environment and Tourism, Namibia.

    Keywords: Namibia/ Caprivi/ livelihoods/ community-based natural resource management/ wildlife

    This desk review extends a financial analysis of rural household livelihood strategies in Caprivi region, Namibia, to an analysis of the

livelihood security/ vulnerability of different stakeholders. It considers a range of strategies such as crop production, livestock, wage employment and cash remittances, harvesting of trees, plants and river resources and wildlife/ tourism enterprises. This overview of household economics is then used to assess the significance of wildlife and natural resource initiatives, identifying the positive and negative impacts of community-based natural resource management (CBNRM) and wildlife use in the region. CBNRM refers to relatively new activities based on wildlife and tourism and older practices such as the use of wild plants, tree and river resources. Households can reduce their vulnerability to ecological and economic shocks by diversifying and spreading risks. CBNRM increases options and is therefore a risk averse strategy for households.

Caprivi is well situated for the wildlife-tourism industry based on the region's wildlife, national parks, riverine attractions (Okavango, Kwando, Chobe, Linyanti and Zambezi) and location along the route to Victoria Falls. The main benefit from wildlife tourism is a boost to cash income at the regional, household and individual levels, from regular wages, additional selling opportunities and the collective income from fees, levies and profits. This in turn can be invested in other food security and household strategies such as building livestock reserves, community strengthening and increased skills and drought-proofing. However, costs include increased competition for land and water and the risk of exclusion from key grazing sites, wildlife damage to individuals and agriculture, conflicts over use of collective income and the distribution of its benefits, and the increased risk of conflict within and between communities over management of resources.

In prime wildlife areas the collective annual income to the community is likely to be in the region of a few thousand (Namibian) dollars, translating as an additional couple of hundred dollars per household. This is insufficient to replace current livelihood activities, except at the margin. Although when aggregated across the community the cash income from wildlife may exceed the market costs of damage to agriculture from wildlife, this may not be so for individual households. Therefore, minimising damage from wildlife is as essential as developing cash generation options. If households invest their wildlife income in livestock production/ ownership in regions where wildlife enterprises have reduced the land or water available for grazing and increased the risk of livestock predation, further costs are imposed upon the household. These are likely to be borne more by those members of the community whose tenure rights are less secure or have small livestock reserves. Similarly, cash needs vary by seasons and are more acute in drought years. Therefore CBNRM initiatives that require time inputs outside of land preparation and harvest seasons, and generate most profits around Christmas, the pre-harvest season and in drought years, are likely to

have more positive net impacts. Inevitably the relevance of CBNRM in the region also depends upon its impact on other household strategies as well as other developments (e.g. access to markets and trends in tourism and the degree of community involvement). The review calls for site-specific analysis when investigating the pros and con's of CBNRM.

17. **Aveling, R., Barrow E., Bergin, P. & Infield, M. (1998):** Livestock and wildlife in the environment: diversity in pastoral ecosystems of East Africa. In: Nell, A.J. (ed.) (1998): *Proceedings of the International Conference on Livestock and the Environment.* Wageningen, 16-20 June 1997: The World Bank, Food and Agriculture Organisation of the United Nations and the International Agricultural Centre, 104-113.

Keywords: East Africa/ Uganda/ Kenya/ Tanzania/ Livestock and wildlife integration/ policy /research priorities

The authors argue that the conflict between pastoralism/ wildlife and agriculture is more profound than that between pastoralism and wildlife. Some pastoralists and conservation groups have therefore adopted strategies of combining political and economic forces to restrict the expansion of agriculture into certain areas, and trying to minimise conflicts and maximise complementarities between livestock and wildlife. The African Wildlife Foundation has a number of projects that work specifically with pastoralist groups to investigate options for managing land, vegetation, livestock and wildlife resources. The paper provides a number of examples of mixed wildlife/ livestock systems from East Africa. In Uganda, options for integrating Ankole Longhorn cattle into the management of Lake Mburo National Park are being explored. In Tanzania, the authors acknowledge that the great herds of wildlife that remain in the Serengeti ecosystem are present today mainly because of the Maasai tradition of pastoralism rather than agriculture as a primary economic activity, as well as the Maasai tradition of not eating wild meat under most circumstances. It is also argued that restrictions associated with the conservation of the Ngorongoro region have spared pastoralists from agricultural expansion. However, the failure of mechanisms to devolve revenues from the Ngorongoro Conservation Area Authority (NCAA) to the Maasai, together with the breakdown in veterinary services, which might limit the transmission of disease between wildlife and livestock, are souring relationships between conservation and pastoralism. Lands held and grazed by the Maasai often provide the last remaining corridors and dispersal areas between national parks. In Kenya, riverine forest plays an important role in the livestock production systems of the Turkana, who have consequently developed usufruct rights to crucial areas of trees, which effectively protects a number of important

species. The paper provides recommendations to investigate and support innovative management systems for livestock and wildlife.

18. **Baldus, R. D. (ed.) (1991):** 'Community wildlife management around the Selous Game Reserve.' Selous Conservation Programme Discussion Paper No. 12. Dar es Salaam: Tanzania Wildlife Division and Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ); and

19. **Baldus, R. D. (1995):** 'Selous Conservation Programme (SCP).' Project Brief. Dar es Salaam: Tanzania Wildlife Division and Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ).

    Keywords: Africa/ Tanzania/ Selous Conservation Programme

    Both of these papers outline the management plans and achievements of the Selous Conservation Programme (SCP), which occupies 6% of Tanzania's land surface and therefore represents one of the largest protected areas in Africa. It has been named as a World Heritage Site as it contains Miombo woodland as well as 70% of Tanzania's elephants and many of its last remaining black rhinos, buffaloes and wild dogs. Intensive tourism is not promoted in the Selous Game Reserve (SGR), and sustainable utilisation of wildlife is only promoted in the buffer zones surrounding the reserve where community wildlife management programmes are in operation.

20. **Baldus, R. D., Krischke, H., Lyamuya, V. and Ndunguru, I. F. (1994):** People and wildlife experiences from Tanzania. Selous Conservation Programme Discussion Paper 16. Dar es Salaam: Tanzania Wildlife Division and Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ).

    Keywords: Tanzania/ Selous Conservation Programme/ wildlife/ community wildlife management/ community hunting

    The Selous Conservation Programme (SCP) is a project that involves 33 villages in Morogoro, Ruvuma and Tunduru Districts (approx. 80,000 people) in Tanzania. The paper contains chapters on: the SCP, community wildlife management; practical experiences from Morogoro District, and community hunting as a means of benefiting from wildlife.

21. **Baldus, R. and Stronach, N. (1994):** Bibliography on Selous Game Reserve. Selous Conservation Programme Discussion Paper No. 17. Dar es Salaam: Tanzania Wildlife Division and Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ).

22. **Barnes, J. I. (1996):** 'Economic aspects of tourism in national parks and game reserves: The Case of Botswana.' *Development Southern Africa*: 13 (3): 377-398.

Keywords: Botswana/ tourism/ consumer demand/ wildlife/ willingness-to-pay/ conservation

An attempt is made to describe some of the forces that affect the attainment of economically efficient tourism in national parks and game reserves in Africa. Historically, little attention has been given to the question of economics in the development and management of national parks and game reserves. The author argues that the motive for setting aside wildlife habitat as protected areas and the development of parks was primarily ethical. Recent developments in environmental economics have made it possible to define this motivation for preservation in terms of economic value. Investment by governments in national park and game reserve development in African countries is increasingly dependent on the ability of the investments to contribute to economic growth and rural development. Maximisation of the total economic value of the wildlife resource, including option and existence values (preservation values) and not only utilisation values will ensure that this is sustainable and optimal. Wildlife-viewing tourism is the primary way in which utilisation can be achieved in protected areas.

Policy in Botswana gives emphasis to low-density, high-priced tourism. Evidence indicates that this can produce high financial and economic returns with minimal environmental damage and loss of preservation values. However, mechanisms need to be developed for distributing the resulting benefits to households in and around wildlife areas. To a lesser extent, policy making provision for cheap and easy access for citizens to engage in wildlife-based tourism activities is also supported by the author. Judicious use of fee differentials and land zoning can be used to make these two conflicting objectives achievable. It is important to generate public support for conservation. The market environments for wildlife-based tourism are poorly known and a shift in emphasis toward market-orientated development is needed. In addition, there is very little information on the nature and extent of preservation values associated with wildlife resources. Research is required to ameliorate these problems.

In Botswana, wildlife-viewing tourism is the largest contributor to the economy within the wildlife sector, contributing some 14 million pula in first round spending to the Gross Domestic Product. With inclusion of further rounds of spending the total contribution may be 2.1 times as large. This is less than 2% of total GDP. A financial and economic budget and cost-benefit model developed for a game viewing lodge enterprise shows it to be reasonably attractive to the

private investor and very desirable economically. Financial profitability is more highly sensitive than economic viability to changes in occupancy rates or product prices. At occupancies below 28%, the enterprise is financially unattractive after ten years. There is distortion of financial values from economic ones in conditions of low profitability. This suggests that some government support could be directed towards this sub-sector, perhaps directly aimed at increasing occupancy rates. Cost-benefit analysis shows planned implementation of a management plan for the Moremi Game Reserve will result in a favourable return in terms of economic use values derived from wildlife-viewing tourism. Since the primary planning objective was to maintain the reserve's pristine wilderness quality, the plan implementation will most probably also yield significant non-use values.

23. **Barnes, J. I. and de Jager, J. L. V. (1995):** 'Economic and financial incentives for wildlife use on private land in Namibia and the implications for policy.' Research Discussion paper No. 8. Directorate of Environmental Affairs, Ministry of Environment and Tourism, Namibia.

Keywords: Namibia/ wildlife/ sustainable use/ private lands

Wildlife populations and species diversity were estimated in aggregate on private lands between 1972-92. Species diversity and biomass appear to have increased by 80% during this time (3% p.a. over the 20-year period); the numbers of game species recorded increased by 44%. Cost-benefit models were used to assess the economic and financial efficiency of wildlife use on private land.

Livestock-game production for consumptive use and wildlife production for non-consumptive use (e.g. viewing) have low financial profitability, although both enterprises were deemed economically efficient. Thus there are financial incentives for private landholders to group together and form 'large-scale conservancies' which can benefit from economies of scale. The addition of wildlife production for non-consumptive use was found to yield greater economic net value per unit of land than livestock-wildlife enterprises for consumptive use, especially at large scales of operations. At 1994 prices, aggregate estimates of annual net value-added to national income from wildlife use on private land were N$30.6 million in 1972 and N$56 million in 1992. Hence the economic value of wildlife as a proportion of the economic value of all private land rangeland uses has risen from 5% to 11% in this time. The authors conclude that the current policies to promote wildlife conservancies appear to be 'economically sound, particularly where these are aimed at eventual conversion to wildlife-based tourism uses.'

24. **Barnes, J. I., Schier, C. and van Rooy, G. (1997):** 'Tourists' willingness to pay for wildlife viewing and conservation in Namibia.' Research Discussion Paper No. 15. Directorate of Environmental Affairs, Ministry of Environment and Tourism, Namibia.

Keywords: Namibia/ tourism/ willingness to pay/ conservation/ development

Thirteen percent of Namibia is set aside for nature conservation. Wildlife-based tourism operates in protected areas, communal and private lands. It is argued that the potential for expansion and intensification of wildlife-based tourism is greatest in the communal areas and is best achieved through non-consumptive means. This study used questionnaires to provide quantitative data on patterns of expenditure among wildlife-viewing tourists in Namibia and their willingness to pay (WTP) for: wildlife viewing trips, park entry and wildlife conservation, and community-based tourism initiatives. The authors argue that knowledge of WTP is useful for planning investments and pricing in the tourism sector. The authors note that in this paper they are referring to economic value as opposed to the economic impact of wildlife-viewing tourism. Hence value is perceived as the WTP for the use and non-use of the resource, exclusive of all economic costs and leakages; impact refers to the flows of expenditures through the economy resulting from use of the resource, including multiplier effects and excluding leakages.

The results of 752 questionnaires indicate that in 1995, each wildlife-viewing tourist in Namibia contributed an estimated N$907 to net national income at economic prices, N$250.3 million on aggregate. Namibian tourists benefited from consumer surplus of WTP N$362 per tourist (N$30 million p.a. on aggregate), more than they actually paid. Foreign wildlife-viewing tourists also experienced consumer surplus, paying N$627 per tourist (N$121 million p.a. on aggregate). (At the time of the survey, N$1 was equivalent to US$0.27.)

The authors argue that the survey revealed that tourists would be WTP higher daily park admission fees (up to N$17 per day), which could result in the capture of N$18 million p.a. On average, tourists are WTP N$104 into a wildlife conservation fund for Namibia. On a national scale this potentially translates as N$28.7 million p.a. for investment into the wildlife sector. On top of this, the average tourist is WTP N$26 into a community trust fund aimed at fostering the welfare of rural communities in Namibia. This would amount to N$7.2 million p.a. for community development. The authors recommend that foreign tourists should pay more while Namibians receive discounts. A conservation fund should be established with donations or levies from tourists to fund community-based conservation.

25. **Barrett, T., Forsyth, M. A., Inui, K., Wamwayi, H. M., Kock, J., Wambua, J., Mwanzia, J., and Rossiter, P. B. (1998):** 'Rediscovery of the second African lineage of rinderpest virus: its epidemiological significance.' *Veterinary Record* **142**: 669-671.

Keywords: Kenya/ buffalo/ kudu/ rinderpest

An account is given of the reappearance in 1994 of rinderpest virus, lineage type 2, in buffalo and kudu in Kenya. This type had last been reported 30 years ago. It is suggested that the virus has persisted unnoticed in cattle as a mild disease on the Kenya Somali border.

26. **Barrett, C. B. and Arcese, P. (1995):** 'Are integrated conservation-development projects (ICDPs) sustainable?.' *World Development* **23**(7): 1073-1084.

Keywords: Integrated conservation-development projects/ biological sustainability/ economic assumptions/ conservation/ development/ decoupling

This paper asserts that ICDPs are based on flawed biological and economic assumptions and approaches to addressing conservation and development issues in Sub-Saharan Africa (SSA). They argue that, as human demands on the environment will only increase over time, it is unsound to base those demands on a dwindling wildlife population which will only come under increased pressure in that time. Hence, the paper criticises the concept of conserving wildlife through its controlled utilisation, arguing that ultimately the only sustainable way to promote wildlife is to decouple our reliance on it.

ICDP initiatives arose largely in response to the apparent failure of the 'fence and fine' approaches to conservation of large mammals in Africa. Since its theoretical inception, the ICDP approach has been heralded as a panacea to the conflicts over land use between wildlife and people in the more marginal, tsetse-infested rangelands of SSA where livestock rearing is less viable.

ICDPs are frequently designed to promote conservation through the controlled exploitation of wildlife in return for other benefits: financial, material, infrastructural, etc. However, a review of 23 ICDP projects in Africa, Asia and S. America by Wells, Brandon and Hannah (1992), states that "any measurable progress has been rare". The Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) in Zimbabwe, described by Kiss (1990), has been one of the most influential models for ICDPs. CAMPFIRE attempts to ameliorate problems of poverty, declining wildlife numbers and a lack of co-operation between locals and the government. However, the authors critique such ICDPs from a

number of angles: their biological sustainability; the future costs and benefits of sustainable harvests and wider socio-economic considerations.

Biological sustainability: The cropping of wildlife is marginally profitable for a few species that can be easily slaughtered, transported and marketed, and it is argued that, under most environmental conditions, domestic stock are more productive than wild species in the same area. Gauging sustainable off-take over the long term is problematic, as it will change according to spatio-temporal fluctuations in the biotic and abiotic environment, thus requiring a flexible management strategy. This in turn has repercussions for the local support for ICDPs, as demands are likely to be unsustainable during vulnerable times.

Future costs and benefits: Estimating future sustainable off-take is also complicated by population increases (natural and through immigration to ICDP areas), which will lead to a decrease in the per capita benefits from ICDPs.

Socio-economic issues: Often the responsibility for the depletion of wildlife does not rest with the rural poor, but with urban-based elites. ICDPs do not accommodate non-pecuniary benefits of wildlife (e.g. traditional hunting rites of initiation). The demand for wildlife products and their availability are vulnerable to the fallacy of competition. The efficacy of ecotourism is reliant on many compounding factors such as civil unrest, exchange rate fluctuations etc. Even in the prime areas for tourism and wildlife such as the Maasai Mara Game Reserve and Amboseli National Park, the revenues that reach the local population are small: 1.6% of $20 million p.a. and 1% of $15 million p.a. respectively and a lot of visitors would be required annually to increase the revenues obtained. The ICDPs themselves are liable to impact on local employment rates and increase the price of food and goods. Wells, Brandon and Hannah (1992) argue that most ICDPs 'showed no evidence of having absorbed basic lessons of past rural development'.

In summary the efficacy of ICDPs is questioned as the author argues that they are based on flawed biological and ecological assumptions. As human demands increase over time, it is unsound to base demands on unstable wildlife populations that will not grow. The author argues that too often the links between conservation and development are promoted as inextricable and schemes that yield material benefits from wildlife cropping or ecotourism, are counter to the objective of decoupling rural livelihoods from resource exploitation and are therefore likely to be unsustainable in the long term.

ICDPs are short-term solutions – only a part of longer-term attempts to refocus attention and resources on the parallel processes of rural development, poverty alleviation and wildlife conservation.

27. **Barrow, E.(1996):** 'Partnership and empowerment: community conservation approaches and experiences from east Africa.' *Rural Extension Bulletin*, **10**: 5-13.

    Keywords: Uganda/ Kenya/ Tanzania/ policy

    This paper provides an introduction to community-based conservation in developing countries throughout the world, including a useful overview of policies and experience in Uganda, Kenya and Tanzania, and reports on specific initiatives in all three countries.

28. **Barrow, E., Lembuya, P., Ntiati, P. and Sumba, D. (1996?):** 'Knowledge, attitudes and practices concerning community conservation in the group ranches around Amboseli National Park.' Community Conservation Discussion Paper, No 11. Nairobi, Kenya: African Wildlife Foundation.

    Keywords: Kenya/ Amboseli National Park/ community conservation/ indigenous knowledge/ group ranches

    This paper presents the results of an open-ended questionnaire-based survey with the following objectives (among others):

    - to gain an understanding about the knowledge of rural resource users concerning conservation and natural resource management
    - to see what attitudes rural people have towards conservation and in particular towards wildlife and protected area authorities
    - to gain an understanding of some of the existing conservation-related practices that rural people undertake in these areas

    Sixty- six per cent of respondents felt they should be allowed to enter Amboseli National Park, especially to access grazing and water and traditional salt licks. Seventy per cent felt that tourist visitors to the Park helped pastoralists, especially through employment opportunities. However, tourists also take photographs inconsiderately, spread disease, increase the price of goods and spoil women, children and culture. A number of wild animals, in particular buffalo, lions, leopard, elephant and baboon, cause problems. The Maasai protect against damage by building strong livestock enclosures, protecting livestock and guarding crops. Few respondents claimed to use wildlife as a source of food or to hunt. The majority of respondents said that there are rules and regulations concerning wildlife use and protection, which are related to traditional methods, based on various taboos.

    Women are most worried about charcoal burning and bird hunting, while men are most concerned about poaching and over-grazing. Positive factors of living next to the Park, such as employment and revenue sharing, are offset by negative effects, such as ranger disturbance, spread of animal disease, livestock loss, crop

destruction and over-grazing attributed to wildlife. Surprisingly, elephant damage was small compared to other issues. Sixteen per cent of respondents thought the Park should be abolished so that the land could be used for settlement, grazing and cultivation.

Key natural resources were defined as grass, water, firewood, fuel, food, medicines and cultural uses. While most resources were obtained from the group ranch and surrounding areas, a small but significant amount of resources was obtained from the National Park, in particular water, grass and cultural uses. The importance of these communal lands for the provision of key resources is a strong argument against land use division in the Amboseli group ranches. People would like the Park/ conservation authorities to provide mainly rural development services, but also electric fencing and problem animal management.

29. **Bengis, R. G. and Veary, C. M. (1997):** 'Public health risks associated with the utilisation of wildlife products in certain regions of Africa.' *Revue Scientifique et Technique de l'Office International des Epizooties* **16:** 586-593.

Keywords: South Africa/ wildlife/ public health/ wildlife utilisation

The authors describe the public health risks associated with wildlife products in certain regions of Africa. Most of the information presented is obtained from the Republic of South Africa, particularly the Kruger National Park. There are no statutory requirements in South Africa regarding the general inspection of game carcasses prior to sale: however, current regulatory inspection requirements are explained. Game farming systems in southern Africa are generally extensive systems with wild herbivores living in a near-natural 'free-ranging' state. Several pathological processes and disease entities have been confirmed in wildlife carcasses and these are listed with zoonotic implications.

30. **Behnke, R., Scoones, I., and Kerven, C. (eds.) (1993):** Range ecology at disequilibrium: new models of natural variability and pastoral adaptation in African savannas. London: Overseas Development Institute, International Institute for Environment and Development and Commonwealth Secretariat.

Keywords: Africa/ savannas/ range ecology/ equilibrium / non-equilibrium / pastoral/ adaptation/ management

This book counters the conventional wisdom regarding pastoral management and adaptation in the semi-arid/ arid rangelands/ savannas of Africa. It comprises a series of chapters that explore the recent biological research into African rangelands and highlight its

management implications for future donor and government policy. An understanding of rangelands as non-equilibrium (disequilibrium) environments unifies the themes of the book.

31. **Berger, D. J. (1993):** 'Wildlife extension: participatory conservation by the Maasai of Kenya.' Nairobi, Kenya: ACTS Press.

    Keywords: Africa/ Kenya/ Maasai/ Amboseli/ Tsavo/ national parks/ wildlife extension.

    Berger evaluates participatory extension work in the Kajiado District of Kenya between 1984 and 1987. This is a case study of attempts to encourage community initiatives in conservation on Maasai group ranches near Amboseli and Tsavo West National Parks. The aim of extension work was to investigate and resolve people-wildlife conflicts and promote opportunities for local people to benefit from wildlife and tourism. The book looks at the 'wildlife extension' (WEX) process and the involvement of the local Maasai community in planned participatory research and education initiatives that empowered local people to build local institutions and enterprises for wildlife and natural resource use.

32. **Berger, D. J. (1996):** 'The challenge of integrating Maasai tradition with tourism.' In Price M. (ed.) *People and Tourism in Fragile Environments.* Chichester: Wiley

    Keywords: Kenya/ group ranches/ community/ gender/ Kenya/ Maasai/ tourism

    This paper discusses the gradual involvement of the Maasai with tourism on group ranches in Kenya. It emphasises that some Maasai have benefited while others have lost out, for the following reasons:
    - Economic linkages with other Maasai enterprises are weak.
    - Commodity prices have increased.
    - Increased and unregulated traffic is environmentally damaging and endangering life.
    - Human populations have increased dramatically along the main tourism routes.
    - Tour drivers have exploited the Maasai; women and children have been exploited by Maasai men.
    - Power and wealth have been concentrated.
    - Policies which reduce environmental pressures inside parks have led to degradation outside parks.

    The Maasai need to establish community institutions with which outside tourism entrepreneurs can enter partnership. Kenya is now facing competition from countries that are managing these externalities of tourism better.

33. **Bigalke, R.D. (1994):** 'The important role of wildlife in the occurrence of livestock diseases in southern Africa.' In: *Infectious diseases of livestock with special reference to Southern Africa* (Coetzer, J. A. W., Thomson, G.R., and Tustin, R. C., eds): Cape Town, Oxford, New York: Oxford University Press **1**: 152-163.

    Keywords: Southern Africa/ wildlife/ livestock/ co-existence/ diseases

    This chapter reviews the wildlife-associated diseases of livestock that can occur in southern Africa. The author states that a holistic approach is necessary to fully appreciate the complex role played by wildlife in diseases of livestock in southern Africa. It is important to realise that African wildlife and many of the diseases and parasites associated with them have not evolved in isolation but together. They have consequently 'learned to live with each other', thus securing their survival to the detriment of livestock that have intruded into their environment. It is, however, clear that although diseases of wildlife origin, or with a wildlife connection, have played a crucial role in shaping the early history of livestock farming in southern and the rest of Africa, research is, to an ever increasing extent, facilitating the peaceful co-existence of wildlife and livestock in the various ecosystems involved.

34. **Binepal, V. S., Wawiru, B. N., Davies, F. G., Soi, R., and Olubayo, R. (1992):** 'An attempt to define the host range for African horse sickness virus (Orbivirus, Reoviridae) in East Africa by a serological survey in some *Equidae, Camelidae, Loxodontidae* and carnivores.' *Veterinary Microbiology* **31**: 19-23.

    Keywords: East Africa/ wildlife/ livestock/ African horse sickness

    A survey was carried out in horse, zebra, elephant, camel, sheep and goat and wild carnivore sera for virus-serum neutralising antibody to the nine type strains of African horse sickness virus. Antibody was found amongst the horse, zebra and elephant sera to all nine different strains. No antibody was detected in any sera from camels, sheep and goats. None was found in sera from hyaena and jackals in this series but had been detected earlier.

35. **Bird, C. and Metcalf, S. (1995):** 'Two views from CAMPFIRE in Zimbabwe's Hurungwe District: training and motivation, who benefits and who doesn't ?' *Wildlife Development Series No.5.* London: International Institute for Environment and Development

    Keywords: Zimbabwe/ Hurungwe/ CAMPFIRE/ exclusion/ settlers/ conflicts

This paper explores the complexities of managing a CAMPFIRE programme in Hurungwe district, north-western Zimbabwe. The District comprises state, commercial and communal lands. In the latter areas, there has been a high degree of human settlement since the 1980s, creating a high degree of social tension in the area. Settlers tend to be less tolerant of wildlife and their associated costs, while also tending to obtain a louder voice within the communities they migrate into. The District Council (DC) applied for appropriate authority status in 1991 to manage the communal area resources under the CAMPFIRE programme. This move also intended to help stem the tide of illegal settlers in the area, with more marginal areas being designated as 'wildlife areas', and illegal settlers evicted. The DC has also upheld the policy of withholding CAMPFIRE-derived benefits from families who were not legally registered in the areas. Further conflicts of interest arose between the DC and traditional leaders, as local chiefs have boosted their own power bases, settling people in these wildlife areas for financial gain. The paper investigates how these factors have been ameliorated through institutional means.

36. **Birgegard, L. E. (1993):** 'Natural resource tenure: a review of issues and experiences with emphasis on Sub-Saharan Africa (SSA).' *Swedish University of Agricultural Sciences, International Rural Development Centre, Rural Development Studies 31.* Uppsala, Sweden.

Keywords: Sub-Saharan Africa/ tenure/ resource use/ reform/ common property resource management/ sustainability/ community-based management systems.

This review studies the trends in natural resource tenure (NRT) in SSA, using empirical evidence to assess the arguments for and against 'indigenous tenure systems' and 'modern individualised titling systems'. The fundamental issue is whether indigenous systems hinder more efficient and sustainable resource use and should be replaced.

NRT refers to the terms and conditions on which natural resources are held and used. Tenure is regarded as a social institution in which the rights and obligations to the use of land are defined for individuals and groups of individuals. Tenure systems in SSA are extremely diverse according to the different resources considered as well as the ethnic origins, gender, histories, and social, political, agricultural and religious practices of the population exploiting them. Debates over land tenure have increased for a number of reasons: socialist experiments have been dismantled, shifts in the development paradigm have occurred to promote a more market-oriented and entrepreneurial approach, and with the rise of ecological problems,

the sustainability of land use practices has been called into question. The historical debate has focused on how to manage the available land in the most 'efficient manner'.

The conventional view has seen indigenous forms of land tenure as an obstacle to efficiency, predominantly equated with commercial agricultural production. The trend has been for arable land to move towards privatisation and registration, and for forests and rangelands to come under government control or private registered titles, according to the political history and ideology of the country concerned. This paper looks at arguments surrounding tenure security and investment, tenure and access to credit; tenure, promotion of land markets and allocative efficiency, land fragmentation and production efficiency before moving on to look at common property resource management (CPRM).

Tenure and common property resource management (CPRM) has been inaccurately tarred with the brush of Hardin's 'Tragedy of the Commons' which has been used to justify (government) intervention. However, the rationale underpinning Hardin's argument has been shown to be flawed in the context of CPRM regimes, as it refers to 'open access' rather than communal management. Evidence has shown that government intervention may actually promote the open access system it aims to prevent. In such a situation, no tenure rules operate and it becomes unclear who has the responsibility for controlling access to and use of resources. Thus, current land tenure reforms have focused on devolving responsibility from the government to users. The debate then arises over how this should operate: through privatisation or community-based management systems (CBMS) and the relative feasibility and success of each.

Within rangelands, there is opposition to privatisation on the grounds of spatio-temporal heterogeneity of resource distribution. This places constraints on the size of viable ranges and highlights the likelihood that more pastoralists would be displaced than sustained under such a system, especially those who are poorer or subordinated/ marginalised in other ways (e.g. through gender.)

A number of factors influence the success of CBMS. It is generally considered that the groups involved should be relatively small and homogenous, (economic and social stratification constrain this). Material incentives should be considerable, predictable and dependable to ensure participation. In terms of the resource itself, it helps if it has clear boundaries and is manageable in size, which facilitates more efficient monitoring and evaluation. There is also the need for an organisational framework to monitor and evaluate the system, as well as enable conflict resolution. CBMS need to be linked to society at large through legislation so that communities are able to exclude non-members from using the resource in question.

Summary: Experiences in Kenya show that the introduction of formal registration systems may promote tenure insecurity and do

not necessarily lead to increased use of credit with the land as collateral for loans. It also highlights the fact that titling need not increase the level of formation of land markets nor their efficiency. This is due to transfers and sales being determined by economic, social and cultural factors that are integral to land rights and security. Although World Bank studies in Ghana, Kenya and Rwanda conclude that fragmentation does not seem to adversely affect agricultural productivity and is a sensible risk-spreading strategy, the author concludes from experiences in Kenya that increased fragmentation of arable land does lead to increased inequality. The tenure rights of women especially are eroded by commercialisation, individualisation and formal titling.

The author argues that tenure reform for arable land should build on existing indigenous tenure frameworks, rather than try to replace them. It should provide a flexible legal framework that recognises the indigenous systems and institutions that administer them, but does not codify them in law as this undermines their inherent flexibility. It also recommends that formal titling should not be promoted in SSA for many years to come, except for specific cases such as peri-urban areas, irrigation and possible settlement schemes. With respect to forest and rangeland, reform recommendations are harder to define. It is argued that it is 'essential to promote tenure reform which changes open access situations to managed tenure'.

37. **Boa, M.E., Bogh, H.O., Kassuku, A.A., and Nansen, P. (1997):** 'The prevalence of *Taenia solium* metacestodes in pigs in Northern Tanzania.' *Journal of Helminthology*, **69**: 113-117.

Keywords: Tanzania/ *Taenia solium*/ tape worm/ pigs

Eighty-three carcasses of pigs were examined at three abattoirs in Moshi, Arusha and Mbulu in northern Tanzania. *Taenia solium* metacestodes were found in all the three abattoirs with an overall prevalence of 13.3%. During routine meat inspection in Kiboroloni, Moshi, 6.2-6.9% of the pigs were found to harbour *T. solium* cestodes. The mean number of hooks on the protoscolices was 27 and the length of the small hooks varied from 105 to 130 mu m while that of the larger hooks varied from 168 to 174 mu m confirming that the cysts were metacestodes of *T. solium*. Although cyst-like lesions were recovered from livers of both pigs and cattle, no hooklets of sizes in the range of 5-37 mm were found, indicating that no Taiwan Taenia metacestodes were recovered during carcass examination.

38. **Bond, I. (1993):** 'The economics of wildlife and land use in Zimbabwe: an examination of current knowledge and issues.' Multi-species Animal Production Systems Project Paper 36. Harare, Zimbabwe: World Wide Fund for Nature.

Keywords: Southern and eastern Africa/ multi-species systems/ livestock/ wildlife/ economics/ conservation/ land use/ rangelands/ semi-arid

Author's Abstract: Approximately 70% of Zimbabwe is classified as semi-arid and is suitable only for extensive livestock production, with domestic livestock production in the commercial farming areas and agro-pastoralism in the communal areas. In the commercial sector, wildlife production is becoming an increasingly important land use. In the communal areas, the conditions now exist for farmers to derive direct benefits from wildlife. This paper considers the financial and economic aspects of domestic livestock production and wildlife production in Zimbabwe and the implications this will have for future land use systems.

In the higher rainfall areas of Natural Regions I and II, wildlife production is being used by farmers as a means of diversification to bring marginal land into production. Very little, if any, crop production has been displaced by wildlife enterprises, which do not pose a threat to national food security as is often argued.

In the more arid regions (Natural Regions III, IV and V) of the country wildlife enterprises are both financially and economically efficient. The viability of wildlife enterprises appears to improve with aridity. The viability of cattle enterprises was constrained by Government's implicit taxation of beef production. For cattle enterprises there appeared to be a loss in the viability with increasing aridity. Therefore the relative viability of wildlife compared with cattle enterprises increased from Natural regions III to V. However, in all regions there were financially profitable and unprofitable wildlife and cattle enterprises. This implies that there are factors other than natural region, which affect the profitability of livestock and wildlife enterprises in the semi-arid areas.

In the communal sector farmers clearly derive significant and appropriate benefits from livestock production and the maximisation of herd size is a rational production strategy. Most importantly the benefits from livestock accrue to individuals and households, while the financial benefits from wildlife are communal resources. The Appropriate Authority for the management of wildlife, however, is vested in district councils, quotas are controlled by Government and the utilisation is largely undertaken by commercial safari operators. The only control which communities have is in the decisions relating to the use of the revenue devolved from district level to wards and sometimes to villages. To date the benefits from wildlife have mostly

been invested in development of infrastructure. There are only limited examples of individual households' dividends being paid. This is a result of financially inefficient resource use, the high costs of centralised resource management, failure to clearly define the beneficiaries and a reluctance of districts to devolve revenue and thereby forfeit some of their power to lower-level institutions. Consequently the high costs of living with wildlife, and the threat to human life have not been compensated for by adequate returns at the household level. If wildlife is to become a viable and alternative land use in communal areas those people who live with wildlife, and therefore bear the greatest costs, must get the full financial benefit of the resource. The 'producer communities' can then decide on how much land and revenue to invest in wildlife management.

At a national level wildlife-based production systems are still not fully accepted as a legitimate form of land use in all natural regions and under all forms of land tenure. Until this occurs wildlife as a land use will continue to be marginalised. To date CAMPFIRE has focused almost entirely on wildlife. The principle that it embodies, however, namely the empowerment of rural communities to manage their own natural resources, is appropriate throughout the country in communal and resettlement areas.

39. **Boonzaier, E. (1996):** *Negotiating the development of tourism in the Richtersveld, South Africa,* in Price, M. (ed.). People and Tourism in Fragile Environments. Chichester: Wiley.

Keywords: Community empowerment/ conservation areas/ tourism/ South Africa

This paper describes the process of community empowerment that led to increased local community involvement in the gazettement of a new conservation area, focusing on the underlying reasons behind changes in the attitude of major stakeholders. Important points to emerge include:

- Conservation authorities were under increasing pressure to involve local communities from international conservation organisations, and from the shift towards black majority government in South Africa.
- Communities had experienced empowerment during the transformation of South African society in the 1980s, and the strengthening of various civic organisations.
- Communities had already developed effective mechanisms to prevent intrusion of outsiders in response to excessive use of grazing resources, and had succeeded in preventing the privatisation of their communal lands.

Finally, the paper emphasises that benefits have been limited:

- Some of the infrastructure improvements associated with park development were long overdue; a mere nine local jobs have been created.
- The type of hardy tourists attracted to the park are self-sufficient and spend little in the locality.
- Competition within local communities for access to these limited benefits has intensified.
- The system of entitlements to grazing access threatens to freeze the status quo.

On the other hand, conservation authorities have managed to restrict over-use of resources and exploitation by outsiders, and some locals are proposing that the park should be expanded.

40. **Bourn, D., (ed.) (1998):** 'Case studies of environmental change and trypanosomosis control in Kenya.' Nairobi: Kenya Trypanosomosis Research Institute and UK Department for International Development Joint Trypanosomosis Research Project.

Keywords: Kenya/ environmental change/land cover/ photo-interpretation/ tsetse/ trypanosomosis

This report is based on field studies by staff of the Environment and Socio-economic Unit of the Kenya Trypanosomosis Research Institute during 1995-97, and is in five sections. The first provides a general overview, and highlights the findings of the four case studies of environmental change and trypanosomosis control that follow: Busia District, on the border with Uganda; Galana Ranch, adjacent to Tsavo East National Park; Nguruman, in the southern Rift Valley; and Olambwe Valley, near Lake Victoria in western Kenya.

The findings are broadly in line with those of other studies of environmental change associated with trypanosomosis control in Nigeria and Zimbabwe. An important distinction, however, is that the Kenya case studies were selected to reflect a range of environmental conditions, farming systems and epidemiological circumstances, including densely populated mixed farming areas with a history of sleeping sickness, and semi-arid rangelands. Assessments of change in the Kenyan studies have also been over a substantially longer period of time, going back to the turn of the century, and are based on a combination of air-photo interpretation, participatory rural appraisal and historical review.

With the continued growth of Kenya's human population and mounting pressure on limited land resources, future development priorities must focus on the intensification of agricultural production, and measures capable of achieving greater productivity in the context of existing farming systems.

Human sleeping sickness no longer ranks as a disease of major importance in Kenya, compared for instance with malaria, or HIV/

AIDS. Trypanosomosis in animals, however, is common, and is a constraint on livestock production in many areas. It is also a constraint on the use of draught power and, thus, limits the potential for intensification of agricultural production.

The relative importance of trypanosomosis, compared with other livestock diseases and other constraints on production (e.g. fodder, water, management and finance), is difficult to assess. This is because of a general lack of reliable up to date information about the incidence of major diseases and associated production losses in different parts of the country. The Kenya Agricultural Research Institute has gone some way towards this aim, but studies have been hampered by unreliable population figures and limited disease incidence data. Such information is of paramount importance for strategic planning. A national survey of livestock diseases, including an assessment of the relative importance of trypanosomosis, is required.

An array of measures is available for controlling animal trypanosomosis, ranging from vector control by traps and targets, to the use of trypanocidal drugs, and the application of pour-ons. The direct impact on the environment of these methods is considered to be marginal, compared with those associated with ongoing expansion of agriculture and rural development.

The reality of the situation in Kenya today is that producers make decisions about livestock management and disease control, based on information and products available, their relative costs, and other calls on limited household income and labour. If disease control measures are too expensive, too time consuming, or too complex for the benefits perceived, they will not be adopted. Studies by KETRI at Nguruman suggest that the cattle of Maasai transhumant pastoralists in the southern Rift Valley get by on an average of one trypanocidal drug treatment per animal per year, costing about US$1. Clearly, alternative methods of disease control must be highly effective to compete with this.

Given the importance of wildlife and tourism to the Kenyan economy, the problem of tsetse and trypanosomosis control within and in the immediate vicinity of national parks and other protected areas demands particular attention. In years to come, many of these areas will be surrounded by agricultural land and human settlement (as some are already), and will be threatened by encroachment, unless local communities see some benefit from their continued existence.

Kenya Wildlife Service has adopted a policy of encouraging community participation in wildlife conservation and the integrated development of peripheral buffer zones around protected areas. Such initiatives should include strategies for the control of trypanosomosis and other diseases of livestock and wildlife. Successful interventions

of this kind, leading to the long-term co-existence of people, livestock and wildlife, obviously have relevance beyond Kenya.

41. **Brandon, K. E. and Wells, M. (1992):** 'Planning for people and parks: design dilemmas.' *World Development*, 20, 4: 557-570.

    Keywords: Integrated Conservation-Development Projects/ conservation/ development

    This paper outlines the evolution of Integrated Conservation-Development Projects (ICDPs) so far and explores the inherent trade-offs in linking conservation with development on the ground. ICDPs attempt to marry the conservation of biodiversity in protected areas with the social and economic development of the communities around these areas. It is argued that, without addressing these pressures, conservation of biodiversity will be constrained in the longer term. The authors illustrate that the performance of ICDPs has been undermined by difficulties with social implementation, weaknesses or technical design flaws, all of which are obstacles to the success of ICDPs in the field.

42. **Brockington, D. and Homewood, K. (1996):** 'Wildlife, pastoralists and science: debates concerning Mkomazi Game Reserve, Tanzania.' In Leach, M. and Mearns, R. (eds.) (1996): *The Lie of the Land, Challenging the Received Wisdom on the African Environment:* 91-105. Oxford: James Currey.

    Keywords: Tanzania/ Maasai/ pastoralism/ conservation/ perceptions/ non-equilibrium

    This chapter explores how perceptions of pastoralism in Mkomazi National Park in Tanzania were shaped and interpreted by political and scientific interests working within the equilibrium paradigm. The perception of pastoralists as irrational herders whose stocking levels inevitably led to overgrazing and land degradation was used to justify the piecemeal removal of pastoralists from Mkomazi over a thirty-year period since 1951, when the Park was established as a substitute for the Ruvu Game Reserve, which was thought to be too degraded for wildlife. The authors examine the role of science in challenging received wisdom, and highlight the complexities of the paradigm shift to non-equilibrium ecology and its implications for perceptions of pastoralism in the area.

43. **Burrows, R., Hofer, H., and East, M.L. (1998):** 'Population dynamics, intervention and survival in African wild dogs (*Lycaon pictus*).' *Proceedings of the Royal Society of London* 262: 235-245.

Keywords: Serengeti/ African wild dog/ rabies

This critical paper considers the evidence concerning the reasons for the disappearance of African wild dogs in the Serengeti and concludes that handling of the dogs may lead to clinical appearance of latent rabies infections.

See also: Dye, C. (1996) and East, M.L. and Hofer, H. (1996)

44. **Cater, E. (1994):** 'Ecotourism in the third world: problems and prospects for sustainability.' Cater, E. & Lowman, G. (eds.) *Ecotourism: A Sustainable Option?* Chichester: Wiley.

Keywords: Tourism

Developing countries have a comparative advantage in ecotourism. Ecotourism appears to offer an opportunity to generate foreign exchange, develop remote areas, and conserve the natural resource base. Small-scale locally owned operations are less demanding in terms of costly infrastructure, are more likely to develop local economic linkages (given demand for less-sophisticated products), and profits are more likely to be retained locally. As most ecotourists originate in developed countries, tour operators and expenditure are more likely to be based in developed countries and not at the destination. For destination countries, it is vital to maintain visitor attraction, whereas international operators are more mobile. Ecotourists may spend less money than mass tourists, as there are fewer things to spend money on in the wilderness. Tourism often creates inflationary pressures on land, property and even local produce in destination countries. Managing rapid growth is more problematic than a gradualist approach. The advantage and disadvantage of enclave tourism is that it concentrates tourism pressures.

Ecotourists are not necessarily environmentally sensitive, especially given the rapid growth in ecotourism. Ecotourism often excludes local populations, especially when based on conservation areas. Tourism enterprises should undertake environmental audits. It is necessary to recognise the mutually dependent interests of the public and private sectors in tourism. The interests of a local elite may be more closely bound to international investors than to local populations. The time perspective of local communities is likely to be longer than that of outside entrepreneurs, and they may have a greater interest in sustainability. Land transfers should be leasehold rather than freehold.

45. **Child, B. (1995):** 'The practice and principles of community-based wildlife management in Zimbabwe: the CAMPFIRE programme.' *Biodiversity and Conservation,* 5: 369-398.

    Keywords: Africa/ Zimbabwe/ CAMPFIRE/ community-based natural resource management/ wildlife utilisation.

    This paper discusses Zimbabwe's Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) which seeks to alleviate the inter-linked problems of conservation and poverty, through sound management principles based on transparency, accountability and democracy at the community level. So far, this has been largely based around the sustainable use of a narrow definition of wildlife. The paper begins by assessing the causes of natural resource conflicts in communal areas and describes how they are exacerbated by a failure to price and allocate resources efficiently. It then looks at the evolution of CAMPFIRE and addresses the principles upon which it is founded. It next discusses the governance of natural resources and describes the process by which rights to wildlife have been devolved, emphasising the importance of political and administrative systems in wildlife conservation. The author maintains that CAMPFIRE 'can be viewed as a five step process: getting an enabling political, legal, administrative and economic environment; creating awareness and a demand for the programme; generating revenues; using these revenues effectively; and, finally, setting in place the institutions and capacity for locally-based natural resource management.'

46. **Child, G. (1995):** 'The role of community-based wild resource management in Zimbabwe.' *Biodiversity and Conservation*, 5: 355-367.

    Keywords: Africa/ Zimbabwe/ community management/ wild resources

    This paper describes the evolution of Zimbabwe's community-based wildlife management legislation, which since the 1960s has promoted the devolution of responsibility for wildlife to landholders who were encouraged to use it profitably. It explores the concept of the Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) in the communal areas noting that, in order for CAMPFIRE to be successfully implemented, 'appropriate institutions' should be in place that encourage those people living in the communal lands to have a 'meaningful say in the management of their wildlife', and permit them to use it profitably. The paper concludes that, as on large-scale commercial ranches, 'socio-

economic factors proved more significant than ecological considerations in preserving wildlife on communally occupied land.'

47. Child, G. (1995): *Wildlife and people: the Zimbabwean success (How the conflict between animals and people became progress for both).* Harare, Zimbabwe, New York, USA: Wisdom Foundation.

Keywords: Zimbabwe/ wildlife/ conservation/ game ranching/ CAMPFIRE/ hunting/ tourism.

This book investigates the evolution of wildlife conservation in Zimbabwe and the trends towards its sustainable management through game ranching, CAMPFIRE projects, hunting and tourism. It explores the roles of institutions and economics in the commercialised use of wildlife and argues that this philosophy ultimately benefits the resource on private as well as public lands. Increasing shortages of land mean that 'for wildlife and protected areas to survive on a significant scale [in Zimbabwe] they must be socio-politically acceptable, economically viable and ecologically sustainable' (p11).

Game Ranching was introduced to the country by commercial ranchers on private lands in the 1950s. Since this time it has become an increasingly popular land use strategy in the low-energy savanna ecosystems and it has demonstrated its economic and ecological advantages to mono-cultural livestock production on ranches in Natural Regions III (Midlands), IV (NW Zimbabwe), and V (South East low veldt). Under present pricing structures the author argues that mono-cultural livestock production is economically and ecologically untenable for individual ranchers in the semi-arid rangelands of Zimbabwe, where the rainfall is below 750mm/ p.a. The rangelands continue to be used for cattle production as 'principle production inputs are not priced and the opportunity costs of abusing the ecosystems are not taken into account' (p 139). Although husbandry of cattle is more expensive, their harvesting and marketing is cheaper, being heavily subsidised by the vested interests of the state. Hence, the relative economic efficiency of game ranching to livestock production improves with the introduction of safari hunting to game ranches (e.g. Iwaba in the Midlands, the Matesi Area in NR IV, Buffalo Range and Limpopo Intensive Conservation Area in NR V).

Increasing subsidiarity over the control and management of wildlife has increased the benefits derived from the resource and their accountability at the grass-roots level. Game ranching has diversified land use, enhanced the profitability of farming, and broadened the national economy, thus increasing foreign exchange for national development.

[Other chapter titles of relevance: Sebungwe Region and CAMPFIRE/ Hunting for Conservation/ Wildlife and Tourism.]

48. **Christiansson, C., Kikula, I. S., Ostberg, W. (1991):** 'Man-land interrelations in semi-arid Tanzania - a multi-disciplinary research-program.' *AMBIO*, **20**, 8: 357-361.

Keywords: Africa/ Tanzania/ semi-arid/ man-land inter-relations/ land conservation

Natural and social scientists are co-operating in a major research program focused on environmental change in semi-arid North Central Tanzania. The aim is to contribute to an empirical and theoretical basis for assessing interrelations between man and land in a semi-arid environment, and also to support ongoing development projects in the area. Physical processes are recorded and analysed. Indigenous conservation practices are documented. The relationships between land degradation and factors such as land tenure, ethnic and social stratification, and degree of market involvement are studied. The effect of a large-scale environmental intervention and the removal of all livestock from the so-called Kondoa Eroded Area are analysed in a relatively long-term perspective.

49. **Cleaveland, S. and Dye, C. (1995):** 'Maintenance of a micro-parasite infecting several host species - rabies in the Serengeti.' *Parasitology*, **111**, S33-S47.

Keywords: Serengeti/ wild carnivores/ domestic dogs/ rabies

Whether and how micro-parasites such as rabies persist in their host populations are among the fundamental questions of infectious disease epidemiology. Rabies is a fatal disease of all mammalian species, but not all mammalian species can maintain the infection as reservoirs. The approach to control depends on which of the affected species do act as reservoirs. Bringing together old and new data, we examine here the role of wild and domestic animals in maintaining rabies in the Serengeti region of Tanzania, presenting our findings in two parts. In Part I, we argue that domestic dogs are the likely reservoirs because: (1) rabies has been continuously present in the dog population since its (re)introduction in 1977, whilst (2) wildlife cases have been very rare over this period, despite intensive study of Serengeti carnivores; (3) outbreaks of rabies in wild canids (jackals) elsewhere in Africa (Zimbabwe) have followed, rather than preceded, outbreaks in the dog population; (4) all viruses isolated from wild carnivores in the Serengeti ecosystem (including the Kenyan Masai Mara) are antigenically and genetically indistinguishable from the typical domestic dog strain; (5) dog rabies control in the Serengeti

between 1958-77 apparently eliminated the disease from both dogs and wildlife.

Having identified dogs as reservoirs, Part II explores some possible mechanisms of maintenance in dog populations. In theory, infection is more likely to be maintained at higher dog densities, and we provide evidence that rabies is maintained in one district with a dog density > 5/ km^2, but not in two other districts with densities < 1/ km^2. Because 5 dogs/ km^2 is much lower than the expected density required for persistence, we go on to investigate the role of atypical infections, showing: (1) from serology, that a substantial proportion of healthy dogs in the Serengeti have detectable serum levels of rabies-specific antibody; (2) from mathematical models that, whilst we cannot be sure what sero-positivity means, persistence in low-density dog populations is more likely if sero-positives are infectious carriers, rather than slow-incubators or immunes.

50. **Cleaveland, S. (1998):** 'Epidemiology and control of rabies. The growing problem of rabies in Africa.' *Transactions of the Royal Society of Tropical Medicine and Hygiene,* 92: 131-134.

Keywords: Africa/ rabies/ epidemiology/ control

Although rabies is relatively insignificant in terms of human mortality, the disease is still relevant because of the high costs of rabies prevention. Over the past two decades, demographic, economic and socio-political trends in Africa have increasingly favoured the persistence and spread of rabies, while limiting the effectiveness of control measures. Dog rabies predominates throughout most of Africa; the domestic dog is the principal reservoir host as well as the most important source of infection for people. However, wildlife rabies is increasingly a concern, both as a threat to endangered wildlife populations and because of the possible emergence of new maintenance hosts.

51. **Cornia, G. A., (1994):** 'Neglected issues in the decline of Africa's agriculture: land tenure, land distribution and R&D constraints.' In Cornia, G. A. and Helleiner (eds.): *From Adjustment to Development in Africa: Conflict, Controversy, Convergence, Consensus?* 214-47. Basingstoke: Macmillan).

This paper examines how the declines in agricultural production in SSA have been affected by land tenure issues. In the past, these issues have been neglected in analyses in favour of a more econometric approach based on 'getting the price right'. The paper gives an overview of the two main perspectives on land tenure and distribution in SSA: the neo-classical view (private property right paradigm) and the neo-institutionalist perspective. Both these views

argue that increased individualisation of tenure rights through private titling will increase tenure security and provide a greater incentive for investment, by providing collateral for credit, and because larger farms are supposedly more economically efficient.

From the neo-classical (NC) perspective, traditional customary tenure regimes are regarded as sub-optimal, outdated and inefficient in terms of allocating resources when compared to larger farms, creating disincentives for production and investment. The allegedly ambiguous nature of traditional tenure rights is argued to result in higher transaction costs and lower investments in land. Thus it necessitates policies designed to reform land tenure and distribution that favour the creation of an unconstrained land market through individualisation of land rights. The neo-institutionalist (NI) perspective maintains that both 'economic structures' (rules, contracts and institutions *strictu sensu*) and land distribution evolve spontaneously in response to changes in technology and factor endowments in order to reduce transaction costs. Thus little government intervention is required as it could interfere with this evolutionary process.

The author critiques these theoretical perspectives on a number of grounds:

- confusing property regimes and underestimating the flexibility of customary land tenure systems
- the co-existence of various types of property rights and methods of land acquisition (i.e. non-market methods)
- underestimation of the ability to dispose of plots under traditional tenure
- underestimation of the security of tenure of traditional systems
- overestimation of the relationship between titling and economic efficiency in relation to land use, with little evidence for activating credit markets and investment in the agricultural sector
- misconceptions about the effects of land registration programmes
- lack of induced technical innovation or 'autonomous agricultural intensification'

52. **Cosivi, O., Grange, J. M., Daborn, C. J., Raviglione, M. C., Fujikura, T., Cousins, D., Robinson, R. A., Huchzermeyer, H. F. A. K., de Kantor, I., and Meslin, F. X. (1998):** 'Zoonotic tuberculosis due to *Mycobacterium bovis* in developing countries.' *Emerging Infectious Diseases*, 4: 59-70.

Keywords: Developing countries/ tuberculosis/ *Mycobacterium bovis*

The World Health Organisation (WHO) estimates that human tuberculosis (TB) incidence and deaths for 1990 to 1999 will be 88

million and 30 million respectively, with most cases in developing countries. Zoonotic TB (caused by *Mycobacterium bovis*) is present in animals in most developing countries where surveillance and control activities are often inadequate or unavailable; therefore many epidemiological and public health aspects of infection remain largely unknown. We review available information on zoonotic TB in developing countries, analyse risk factors that may play a role in the disease, review recent WHO activities, and recommend actions to assess the magnitude of the problem and control the disease in humans and animals.

53. **Cumming, D. (1990):** 'Wildlife products and the market place: a view from southern Africa.' Multi-species Animal Production Systems Project Paper 12. Harare, Zimbabwe: World Wide Fund for Nature.

    Keywords: Africa/ Zimbabwe/ wildlife/ products/ marketing

    The author argues that use of wildlife and the marketing of its products are a sensible economic enterprise and effective means of promoting conservation in Africa. The paper looks at the evolution of wildlife conservation policy in Zimbabwe from colonial times to the present and observes that the marketing of wildlife products has become an integral part of productive land use strategies in Zimbabwe and southern Africa.

54. **Cumming, D. (1990):** 'Developments in game ranching and wildlife utilisation in east and southern Africa.' Multi-species Animal Production Systems Project Paper 13. Harare, Zimbabwe: World Wide Fund for Nature.

    Keywords: East and southern Africa/ wildlife utilisation/ game ranching/ land use/ conservation/ benefits/ costs.

    This paper reviews the current status of game ranching and wildlife utilisation in east and southern Africa. The main forms of wildlife utilisation are ranching, safari hunting and photographic safaris on private lands, especially in southern Africa. Game ranching in Kenya is found only on a single ranch although other ranches with substantial wildlife populations earn significant revenues from the viewing of game. State or community-owned land outside of National Parks is used in Namibia, Tanzania, Zambia, Zimbabwe and Mozambique. There is increasing interest in the development of community-based wildlife schemes in Botswana, Namibia, Tanzania, Zambia and Zimbabwe. The author argues that evaluating the relative benefits of such schemes against more conventional land uses, such as crop- or livestock-based agriculture is difficult, as the relevant economic and ecological data do not yet exist.

55. **Cumming, D. (1990):** 'Communal land development and wildlife utilisation: potential and options in northern Namibia.' Multi-species Animal Production Systems Project Paper 14. Harare, Zimbabwe: World Wide Fund for Nature.

    Keywords: Africa/ Namibia/ communal areas/ wildlife utilisation/ economic returns/ game meat/ tourism

    This paper outlines developments in community-based wildlife utilisation in east and southern Africa and draws upon these to formulate some principles and policy issues relating to planning and implementation. The paper discusses the potentials in the communal areas of Namibia, presenting a proposal for Bushmanland. This includes outline economic assessments of the potential returns from combining game meat use with tourist enterprises.

56. **Cumming, D. H. M. (1991):** 'Multi-species systems and rural development in southern Africa: opportunities, constraints and challenges'. Multi-species Animal Production Systems Project Paper 19. Harare, Zimbabwe: World Wide Fund for Nature. Presented at Workshop on Meeting the Rangeland Challenge in the 1990s: Centre for Scientific and Industrial Research, Pretoria.

    Keywords: Southern Africa/ Zimbabwe/ multi-species systems/ livestock/ wildlife/ conservation/ land use/ rangelands/ semi-arid

    Author's Summary: Cattle, sheep and goats, and perhaps donkeys, reached southern Africa about 2,000 years ago. Multi-species pastoral and agro-pastoral systems developed in the region. The rich indigenous large mammal fauna were used for subsistence and trade (e.g. ivory). European colonisation of the region led to the introduction of breeds of livestock and commercial production systems, which focused almost entirely on cattle or sheep. Single species systems displaced multi-species livestock systems and indigenous large mammals were eliminated where they competed with livestock. For three decades increasing numbers of commercial producers have extended their production systems to include indigenous ungulates. During the last decade community-based wildlife utilisation schemes have been developed in the communal lands of the region. Despite these moves and the apparent ecological and economic advantages of multi-species systems, most research, rural development and support services are still directed almost entirely at single species animal production systems.

    New insights into the spatial and temporal scales affecting range succession and management have not yet begun to influence management practices and policies. Research and management tend

to be focused at the scale of the farm and the potential for greater returns from the communal management of resources over larger areas and over longer time scales has been ignored. Mechanisms to link resource management at the farm level to resource management at larger or regional levels are lacking. This is particularly true for seasonally scarce key grazing and water resources and for migratory large mammals. Returns on further research into improved single species commercial systems are unlikely to be as great as returns from research on and development of multi-species systems. There is a need to re-allocate research and support services to examine alternative multi-species animal production systems.

The real challenge for the 1990s is to explore the region's potential for alternative animal production systems. This challenge involves a wide range of inter-related research and development issues amongst the most important of which are:

- the ecological and economic bases of single and multi-species systems in arid savannas
- the institutional frameworks needed to manage common, fugitive resources at the spatial and temporal scales characteristic of the region and which are needed to maximise sustainability
- the development of national and international markets, which maximise the returns to landowners/occupiers of the region and make the most effective use of the comparative advantages that multi-species systems may have to offer; and
- the integration of multi-species systems into agro-pastoral and agro-forestry systems

The WWF Multi-species Animal Production Systems Project is presently examining the ecological and economic basis of multi-species systems and how multi-species systems may be incorporated into rural development in the region. The project's aims and objectives and progress to date are outlined briefly in an Appendix.

57. **Cumming, D. H. M. (1994):** 'Are multi-species systems a viable land use option for southern African Savannas?' Multi-species Animal Production Systems Project Paper 46. Harare, Zimbabwe: World Wide Fund for Nature. Presented at the International Symposium on Wild and Domestic Ruminants in Extensive Land Use Systems: Humbolt University, Berlin 2-4 October 1994.

Keywords: Southern and eastern Africa/ multi-species systems/ livestock/ wildlife/ conservation/ land use/ rangelands/ semi-arid

Author's Abstract: The viability of rangeland production systems should be judged on more than economic criteria. Ecological, legal, political, social and technical criteria are also important and are often limiting factors. Rangeland management systems have evolved over the last two millennia from indigenous multi-species wildlife

systems (typically >20 Species) to mixes of wildlife and two or three species of domestic stock in extensive pastoral systems to the current dichotomy comprising fenced single-species ranching or contained wildlife systems. Fenced ranching systems are less than a century old. Their ability to meet both production and conservation goals now and in the future is questionable. The move by both commercial and communal farmers in the region towards multi-species systems lends support to this conclusion. Key features of multi-species systems are their ability to make fuller use of the ecological potential of spatially and temporally variable environments and the marketing of goods and services that do not depend on increased stocking rates to generate higher returns from the land or from investment. They also promise to be more appropriate for event-driven, disequilibrial rangelands. Four extensive multi-species production systems in the region, which appear to provide viable land use models are briefly outlined. However, legal, political, social and technical constraints inhibit the development of their full potential in the region, under both private and communal systems of land tenure. Given solutions to these problems, multi-species systems could be a viable form of land use for between 30 and 50% of the region for which they are ecologically suited.

58. **Cumming, D. H. M. and Bond, I. (1993):** 'Animal production in southern Africa: present practice and opportunities for peasant farmers in arid lands.' Multi-species Animal Production Systems Project Paper 22. International Development Research Centre Report. Harare, Zimbabwe: World Wide Fund for Nature.

Keywords: Southern Africa/ semi-arid rangelands/ livestock/ wildlife/ pastoralism/ land tenure

Within the semi-arid rangelands of southern Africa, much of the land is held in communal tenure. Due to a range of ecological and socio-economic factors, the dominant farming system is agro-pastoralism, with genuine pastoralism being comparatively rare. Cattle are kept for a variety of products: milk, draughtt, manure, and as a store of wealth. As cattle producers are not market-oriented and are concerned mainly with immediate products, the per capita consumption of animal protein is low and most countries import animal protein for urban consumers.

Within many of the region's communal areas, increases in human and livestock populations are placing pressure on the environment and leading to land degradation. This degradation is difficult to quantify. Many pastoralist development interventions have, in the past, been top-down and promoted the transfer of inappropriate technology, and in the long term have exacerbated environmental pressures. Beef exports in Botswana for instance are only feasible

with massive state intervention to control animal diseases and provide other subsidies to commercial producers.

Where wildlife is present, its highly priced consumptive and non-consumptive utilisation offers a potential alternative to conventional agro-pastoralism. The authors argue that the main constraint on the development of multi-species animal production systems is the variety of tenurial systems governing different resources. Livestock are private property and their grazing pastures communal property. Wildlife is communally owned and fugitive. Hence its utilisation requires 'the development of appropriate legal and institutional framework for the management of the resource'. Wildlife utilisation programmes can generate significant benefits to communities with low agricultural incomes, and appear to offer the greatest advantages over conventional livestock production where this is constrained by tsetse fly.

The authors maintain that research into livestock production has been less favoured than technology-orientated crop research, or it has focused on commercial production, and as a result 'interventions in the communal lands have generally failed'. They call for emphasising research on livestock development that is integrated with biological, economic and social factors of agro-pastoral systems in communal areas.

[Sections include: Introduction; Environment, Land Use and Animal Populations; Agro-economics of Livestock and Wildlife Industries; Environmental and Biological constraints; Socio-economic constraints; Carrying capacity and Overgrazing; Livestock Production systems (Pastoral, Transhumant, Agro-pastoral & Commercial Ranching); Wildlife Production Systems; Mixed Livestock/Wildlife Systems; Production Systems Compared; Development Options and Research needs.]

59. **Dalal-Clayton, B. (1989):** 'Wildlife working for sustainable development.' *Gatekeeper Series S.A. 9.* Sustainable Agriculture Programme, IIED, London.

Keywords: Africa/ Zambia/ wildlife/ sustainable utilisation/ management/ local community

A summary of the ethos of a sustainable wildlife management programme in the Luangwa Valley of Zambia. The paper stresses the need for ensuring that the benefits are distributed at the local level.

60. **Davies, F. G. (1981):** The possible role of wildlife in the natural history of rabies in Kenya. In: Karstad, L., Nestel, B. and Graham, M. (eds.): *Wildlife Disease Research and Economic Development*: Proceedings of a workshop held at Kabete, Kenya, September 1980: International Development Research Centre IDRC-179e: 28-29.

Keywords: Kenya/ wildlife/ rabies

The various vertebrate hosts confirmed to have died of rabies in Kenya between 1968 and 1979 are listed. Likely candidates for maintaining a sylvatic cycle of the virus are the honey badger, the white-tailed mongoose and the silver-backed jackal. It is concluded that there are good grounds for suspecting that there is a sylvatic reservoir of rabies in Eastern Province in Kenya. In northern Kenya there is a suspicion that there may be sylvatic rabies involving the jackal and possibly other carnivores. It is stated that there is a need to investigate the natural history of rabies in East Africa on a broader basis in the different ecological zones.

61. **Davies, F. G. (1981):** The possible role of wildlife as maintenance hosts for some African insect-borne virus diseases. In: Karstad, L., Nestel, B. and Graham, M. (eds.): *Wildlife Disease Research and Economic Development*: Proceedings of a workshop held at Kabete, Kenya, September 1980: International Development Research Centre IDRC-179e: 24-27.

Keywords: Africa/ wildlife/ insect-borne diseases

Based on serological investigations, the author draws some conclusions on the involvement of wildlife in the maintenance of a number of insect-borne virus diseases in Kenya. The conclusion from this work is that wild animals do not play any role in the maintenance of the Nairobi sheep disease virus, supporting a hypothesis that it is an introduced virus. Other virus infections such as bluetongue, ephemeral fever, African horse sickness and lumpy skin disease are likely to be indigenous to the east African ecosystems and be maintained in the wild game populations of the region. Rift Valley fever is also an indigenous virus utilising the forest habitat for maintenance and probably some, as yet unidentified, wild vertebrate species.

62. **Davies, F.G. and Otieno, S. (1977):** 'Elephants and zebra as possible reservoir hosts for African horse sickness virus.' *Veterinary Record*, **100**: 291-292.

Keywords: Africa/ elephant/ zebra/ African horse sickness/ reservoirs

Using a complement fixation test, antibodies to African horse sickness or a closely related virus were found in elephant sera from northern Tanzania. Antibodies were also detected in zebra sera adding to previous evidence that zebra are involved in the maintenance of African horse sickness virus. It is noted that the disease has been seen in horses in the coastal strip of Kenya where zebra do not occur but where elephants are relatively common.

63. **Davies, G. (1993):** 'Bovine petechial fever (Ondiri Disease).' *Veterinary Microbiology*, 34: 103-121.

Keywords: Kenya/ bovine petechial fever/ cattle/ buffalo/ bushbuck

Bovine petechial fever is a Rickettsial disease of cattle, which has been diagnosed only in Kenya, east Africa. Other countries in the region share some of the biotopes in which the disease occurs, and may well have the infection. The disease is characterised by widespread petechial and ecchymotic haemorrhages on the mucosal surfaces, and throughout the serosal and sub-serosal surfaces of the body organs and cavities. It may be fatal in up to 50% of untreated cases. The causal organism may be demonstrated most readily in the cytoplasm of polymorphonuclear granulocytes of the peripheral blood, as well as other leucocytes, and has been classified as *Cytoecetes ondirii*, a member of the tribe Ehrlichiae. Circumstantial and other evidence suggests that the disease is transmitted by an arthropod vector, which has yet to be identified. The blood of a naturally infected wild ruminant, the bushbuck, *Tragelaphus scriptus* has been shown to remain infective for at least two years, and other species such as the African buffalo, *Syncercus caffer* for at least five weeks. These and possibly other species, may serve as the amplifying and reservoir hosts.

64. **Dawe, P.S., Flanagan, F.O., Madekurozwa, R.L., Sorensen, K.J., Anderson, E.C., Foggin, C.M., Ferris, N.P., and Knowles, N.J. (1994):** 'Natural transmission of foot-and-mouth-disease virus from African buffalo (*Syncerus caffer*) to cattle in a wildlife area of Zimbabwe.' *Veterinary Record*, **134**: 230-232.

Keywords: Zimbabwe/ cattle/ buffalo/ foot-and-mouth disease/ transmission

An outbreak of foot-and-mouth disease (FMD) occurred during April 1991 in a trypanosomosis sentinel cattle herd by the Rifa River to the east of Lake Kariba, Zimbabwe. Despite the cattle having been vaccinated biannually for the previous five years the disease was severe. The viruses isolated from the affected animals were typed as FMD virus type SAT 1. Free- living African buffalo (*Syncerus caffer*)

which had been using the same watering place as the affected cattle were sampled and FMD type SAT 1 virus was isolated. Partial nucleotide sequencing of the gene coding for the capsid protein 1D (VP1) of one of the viruses isolated from cattle and two of the viruses isolated from buffalo demonstrated a close relationship between the three viruses. Since no other cattle were present in the area and no outbreaks of SAT 1 had occurred in Zimbabwe since 1989, it was concluded that the disease had been transmitted from buffalo to cattle.

65. **Dye, C. (1996):** 'Serengeti wild dogs: What really happened.' *Trends in Ecology and Evolution*, **11**: 188-189.

    The author argues that Burrows's idea of latent rabies being reactivated after stress of handling is unlikely. It is suggested however that no handling of the dogs is the best option unless there is a high risk of exposure to rabies when vaccination should be given.

66. **East, M.L. and Hofer, H. (1996):** 'Wild dogs in the Serengeti ecosystem: What really happened? Reply.' *Trends in Ecology and Evolution*, **11**: 509.

    The authors criticise Dye's conclusions (*Trends in Ecology and Evolution,* **11**: 188-189). This is followed by a reply from Dye.

67. **Eber, S. (ed.) (1992):** *Beyond the Green Horizon: Principles for Sustainable Tourism.* Tourism Concern, Godalming: World Wide Fund for Nature (UK).

    Keywords: Tourism

    This discussion paper examines the economic structures, and the socio-economic and environmental consequences of various forms of tourism. It suggests alternative policies for tourism development and guidelines on how these might be implemented. For tourism to be sustainable, it must be ensured that resources are not over-consumed, that natural and human environments are protected, that tourism is integrated with other rural development activities, that it provides real benefits to the local communities, that local people are involved and included in tourism planning and implementation, and that cultures and people are respected. The paper defines ten principles for sustainable tourism as:

    - using resources sustainably (which includes not forcing people off their land, or impeding their access to natural resources; while cultures can be revived/ sustained through sensitive tourism, they can also be overwhelmed)

- reducing over-consumption and waste: especially of water, fuelwood and other resources where excessive tourist demand may affect supply to local communities and lead to local inflation; on the other hand, local sourcing and local enterprises development should be promoted where resources are locally plentiful; need for proper planning and comprehensive environmental impact assessments (EIAs), and adoption of the polluter pays principle
- maintaining diversity: destruction of natural and cultural diversity undermines the sustainability of tourism itself; cultural diversity can be undermined when traditional occupations are neglected in favour of jobs in tourism
- integrating tourism into planning: through strategic long-term planning and EIAs
- supporting local economies: integrating environmental values into conventional cost-benefit analysis (CBA) (including those enterprises which are not so obviously dependent on the environment); promoting economic diversity (because tourism is a volatile industry); the private sector should cover part of costs of infrastructural development; encourage in-country payment (e.g. using the national airline)
- involving local communities: local communities are long-term stakeholders – better able to provide checks and balances when tourism companies can simply move elsewhere; this should increase linkages
- consulting stakeholders and the public
- training staff: improving the status of local staff
- marketing tourism responsibly: the principles of sustainability should apply to the industry as a whole, including the mass market; tourist impressions and expectations are usually formed before arriving at the destination through marketing literature etc.; it is in the industry's interests to inform tourists about a destination in order to lessen negative responses and hostility
- undertaking research: especially proper environmental and social impact assessment and monitoring

68. **Elliott, J. and Mwangi, M. M. (1997):** 'Increasing landowner earnings from wildlife cropping in Laikipia, Kenya.' Community Conservation, Economics and Commerce Programme: Laikipia Wildlife Economics Study Discussion Paper 2. Nairobi, Kenya: African Wildlife Foundation.

Keywords: Kenya/ Laikipia/ economics/ wildlife utilisation/ cropping

The commercial wildlife cropping industry is small and fragmented, due to the effective ban on wildlife utilisation from 1977-1990 and

the tight regulatory framework that is in place. The legal market for bush meat has a current wholesale value of about $450,000, and appears to be closely linked to the informal market, which is believed to be hundreds of times larger. The competition in supplying game meat has increased since 1990, and real prices have fallen significantly.

Landowner earnings from cropping have been low, primarily because they receive only 5% of the value-added from the main cropping products – meat and skins. Profits also depend significantly on transport costs. Abattoir wholesalers, on the other hand, make attractive rates of return on high value meat given sufficient demand. However, barriers to entry to this market include significant investment costs, a minimum economic scale of 400 animals p.a. and the need for both an established distribution network and excellent buyer relationships.

Landowner earnings from wildlife cropping could be increased by deregulating the cropping industry to allow a greater range of value-added activities in Kenya. Alternative strategies include vertical integration, renegotiation of abattoir animal purchase prices, the payment of 'grass rents' to landowners who protect wildlife but receive no economic benefit, or the development of an economic small-scale approach to processing value-added products.

The transfer of property rights from KWS to the landowner, though as yet very limited, has increased the opportunities for adjusting livestock and wildlife populations (e.g. as a means of managing the demand for fodder and water). Despite the fact that the new policy has not allowed for hunting or trade in live animals, it has dramatically altered landowner perceptions of wildlife, encouraging them to protect wildlife on their land.

Wildlife cropping has been well below quota, partly because current rates of return from cropping are very low. These low returns are due to three main factors:

- restrictive regulatory environment - KWS tries to maintain effective control over the processing, marketing and sale of wildlife products
- growing competition in a small but growing market
- less than 5% of value-added from wildlife products currently accrues to landowners who face significant barriers to entry into value-added activities

69. **Elliott, J. and Mwangi, M. M.** (1997): 'Making wildlife "pay" in Laikipia, Kenya.' Community Conservation, Economics and Commerce Programme: Laikipia Wildlife Economics Study Discussion Paper 1. Nairobi, Kenya: African Wildlife Foundation.

Keywords: Kenya/ Laikipia/ economics

The authors conclude that, without a significant change in the current framework of economic incentives, the trend will be for wildlife to be removed from all land in Laikipia except that supporting successful wildlife tourism ventures or where the landowner has non-economic reasons for conserving wildlife.

70. **Elliot, J. and Mwangi, M. M. (1998):** 'Developing wildlife tourism in Laikipia, Kenya – who benefits?' Community Conservation, Economics and Commerce Programme: Laikipia Wildlife Economics Study Discussion Paper 3. Nairobi, Kenya: African Wildlife Foundation.

Keywords: Kenya/ wildlife/ tourism/ financial sustainability/ livestock/ economics

The main findings of the study are that wildlife-viewing tourism represents the highest value land use on the agriculturally marginal lands of Laikipia, generating at least five times higher earnings than the next most economic land use, which is livestock rearing. In this paper, the authors examine the scope for increasing opportunities for, and earnings from, wildlife tourism in Laikipia.

However the opportunities to enter the high value end of the tourism market are restricted to landowners with large landholdings, an excellent viewing product and good access to customers. Opportunities in the low-medium end of the tourism spectrum are restricted by poor infrastructure among many factors.

The authors argue that growth in all segments of the tourism market will depend on improvements in the product, the overall health of the Kenyan safari industry, the development of new tourist circuits in Laikipia and the marketing of Laikipia as a destination, and on infrastructural improvements.

Successful wildlife-viewing tourism also requires a healthy population of the 'big five' on large ranches (10,000 ha plus). High - value wildlife-viewing tourism yielded profits of between $4.40 and $32.50 per hectare p.a. (note wide range), but earnings from other tourism businesses, such as curio shops and cultural shops (the type of micro enterprise which poorer community members can most easily access), are low. In particular, craft artisans sell their products at negotiated prices which may, or may not, cover the time and materials involved in production. However, despite the small amounts, this income has a huge multiplier effect on the local economy, as it is used to buy food and agricultural inputs and to pay for school fees and medicines. With the exception of some local employment, the bulk of inputs for the tourism industry appear to come from outside the district. Higher rates of local employment would require the provision of more training and opportunities for local people.

The only luxury lodge which is 100% community-owned has had support from neighbouring landowners, Kenya Wildlife Service and in the form of grant donations for capital costs. Significant support is needed for sales and marketing, capital investment and financial management for community lodges. There may not be scope for more than one such venture within Laikipia.

Where joint ventures work, the opportunities for communities to benefit are excellent and the risks reduced. Experience from other countries (Namibia and South Africa) suggests that the challenge is to find private sector operators with the commitment and capacity for making partnerships with communities work.

An alternative model, not yet explored, is for private operators to pay some form of 'grass rent' to local communities who protect wildlife on their land.

The rate of return per hectare to wildlife tourism depends critically on:

- the overall attractiveness of Kenya as a tourism destination
- the competitiveness of the tourism product on offer
- the type of tourism venture
- the right partner(s)
- a defendable niche

Problems arise regarding the compatibility of tourism with other land uses, particularly livestock ranching ('tourists don't want to see cattle'), hunting ('high-value tourists won't come to Kenya if the hunting ban is lifted') and cropping.

71. **Emerton, L. (1998):** 'Why wildlife conservation has not economically benefited communities in Africa.' Community Conservation Research in Africa, Principles and Comparative Practice. Report No. 5. Institute for Development Policy and Management, University of Manchester.

Keywords: Africa/ community-based wildlife conservation/ economics

Community-based approaches to wildlife conservation are premised on the economic rationale that communities must benefit from wildlife conservation if they are to conserve it. These approaches aim for a 'win-win' situation: the welfare of local communities is enhanced and wildlife is conserved. Benefits may be direct (sustainable income generation) or indirect (benefit-sharing and development activities). Although such approaches have led to more equitable benefit-sharing when compared to exclusionist approaches, the authors argue that 'benefit-based models are an incomplete understanding of the economics of community conservation.' In the longer term, 'they may lead neither to community welfare improvement or wildlife conservation.' It is argued that the economic

incentives to conserve wildlife extend beyond benefit-sharing, although this is a necessary part of the incentives. When evaluating the livelihood gains from wildlife-related activities, considerations need to be given to the economic costs incurred at a range of levels (individual, household, community), the forms of wildlife benefits received, the costs and benefit ratio of other economic activities.

72. **Enghoff, M. (1990):** 'Wildlife conservation, ecological strategies and pastoral communities: a contribution to the understanding of parks and people in East Africa.' *Nomadic Peoples,* **25-27**: 93-107.

Keywords: East Africa/ wildlife/ conservation/ parks/ ecology/ pastoralism

Enghoff critically evaluates the coexistence of wildlife and pastoralism in East Africa with reference to future prospects for conservation and development in the area. He adopts an historical approach, investigating the origins of parks and game reserves in Kenya and Tanzania and the costs and benefits of wildlife conservation to the pastoral communities in the area such as Maasai, Samburu, Borana, Turkana and Karamojong. Wildlife conservation is now viewed as a productive alternative form of land use in the semi-arid rangelands, both in terms of the tourist revenue it generates at a national level and the indirect long-term global benefits accrued from the conservation of biodiversity. He argues that, ultimately, the future of East African rangelands lies with the coexistence of wildlife conservation and pastoral production/ development.

Prior to the 1890s, wildlife and man co-existed and competed in areas that are now famous national parks, with man having the upper hand. The arrival of European settlers coincided with a series of events that drastically altered the appearance of the relationship between man and wildlife. Rinderpest had decimated 90-100% of cattle populations in the region. Famine, drought and disease had killed many of the Maasai in the area, with the population falling from 500,000 to nearer 50,000. Pastoral rangelands that were previously regulated and managed for livestock became tsetse-infested bushland, interspersed with wildlife.

Colonial wildlife conservation policies in East Africa were formulated against this backdrop. The ethos of conservation was derived from preserving wildlife for controlled hunting for the colonists. Pastoralists and their livestock were excluded from national parks and game reserves, and the dogma that pastoralists were 'irrational land users' who promoted overstocking and thus overgrazing was used to justify the expropriation of pastoral grazing lands for conservation purposes (e.g. in Tanzania: Serengeti National Park, Maswa Game Reserves, Tarangire National Park, Manyara National Park, Mkomazi Game Reserve; and in Kenya: Nairobi

National Park, Amboseli National Park, Tsavo National Park and the Maasai Mara National Reserve).

Through such policies of exclusion, wildlife numbers have increased in the region, (seasonally encroaching onto pastoral grazing lands), also acting as reservoirs for diseases such as East Coast Fever and Malignant Catarrhal Fever, and the forage species composition in the parks and reserves has changed, favouring less edible species such as *Eleusine jaegeri*. Thus the author argues that pastoral production is the most efficient use of semi-arid rangelands in terms of production per unit area, and that it can contribute significantly to the national economy, especially when local markets/ informal sector is considered. He argues that wildlife conservation is a serious constraint to livestock production in these regions, and pastoralists are not compensated adequately for the opportunity costs of production forgone. Ngorongoro Conservation Area in Tanzania is the only conservation area in East Africa that has adopted a policy of multiple land use by wildlife and livestock. Problems with this approach are discussed and future lessons inferred.

73. **Esprit, S. (1994):** 'Dominica; managing the ecotourism option: a view of the planning and management tasks required by a national ecotourism policy.' Agricultural Extension and Rural Development Department, University of Reading. *Rural Extension Bulletin*, **5**: 3-10.

Keywords: Tourism

This article outlines a model for planning and managing ecotourism development, and highlights some of the main issues which an ecotourism-based policy must address. Firstly, it is argued that a strategic approach is essential for successful ecotourism development. This strategy should identify goals, such as local ownership and control, job creation, and protection of both cultural and natural heritage, as well as the broader goal of socio-economic development. The strategy should include the following considerations: adaptability to changing market conditions, management demands in line with local managerial capacity, emphasis on linkages with other sectors, and the involvement of local populations on whom ecotourism depends.

Elements within such a strategy would then include: a training and enterprise scheme (to ensure that training responds to the needs of enterprises, and to provide advice to new enterprises); micro-enterprise development (aimed at a range of related enterprises and including access to credit); communications and public awareness (to ensure awareness of the value of natural and cultural resources prior to their exploitation, and enable constructive interaction between hosts and visitors); research and development (located within appropriate sectoral institutions but co-ordinated by tourism

authorities); institutional development (including effective regulation of private sector activities, and strengthening of community institutions by government agencies and NGOs); multi-agency approaches (in particular combining the comparative advantages of government and NGOs); and development of a land use policy (to avoid land speculation and retain local ownership, with leasing options for foreign investors).

Successful ecotourism requires effective environmental management, in particular the separation of incompatible land uses, diversification to reduce concentrated tourism pressure, and carrying-capacity assessments. It is also essential to develop inter-sectoral linkages, for example with agriculture (especially as tourism development is often associated with a decline in agricultural output and widening wage differentials) and with crafts, arts and entertainments. To finance the implementation of such a strategy, a national ecotourism fund could be established with money raised from central government, private sector and international funding agencies. The private sector should be encouraged to fund some infrastructural development. Community-based organisations and NGOs should be encouraged to mobilise alternative resources.

74. **Field, C., Moll, G. and Ole Sonkoi, C. (1997):** *Multiple land-use: the experience of the Ngorongoro conservation area, Tanzania.* Thompson, D., (ed.): Gland, Switzerland and Cambridge International Union for the Conservation of Nature, 181-200.

Keywords: Africa/ Ngorongoro Conservation Area/ livestock/ development/ conservation/ pastoralism/ Maasai

This paper discusses the impacts of social and economic change on the Ngorongoro Maasai and their livestock. The authors assert that performance of livestock has been 'poor' in terms of low milk yields, long calving intervals and tick-borne diseases, which are a constraint on life span as well as productivity. Due to this, population growth has outstripped cattle numbers, leading to a decline in milk availability per capita and an increased reliance on grain to supplement nutritional needs.

The authors propose that the livestock economy can be improved without adversely affecting 'conservation and wildlife values'. They suggest a multi-faceted approach to livestock development including: land zoning of the Conservation Area; creation of a livestock extension team; improved disease control and prevention, and more epidemiological research into livestock diseases and their impact on productivity. They conclude that, since these efforts will take time, Ngorongoro Maasai are unlikely to reduce their dependency on grain for the foreseeable future.

75. **Galaty, J. G., af Ornäs, A. H., Lane, C. and Ndagala, D. (1990):** 'Introduction.' *Nomadic Peoples*, 34-5: 7-21.

Keywords: Africa/ land tenure/ pastoralism/ livestock/ wildlife conservation

This paper examines the pastoral land crisis in eastern Africa, looking at issues relating to land policy. Throughout the continent, there has been a decline in rainfall over the past few decades. Coupled to this, the authors maintain that state-led changes have adversely impacted on range use with a decline in the quality of rangeland management. The trend has been for most people in dryland/ semi-arid areas to seek increased security over access to resources and rights to land, but the authors maintain that tenure reforms have undermined their land rights.

Tanzania's 'villigisation' programme in pastoral area has had negative impacts on pastoral populations who rely on mobility to mitigate the risks of spatio-temporal change in the semi-arid savanna/ rangeland environments. Land has been appropriated by governments for game reserves and national parks, state farms and ranches, as well as by the commercial agriculture/ livestock sector. There has been a renewed impetus to encourage rural land privatisation that has stimulated current research interests in systems of common resource management.

The authors maintain that critiques of pastoral practices are misguided. Increased private enclosure of land is often at the expense of local people and in particular pastoralists, who are forced into more marginal lands and then blamed for resource mismanagement. In many cases, privatisation transfers land into the hands of absentee landlords who use land as collateral for loans when the market is buoyant. This often means lower agricultural production. Wildlife and management strategies must emphasise local communities' rights to wildlife resources in order to encourage their conservation.

With the (World Bank-supported) global trends towards increased individualisation, making it increasingly difficult for pastoralists to secure tenure and asserting that pastoralism is inappropriate to the African rangelands, there has been increased politicisation of pastoral NGOs.

76. **Game Ranching Limited (1995):** 'Land use options in arid and semi-arid land (ASAL) areas: the case of wildlife utilisation.' Proceedings of a workshop organised by Game Ranching Limited, Nairobi, Kenya.

Keywords: Africa/ Kenya/ game ranching/ consumptive/ non-consumptive/ multi-use

This workshop discussed the range of consumptive and non-consumptive wildlife uses and the concept of multi-use systems in arid and semi-arid lands (ASAL), as well as the financial implications and infrastructure required in these cases. Multi-use systems involve tourism, education, live trade, cropping and hunting. Throughout Kenya, pastoral populations still perceive wildlife populations as a pest, a carrier of disease for livestock, a competitor for graze and a threat to human life as well as crops. The workshop helped to reverse these perceptions, increasing awareness of wildlife as a natural resource, and stressing the beneficial interaction between wildlife and the semi-arid rangelands, resulting in improved quality of vegetation.

The author claims that the fragmentation of the rangelands through the establishment of small holdings with title deeds, has increased the wildlife/ livestock conflict. Similarly, the spatio-temporal variability in the availability of resources in the rangelands increases the difficulty of managing them sustainably, and is compounded by the trends towards individual tenure (e.g. access to dry season grazing/ water).

The main problems identified as associated with wildlife were: destruction of crops and infrastructure; loss of human life; loss of livestock; competition for grazing and water; and disease interaction with livestock. Other problems identified were lack of co-operation between stakeholders (Kenya Wildlife Service and district officers); lack of compensation for damages incurred; lack of benefit distribution schemes where revenue was generated from tourism or cropping; wildlife dying out; infiltration of people into game reserves and land fragmentation (in Kajiado District).

In all the regions studied it was concluded that wildlife was not viewed as a resource to be used by people and currently there were no wildlife utilisation activities occurring of direct benefit to local people. Disease transmission from wildlife to cattle was commonly cited as a negative factor of livestock/ wildlife co-existence. However, the authors claim that the worries are overstated, and that keeping livestock away from areas with wildebeest calves reduces the risks of Malignant Catarrhal Fever significantly.

Game on communal areas is considered State property and Kenya's wildlife utilisation plans are constrained by national law that excludes formal marketing possibilities, imposes export limitations and bans safari hunting. Hence exploring the possibilities for wildlife utilisation for various land tenure groups has led to the following conclusions:

- for small-scale land holders: little scope as wildlife is a product of the rangelands; heterogeneity of stakeholders' priorities may complicate consensus building; possibilities of farming individual species (e.g. duikers, ostrich and guinea fowl); protection from wildlife through fencing and culling

- for group ranches and co-operatives: all options are available except for safari hunting at present; game capture and live sales are costly but may be feasible with potential for export and local area translocations; ostrich farming; tourism
- for Trust Lands (large tracts of government-owned land used by locals): suitable for wildlife utilisation experiments provided that the people living on the land become owners
- for individual ranches: most convenient and viable areas as larger areas under control of one owner or company
- for game reserves: in remote areas it is important to develop basic tourism infrastructure and marketing strategies

The document discusses case studies of wildlife management plans from Kenya: the Elangata Wuas Ecosystem Management Programme (EWEMP) in Kajiado District; East African Portland Cement Farm; and Kedong ranch wildlife management plans.

77. **Gascoyne, S. C., King, A. A., Laurenson, M. K., Borner, M., Schildger, B., and Barrat, J. (1993):** 'Aspects of rabies infection and control in the conservation of the African wild dog (*Lycaon pictus*) in the Serengeti region, Tanzania.' *Onderstepoort Journal of Veterinary Research*, 60: 415-420.

Keywords: Serengeti/ African wild dog/ conservation/ rabies

Lycaon pictus is amongst the most endangered wildlife species in Africa. In 1990 rabies virus was isolated from the brain of an adult *Lycaon* found dead in the Serengeti region of Tanzania. One adult and six pups of the same pack feeding on the carcass showed clinical signs and rabies was suspected; within two days they had disappeared and are presumed to have died. Subsequently, two *Lycaon* packs in the Serengeti National Park were given inactivated rabies vaccine either by dart or by parenteral inoculation following anaesthesia. Lycaon sera which had been collected over the previous two years and sera collected pre- and post-vaccination were examined for the presence of rabies virus neutralising antibody. Three of 12 unvaccinated *Lycaon* had antibody levels > 0,5 IU/ ml; post- vaccination samples from two *Lycaon* showed increased antibody levels. Between four and ten months post-vaccination, at least four of the vaccinated animals had died from unknown causes. Issues relating to wildlife vaccination and veterinary intervention in conservation are discussed.

78. **Gathura, P. B. and Kamiya, M. (1990):** 'Echinococcosis in Kenya - transmission characteristics, incidence and control measures.' *Japanese Journal of Veterinary Research*, 38.

Keywords: Kenya/ Echinococcosis/ hydatid/ life cycle

Kenya has the highest reported incidence of human hydatid disease in the world. Up to about 30 % of cattle, 15 % of goats and 13 % of sheep harbour the infection. The causative agent of the disease in Kenya is *Echinococcus granulosus* and a complex strain picture of this parasite has been postulated to occur. The domestic dog is the main definitive host of *E. granulosus* in Kenya but infection in wild carnivores has also been reported. Hydatid cysts have also been found in wild herbivores. Although the domestic cycle has been shown to be the most important mode of transmission of the disease, a sylvatic cycle is also known to exist. The etiology of hydatid disease, the strain differentiation of *E. granulosus* found in Kenya, and the role that wildlife plays in the transmission cycle is reviewed. The current trends in the incidence of hydatid disease in man and livestock, and the efforts being made to control the disease are also discussed.

79. **Georgiadis, N. and Heath, B. (1998):** 'The hunt to save the game.' *Swara*, 20:6 & 21:1.

Keywords: Kenya/ wildlife/ hunting/ tourism

This article argues the case for re-establishing hunting as a means of providing economic incentives for conservation in Kenya. The authors argue that, if current trends continue, areas outside protected areas will be devoid of wildlife. For most landowners, wildlife is a pest that destroys crops and kills people.

Tour operators oppose hunting because they are concerned that tourists will boycott Kenya if hunting is resumed. The authors claim that tourist numbers are already declining, and tourists are switching to countries where hunting is permitted. Safari hunters as well as tourists have incentives to conserve the game, and over a much wider area, as much of Kenya is unsuitable for photographic safaris but would make excellent safari hunting country.

Kenyan legislation already grants land users and owners custody over, and rights to, wildlife on their properties (but not outright ownership). A regulatory system would need to ensure that landowners and users are the main beneficiaries of hunting and control who hunts on their land and how much they pay. Licensing of professional hunters must be controlled by an independent board of ethically-minded professionals; concessions must be won on a competitive basis and be long enough (5-10 years) to provide incentives for wildlife conservation. Hunting of the big five should be permitted, as it is these species which will best enable wildlife to pay its way. Reinstating hunting would not imply reinstating internal

trade in wildlife products. Hunting involves killing far fewer animals than cropping for meat, and is easier to control.

80. **Gillingham, S. (1997):** Do all peasant farmers look alike? The socio-economic context of community wildlife management around Selous Game Reserve, Tanzania. SCP Discussion Paper No. 22, SCP Wildlife Division. Ludwig Siege (ed.).

Keywords: Community-based conservation/ wildlife management/ heterogeneity

This study of the social structure of the Mgeta River Buffer Zone (MRBZ), around the Selous Game Reserve in Tanzania, serves to highlight the socially, economically and culturally heterogeneous nature of the concept of 'community'. It maintains that communities cannot be treated as 'black boxes' that will act in an economically rational manner, especially when factors such as the distribution of wealth and power, climatic conditions, hunger, tribal affiliations are taken into account in the planning of participatory conservation programmes. Within the region, there is a variety of ethnic groups that have been subject to, and active in, a history characterised by change and disturbance. Lack of common cultural background and an influx of migrants into the area were cited as being responsible for a lack of 'community spirit' or cohesion. Hence there is little exclusivity applied to community membership.

There are large disparities in wealth distribution within the MRBZ, although the community as a whole is weighted to the poorer end of the scale, subsisting on the basis of short time frames and high discount rates. Political strengths reflect economic strengths, with women and poorer households faring least well in decision making, which tends to fall into the hands of a few. Hence the majority of villagers' concerns are under-represented, leading to disempowerment and apathy for the concerns of village life, which in the longer term constrains the drive to positive institutional change. Overall, 'the villages lack the "social capital" necessary for successful community-based action'. In this context of extreme poverty together with a high degree of socio-economic differentiation, it is argued that there is a risk of the interests of CWM being co-opted to serve the interests of an elite minority. In order to 'empower local people to benefit collectively from the sustainable use of natural resources', this heterogeneity should be factored into project design and implementation.

81. **Goodwin, H. J., Kent, I. J., Parker, K. T. & Walpole, M. J. (1997):** 'Tourism, conservation and sustainable development: Volume I, Comparative Report.' Report by Durrell Institute for Conservation and Ecology to the UK Department for International Development.

Keywords: Zimbabwe/ tourism/ conservation/ development/ financial sustainability

This paper examines tourism as a means for the sustainable financing of conservation and for local development (among other issues), based on the comparative analysis of case studies in Zimbabwe, India and Indonesia. In all three cases, revenues revert to the central treasury that then allocates funding to the park: there is no direct relation between revenues and expenditure. The paper finds that protected area tourism revenues cover only a small portion of total management expenditure, but a more significant proportion of tourism-related expenditure. Contingency valuation suggests that individual tourists and tourism operators would be prepared to pay significantly higher fees. However, the paper argues that maximisation of tourism revenue is inappropriate, as parks have other objectives as well as the provision of tourism opportunities, and that conservation management should continue to be subsidised. For park departments, the role of regulator and operator should not be confused. The paper also cautions that raising fees may shift the balance between independent travellers and package tourists with adverse impacts on the local economy.

With regard to local development, the paper argues that external assistance should be focused on non-capital intensive enterprises appropriate to the managerial skills and endowments of local populations. Training and advice and access to credit are necessary for local populations to become involved at higher levels. Improved organisation among small traders could significantly increase their bargaining power. Tourism operators should be encouraged to source goods and services (such as transport, food, accommodation and guides) locally, and regulation is necessary to discourage enclave practices. Investment is needed in local institutional strengthening and the promotion of partnerships and revenue-sharing agreements. Tourism development should be seen as part of a wider development strategy, and over-dependency should be avoided.

The associated technical report provides some interesting points on the contribution of tourism to park finances and on tourism as a means for local development:

- Visitor fee income should be supplementary and not replace core income – the maintenance of biodiversity for future generations should be considered as properly a government responsibility.

- Park departments have traditionally been regulators of use rather than operators - the two roles should not be confused.
- Revenue maximisation may lead to conflict with local communities if tourism revenues in the local community are reduced.
- Assistance should be focused on non-capital intensive enterprises, including those in the informal sector.
- Development should be based on local technology.
- Tourism should be one component of a wider development strategy.

Finally, the report points out that foreign tour operators generally have a low commitment to particular destinations, and that destination areas have limited sovereignty over the volume and character of tourism.

82. **Graber, M. (1981):** Helminths in wild ruminants in central Africa: impact on domestic ruminants. In: Karstad, L., Nestel, B. and Graham, M. (eds.): *Wildlife Disease Research and Economic Development.* Proceedings of a workshop held at Kabete, Kenya, September 1980: International Development Research Centre IDRC-179e: 48-52.

Keywords: Central Africa/ wild ruminants/ domestic ruminants/ helminths

In Central Africa, internal parasitism of wild herbivores is in most cases due to specific helminths that affect domestic ruminants only rarely or not at all. Conversely certain pathogenic parasites frequently found in zebus and sheep do not exist among wild ruminants. Nevertheless, certain infestations occur in both groups of herbivores. The author lists these including *Fasciola gigantica*, paramphistomes and *Haemonchus contortus*. The author concludes that in areas where domestic and wild herds come into close contact there may be certain repercussions on domestic herding with the wild ruminants serving as parasite reservoirs. It is considered that this mode of contamination will mainly affect herds belonging to nomads because with sedentary herds the constant presence of humans means that fewer wild herbivores are normally present.

83. **Grootenhuis, J. G. (1986):** Trypanosomiasis, East Coast fever and some other tick-borne diseases. In MacMillan, S. (ed.): *Wildlife/Livestock Interface on Rangelands* p 57-62. Proceedings of a conference held at Taita Hills Lodge, Kenya, 22-25April, 1985. Nairobi, Kenya: Inter-African Bureau for Animal Resources.

Keywords: Africa/ wildlife/ trypanosomiasis/ tick-borne diseases

The role of wildlife in trypanosomiasis, theileriosis, heartwater, anaplasmosis and bovine petechial fever is described. In the case of trypanosomiasis, it is suggested that use should be made of the trypanotolerance of wildlife, first by using wild animal species for meat production and second by applying the trypanosome control mechanisms found in wildlife to domestic livestock. Experimental-scale vaccination against buffalo-derived theileriosis has been effective in the field.

84. **Grootenhuis, J. G. and Olubayo, R. O. (1993):** 'Disease research in the wildlife-livestock interface in Kenya.' *Veterinary Quarterly*, **15**: 55-59.

Keywords: Kenya/ wildlife/ livestock/ disease/ research

Selected results of wildlife disease research in Kenya are given against the background of the socio-economic conflict in the wildlife/ livestock interface. An attempt is made to rank the three areas of conflict between wildlife and livestock: feeding competition, disease control and predation. Disease survey results reveal the lack of wildlife reservoirs, with the exception of some important problem areas. Research on trypanosomiasis identifies a variety of adaptations evolved in wild Bovidae. The most striking result is the isolation of serum proteins from buffalo with trypanocidal activity against all common species of trypanosomes.

The importance of wild Bovidae as reservoir hosts for theileriosis of livestock is discussed. The African buffalo presents the only known reservoir host of economic importance. The use of parasite stocks derived from buffalo has been effective to immunise cattle under field conditions in spite of the presence of an unknown number of antigenic types. The occurrence of common antigens indicated by successful immunisation in the field was also confirmed by the recognition of common antigenic epitopes by cloned cytotoxic T cells. These results are encouraging for the plans afoot for large-scale immunisations in Kenya. The co- existence of livestock and wildlife is threatened by declining profits and increasing costs for wildlife production and the absence of a general policy to encourage the full economic use of wildlife in areas where it competes with livestock.

85. **Harder, T. C. and Osterhaus, A. D. M. E. (1997):** 'Canine distemper virus, a morbillivirus in search of new hosts?' *Trends in Microbiology*, 5: 120-124.

Keywords: Canine distemper virus/ morbillivirus infection/ carnivores

Canine distemper morbillivirus (CDV) induces a multi-systemic, often fatal disease in a wide and seemingly expanding host range among the Carnivora. Several genotypes of an otherwise monotypic

virus species co-circulate in a geographically restricted pattern. Interspecies transmissions frequently occur, often leading to devastating epizootics in highly susceptible or immunologically naive populations

86. **Hartley, D. (1997):** Community wildlife management: a review of the ODA's experience in Tanzania. Report to the UK Overseas Development Administration.

Keywords: Tanzania/ Ruaha/ community-based wildlife management

This paper evaluates the Ruaha Ecosystem Wildlife Management Project (REWMP) that has been funded through a bilateral agreement between the British and Tanzanian governments and comprises two components: park planning and community wildlife management (CWM). The author describes the project as a 'classic Integrated Conservation- Development Project'. Although there was a lack of policy framework for direct community wildlife management, two pilot schemes were launched by the Wildlife Department in the Serengeti and Selous ecosystems. TANAPA (Tanzania National Parks – an independent parastatal) initiated the Community Conservation Service (CCS), a benefit-sharing scheme, in four parks in the northern region. The latter was criticised for its lack of participation, and socio-economic surveys revealed a number of resource conflicts in the area:

- intra-community conflicts between pastoralists and agriculturalists
- conflicts between different stakeholders
- lack of trust between the wildlife authorities and the rural community

REMWP illustrates why good examples of CWM are hard to find:

- CWM is a development issue.
- There is confusion over the welfare issues associated with a benefit-sharing approach.
- Developing institutions and their capacity is fundamental to the success of CWM.
- The agendas of different stakeholders may conflict.
- Conflicts may arise from the socio-political context of CWM.
- Encouraging the facilitatory role of donors and NGOs is vital to translate from policy to praxis.

The paper concludes with recommendations for the donor.

87. **Hartley, D. & Hunter, N. (1997):** Community wildlife management: turning theory into practice. Paper presented at the Natural Resource Advisors Conference for the Department for International Development, Sparsholt, July 1997, mimeo.

Keywords: Africa/ donors/ community wildlife management/ policy

This paper is addressed to donors seeking to invest in community wildlife management, especially in Africa, and raises a number of pertinent points:

- Community wildlife management demands a much broader range of skills, such as extension and conflict resolution skills, than those provided in the traditional training of wildlife managers.
- A broad definition of wildlife, consistent with biodiversity and ecosystem conservation and the perceptions of local populations should be adopted. However, this approach implies the need for strategies and mechanisms to promote collaboration and inter-linkages between government departments.
- The paper makes a distinction between community-based approaches, which aim to promote the development of rural communities, and benefit-sharing approaches, which aim to improve relationships between conservation area authorities and people living in it or around its borders. Three models of benefit-sharing are defined: the good neighbours model, the problem-solving model and the business development model.
- Firm linkages should be established between community wildlife management projects and the policy-making process, to allow for feedback between policy-making and implementation. Projects that do not seek to influence policy are likely to become isolated and have limited long-term impact. This will require a longer-term approach.

The paper concludes with a set of major areas and questions for DFID.

88. **Hartup B. K. (1994):** 'Community conservation in Belize - demography, resource use, and attitudes of participating landowners.' *Biological Conservation,* 69 (3): 235-241.

Keywords: Belize/ community conservation/ survey/ attitudes

Surveys of local population resource use and attitudes are essential to the success of tropical conservation projects aiming to promote sustainable development. The following is a report from a survey of landowners participating in a voluntary conservation program for

the black howler monkey, *Alouatta pigra,* at the Community Baboon Sanctuary (CBS) in Belize. Interviews revealed a variety of issues requiring consideration by CBS managers, such as:

- Continued urban flight may jeopardise community stability.
- Hunting and agricultural production methods will require management to lessen impact on wildlife resources and habitat.
- Protection of the black howler monkey is enthusiastically supported for a variety of non-economic reasons.
- A majority of respondents feel they have benefited from participation in the CBS, but showed diminished confidence in deriving direct economic benefit from increased tourism to the CBS when compared to benefits from tourism at local or national levels.

The continued success of the CBS will depend on locally-driven sustainable resource use and agricultural development, in addition to well-planned tourism development, in order to foster conservation of biodiversity.

89. **Heath, B. (1996):** 'Agriculture in rangelands: a case study from Laikipia District in central Kenya.' Paper presented at the Economics of Biodiversity Loss Workshop, 22-24 April 1996. Gland, Switzerland: International Union for the Conservation of Nature.

Keywords: Kenya/ Laikipia/ livelihoods

Laikipia District in central Kenya is rich in wildlife. The primary cause of biodiversity loss is the land tenure system. Due to a high rate of population growth in Kenya, pressure on the land has increased dramatically. As a result, the Government began to allocate plots to the landless. Between the time when the land is sold and the peasants actually move onto the land, a period as long as 10 years can go by. Meanwhile the land is unguarded and illegal use of it is made. Open access then leads to over-exploitation of the natural resources and biodiversity is eroded. Moreover, when the land is actually settled, the erosion is not halted because the peasants then cut the vegetation for fuelwood, charcoal and building materials and hunt the wildlife for food. The Government does not encourage sustainable use of the natural resources. The author suggests as a solution the granting of property rights over wildlife to the landowners, thereby making them responsible for its management. Putting local people in control of 'their' biodiversity gives them the incentive to use it in a sustainable way.

90. **Heath, B. (1996):** Wildlife utilisation study: implementation strategy, conservation and resource areas. Conservation of Biodiverse Resource Areas Project Report No. 7. Nairobi: Kenya Wildlife Service with African Wildlife Foundation.

Keywords: Kenya/ wildlife utilisation

Ownership and responsibility for wildlife rests with the State through KWS, and its consumptive utilisation has been banned since 1977, although limited utilisation does now occur under the Director's 'special authority'. Four studies were carried out to investigate the potential for income generation, consumptive utilisation, current and future land use, and the implications for legislation. All studies concluded that, despite a ban on hunting, wildlife populations are declining as a consequence of increased human population pressure, sub-division of land and the spread of agriculture into rangelands. The Community Wildlife Service was set up by KWS to raise awareness of the value of wildlife and provide training in wildlife management. The report makes recommendations with regard to sustainable wildlife use as well as proposing a strategy for increased subsidiarity of wildlife ownership to landowners and communities that bear most of the costs of living with wildlife. It is also suggested that combining wildlife use and livestock production will present landowners with options not to cultivate land in marginal areas and cause less environmental degradation than agriculture.

91. **Hedger, R. S. (1976):** 'Foot-and-mouth disease in wildlife with particular reference to the African buffalo (*Syncerus caffer*).' In: *Wildlife Diseases:* 235-244. New York and London; Plenum Press.

Keywords: Foot-and-mouth disease/ wildlife/ buffalo

Random serological surveys have indicated a number of species to be susceptible to foot-and-mouth disease virus, the highest and most consistent antibody titres being recorded in the African buffalo. Results indicate that the buffalo is a true maintenance host of foot-and-mouth disease virus and a possible means of perpetuation of the virus is suggested. Overspill of virus into other species is considered to be a rare occurrence.

92. **Hedger, R. S. and Condy, J. B. (1985):** Transmission of foot-and-mouth disease from African buffalo virus carriers to bovines. *Veterinary Record* **117**: 205.

Keywords: Foot-and-mouth disease/ wildlife/ buffalo/ transmission

Three Sanga cattle were kept for two years on a peninsula in Lake Kariba with seven tame buffalo. The animals grazed together and were kept together in a small enclosure at night. Foot-and-mouth disease virus (SAT 3) was regularly isolated from the buffalo but no infection was detected in the cattle. Two buffalo were then transported to another research station and returned after three weeks. Two to three days after this, the cattle became clinically infected with SAT 3 but no clinical disease was seen in the buffalo. The only unusual factor associated with the event was the movement by vehicle of the virus-excreting buffalo.

93. **Jordan, A. M. (1992):** 'Degradation of the environment: an inevitable consequence of trypanosomiasis control?' *World Animal Review* **70/71:** 2-7.

In considering trypanosomiasis control under different land-use systems it is mentioned that tsetse control in national parks and reserves is a particularly emotive issue. Those opposing this method argue that the fly's presence is a major factor in preventing encroachment of domestic livestock. Those in favour see the removal of the fly as essential to the protection of domestic livestock in the periphery of reserves. It is stated that it would be defeatist to retain a disease risk in areas surrounding a park just because the authorities felt they could not protect the park in any other way. It is emphasised that the potential impact of control measures on the environment can vary from highly damaging, if stock numbers are subsequently uncontrolled, to highly advantageous. It is concluded that control interventions carried out to protect well-established farming systems from trypanosomiasis are generally entirely beneficial.

94. **Holden, S., Ashley, S., and Bazeley, P. (1997):** 'Livestock and poverty interactions: a review of the literature.' Working Paper for UK Department for International Development. Somerset, England: Livestock in Development.

Keywords: Livestock/ core poverty/ peripheral poverty/ development/ livelihoods

This paper reviews the current literature on livestock and poverty interactions. It focuses on the role of livestock in improving livelihoods through multiple functions: food; helping produce crops and providing cash for food and other essential purchases. The authors identify points of interaction between poverty and livestock by defining poverty, its location and their approach to poverty alleviation. They then contrast their 'poverty profile' against three types of livestock production systems: grazing systems in arid lands;

rain-fed mixed farming systems in semi-arid or mountainous areas and homestead systems in areas where people lack land. For each of these livestock/ poverty interfaces, the authors examine how livestock improves the livelihoods of the poor.

The authors define peripheral poverty as being 'linked to the efficiency with which households derive a living from natural resources. It is more likely to occur in areas that have low agricultural productivity and are relatively isolated from markets and support services' (p 2). These areas are characterised by uncertain climates and hence they are likely to be non-equilibrium environments. Core poverty is defined as relating to 'employment opportunities, and generally concerns landless families who are dependent on wage labour and non-farm sources of income; ..... [it is] probably more common in areas where population densities are higher and there is a marked inequality in land ownership.'

Overall trends reveal an intensification of livestock rearing: pastoral systems are being converted to mixed farming systems (which are themselves becoming more specialised), as an attempt to diversify income sources. Hence the agro-pastoral sector is set to increase. Pastoral grazing resources are also gradually shrinking as farmers and commercial agriculture/ ranching encroach onto farmland, and as population growth and increased fencing and legislation reduce mobility of herds. Hence, this sector is more vulnerable to the vagaries of climate, and at risk of moving from peripheral poverty into core poverty if dwindling livestock assets are lost altogether. As farm sizes diminish, livestock are likely to increase in importance on smaller farms. All these factors are likely to contribute to the creation of more landless households. This means that homestead livestock production systems are set to increase in importance as a means of improving the livelihoods of a growing class of core poor.

Policy recommendations should recognise the diversity of livestock/ poverty interactions and seek to enhance the welfare of poor livestock producers, rather than maximise the supply of livestock products through a single-commodity approach. Important issues highlighted by the authors include:

- opportunities for trade: how can market access and terms of trade be improved for pastoralists and landless farmers? how can these be maintained in times of crisis?
- common property resources: how can access to common property resources be secured for the many categories of poor livestock-owning communities/ individuals?
- asset acquisition: how can poor livestock-owning communities/ individuals gain easier access to the acquisition of livestock?
- asset protection: how can poor households be empowered to better protect their assets from loss?

95. **Homewood, K., Rogers W.A. and Arhem, K. (1987):** 'Ecology of pastoralism in Ngorongoro Conservation Area, Tanzania.' *Journal of Agricultural Sciences,* 108: 47-72.

Keywords: Tanzania/ Ngorongoro/ pastoralism

This paper suggests that, contrary to popular opinion, 'pastoralist land use is an ecologically appropriate and efficient form of livestock management' in the Ngorongoro Conservation Area (NCA) and 'there is no adverse affect on the conservation values of the NCA.' In order to evaluate the range, livestock and Maasai ecology of NCA, the study looked at the spatio-temporal variation in range resources at three sites over a two-year period. Livestock responses were analysed in terms of biomass densities, habitat and pasture utilisation, activity, herd size, composition and dynamics. Milk yield and factors affecting it were investigated. Household surveys revealed that pastoral products accounted for 40% of the Maasai dietary energy intake. The remaining 60% were associated with grain intake.

Although livestock and wild ungulates are competing for similar rangeland resources, the authors argue that disease interactions and administrative restrictions 'allow wildlife to establish preferential access to critical grazing resources'. However, the impact of the livestock on the conservation of resources in the NCA is mitigated by off-take of for grain purchase that is leading to a decline in numbers. Restrictions on grazing and cultivation sustain 'poor conditions for livestock trade and grain supply'. The paper examines potential interventions and their impacts and suggests alternative management strategies (water and fire regimes) that could benefit both pastoralists and wildlife.

96. **Homewood, K. and Rogers W. A. (1987):** 'Pastoralism, conservation and the overgrazing controversy.' In: Anderson, D and Grove, R. (eds.): *Conservation in Africa, Parks, Policies and Practice*: 111-128. Cambridge: Cambridge University Press.

Keywords: Kenya/ pastoralism/ conservation/ overgrazing/ carrying capacity.

This paper challenges the orthodox view, rooted within the equilibrium paradigm of ecology, that pastoralist land use regimes inevitably lead to overgrazing. Evidence is examined from the Baringo region of Kenya and the Ngorongoro Conservation Area (NCA). The authors maintain that state intervention and pastoral development schemes, justified on the basis of this 'conventional wisdom', are often subjective and therefore misguided. They question the definition of 'overgrazing' and its use in comparing different

ecological areas. The concept of carrying capacity (ecological and economic) is discussed. The paper reinforces the dynamic nature of rangeland ecology and argues that in neither case are 'repeated assertions of overgrazing borne out by satisfactory trends of long-term degradation or declining productivity'. That this has been used to justify intervention, especially in the NCA, is largely due to the international conservation lobby.

97. **Homewood, K., Kiwasila, H., and Brockington, D. (1997):** Conservation with development? The case of Mkomazi, Tanzania. Report to the Economic and Social Committee for Research, Department for International Development, May 1997.

Keywords: Tanzania/ Mkomazi/ conservation/ development/ pastoralists/ agro-pastoralists

This report provides a comprehensive overview of the pressures and conflicts that are brought to bear on rural communities that live adjacent to protected areas, based on three years of work on Mkomazi Game Reserve (GR) in Tanzania. Is conservation compatible with development in this situation? Previous conservation efforts have been grounded in policies of exclusion, policed through the imposition of penalties. This top-down approach is anathema to the concepts of 'participation' and 'ownership' that today underpin approaches to conservation and/ or development. Conservation is likely to be valued by individuals, households and communities where it enhances the opportunities for (sustainable) livelihoods. Realistically, conservation must pay its own way in terms of alternative land use options in any given area. Communities are not homogenous entities and, as such, efforts to seek participation must recognise this diversity. The devolution of legally recognised ownership of resources and control of their management is imperative to the ethos of participation.

The report gives an account of the history of Mkomazi prior to and since its gazetting as a GR and examines the implications for local agro-pastoral and pastoral communities. Evictions of pastoral populations and the subsequent conflicts of interest between pastoral (Il Parakuyo, Maaśai) and agro-pastoral (Pare, Saamba) populations has led pastoral groups in the area to challenge the legality of evictions on an international stage. The GR is a wet-season dispersal area for livestock and wildlife and has, in comparison to other East African savanna areas, relatively few tourists. There is a large population adjacent to the reserve and no buffer zone. Hunting is banned and the reserve has problems generating enough revenues to cover its running costs. The report investigates the ways in which the livelihoods of those living around the reserve can be improved and examines the policy settings that can aid this process.

98. **Hunt, D. (1996):** 'The impacts of individual land titling in Mbeere, eastern Kenya.' Discussion paper in Economics 01/96. University of Sussex.

Keywords: Kenya/ semi-arid environments/ land titling/ markets

This paper looks at the impacts of land titling arrangements in semi-arid, low population density, low farming potential areas of eastern Kenya. The author maintains that the impact of titling is likely to be greater in these areas than in areas where population densities and land potential are higher and where titling and the formalisation of land rights have often evolved within the indigenous system. Hunt confirms that titling does not necessarily lead to a market for farm credit, and that the impacts of titling have been far from uniform on people's perceptions of security of tenure and efficiency of land use. Titling has created the incentives for long-term investments in soil and water conservation and also facilitated moves towards house building.

Hunt's main arguments in favour of titling include:

- reductions of uncertainty and disputes
- encouragement of investment and security
- raising efficiency
- using land as collateral for credit

The World Bank and other donors such as the US Agency for International Development (USAID) have favoured formal registration of land as they held fast to the perception that shifting cultivation was environmentally damaging. However, this view has been critiqued as there is little evidence that land without title prevents experimentation in agricultural crop mixes and practices. Indigenous forms of tenure have been shown to be highly flexible and diverse; and titling can increase, not reduce, conflicts over land in semi-arid environments where resources vary in space and time.

Evidence from Africa reveals that titling often fails to activate the credit market (by allowing land to be used as collateral) as credit linked to the land title is often not invested in farming. Land markets are not driven solely by the motive of increasing profits. The widespread adoption of tree crops demonstrates that absence of title does not deter investment in farming. However, with a shortage of available land and a free land market, it is usually the rich and often absentee land owners who can exploit opportunities at the expense of the poor, who are often forced to sell resources at times of economic constriction within the household.

It is now widely agreed that the strength of the economic case for titling is related positively to the degree of pressure on the land, the degree of local demand and the investment opportunities in agriculture.

Evidence from Kenya shows that between 1991 and 1994, land markets were operating more actively in the former white settler areas where there was a reduction in the constraints on land sales such as kinship ties. Thus, it is concluded that titling is most likely to be justified in:

- settlement areas
- where there are high levels of dispute
- or where new project interventions require it

The author maintains that government policies that assist indigenous systems to operate more effectively (e.g. voluntary registration) are more likely to succeed.

99. **Hunter, M. L., Hitchcock, R. K., Wyckoff-Baird, B. (1990):** 'Women and wildlife in southern Africa.' *Conservation Biology* 4: 448-451.

Keywords: Southern Africa/ women/ wildlife management projects/ livelihood security

Wildlife utilisation projects in southern Africa are traditionally patriarchal, and women's roles as resource managers tend to be overlooked. For example, as women are on resource-gathering trips they often act as key informants to men of the location of fugitive wildlife species. Similarly women are active in deciding when and where to gather resources, including wildlife such as fish, birds and rodents. Large game management projects can bring benefits to women from increased cash income levels (with concurrent increases in food/ livelihood security) and improved community services such as clinics and schools which may be funded by such projects. These same projects may also imply a cost to women, as large game can destroy crops as well as make women fearful of travelling in order to collect resources, which may have ramifications for household livelihood strategies. The authors recommend that income-generating activities from alternative forms of wildlife are developed in order to increase women's participation. For example, the mopane worm (*Gonimbrasia belina*) is important to women and can be marketed.

100. **Infield, M. (1996):** 'Livestock production and wildlife conservation: opportunities for compatible management and integrated production.' Paper presented on behalf of the African Wildlife Foundation at the East Africa Livestock Assessment Workshop, held in Entebbe, Uganda, Jan 29- Feb 1, 1996. Small Ruminant Collaborative Research Support Program, University of California, USA.

Keywords: Conservation / development/ livestock/ wildlife/ integration/ costs/ benefits/ production

This paper explores the potentials for integrating wildlife into livestock production systems in east Africa. It examines the historical background to the relationships between wildlife and livestock in the region and how these relationships have changed in response to increased pressures on rangeland resources. It then discusses specific conflicts between wildlife and livestock producers (individuals and communities), and ways in which the costs of these interactions can be ameliorated to enhance opportunities to conservationists, farmers and livestock-owning communities. Infield looks at disease transmission, damage to infrastructure, competition and cultural aspects, before moving on to discuss ways in which wildlife can be integrated into livestock production systems. Wildlife is arguably better adapted to the physical environment than livestock, and hence mixed species production systems make intuitive sense, especially as they increase the diversity of livelihood strategies through consumptive and non-consumptive sustainable use. Infield discusses some of the constraints to mixed production systems, issues of carrying capacity and farming of wildlife, as well as the role of livestock development in wildlife conservation, especially around protected areas. Infield concludes by making recommendations for further research.

101. **IIED (1994)**: *Whose Eden? An Overview of Community Approaches to Wildlife Management.* London: International Institute for Environment and Development.

Keywords: Africa/ community-based natural resource management/ wildlife

This literature review raises a number of interesting issues. In particular, schemes that compensate local populations for loss of access to natural resources by providing an alternative livelihood source often assume that this will remove the incentive to exploit wildlife. Secondly, rebuilding relationships between conservation authorities and local people, after a history of conflict and exclusion, is extremely difficult. It emphasises that the comparative value of wildlife to local people and the social structure of local communities are essential in determining the options for community wildlife management. It also reminds readers of the fundamental importance of an enabling legislative framework, and the need for secure community rights of ownership and tenure of wildlife resources. Furthermore, project approaches must move away from an emphasis on funds disbursement and measurable results, towards a process approach with gradual release of funds after a substantial period of consultation and capacity strengthening.

102. **Jansen, D. J. (1989):** 'Joint venture options for wildlife utilisation in Zimbabwe.' Multi-species Animal Production Systems Project Paper No. 3. Harare, Zimbabwe: World Wide Fund for Nature.

Keywords: Southern Africa/ Zimbabwe/ tourism/ wildlife/ management

In this paper, the author provides an overview of joint venture arrangements for wildlife utilisation in the communal areas of the Zambezi valley, Zimbabwe. It is recommended that joint ventures between tourist or hunting operators and district councils (which are deemed the 'appropriate authority' for wildlife management in these areas) will lead to commercially successful co-management.

103. **Jansen, D. J. (1990):** 'Sustainable wildlife utilisation in the Zambezi valley of Zimbabwe: economic, ecological and political trade-offs.' Paper presented at the Ecological Economics of Sustainability: An International Interdisciplinary Conference, 21-23 May 1990, The World Bank, Washington DC. Also Multi-species Animal Production Systems Project Paper No. 10. Harare, Zimbabwe: World Wide Fund for Nature.

Keywords: Zimbabwe/ Zambezi valley/ sustainable utilisation/ wildlife/ ecological/ economic/ CAMPFIRE

This publication argues that, despite political opposition, sustainable wildlife utilisation is probably the best land use option for large parts of the Zambezi valley, on economic and ecological grounds. It is regarded as the most productive land use option in marginal areas (i.e. with poor soils, unreliable rainfall, tsetse infested and far from commercial markets). It examines the cost/ benefit ratio of wildlife to the resident population from the Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) initiative in two communal areas: Nyaminyami District and Guruve District. It examines how project revenue is earned at the district level and discusses how this constrains the return of benefits from CAMPFIRE at the local level. It is argued that in both areas, local level participation is still limited 'largely due to the lack of functioning economic and management units at the ward and village level'. Strengthening institutional frameworks and increasing their flexibility at these levels are prerequisites for a successful CAMPFIRE project. Recognition of local 'ownership' and facilitation and training in financial and ecological management of wildlife resources by locals is recommended.

The author also highlights the potential contribution to natural resource management (NRM) in communal areas that can be made by the private sector, in particular, commercial safari operators. Such

efforts would encourage the subsidiarity of wildlife-derived benefits from district to ward/ village level which will in turn strengthen NRM and land use planning. Lack of community participation in planning, management and distribution of revenues threatens to undermine the long-term sustainability of wildlife utilisation in the area.

104. **Jansen, D. J., Bond, I. and Child, B. (1992):** Cattle, wildlife, both or neither? A summary of survey results for commercial ranches in Zimbabwe. Multi-species Animal Production Systems Project Paper No. 30. Harare, Zimbabwe: World Wide Fund for Nature.

Keywords: Zimbabwe/ commercial ranches/ cattle/ wildlife/ financial viability/ economic viability

This paper gives a detailed report on the relative financial and economic viability of both cattle ranching and wildlife utilisation, alone and combined, on commercial ranches in the semi-arid regions of Zimbabwe (Natural Regions IV and V). The survey, to assess which of these three land uses can best exploit the semi-arid rangelands in a sustainable manner, was conducted in 1989/ 90 and involved 89 ranches.

Financial analysis incorporates direct, overhead and capital costs, using market prices (whether these are determined by government or by supply and demand) to value inputs, factors of production and output. Thus it is used to study the optimal allocation of resources from the individual landholder's perspective. Economic analysis uses economic prices (which reflect scarcity values or opportunity costs) to assess resource options which should be encouraged or discouraged by government. It is therefore used to look at the optimal allocation of resources in terms of the nation. It highlights which activities are economically efficient and in which the country has a comparative advantage. Only economically efficient activities will be net earners of foreign exchange.

The authors use a policy analysis framework (PAM) to measure the financial and economic profitability of the production of cattle for export/ domestic market, and game ranching, photographic/ hunting safaris, separately and together.

The survey results are for 89 ranches in NR IV and V; 45 are cattle-only enterprises, 12 wildlife-only enterprises and 32 are combined enterprises. For the combined ranches, financial and economic analyses were made of the cattle and wildlife enterprises separately, as well as a complete unit. On average, cattle-only ranches are smaller than wildlife-only ranches, and single enterprise ranches are in turn smaller than mixed (cattle/ wildlife) enterprises. Ranches in NR V are larger than those in NR IV.

Financial indicators

Cattle enterprises: In the period 1989/ 90 in NR IV and V, more than a third of the 77 cattle enterprises surveyed were operating at a loss (39%), and only 5% had a return of more than 10% on their investment. In order to 'make ends meet' the owners were destocking or increasing the size of their overdraft, neither of which, the authors argue, is sustainable. Only 4% of ranches had a return of at least $25 per hectare. The weighted average adjusted net revenue per hectare was $2.78 per hectare. The average return on investment is 2.6% and adjusted net revenue per hectare is $2.94. Returns vary by region, being more positive in NR V than IV.

Wildlife enterprises: On the whole, wildlife enterprises were more financially profitable than cattle enterprises in 1989/ 90 in NR IV and V, with only 9% operating at a loss, and 55% having at least a 10% return on their investment. Only 9% gave a return of $25 per hectare (all of these ranches also had cattle), and the weighted average adjusted net revenue per hectare was $5.81. The average return on investment is 9.7% and adjusted net revenue per hectare is $6.09. Returns did not vary as much with region as for cattle-only enterprises, with, on average, wildlife enterprises in all areas having a positive return on investment.

Combined enterprises: In general the authors conclude that on combined ranches the cattle element is of more importance, although there is a trend for wildlife to be of increased financial importance. The average return on investment is 3.6% and the adjusted net revenue per hectare is $3.02.

Conclusion: Although results vary by region, wildlife-only enterprises are more financially viable, with an average return on investment of 10.5% compared to only 3.6% for mixed enterprises and 1.8% for cattle-only ranches.

Economic indicators

Assessing the economic efficiency of ranching enterprises is different from assessing their financial viability; economically efficient enterprises may be financially unprofitable due to government policies that subsidise or favour one sector over another, allowing economically unprofitable activities to be financially profitable. Economic analyses also incorporate environmental costs and benefits (e.g. both cattle and wildlife enterprises are charged an overstocking cost for loss of financial productivity from land degradation in the long term due to over-stocking in the shorter term). Analysis was conducted on the following variables: price of cattle; exchange rate; overstocking cost; price of land; interest rate used for determining costs of fixed or movable assets, working capital and land.

Cattle enterprises: The economic profitability of cattle enterprises is considerably greater than their financial profitability: 52% of the 77 cattle enterprises yield an economic return of more than 10% with

only 14% operating at a loss (compared to 5% and 30% respectively in the previous analysis). This is for two reasons: corrections for the overvaluations of the Zimbabwe dollar, and upwards adjustments for the sale price in cattle. Cattle enterprises have the highest average adjusted net revenue per hectare at $18.53.

Wildlife enterprises: Wildlife enterprises are also more profitable in economic than financial terms, again due to corrections in the overvaluation of the currency. Valuing costs and revenue in economic prices, 80% (as compared to 55%) of the 44 wildlife enterprises give returns on investment greater than 10%, and only 2% operate at a loss. However, only 18% yield a return per hectare of over $25, as compared to 9% in the previous financial analysis. Wildlife enterprises have the highest rate of return on investment at 20.9%.

Combined enterprises: Economic returns are greater than financial returns: returns on investment are 14.8% compared to 3.6% in financial terms, and the adjusted net revenue per hectare is $15.59 (compared to $3.02 financially).

Conclusions: The authors conclude that, for wildlife-only ranches, the economic return is approximately double the financial rate of return (20.9% as opposed to 10.5%). For combined and cattle-only ranches, economic returns are four and seven times the financial rates of return.

Policy analysis matrix

In the context of the PAM the authors point out that profitability is measured as 'gross revenue less direct and overhead costs, as well as the opportunity costs of land, assets and animals. Adjusted net revenue is defined as gross revenue less direct and overhead costs only. It is thus a cash flow concept' (p 26). Hence a ranch may have a positive adjusted net revenue, but once the costs of investing capital into ranching are added, it may end up with negative profits.

Conclusions

Cattle enterprises: None of the cattle enterprises is financially profitable or viable. However, 27 of the 77 cattle enterprises are 'efficient' and of these 16 are cattle-only ranches (36% of the sample of cattle-only) and 11 are combined wildlife enterprises (34% of the sample of combined ranches). Thus the authors conclude that 'a cattle-only ranch is just as likely as a combined cattle and wildlife ranch to have an economically profitable or efficient cattle enterprise.'

Wildlife enterprises: Financial profitability is 'considerably better' than for cattle enterprises, but still, on average, not financially profitable or viable and again, as with cattle enterprises, economic efficiency does not appear to be a function of the type of ranch on which the enterprise operates. Wildlife-only ranches are more

financially and economically profitable than cattle-only or mixed enterprises, and therefore the authors argue that they are more profitable.

Cattle, wildlife, both or neither? The authors argue that there is no satisfactory answer to this question, as relative economic profitability or efficiency depends on the area of the country being considered, and wildlife appear to have a clear 'superiority' over cattle-only in the Hwange area.

Indicators of efficient cattle enterprises: above average cattle sales price, turnover rate, calving rate, rainfall, lower than average direct and overhead costs per head, overstocking, outside the vaccinated zone.

Indicators of efficient wildlife enterprises: more likely to be in NR IV, but identifying market indicators proved difficult due to the heterogeneity of the stock. However marketing strategies and diversity were crucial to their success.

Employment: Cattle enterprises are, on average, twice as labour intensive as wildlife enterprises, although wildlife enterprises are more skill intensive.

Foreign exchange earnings: Net foreign exchange earnings for wildlife are higher (58%) than for cattle (44%).

105. **Johnstone, R. (1998):** 'Eternal questions.' *Swara* 20:6 & 21:1

Keywords: Kenya/ hunting

Both sides of the hunting debate agree that, if Kenya's wildlife is to survive outside parks, it must be given greater value to give landowners an incentive to protect the wildlife. Currently, wildlife brings disease and extra expense to ranchers and pastoralists; crop damage and danger to farmers and local communities. Pilot culling schemes have brought minimal returns to a handful of ranchers. Wildlife causes less damage to Kenya's rangelands than cattle, causing less destruction and desertification. Most conservationists agree that, in order for wildlife to have value, it must be decentralised and privatised: de facto ownership must pass to landowners. Without local tanning and leatherworking facilities, and with limited markets for game meat, landowners rarely receive more than 5% of the end returns from culls.

However, many conservationists, including those not opposed to hunting per se, are concerned that effective control over hunting would be impossible given the current circumstances of Kenya and the Kenya Wildlife Service (KWS). There are further concerns that, in

order to compete with southern Africa, rarer trophies would need to be offered in Kenya. Dr Richard Leakey argues that hunting will remain politically unacceptable in Kenya as long as it is associated with the expropriation of land and game by white colonials. A further argument concerns the compatibility of hunting and tourism, and centres around the question of whether hunting will take place only in areas that are unsuitable for non-consumptive tourism. Many of these areas may prove suitable for less conventional forms of non-consumptive tourism such as bird-watching and river-rafting.

One tour operator argues that wildlife-based tourism requires a system under which different properties pay different sums for tourism leases; standards are set for the dispersal and carrying capacities of animals, and for fee-sharing between properties, according to visitor facilities and the costs of hosting wildlife. Finally, there is general agreement on the need for a widespread community education and awareness programme.

106. **Karstad, L. (1986):** Can livestock and wildlife co-exist? In Wildlife/ Livestock Interface on Rangelands. In MacMillan, S. (ed.): *Wildlife/Livestock Interface on Rangelands* pp 51-55. Proceedings of a conference held at Taita Hills Lodge, Kenya, 22-25April, 1985. Nairobi, Kenya: Inter-African Bureau for Animal Resources.

Keywords: Wildlife/ livestock/ co-existence/ disease

Diseases and parasites shared by wild and domesticated animals represent a special form of competition, especially in situations of free association on rangelands. Transmission occurs from wild to domestic animals and vice versa. Among the various examples of shared diseases, a complete spectrum of disease severity occurs - ranging from infection without clinical signs of disease to fatal illness. Only in rare instances would the presence of an infection in wildlife or livestock prevent the healthy co-existence of these two groups. In many instances lack of a thorough knowledge of the epidemiology of an animal disease prevents rational disease control. Rinderpest is such a case. More research on a number of animal diseases is needed.

107. **Kenya Wildlife Service (1996):** Wildlife-human conflicts in Kenya: Report of the five person review group, 19th December, 1994, Kenya.

Keywords: Kenya/ wildlife-human conflicts/ costs/ benefits/ management/ policy/ planning

Kenya Wildlife Service (KWS) conducted research into the perceptions and experiences of wildlife-human conflicts of a variety of stakeholders, with the aim of formulating grassroots solutions to

identified problem areas. Human-wildlife conflicts are most intense where agriculture is involved (e.g. cropland borders to forested national parks, or pockets of agriculture bordered by rangelands). The authors claim that, under current law and management regimes, the prevailing attitude towards wildlife is that it is a 'liability imposed upon land owners; most are desperate for relief.' Elephants, baboons and monkeys are cited as the most problematic animals. The report identifies policy issues and recommends courses of action.

108. **Khalil, L.F., Jones, A., and Gibbons, L.M.** (1980): 'Cysticerciasis and taeniasis in game animals of Africa and their public health importance.' *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 74: 115-116.

Keywords: Africa/ wildlife/ cysticerciasis/ taeniasis

In a survey of 555 wildebeest (*Connochaetes taurinus*) in Kajiado District of Kenya, three species of cysticerci were found. All the cysts had scolices with hooks indicating that they were not *Cysticercus bovis*. It is concluded that the wildebeest does not harbour cysticerci infective to man and therefore the meat of wildebeest should not be condemned as unfit for human consumption on the basis of cysticerciasis.

109. **Khan F.** (1996): 'Living on the margins: ecotourism and indigenous people in southern Africa.' *African Wildlife* 50, 3. Pretoria: Wildlife Society Southern Africa.

Keywords: Tourism/ indigenous peoples

This article stresses that there are few successful ecotourist ventures that involve indigenous southern African people on the basis of an equal partnership. In joint ventures with private partners or government-owned partners, the powerful senior partner usually dominates. Indigenous peoples are themselves often impoverished and politically powerless. Obstacles to success include lack of funding, tourist infrastructure and management skills. However, relative success stories are cited, in particular Whale Watch Kaikoura in New Zealand, which was initiated, implemented and managed by indigenous people themselves, allowing them to control the socio-economic benefits and minimise the negative impacts to their life-styles.

110. **King, J. M. and Heath, B. R. (1975).** Game domestication for animal production in Africa. *World Animal Review. Food and Agriculture Organisation of the United Nations, Rome* **16**: 23-30.

111. **King, J. M., Heath, B. R. et al. (1977).** Game domestication for animal production in Kenya: theory and practice. *Journal of Agricultural Sciences, Cambridge.* **89**: 445-457.

112. **Kiss, A. (ed.) (1990):** 'Living with wildlife: wildlife resource management with local participation in Africa.' World Bank Technical Paper 130, Washington D.C., USA.

Keywords: Africa/ wildlife/ livestock/ management/ conservation

This paper investigates the potentials and constraints of wildlife management programmes that involve and aim to benefit local people. Population expansion, with concomitant increases in land use and degradation, is leading to conflicts between people and wildlife in which, the author argues, the latter inevitably lose out. The international conservation community places a high value on the biodiversity of Africa and wants to see it preserved. However, unless this value can be translated into tangible benefits for those (rural) communities that bear the direct costs of living with wildlife (e.g. crop raiding, attacks on livestock and people, and incomes forgone from alternative land use), this will not happen. This paper explores the potential for wildlife management to promote independence and institutional capabilities in rural communities, as well as increased diversity and flexibility in their economies. The paper looks at principles and issues, planning and implementation of wildlife management projects and examines 17 case studies of projects both inside and outside protected areas, and provides an economic assessment of wildlife utilisation as a land use option in the semi-arid rangeland of southern Africa.

Relevant case studies

Based on protected areas: Air-Tenere National Nature Reserve, Niger; Queen Elizabeth Park, Uganda; Amboseli and Maasai Mara, Kenya; Protected Areas: neighbours as managers, Tanzania.

Not based on protected areas: Luangwa Integrated Rural Development Project (LIRDP) and Administrative Design for Game Management Areas (ADMADE), Zambia; CAMPFIRE Program (Dandle Communal Lands), Zimbabwe; Nazinga Pilot Wildlife Utilisation Project, Burkina Faso; Wildlife Management Areas, Botswana.

113. **Kiss, A. (1990):** 'Assessment of wildlife utilisation as a land use option in the semi-arid rangeland of southern Africa.' in Kiss A (ed.) (1990): *Living with wildlife: wildlife resource management with local participation in Africa.* Washington, D.C.: World Bank Technical Paper 130, 155-176.

Keywords: Southern Africa/ wildlife utilisation/ land tenure/ livestock/ pastoralism/ tourism

In the semi-arid rangelands of southern Africa, wildlife utilisation as a competitive, productive land use in non-protected areas is well established on private lands. As a source of meat, wildlife has been argued to have a marginal comparative advantage over livestock, but this is constrained due to technical, economic and political obstacles, and as yet there are "no successful commercial large scale enterprises producing wild meat in southern or eastern Africa" (pp 155-6, p 159). Wildlife is also used for tourism, and safari hunting. This chapter discusses the ecological and economic viability of wildlife utilisation as a land use option in the semi-arid rangeland of southern Africa.

Semi-arid rangelands constitute two thirds of the land area in Africa and hence they 'must play an important part in Africa's economic development' (p 156). However, they are marginal environments for cultivation, and thus new land use options are required. The author argues that:

- the ecological characteristics of the semi-arid rangelands make them difficult to manage on a sustainable basis;
- there are important limitations to meat production from livestock as a means of exploiting the rangeland resource;
- in many areas the maximum productivity of the rangeland for meat has been reached and is being exceeded, resulting in degradation of the resource;
- under many circumstances, wildlife may provide greater returns from the rangeland than livestock or crop cultivation, because of the potential for high use values, multiple uses, multiplier effects and sustainable production. This productivity advantage is 'likely to be fairly small (perhaps up to about 20%), because ultimately secondary production from wildlife is limited by primary production just as it is for livestock' (p 159).

Sustainable wildlife utilisation as a viable alternative to livestock production is enhanced by the multiple consumptive, 'lightly consumptive' and non-consumptive uses it offers (e.g. game ranching, safari hunting, live animal trade, trade in wildlife products such as skins, tourism etc.) Hence, per unit of biomass, wildlife can offer more profit than livestock production. In addition, multiple use of the rangelands to support livestock and wildlife together is possible,

taking into account veterinary restrictions on the spread of diseases. The author maintains that, at moderate stocking levels, 'there is relatively little competition between wild herbivores and livestock, so that wildlife utilisation can be added to extensive ranching operations at little opportunity cost, and this combination is the most common form of wildlife utilisation in southern Africa' (p 161). Recreation-based wildlife utilisation, such as safari hunting and tourism, can be financially lucrative without depleting the resource base or extracting environmental capital at unsustainable rates. In theory, where the community has legal rights to the commercial value of the wildlife resource, the revenue generated from wildlife can be distributed to the greater good of the community (e.g. the Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) in Zimbabwe).

The majority of semi-arid rangelands are populated by small scale farmers and pastoralists who are increasingly becoming settled into rain-fed cultivation to supplement their livelihood strategies, as access to traditional grazing lands is constrained. Livestock has a variety of economic and non-economic values (meat, milk, draught power, manure), and acts as financial security as well as an indicator of status. In areas where this is the case, the author maintains that it is unrealistic to propose wildlife utilisation to completely replace herding - rather it could be mobilised (with appropriate infrastructural and educational support) as a viable alternative supplement to pastoral income.

The wildlife industry in southern Africa

Tourism is less developed in southern Africa (specifically Namibia, South Africa and Zimbabwe), than eastern Africa in terms of total numbers of visitors and total revenues earned. However, unlike eastern Africa, it is based primarily on individual incentives on privately controlled land and wildlife resources. Data on the comparative environmental impacts and economic returns from wildlife versus cattle ranching in Zimbabwe suggest that wildlife is a profitable rural sector which, when reflected in market prices, rapidly alters land utilisation towards wildlife.

Wildlife utilisation and developing rural communities

Strengthening the capacity of communities to manage wildlife for profit at the local level is essential in the semi-arid environments that are predominantly occupied by Africa's rural poor. Kiss makes recommendations for 'restructuring to benefit the wildlife sector', 'proprietorship of wildlife', 'reforming economic and other policies', 'support for the development of the wildlife industry.' and altering 'international attitudes' to sustainable wildlife utilisation.

It is concluded that wildlife utilisation can provide 'much higher sustainable financial returns than domestic livestock or crop

cultivation on semi-arid rangelands.' The multiple use options promoted by wildlife use are able to make these profits at a lower cost to the environment. Primarily the benefits of wildlife use have been enjoyed in the private sector and only fairly recently have these been attempted in the communal areas through programmes such as CAMPFIRE in Zimbabwe. Initially, such programmes are likely to rely heavily on safari hunting as a use option, as it provides high and rapid returns at low infrastructural costs. Kiss calls for institutional reform granting proprietorship of wildlife to landholders in southern Africa, and developing institutions to control the management of resources and the benefits they generate. Kiss also emphasises setting appropriate pricing policies into place to address resource bottlenecks through the market.

114. **Kock, M.D. (1996):** 'Wildlife, people and development - veterinary contributions to wildlife health and resource-management in Africa.' *Tropical Animal Health and Production*, 28: 80.

Keywords: Africa/ wildlife/ health/ management

Human population pressures, habitat loss, environmental degradation and illegal hunting in Africa have resulted in the loss of biodiversity and near extinction of certain wildlife species. The dilemma for Africa is the balancing of conservation and development. If wildlife is not to become a relic of the past then it must have more than just aesthetic value. It must contribute materially to the well being of people who live close to the resource. In fact, appropriate management of biodiversity would lay the foundations for a more positive future for the rural people of Africa, with the key being the adoption of an active adaptive management philosophy. This paper reviews the issue of sustainable use of wildlife resources and how the veterinary profession contributes positively to wildlife health management in Africa. These contributions have been through increasing veterinary inputs into wildlife management and research, disease surveillance and prevention, training and education. Wildlife and ecosystems are increasingly having to be managed in order to save and maintain biological diversity. Veterinarians have a crucial role to play towards the maintenance of wildlife health as part of a multi- disciplinary wildlife management team.

115. **Kock, N.D., Vanvliet, A.M., Charlton, K., and Jongejan, F. (1995):** 'Detection of *Cowdria ruminantium* in blood and bone-marrow samples from clinically normal, free-ranging Zimbabwean wild ungulates.' *Journal of Clinical Microbiology*, 33: 2501-2504.

Keywords: Zimbabwe/ wild ungulates/ heartwater

Cowdria ruminantium causes severe, often fatal disease in domestic ruminants, whereas wildlife species usually are not affected. Blood and bone-marrow samples from healthy, free- ranging Zimbabwean ungulates were taken during translocation from areas harbouring *Amblyomma* ticks and tested for the presence of *C. ruminantium*, using a PCR assay based on the *C. ruminantium* map 1 gene. Positive reactions were obtained in tsessebe (*Damaliscus lunatus*), waterbuck (*Kobus ellipsiprymnus*), and impala (*Aepyceros melampus*). Wildlife species may therefore be a reservoir for *C. ruminantium* thus contributing to the spread of cowdriosis.

116. **Kock, R., Chalmers, W.S.K., Mwanzia, J., Chillingworth, J., Wambua, J., Coleman, P.G., and Baxendale, W. (1998):** 'Canine distemper antibodies in lions of the Masai Mara.' *Veterinary Record*, 142: 662-665.

Keywords: Kenya/ lions/ canine distemper

Fifty-five per cent of serum samples obtained from wild lions of the Masai Mara have been found to contain neutralising antibody to CDV, indicating that they had been exposed to the virus.

117. **Kreuter, U.P., Workman, J.P. (1992):** 'The comparative economics of cattle and wildlife production in the midlands of Zimbabwe.' Multi-species Animal Production Systems Project. Paper No. 31. WWF, Harare, Zimbabwe.

Keywords: Zimbabwe/ cattle/ wildlife/ financial profitability/ economic profitability/ policy analysis/ overstocking costs/ comparative advantage.

This study is rooted in the equilibrium paradigm of range ecology. It examines the claim that wildlife ranching can give greater profits than cattle ranching on semi-arid African savannas using financial (market) prices and economic prices (opportunity costs on both single and mixed cattle and wildlife ranches).

Cattle ranches in areas with least wildlife provide the greatest net revenues, whereas in areas with abundant wildlife only mixed ranches were financially profitable (when depreciation was included). The overall conclusions are that research does not support the claim that wildlife ranching is more profitable or efficient than cattle ranching in the semi-arid rangelands of the Zimbabwe midlands.

118. **Lane C. R., (1997) (ed.):** *Custodians of the commons: pastoral land tenure in East and West Africa.* London: Earthscan and International Institute for Environment and Development.

Keywords: Africa/ pastoralism/ land tenure/ property regimes

This book explores the current trends in the pastoralism/ land tenure debate using case studies from East and West Africa (Kenya, Mali, Mauritania, Senegal, Sudan, Tanzania, and Uganda). Historically, land tenure and land use in pastoral rangelands has been based on the concept of 'usufructary land rights' (i.e. 'the right to enjoy the product of land only in so far as it does not cause damage and reduce its future productive capacity'). Pastoralism provides a living for over 25 million people in Africa and makes a significant contribution to economies of the region. It employs 12% of the population using 500 million hectares of land.

A lack of understanding by African governments and Western donors of customary land rights and their involvement in land management has adversely affected pastoral livelihoods and led to their increasing political, social and economic marginalisation. Lane argues that pastoralist production systems based on usufructary rights are effective, given the spatio-temporal variability of the rangelands. However, in order to continue making a significant contribution to regional economies, such systems must adapt to changing conditions such as population increases, alienation of land and conflicts over its use, restrictions on migratory land movements and sustained and prolonged drought periods/ climatic change.

Broadly speaking, pastoral lands in Africa are held under three main controlled access tenure regimes: as state/ national property, communal property and private property; and pastoralists may use more than one tenure regime in pursuing their livelihoods. There are three prevailing economic models of rangeland use and tenure in Africa that have influenced thinking of tenure in the pastoral context:

- advocating privatisation of property under the assumption of Hardin's 'Tragedy of the Commons' theory
- the 'property rights' school
- advocating common property resource management, based on the 'assurance' problem

Previous pastoral management policies were rooted in the 'top-down' technical intervention paradigm, which viewed all communal tenure[1] arrangements essentially as 'open access' systems, which inevitably lead to Hardin's 'Tragedy of the Commons'. This argument has been used to justify government and donor support for the privatisation of pastoral commons, the registration of title deeds and formal land use planning. In turn, this has facilitated the

[1]Land tenure is defined as the 'terms and conditions on which natural resources are held and used.' It refers to the manner in which resources are owned (i.e. the property relations that are sanctioned by the society in which people live (see p 6 for details))

encroachment of cultivators onto pastoral lands as well as the alienation of lands for large- scale commercial farms.

The property rights school argues that, as the demand for resources increases due to population increases and market demand, the resources will become increasingly controlled. In these conditions, it is argued that herders will evolve their own management institutions in line with the scarcity of resources, thus intervention is not required.

The assurance problem refers to past pastoral management institutions based on mutual assurance. Members who are given access to a specific resource will respect the regulations controlling access to that resource, and outsiders to the agreement will be effectively excluded. These institutions have been undermined by wider political, social and economic factors. Proponents of this approach argue that, with effective support, herders are able to generate appropriate tenure arrangements and sustainable management strategies.

The four major aspects of land tenure reform underway in Africa at present are: the nationalisation of natural resources; sedentarisation of nomadic herders; titling and formal land use planning, and the privatisation of land.

Nationalisation

Lane argues that nationalisation strategies are breaking down customary land tenure arrangements and failing to replace them with a viable alternative. He maintains that this strategy may in fact be promoting an open access regime, as the state is unable to provide adequate management yet insists everyone has a right to access by virtue of their citizenship. As the costs of increased grazing are borne by everyone, if individuals do not make use of the pasture someone else will. Research is showing that herders are increasingly unable to regulate who that 'someone else' is, as elites and their vested interests are able to acquire access to more land due to ambiguities in tenure arrangements.

Sedentarisation

The push towards sedentarisation is also derived from Hardin's theory: pastoralists are unable to manage their lands, and mobility is equated with disorganisation. Hence the solution is to promote settling down to a more 'organised' life, which is more conducive to cultivation, historically seen as a sign of 'civilisation.' The policy has been promoted in a variety of ways: nationally as in Tanzania's 'villigisation programme'; in response to a crisis, as in the Sahel after the droughts of the 1970s and 1980s; as the inevitable consequence of tenure reform and the push for privatisation, or under the auspices of Western aid donors and the desire to improve welfare services to rural populations. It has strong repercussions for communal tenure.

One area where it has been actively resisted is among the Karamojong in Uganda. Division of village boundaries facilitate the formation of administrative units, but at the expense of access to resources that vary in time and space.

Titling/ formal land use planning

Often seen as an integral part of land reform, the ethos behind this trend is that it provides security to invest in long-term productivity, thereby preventing resources being over-exploited and encouraging credit lending opportunities. The author maintains that titling land inhibits the communal land rights upon which pastoral livelihoods depend. For example the Barabaig herders who settled in Tanzania are now forced to limit their herding patterns to distances that can be covered in one day. Inevitably this has led to adverse ecological impacts in their villages and environs and is thought to be encouraging the trend towards agro-pastoralism.

Land use planning is too formal to reflect the complexities of customary land use arrangements that rely on mobility. Rapid rural appraisal (RRA) in Tanzania conducted by the World Bank concluded that the planning process was obtuse and unintelligible to villagers and their views were largely ignored in the process. Two new initiatives in francophone West Africa aim to improve the prospects of pastoralists in the planning process. The '*gestion de terroirs*' (management of village lands) approach has arisen in response to the recognition that there was a lack of clarity regarding land rights, that development performance was poor, and the states' administration abilities were limited. *Gestion de terroirs* encompasses technical interventions, socio-economic institutions and legal rights and responsibilities. It aims to address these problems by clarifying rules of tenure, redefining community rights and facilitating participatory diagnoses of problems. It differs from approaches in East Africa as it is based more on territories that reflect ecological land use units and it gives a higher priority to local land users' involvement in problem identification, project planning, evaluation and monitoring and elections of land management committees. It reinforces the local communities' rights and responsibilities in relation to land but is still problematical when considering access to resources beyond village boundaries and land alienation at the expense of vested interests on the land management committees (e.g. Niger's government is formalising customary tenure rights into law through the '*Code Rurale*').

Privatisation

Privatisation is also advocated on the strength of Hardin's theory, and again Lane stresses that there is no definite correlation between individual land ownership and increased productivity. Lane argues that privatisation can lead to ineffective rangeland management. For

example, the tribal grazing lands policy in Botswana led to communal grazing areas being fenced and those landowners (usually the elite) who could afford access to bore holes were able to requisition the best grazing lands and thereby accumulate a greater share in the national herd. Restricted access to rangelands can also inhibit the exploitation of forage in both dry and wet years, and therefore productivity.

Experiences of group ranches in Kenya and their subdivision have highlighted the problems of private ownership. Aside from denying communal access to resources, it has enabled some private landowners to acquire additional plots and others to sell out of the ranches altogether, thereby undermining the commons into 'potentially unsustainable grazing units'. Private landowners are able to circumvent this problem by 'dual grazing' their stock on remaining common land and allowing their plots to regenerate.

Summary

The author believes that policies for privatisation, titling, and nationalisation have failed to achieve the goals they propose, and exposes the weakness of Hardin's theories as a viable underpinning for rangeland management. These approaches have facilitated the encroachment of smal- scale agriculturists onto private lands and the alienation of pasture for large-scale commercial farms. This has impacted profoundly on the fabric of pastoralist society, and evidence suggests that kinship and other social linkages that underpin pastoral land tenure systems have been severely undermined. Increased political/ economic and social stratification is further increasing the divergence between rich and poor herders. Pastoral land tenure policies must take these factors into account if they want to succeed.

119. **Lane, C. and Moorehead, R. (1995):** 'New directions in rangeland and resource tenure and policy.' In Scoones, I. (ed.): *Living with uncertainty: new directions in pastoral development in Africa*, 116-33. London: Intermediate Technology Publications.

Keywords: Africa/ pastoralism/ rangelands/ development/ tenure/ non-equilibrium

Conventional wisdom depicts pastoral common property resource management strategies as constraining increases in the production levels of the rangelands. Typically, pastoralists have been portrayed as economically irrational, and pastoralist management is viewed as being unable to produce high levels of commercial offtake, unable to maintain stock levels to within the ecological carrying capacity of the land, and therefore unable to inhibit rangeland degradation, inevitably leading to 'over-grazing'. Such opinions have been used to

justify pastoral development strategies that have focused on increasing production through sedentarisation and increasing inputs into the system.

The authors challenge such 'dogma' and argue that it is a flawed basis on which to design and manage rangelands. New thinking on rangeland management, rooted in the non-equilibrium paradigm of ecology, is offered as an alternative paradigm upon which to base policy decisions. The authors discuss the three main theories of land tenure: tragedy of the commons, property rights school and the assurance problem. They then move on to address the three major economic and political changes that are occurring in Africa which will have major influences on pastoralist tenure systems: nationalisation of rangelands and their resources, sedentarisation of herders, and privatisation of the range. Using examples from Mali to Tanzania, the authors conclude by discussing the tenure implications of the new approaches, and future options.

120. **Lane, C. and Moorehead, R. (1994):** 'Who should own the range? New thinking on pastoral land tenure in drylands Africa.' *Pastoral Land Tenure Series*. London: International Institute for Environment and Development.

Keywords: Africa/ pastoralists/ access/ non-equilibrium/ tenure/ rangeland

Pastoralists in Africa are often criticised for indigenous tenure systems that have been held responsible for over-stocking and degrading the rangeland resources they use. This paper looks at the non-equilibrium approach to ecology and rangeland management that is challenging this old orthodoxy. It discusses the implications for tenure issues and maintains that if empowered to do so, pastoralists are capable of managing their own resources. The key factors are secure access rights to range and water. The authors also look at the threats to pastoral livelihoods, such as privatisation of key pastoral resources, and give an agenda for action to support herders' own tenure systems.

121. **Lane, C. and Swift. J, (1989):** 'East African pastoralism: common land common problem.' Report on the Pastoral Land Tenure Workshop, Arusha, Tanzania, 1-3 December 1988. Drylands Programme Issues Paper No 8. London: International Institute for Environment and Development.

Keywords: East Africa/ pastoralism/ land tenure

This workshop discussed threats to pastoral livelihoods from conflicts over land alienation, tenure insecurities, and policies that

discriminate against pastoral production and thereby threaten food security. Case studies include: Maasai group ranches, Kenya; Northern Kenya pastoralists; Maasai in Tanzania; and the Barabaig in Tanzania. Themes developed at the conference were: law and institutions; information, education and training, and policy frameworks. An action programme was also outlined.

122. **Leach, M. and Mearns, R. (1996)**: *'The lie of the land, challenging the received wisdom of the African environment.'* Oxford: James Currey.

Keywords: Africa/ environment/ conventional wisdom/ policy/ discourse/ perceptions/ degradation/ pastoralism/ soil erosion/ desertification/ indigenous knowledge/ population

This book presents a collection of essays, all of which are united by the common goal of questioning the so-called 'conventional wisdom' of perceptions of the African environment which have informed policy decisions since the colonial era on the continent. While not wanting to deny that environmental problems do exist in Africa, the authors are keen to present the antithetical view in order to redress the balance of opinion with regard to the African environment.

The introduction focuses on the evolution and implications of this conventional wisdom and explores the power of discourse in influencing policies. There are several chapters relating to pastoralism and the alleged impact of livestock (including Scoones, 1996; Homewood and Brockington, 1996; *q.v.*). All argue that there is little scientific evidence of land and vegetation degradation due to human or animal activities, and that the negative impacts of livestock and wildlife have been overstated. The semi-arid rangelands are best understood in terms of non-equilibrium dynamics. Pastoral development policies applied in this area have, in the past, been 'misinformed' by the equilibrium paradigm of ecological understanding, leading to the failure of such projects.

Fairhead and Leach, and Cline-Cole deal with forestry issues in the chapters that deal with issues surrounding purported diminishing forestry cover and expansion of savannas in Guinea and colonial versus indigenous forestry in northern Nigeria. Debates surrounding soil erosion and land degradation are dealt with in the chapter by Stocking, and Adams discusses the pros and cons of technical intervention in the design of irrigation systems in western Kenya. Tiffen examines perceptions of 'resource poverty' in the case of smallholder farmers, amongst whom items that represent savings and investment (e.g. trees and buildings) are often overlooked. The final chapter by Hoben discusses the inappropriateness of neo-Malthusian perceptions of famine.

123. **Leader-Williams, N., Kayera, J. A. and Overton, G. L. (eds.) (1996): 'Community-based conservation in Tanzania.' Occasional Paper of the IUCN Species Survival Commission No. 15. IUCN, Gland, Switzerland and Cambridge. ix + 226 pp. and**

124. **Leader-Williams, N., Kayera, J. A. and Overton, G. L. (eds.) (1996):** 'Tourist hunting in Tanzania.' Proceedings of a workshop held in July 1993. Occasional Paper of the IUCN Species Survival Commission No. 14. Gland, Switzerland and Cambridge: International Union for the Conservation of Nature.

Keywords: Tanzania/ tourism/ trophy hunting

Tanzania's trophy hunting industry has in the past proved difficult to administer. Its minimum quota system, where mature males are hunted, is recognised as a sustainable form of wildlife use as well as being consistent with low-density, high-quality tourism. The paper reports a workshop facilitated by PAWM – Planning and Assessment for Wildlife Management. The workshop had the following aims:

- to debate the extent and economic value of tourist hunting in Tanzania
- to bring together expertise and stakeholders from within and outside Tanzania to discuss issues of importance to the future management of tourist hunting in Tanzania and
- to prepare recommendations that would form the basis of policy and management plans to assist the Department of Wildlife to better manage Tanzania's wildlife industry

The report is broken down into: perspectives on tourist hunting; administration and policy towards tourist hunting in east and southern Africa; setting quotas; safari volumes and returns from tourist hunting in east and southern Africa; the professional hunter; and working group recommendations.

125. **Lewis, D., Kaweche, G.B., and Mwenya, A. (1990):** 'Wildlife conservation outside protected areas: Lessons from an experiment in Zambia.' *Conservation Biology*, 4, 2: 171-180.

Keywords: Zambia/ game management/ sustained yield/ offtake/ employment

This paper discusses the achievements to date of wildlife conservation in the Lupande Game Management Area in Zambia through local people's participation. Success has been in part due to the establishment of village wildlife management committees and a sustained-yield utilisation scheme. The project has generated employment opportunities for the villagers (e.g. as wildlife 'scouts').

The revenues from the offtake of wildlife and trophies covered the operational costs of the programme. Overall there has been a decrease in elephant and rhino poaching and a positive change in local attitudes to wildlife.

126. **Lewis, J. G. (1977).** 'Game domestication for animal production in Kenya: activity patterns of eland, oryx, buffalo and zebu cattle.' *Journal of Agricultural Sciences, Cambridge* **89**: 551-563; and

127. **Lewis, J. G. (1978).** 'Game domestication for animal production in Kenya: shade behaviour and factors affecting the herding of eland, oryx, buffalo and zebu cattle.' *Journal of Agricultural Sciences, Cambridge* **90**: 587-595.

Keywords: Kenya/ Galana Ranch/ wildlife/ livestock/ domestication/ activity patterns/ shade behaviour/ herding/ eland/ oryx/ buffalo/ zebu cattle

128. **Lindsey, W. (1987):** 'Integrating parks and pastoralists: some lessons from Amboseli.' In Anderson, D. and Grove, R. (eds.), (1987): *Conservation in Africa: people, policies and practice* 149-167. Cambridge University Press.

Keywords: Kenya/ Amboseli/ Maasai/ exclusion/ conservation/ conflict

This paper discusses the evolution of conflicts between Maasai pastoralists and park authorities in the Amboseli National Park, Kenya. It describes how, after the park was set up, the exclusion of pastoralists from their traditional grazing and, more importantly, water sites, led to conflict resulting in Maasai spearing some of the local wildlife in the 1980s in protest.

129. **Lovatt Smith, D. (1998):** 'Look, don't touch.' *Swara* **20**:6 & **21**:1.

Keywords: Kenya/ Amboseli/ pastoralism/ community participation/ tourism

The author argues that wildlife tourism is the best source of income for pastoral communities. In former times, pastoralists, such as the Maasai and Samburu, only killed wild animals to protect themselves or their livestock, or to eat when there was no other food. However, in line with rising human populations, the explosion of domestic stock numbers is now destroying the land. Species of plants that are unpalatable to domestic stock, which used to be controlled by large wild herbivores, are now proliferating. Wildlife provides a better land use as it is indigenous, sustains a balanced ecosystem, survives

droughts, and is less susceptible to parasites and disease. Under suitable management and marketing, sport hunting is not competitive against wildlife-viewing tourism (based on a ten thousand hectare ranch with a 60-bed lodge).

The author draws on examples from the area surrounding Amboseli National Park in Kenya. Tour operators are invited to bid for concessions, based on their previous record of working in partnership with local communities and successful marketing policies. Contractual obligations ensure that local people are employed, that foodstuffs are purchased locally and that rent for the lodge site and bed-night fees reflect a reasonable percentage of turnover.

130. **Macdonald, D. W. (1993):** 'Rabies and wildlife - a conservation problem.' *Onderstepoort Journal of Veterinary Research*, 60: 351-355.

Keywords: Africa/ wildlife/ rabies/ control/ conservation

Understanding the behavioural ecology of wild mammals in rabies epizootics is a prerequisite to scientifically sound management of the disease. The principal vectors of wildlife rabies in a region tend to be abundant representatives of the Carnivora. Although the population dynamics of these species may be radically affected by rabies, and by attempts to control it, they are generally not threatened with widespread extinction as a result. However, the cases of the Blanford's fox, *Vulpes cana*, the Ethiopian wolf, *Canis simensis*, and the African wild dog, *Lycaon pictus*, illustrate how rabies and its control can pose grave conservation problems for rare carnivores. Disease monitoring is therefore an important element of recovery plans for rare species which are potential victims of rabies and other epizootic pathogens, and the benefits and disbenefits of prophylactic vaccination merit serious evaluation.

131. **Machange, J. (1997):** Livestock and wildlife interactions. In Thompson, D., (ed.): *Multiple land-use: the experience of the Ngorongoro Conservation Area, Tanzania*, II.6, 127-141. Gland, Switzerland and Cambridge: International Union for the Conservation of Nature.

Keywords: Tanzania/ Ngorongoro/ wildlife/ livestock/ co-existence/ disease

Disease appears to be a major constraint on livestock production in the Ngorongoro Conservation Area. East Coast Fever was considered to be the most serious disease but wildlife involvement in transmission was thought to be minimal. Heartwater has been reported for many years but it was thought that the role of wildlife

was negligible. Other diseases of livestock are mentioned. The pastoralists claim great losses from MCF but a lack of veterinary records make it difficult to confirm this. Trypanosomosis was reported to be a serious problem in some areas. It is concluded that a long-term study should be initiated with a view to establishing the implications of the disease interactions between livestock and wildlife.

132. **Macpherson, C. N. L. (1986):** Echinococcus infections in wild animals in Africa. In MacMillan, S. (ed.): *Wildlife/Livestock Interface on Rangelands* pp 73-78. Proceedings of a conference held at Taita Hills Lodge, Kenya, 22-25 April, 1985. Nairobi, Kenya: Inter-African Bureau for Animal Resources.

Keywords: Africa/ / wildlife/ Echinococcus

The literature concerning the role of wild animals in the transmission of *Echinococcus granulosus* in Africa is reviewed. The species found to be infected with the adult tapeworm and with hydatid cysts are listed. Surveys indicate that wildlife cycles involving the lion and its prey species exist in certain national parks in many countries throughout Africa. It is apparent that there is a strain of *E. granulosus* that is adapted to the lion.

133. **Macpherson, C. N. L., Karstad, L., Stevenson, P., and Arundel, J. H. (1982):** 'Hydatid disease in the Turkana District of Kenya III. The significance of wild animals in the transmission of *Echinococcus granulosus*, with particular reference to Turkana District, Kenya.' *Annals of Tropical Medicine and Parasitology*, 77: 61-83.

Keywords: Kenya/ Turkana/ Echinococcus/ wildlife/ transmission

In Turkana District of Kenya, *Echinococcus* adults were found in 11 of 38 silver-backed jackals (*Canis mesomelas*) and 6 of 22 golden jackals (*Canis aureus*). None of the 16 spotted hyaenas (*Crocuta crocuta*) examined was infected. None of 152 wild herbivores of 5 species examined in Turkana harboured hydatid cysts. It seems unlikely that there is a purely wildlife cycle in Turkana and the jackal infections may be incidental and dependent on the continuance of the domestic cycle. In Narok District of Kenya, 26 wild herbivores of 6 species were examined for hydatid cysts. Three wildebeest (*Connochaetes taurinus*) and one topi (*Damaliscus korrigum*) had cysts. This supports previous evidence of a wildlife cycle of *Echinococcus* in the Maasailand and Serengeti regions of East Africa.

134. **Makombe, K. (ed.):** 'Sharing the land: wildlife people and development in Africa.' *IUCN/ ROSA Environmental Issues Series No. 1.* Harare, Zimbabwe: International Union for the Conservation of Nature.

Keywords: Africa/ conservation/ development/ people/ wildlife/ land use/ national parks/ commercial uses/ multi-species systems/ CAMPFIRE.

Makombe provides a useful overview of the issues surrounding development and conservation in Africa, focusing on the sustainable utilisation of wildlife as a primary management strategy. He explores the paradox between conservation and preservation and the rise of conflicts between people and wildlife and how sustainable use of wildlife can help ameliorate some of these conflicts (e.g. resource sharing in national parks, commercial utilisation, multi-species systems, safari hunting and community-based wildlife management initiatives).

Recommendations include: building a coalition of wildlife management interests across the state; civil society and private sectors; researching and establishing well functioning markets for wildlife-related products; research into sustainable management (consumptive and non-consumptive), greater financial responsibility of the international community to aid conservation of biodiversity which is perceived as a 'global commons'.

135. **Madsen, M. and Anderson, E.C. (1995):** 'Serologic survey of Zimbabwean wildlife for brucellosis.' *Journal of Zoo and Wildlife Medicine*, **26**: 240-245.

Keywords: Zimbabwe/ wildlife/ brucellosis

A total of 4066 serum samples from 20 species of wildlife were collected from several game areas in Zimbabwe during 1990 and 1991. The samples were tested for antibodies to *Brucella* by rose bengal, tube serum agglutination, and complement fixation tests. Antibodies were detected in 29 of 444 (6.5%) African buffalo (*Syncerus caffer*), eight of 555 (1.4%) eland antelope (*Tragelaphus oryx*), two of 222 (0.9%) giraffe (*Giraffa camelopardalis*), and one of 2,068 (0.05%) impala (*Aepyceros melampus*). Contact with livestock was likely in the case of sero-positive eland antelope, impala, and giraffe, whereas 14 of 29 (48%) samples from positive buffalo were collected from game areas where contacts with domestic cattle, sheep, and goats could be excluded. These serologic data document the exposure of Zimbabwean wildlife to *Brucella* spp. and demonstrate that the infection may be able to cycle independently in

African buffalo populations, which subsequently should be considered a possible source of reinfection for domestic stock.

136. **Martin, R. B. (1986):** Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) working document 1/86. Harare, Zimbabwe: Branch of Terrestrial Ecology, Department of National Parks and Wildlife Management.

This is the proposal document for the well known Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) which seeks to decentralise wildlife management. The programme's aims are stated as:
"The voluntary participation of communities in a flexible programme which incorporates long term solutions to resource problems; introduces a new system of group ownership and territorial rights to natural resources; provides the appropriate institutions under which resources can be legitimately managed and exploited by the resident communities for direct benefits and provides the technical and financial assistance to communities which join the programme to enable them to reach these objectives."

137. **Masiga, W., Domenech, J., and Windsor, R.S. (1996):** 'Manifestations and epidemiology of contagious bovine pleuropneumonia in Africa.' *Revue Scientifique et Technique de l'Office International des Epizooties*, **15**: 1238-1308.

Keywords: Africa/ cattle/ contagious bovine pleuro-pneumonia/ control

This article reviews the clinical manifestations, lesions and epidemiology of contagious bovine pleuropneumonia in Africa. The authors consider that the epidemiology of the disease is dominated by four factors. Cattle are the only species affected and there is no evidence that there is a reservoir in wild animals. Clinical cases or chronic carriers are the usual sources of infection through direct contact. Cattle movements play a very important role in the maintenance and extension of the disease. The disease has become a major issue in eastern and south eastern Africa and is placing southern Africa under direct threat.

138. **McCabe, J. T. (1994):** Wildebeest/Maasai interactions in the Ngorongoro Conservation Area of Tanzania. Final report submitted to the National Geographic Society. Grant no. 4953-93. 22 pages + bibliography, tables and figures.

Keywords: Tanzania/ cattle/ wildebeest/ malignant catarrhal fever

In the conclusions to this report it is stated that today most of the highly nutritious new grass which grows following the rains in the plains is unavailable for use by Maasai cattle due to the possibility of contracting malignant catarrhal fever. Prior to the eruption of the wildebeest population much of the lowlands could be used by Maasai cattle during the wet season, although it was recognised that contact between cattle and wildebeest calves needed to be avoided. The overall incidence of MCF is low if considered over a number of years but there can be high mortality for some herd owners in certain years.

139. **Moran, D. (1994):** 'Contingent valuation and biodiversity - measuring the user surplus of Kenyan protected areas.' *Biodiversity and Conservation*, 3, 8: 663-684.

Keywords: Kenya/ economics/ ecotourism/ wildlife/ contingent valuation/ park fees

The financial returns to Kenyan tourism demonstrate the importance of the country's tourist potential to its economic development. Protected areas and their inhabitants are the principal focus of the tourist industry, the nation's main foreign exchange earner, and a source of wonder and value for a global population of non-users. It might be expected that such assets would be accorded some degree of security, with sufficient funding to safeguard current and potential economic benefits. Yet park use is haphazard, and there is frequently little coincidence between those that benefit and those that pay for the continued existence of such areas. Growing economic and demographic pressures, which threaten to swamp protected areas only, emphasise the implicit subsidy currently paid by Kenyans to support conservation for the benefit of the world at large.

In this climate, the case for conservation depends on the measurement and capture of economic benefits. Using a contingent valuation survey of expressed preference, this study estimates the consumer surplus attached to current non-consumptive use of protected areas by foreign visitors at some $450 million per annum. This sum alone is more than double the best available estimate of opportunity cost, and appears to justify current resource use. The estimate is additional to current financial returns from tourism and makes no allowance for other direct and indirect benefits and potential returns from consumptive uses. Measured consumer surplus contains some margin of willingness-to-pay that could be captured through the current fee structure. Moreover, park fees represent the most accessible market mechanism to finance revenue sharing and additional park investment, before potential recourse to emerging global market institutions.

140. **Moloo, S.K. (1993):** 'The distribution of *Glossina* species in Africa and their natural hosts.' *Insect Science and its Application*, **14**: 511-527.

Keywords: Africa/ tsetse/ *Glossina*/ hosts

The distribution of 31 *Glossina* spp. and subspecies belonging to *fusca*, *palpalis* and *morsitans* groups is given for 38 African countries. The natural hosts of 17 tsetse species and subspecies from many areas within different regions of Africa are also given. These were collated from the results of both published and unpublished work, for the period 1953 to 1991 inclusive, comprising altogether 47,697 blood meals. This review is aimed to provide current knowledge on the distribution as well as the natural hosts of tsetse.

141. **Murphree, M. W. (1993):** 'Research on the institutional contexts of wildlife utilisation in communal areas of eastern and southern Africa.' Natural Resource Management Working Paper. Harare, Zimbabwe: Centre for Applied Social Services, University of Zimbabwe.

Keywords: East and southern Africa/ wildlife/ sustainable utilisation/ common property/ policy / planning

This paper refers to the institutional issues arising from wildlife utilisation under common property regimes (communal lands) in eastern and southern Africa.

142. **Murphree, M. W. (1995):** 'The lesson from Mahenye: rural poverty, democracy and wildlife conservation.' *Wildlife and Development Series No.1*. London: International Institute for Environment and Development.

Keywords: Zimbabwe/ Mahenye/ wildlife / CAMPFIRE/ sustainable utilisation

This paper provides an overview of wildlife conservation and sustainable use in Zimbabwe and it is the first in a series that focuses on Zimbabwe's Communal Areas Management Programme for Indigenous Resources (CAMPFIRE). Since 1975, Zimbabwe permitted private property owners to claim ownership of wildlife on their land and to benefit from its use. Under the CAMPFIRE initiative, people who live on the country's communal lands (42% of the population) can claim the same rights of proprietorship. As such, CAMPFIRE conceptually acknowledges the inability of the state to manage its natural resources. It attempts to reconcile rural development and conservation of resources by devolving responsibility and authority over their use to local populations who

have more of an interest in their sustainable use. So far, CAMPFIRE initiatives have focused mainly on the use of wildlife, as the scheme originated in the titular government department and because safari hunting generates considerable foreign exchange.

Under colonial rule, ownership of wildlife was removed from local communities, and the ethos of preservationist/ exclusionist conservation dominated. Zimbabwe has witnessed population growth from 800,000 to 10 million in just over 100 years with a concomitant exploitation of marginal lands for subsistence agriculture. Better quality lands were appropriated by colonial farmers and have been increasingly exploited by individuals for wildlife. The author argues that this and the attitude of Western donors has created a culture of poverty (i.e. one where the 'future is discounted at a very high rate'). Coupled to this, he maintains that attitudes towards what constitutes 'development' in Africa need to be reassessed, and countries should not be penalised for their exploiting comparative advantage. For example in the case of wildlife and restrictions on its international trade through the Convention on International Trade in Endangered Species (CITES).

The institutional framework for CAMPFIRE requires clear definitions of territoriality and membership of communities with access to resources: responsibility and authority are linked to economic productivity and there must be long-term security for these institutional arrangements. Institutional dynamics suggest that the smaller and more homogeneous the unit of proprietorship, the more efficient it is at reaching consensual decisions. The author maintains that, despite wildlife being increasingly treated as global commons, proprietorship must be assigned at the level of the range of the resource.

Mahenye is a collection of villages that constitute a ward of approx. 600 km^2 on the boarder of the Gonarezhou National Park in the south east of Zimbabwe. Most people who live there were relocated there after the National Park was set up. Hence, they were hostile to wildlife, in particular elephants that were regarded as a pest to crops. In 1984, the Government granted safari hunting concessions in the Ward for elephant and buffalo migrating out of the park, and the dividends were channelled back into the local community which was given security of tenure and the right to manage wildlife in the long term. The author calls for a strengthening of community institutions that manage resources and the subsidiarity of decision making from the level of district council to the level of the local communities as proprietors, in order for the sustainable utilisation of wildlife under the CAMPFIRE model to be successful.

143. **Mushi, E. Z. (1986):** The role of wild ungulates in the epidemiology of bovine malignant catarrhal fever. In MacMillan, S. (ed.): *Wildlife/Livestock Interface on Rangelands* pp 69-71. Proceedings of a conference held at Taita Hills Lodge, Kenya, 22-25April, 1985. Nairobi, Kenya: Inter-African Bureau for Animal Resources.

Keywords: East Africa/ wild ungulates/ wildebeest/ malignant catarrhal fever

In this short review of MCF it is concluded that wildebeest are the main carriers and transmitters of MCF to cattle. Hartebeest (*Alcelaphus busephalus cokei*) carry a pathogenic strain of MCF, and although natural transmission to other species has not been recorded, it should be considered a possibility. Topi and oryx may be carriers of avirulent strains of MCF virus that might yield an effective vaccine against bovine MCF.

144. **Mwangi, S. (1996):** 'The cost of living with wildlife: a pastoralist's perspective.' Proceedings of two community Workshops held in Koiyaki Group Ranch in Narok District on 17th and 18th March 1996. Sponsored by Word Wide Fund for Nature and Moi University, Nairobi.

Keywords: Kenya/ group ranch/ pastoralists/ wildlife/ costs

- The paper describes the outcome of a workshop held after field work was conducted in two group ranches around the Maasai Mara National Reserve to investigate the economic loss to pastoralists from 'living with wildlife' (e.g. predation and associated costs). Participants cited livestock predation particularly from leopard, as a major concern. Other concerns were competition over water, pasture and the transmission of disease. Although it was conceded that, with the high densities of wildlife on the ranch throughout the year, competition for resources was inevitable, communities felt there were ways in which they could be compensated. These included:
- the receipt of wildlife-derived income
- improvement of local educational facilities
- strategic provision of water for people and livestock
- improved veterinary services
- medical assistance for wildlife-related injuries
- compensation for property destroyed and
- the provision of local education and extension services which relate to conservation and development at the local level

145. **Nabane, N. (1995):** 'Lacking confidence? A gender sensitive analysis of CAMPFIRE in Masoka Village.' *Wildlife and Development Series No. 3.* London: International Institute for Environment and Development.

Keywords: Zimbabwe/ Masoka/ CAMPFIRE/ gender/ patriarchy/ wildlife/ participation

This report examines the gender aspects of one Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) initiative in Masoka village located in the Zambezi Valley of Zimbabwe. Traditionally decision making in relation to wildlife is a patriarchal institution and this has been reflected in Masoka, as CAMPFIRE outcomes have been stratified according to gender. Although both women and men have benefited from the cash dividends raised in the CAMPFIRE project in the village, (which has provided income stability especially in times of disaster), the erection of a game fence to protect an area for cultivation has had unforeseen consequences for the village women. Women were excluded from this decision-making process regards the fence and although the fence does reduce the amount of time both sexes have to spend protecting their crops from raiding, it has also restricted women's access to other resources such as fuel wood and water. This has compound effects on women's labour time and family wellbeing, as women must spend longer times involved in these tasks at the expense of other household activities, such as food preparation. However, the programme has opened up new avenues for women, which may enable them to enhance their participation.

146. **NCA (1996):** Ngorongoro Conservation Area: General Management Plan. Ngorongoro Conservation Authority. Arusha, Tanzania: Ministry of Natural Resources and Tourism.

Keywords: Tanzania/ Ngorongoro/ management plan

This report provides guidelines for the Ngorongoro Conservation Area's (NCA's) 'natural and cultural resource management, community development, tourism and administration operations for the next 5 to 10 years' (p ix). The report states that it was participatory in its assessment methodologies, and presents a comprehensive overview of the NCA (its significance, management issues, resources, management objectives, and zoning scheme management plans) as well as proposed actions for: natural resource management, cultural resource management, community development, tourism management, administration and operations.

147. **Neumann, R. P. (1992):** 'Political ecology of wildlife conservation in the Mt. Meru area of north-east Tanzania.' *Land Degradation and Rehabilitation,* 3: 85-98.

Keywords: Tanzania/ protected areas/ political ecology/ wildlife conservation/ conservation/ history

Author's abstract: Wildlife conservation problems in Tanzania are examined from a political ecology perspective. The analysis is historical, exploring the establishment of national parks under British colonial rule and the tightening of state control over access to resources at the expense of customary rights. Examples are presented from the Mt. Meru area of north-eastern Tanzania. During the colonial period, the formal political debate over land and resource rights was conducted with the participation of African peasants. After Independence, the state continued to assert control over resource access unilaterally. As Meru peasants have effectively been shut out of the formal political process, their only recourse for defending the loss of access to natural resources is everyday forms of resistance, including de facto alliances with commercial poachers and 'foot dragging' in regard to compliance with conservation laws. Consequently, there is little local support for current wildlife conservation policies on Mt. Meru and wildlife populations have declined in the 30 years since Arusha National Park was established there.

148. **Neumann, R. P. (1995):** 'Local challenges to global agendas – conservation, economic liberalisation and the pastoralists rights movement in Tanzania.' *Antipode,* 27, 4: 363.

Keywords: Tanzania/ land rights/ wildlife conservation

Since the mid-1980s, 'democratisation' and structural adjustment have been transforming domestic political economies throughout sub-Saharan Africa. In Tanzania, these processes could significantly alter the terrain in the conflict between local land rights and state wildlife conservation. The situation has become increasingly complex, as the parties involved - landholders, state and international conservation agencies - are joined by land rights political organisations, domestic conservation groups and foreign capital. The paper focuses on struggles over land and resource rights, specifically on new forms of grassroots political action which have raised the issue of wildlife conservation in national parks. At the same time, tourism is expanding with an influx of foreign capital. The paper explores the implications of the interactions between these forces.

149. **Ngeranwa, J. J. N., Venter, E. H., Penzhorn, B. L., Soi, R. K., Mwanzia, J., and Nyongasa (1998):** Characterization of *Anaplasma* isolates from eland (*Taurotragus oryx*). *Veterinary Parasitology*, 74: 109-122.

Keywords: Kenya/ South Africa/ *Anaplasma*/ cattle/ sheep/ eland

Anaplasma were isolated from two eland, one from Kitengela, Kenya and one from South Africa. The isolates were put in splenectomised sheep and calves and DNA profiles were done. The Kenya isolate was similar to *A ovis* causing disease in sheep. The South African isolate was similar to *A marginale* causing disease in calves. It was concluded that eland can be carriers of both *A marginale* and *A ovis* parasites and may therefore be important reservoirs that need attention in the epidemiology of anaplasmosis.

150. **Norton-Griffiths M. (1996):** 'Property rights and the marginal wildebeest: an economic analysis of wildlife conservation options in Kenya.' *Biodiversity and Conservation,* 5: 1557-1577.

Keywords: Kenya/ land tenure/ property rights/ biodiversity conservation/ marginal costs and benefit/ tourism

This paper discusses policy responses to the conversion of rangelands into arable land, and the potential loss of biodiversity incurred in the Mara area of Kenya. It examines two fundamental issues. Firstly, 'to what extent do the Maasai, the traditional owners and users of the land, have the right to benefit from the development potential of their land to further their economic, social and political standing, even if by doing so it creates global externalities in terms of biodiversity loss?' Secondly, 'if the state alienates their development rights in the name of conservation, to what extent should the state compensate the Maasai for their lost economic opportunities?' Central to the debate are the property rights both of the Maasai and the government, and the perceived benefits of conservation to both parties. To the government, which benefits from the revenues generated by international 'ecotourism', conservation is seen as a public good. To the Maasai, conservation is seen as a public bad, as it is seen to increase their costs of production and hinder their development. The author performs a cost-benefit analysis of conserving wildebeest on Maasai Mara Game reserve inner and outer group ranches. He concludes that it is not sustainable to 'condemn the Maasai to poverty on behalf of conservation' and that it would be 'socially profitable' for the government of Kenya to meet the opportunity costs of forgone economic benefits.

151. **Norton-Griffiths, M. and Southey, C. (1995):** 'The opportunity costs of biodiversity conservation in Kenya.' *Ecological Economics*, **12**, 2: 125-139.

Keywords: Kenya/ biodiversity conservation/ incremental costs/ opportunity costs

This paper estimates the opportunity costs of biodiversity conservation in Kenya from the potential net returns of agricultural and livestock production, and compares them with the net returns from tourism, forestry and other conservation activities. At the national level, agricultural and livestock production in the parks, reserves and forests of Kenya could support 4.2 million Kenyans and generate gross annual revenues of $565 million and net returns of $203 million. These forgone net returns of $203 million, some 2.8% of GDP, represent the opportunity cost to Kenya of biodiversity conservation. The current combined net revenues of $42 million from wildlife tourism and forestry are quite inadequate to cover these opportunity costs to land.

The government of Kenya is clearly subsidising conservation activities whose chief values are indirect and external to Kenya, and their ability to continue doing so will be a function of growth and modernisation in the Kenyan economy. Dependency on land will increase if the economy stagnates and rural populations continue to grow, and while the government of today may not consider degazetting parks and reserves, the situation could be quite different in 25 years when rural populations have doubled yet again. Dependency on land will fall only once the economy grows and modernises and rural populations are drawn off the land and into industrial and service sectors.

Given the global nature of the benefits from Kenya's conservation efforts, it is quite inappropriate that so much of the cost is born by Kenya. The present scale of subsidies should instead form the basis for international negotiations to transfer funds to meet all or part of them. At present the global environment facility (GEF) is the only operational programme through which such contributions can be channelled to meet the incremental costs of biodiversity conservation, but situations such as the one described here for Kenya were never envisaged when the GEF was designed. If the developed world expects a country like Kenya to maintain its conservation estate on its behalf, then it must be prepared to contribute substantially towards these costs, until such time as Kenya can afford to carry the burden itself.

152. **Norton-Griffiths, M. (1998):** 'Economics of wildlife conservation policy in Kenya.' In Milner Gulland, E. J. and Mace, R. (eds.) *Biological Conservation and Sustainable Use.* Oxford: Blackwells.

Keywords: Kenya/ wildlife/ conservation/ economics

The percentage decline in wildlife in Kenya over the last two decades is greater outside protected areas, on non-adjudicated land and in areas where tourists do not visit. The main policy failures responsible are:

- prohibition on consumptive use of wildlife and use of resources within protected areas, combined with a complete inability to monitor or enforce
- subsidies to agricultural and livestock production

This has led to the over-conversion of rangelands to livestock and agricultural production at the expense of conservation. The main institutional failure is the lack of property rights and use rights of landowners over wildlife. The main market failure is the absence of incentives to conserve the wildlife resource.

KWS is attempting to reintroduce financial incentives for conservation through:

encouraging private sector tourism on private land
permitting some consumptive use of wildlife (cropping, game ranching and game farming)
substantial grants for conservation

However, a number of problems persist:

compliance costs may be excessive
negative externalities associated with wildlife, which impact on livestock and agriculture

Ratios of wildlife to livestock populations will depend on the marginal returns to wildlife in comparison to livestock, and the development potential of the land, which will change in response to population growth, market expansion and agricultural technology change. Wildlife policy must therefore widen its scope to include a wide range of instruments, such as differential land use taxes and conservation subsidies.

153. **Okali, C. and Barrett, K. (1997):** 'Thoughts on research needs relating to the social and economic interactions between tourism, pastoralism and wildlife management.' In the UK Department for International Development's Renewable Natural Resources Research Strategy Semi-Arid System's invitation to submit research proposals: 'Strategies for the sustainable management of social and economic interactions between tourism, pastoralism, wildlife and other common property resources developed and promoted.'

Keywords: Sub-Saharan Africa/ tsetse/ pastoralism/ wildlife

Discussions on the interface between pastoralism and wildlife are linked to a consideration of tsetse fly and its control, as well as an understanding of the socio-political/ historical context of the various stakeholders concerned in the debate. Pastoralism is recognised in this document as referring to a wide range of land use systems: from mixed crop livestock systems where animals are principally kept for draught power to 'full pastoral systems where animals are the principle if not sole source of livelihoods' (p 2). Tsetse control programmes were justified by colonial and post-colonial governments as opening up new lands for cultivation, reducing conflicts of interest between those who engaged predominantly in crop production to sustain their livelihoods and those who invested more in livestock production.

Tsetse control is ongoing in a limited number of areas. Where these coincide with wildlife (as in national parks/ safari areas/ wilderness areas), the implications for tourism need to be considered as well as the potential degree and type of community participation in tourism. Where pastoralism is predominantly transhumant/ migratory/ semi-sedentary, community participation is 'unlikely to be feasible except in terms of financial contributions through a tax policy of one kind or another' (p 3).

Tsetse control programmes have shifted from a 'total eradication' perspective to a 'tsetse suppression' strategy. This accords more with moves to decentralise development initiatives away from exclusive control by government and create economically and socially sustainable policies in this area. With the possibilities of increased human settlement and/ or increased opportunities for livestock production and use, tsetse control becomes more relevant in discussions of sustainable livelihood opportunities, particularly where livestock populations are brought into increased contact with wildlife, and where there is the possibility of income sharing from consumptive and non-consumptive tourism.

The paper raises issues over who shares in the costs and benefits of tsetse control, how these are perceived by various stakeholders, who participates in programmes, and what form that takes. Other issues to be investigated pertain to institutional collaboration and partnerships, particularly with the private sector; and the paper poses a set of research questions to this effect. The authors discuss issues of land use planning, and raise further questions for research.

154. **O'Reilly, L. M. and Daborn, C. J. (1995):** 'The epidemiology of *Mycobacterium bovis* infections in animals and man - a review.' *Tubercle and Lung Disease*, 76: 1-46.

Keywords: Tuberculosis/ *Mycobacterium bovis*/ livestock/ wildlife/ man

Tuberculosis is primarily a respiratory disease and transmission of infection within and between species is mainly by the airborne route. *Mycobacterium bovis*, the cause of bovine-type tuberculosis, has an exceptionally wide host range. Susceptible species include cattle, humans, non-human primates, goats, cats, dogs, pigs, buffalo, badgers, possums, deer and bison, Many susceptible species, including man, are spillover hosts in which infection is not self-maintaining. In countries where there is transmission of infection from endemically infected wildlife populations to cattle or other farmed animals, eradication is not feasible and control measures must be applied indefinitely. Possible methods of limiting spread of infection from wildlife to cattle including the use of vaccines are outlined. The usefulness of DNA fingerprinting of *M. bovis* strains as an epidemiological tool and of BCG vaccination of humans and cattle as a control measure are reviewed.

The factors determining susceptibility to infection and clinical disease and the infectiousness of infected hosts and transmission of infection are detailed. Reports of the epidemiology of M. bovis infections in man and a variety of animal species are reviewed. *M. bovis* infection was recognised as a major public health problem when this organism was transmitted to man via milk from infected cows. The introduction of pasteurisation helped eliminate this problem. Those occupational groups working with *M. bovis*-infected cattle or deer, on the farm or in the slaughter house, are more likely to develop pulmonary disease than alimentary disease. In recent years, tuberculosis in farmed cervidae has become a disease of economic as well as public health importance in several countries. Nowadays, the human immuno-deficiency virus (HIV) is associated with a greatly increased risk of overt disease in humans infected with Myobacterium tuberculosis. It is believed this increased risk also occurs in the case of *M. bovis* infections in humans.

155. **Paling, R. W., MacOwan, K. J., and Karstad, L. (1978):** 'The prevalence of antibody to contagious caprine pleuropneumonia (mycoplasma strain F38) in some wild herbivores and camels in Kenya.' *Journal of Wildlife Diseases*, **14**: 305-308.

Keywords: Kenya/ wild herbivores/ camels/ contagious caprine pleuropneumonia

Antibodies to *M. mycoides* were found in buffalo, impala and camels, but not in other species of wild antelope.

156. **Palmer, R. (1997):** 'Contested lands in southern and eastern Africa: a literature survey.' OXFAM Working Paper pp. 306. Oxford: OXFAM (UK and Ireland).

Keywords: Africa/ eastern/ southern/ land tenure/ land reform/ pastoralism/ women

This paper provides an authoritative review of 14 African countries, giving accounts of relevant papers on tenure, reform, pastoralism and women, as well as other more general papers. In the general introduction, Palmer provides an overview of land issues and trends.

Primarily there is a shortage of available land for cultivation, and therefore the pressure is to privatise what land there is with a view to foreign investment where appropriate. Farming and grazing lands held under communal tenure have come under increased threat: land commissions have been set up (in Tanzania, Zimbabwe, Mozambique and Malawi); national land policies created (in Zimbabwe and Tanzania); and new land laws passed (in Mozambique, Tanzania and Uganda). As a direct response to such pressures there has been the emergence of grassroots and national NGO co-alliances demanding more open debate on land reform. The impacts of land reform are often greatest on the poor and vulnerable, including women, and groups unaware of their legal rights are being exploited.

In the past the World Bank has viewed indigenous forms of land tenure as a constraint to productive land use, especially agriculture. Hence the Bank's drive through Sectoral Adjustment Programmes (SAPs) to 'improve' land tenure through titling/ registration/ redrafting of land laws, which in theory would encourage privatisation and the development of land markets, leading to improvements in agricultural performance. Palmer researches the literature and concludes that the World Bank is now less dogmatic in its approach and more aware of complexities in land tenure issues, as well as being more oriented to community-based approaches and viewing indigenous tenure as flexible and capable of co-existing with more formal regimes. Increased titling and formal registration are critiqued as disadvantaging secondary land holders and women, failing to resolve land disputes or stimulate the credit market (e.g. in Kenya, where titles became worthless as land owners had no incentives to update them).

However, Palmer cites evidence from Hunt (1996, *q.v.*) who argues that in semi-arid areas, with low population densities, titling can offer people the long-term incentives to invest in resource conservation (soil and water). It is argued that titling is more likely to be justified where there are disputes (e.g. in urban/ peri-urban areas) or resettlement areas or where new project interventions require it. According to Platteau (1996 *q.v.*), land titling is not justified where

land is abundant or of little commercial value, where land transactions or disputes are few, and where other markets are absent or poorly developed.

The current post-cold war period is witnessing the global ascendancy of western economic models where unrestricted market forces, liberalisation, privatisation and structural adjustment policies are fast becoming global macroeconomic hegemons. In Africa the dominant political shifts have been from one-party states to 'democratic' multi-party systems, but corruption is still prevalent. The state's role has diminished in all areas of public policy and there is a rise in the power of globalisation and the World Trade Organisation. Against this backdrop, much rhetoric is given to supporting civil society, but Palmer argues that this is more evident in discourse than in practice.

One of the most pressing issues for new land markets and individual title owners (especially in the case of smaller land owners as in South African black farmers), is whether they will withstand the 'test of the new economic order'? Protective trade barriers have been dismantled in the name of free markets. This makes black farmers vulnerable to competition from cheap subsidised exports, and land becomes concentrated in the hands of commercial élites.

157. **Patel, H. (1998):** 'Sustainable utilisation and African wildlife policy: the case of Zimbabwe's Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) - rhetoric or reality?' Cambridge, MA: Indigenous Environmental Policy Centre, March 1998.

Keywords: Zimbabwe/ CAMPFIRE/ community-based wildlife management

This reports aims to contextualise the pros and cons of Zimbabwe's Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) within the wider framework of the sustainable utilisation of resources in Africa. Fieldwork was conducted within five districts, three of which (Guruve, Nyaminyami and Hurungwe) have had CAMPFIRE projects since the early 1990s. The report concludes that, despite millions of dollars of donor funds being channelled into external organisations for the fulfilment of programme goals in the past eight years (CAMPFIRE is backed by at least US$33 million over a ten-year period from 1989-99, in funds allocated from the US, EU, UK, Japan, Norway, Netherlands and Germany); 'there is little evidence to show that CAMPFIRE has contributed significantly to rural development' (p 1). The authors maintain that, despite the rhetoric of subsidiarity of resource ownership, the implementation process of CAMPFIRE is rooted in 'colonial ideology' which has led to the programme structure facilitating a culture of 'dependency rather than self reliance' (p 1).

The report draws a number of conclusions:

- CAMPFIRE is not a 'community-based, community-directed' programme: rural communities are neither managing, directing nor benefiting from programme activities; several hundred households were evicted; the programme is largely dominated by safari operators, external to community, who receive most of the benefits.
- Local-level business agreements between Rural District Councils (RDCs) and the safari-operating industry weight profits in favour of the latter; revenue which does reach local households is regarded as insignificant and no more than compensatory for refraining from using the wildlife resource base.
- At the national level, the CAMPFIRE strategy is 'devised and supported by the white dominated private wildlife industry to retain their land and increase their control of national policies on land reform and wildlife' (p 2).
- At the international level, the CAMPFIRE strategy and its alleged 'rural development' has enhanced the credibility and profits of the trophy hunting industry, increased donor funds to the sector, influenced wildlife policies across the continent and maintained international markets for trade in endangered species and their products.
- The social sustainability of CAMPFIRE is undermined by forced evictions/ coerced resettlements; the divisive nature of the programme's financial benefits; lack of involvement of local knowledge and practices; and continued prohibition of local use of the wildlife resource base.
- Economic sustainability is low, as studies reveal a limited contribution from wildlife-derived revenue to local households (2-4%). 'Wildlife has not been proven to be a more viable form of land use than subsistence agro-pastoral activities in the communal areas' (p 2). Over-reliance on private safari operators and financial mismanagement at the RDC level have also constrained the contributions to household income levels, as well as employment opportunities and local capacity to manage small income-generating projects in programme areas.
- Ecological sustainability is undermined by 'mismanagement of the trophy quota system; continued subsistence and commercial poaching; failure of the program to resolve human-wildlife conflict; and the total dependence of wildlife management activities on revenues generated by private safari operators' (p 2).

The author claims that the programme has contravened funding requirements 'on the issue of human rights violations, participation of women and the use of funds for lobbying the US Government' and

has 'done little to assist rural communities in their call for equitable land distribution and access to natural resources' (p 2).

It is concluded that CAMPFIRE does have the 'potential to become a community owned program, rooted in the culture and tradition of rural Zimbabwean society' (p 2). A number of recommendations are made:

- All forced evictions must stop, and funding must be stopped until this is investigated.
- Government policies should encourage more equitable access to resources for rural communities living with these resources.
- Independent and public enquiries should be held into profits generated by private safari operators in communal areas.
- Economic feasibility study should be undertaken to investigate how much tourism revenue the Zimbabwe government has lost to the private wildlife industry.
- Enforceable guidelines should be developed to increase the managerial and financial transparency and accountability of the private safari operators and RDCs, including a facility for monitoring the process by rural communities.

In the longer term:

- The capacity of local communities to play a central role in the implementation process should be strengthened.
- Mechanisms to ensure that donor funds directly benefit rural communities rather than external organisations should be put in place.
- External revenue-generating schemes (such as trophy hunting) should be replaced with more 'appropriate small-scale wildlife tourism ventures that are wholly managed at the community level' (p 44).
- The extent to which Zimbabwe's national wildlife resources are being expropriated by an elite minority should be limited.

158. **Parkipuny, M. S. (1991):** 'Pastoralism, conservation and development in the greater Serengeti region.' Drylands Issues Paper, 26. London: International Institute for Environment and Development; and

159. **Parkipuny, M. S. (1997):** 'Pastoralism, conservation and development in the greater Serengeti region.' In Thompson, D. (ed.): *Multiple land use: The experience of the Ngorongoro Conservation Area, Tanzania*: 143-169.

Keywords: Africa/ Tanzania/ Serengeti/ wildlife/ livestock/ parks/ agriculture/ conflicts/ Maasai/ development/ socio-economic

The author discusses issues of conflict over access to resources in the areas that are adjacent to national parks, using the Serengeti region

of Tanzania as a case study. The debate is contextualised historically with reference to wildlife-livestock conflicts in Maasai land, and examines how parklands and agriculture have encroached upon pastoral lands, further increasing pastoralists' insecurity of tenure. Parkipuny concludes that both livestock and wildlife are valuable resources in the area, and this should be recognised in development planning. Policies should focus on meeting the socio-economic needs of local communities.

160. **Pearce, D. (1997): GEC 97-05** 'An economic overview of wildlife and alternative land uses' from the UEA Web site: http://www.uea.ac.uk/menu/acad_depts/env/all/resgroup/cserge/

Keywords: Economics/ sustainable use/ wildlife/ conservation/

The 'sustainable use' of wildlife, as opposed to its outright preservation through 'command and control' policies, has a clear economic rationale. That rationale is based on the fact that wildlife competes with human appropriation of the land for food supply, infrastructure, and other economic development. Stripped of its economic value, wildlife cannot compete - the competitive playing field is too heavily tilted against it.

Some conservation policies have perverse effects. Forbidding the use of wildlife products can simply 'disinvest' economic value (i.e. make the resource valueless or less valuable from an economic point of view). Since much wildlife is also a nuisance, both in terms of disease, interference with crops, and even danger to human life, the effect of taking economic value away is to lose the potential for a conservation relationship between wildlife and the local community. One answer to such problems is to invest economic value in wildlife by creating markets for its use and then, critically, sharing the resulting revenues with local communities. Another solution lies in privatisation, where the landowner collects the revenues and hopefully shares them with local communities or, at least, provides employment. The clue to such arrangements lies in positive incentives, not threats of fines or worse for failing to conserve. Moreover, traditional preservationist approaches leave all the pressures on land unaffected: people are simply excluded from access to land and nothing happens to change the demand for that land.

Evidence on the financial rates of return to wildlife utilisation is fairly extensive, though not always in a form that makes assessment easy. Where it has been standardised in terms of different 'models' of revenues and costs, the evidence suggests that, on many occasions, privatised wildlife pays far better than the usual alternative of cattle, but that on some occasions neither option would meet a standard financial test of being worthwhile. In the long run wildlife will have to pay its way on a more sustainable basis.

Economic appraisal, as opposed to financial appraisal, suggests that, when modifications for overvalued exchange rates and for the 'true' cost of labour are made, rates of return increase. In turn this suggests at least that the wildlife sector should be better treated by national governments (e.g. with more favourable tax regimes).

Further and wider economic appraisal assesses not only the flow of costs and revenues, but the total willingness-to-pay for wildlife. Only a few studies have been carried out for Africa, but they all suggest substantial willingness-to-pay for conservation, particularly from tourists. The relevance of these exercises is that they are, in effect, tracing out the demand curve for wildlife. This then permits an assessment of the effects of charging different levels of price for wildlife viewing and consumptive uses. Several of the economic studies suggest that Africa under-prices its wildlife.

The wider economic studies also suggest that there has to be a greater effort to tap the 'global value' of African wildlife (i.e. the amount that individuals will pay to visit Africa, to conserve the option of future visits, and even simply to conserve wildlife even if there is no chance of the individual ever visiting reserves for real). The Global Environment Facility (GEF) exists to 'capture' such global value, but its resources are modest. This suggests the need for a full exploration of the panoply of global financing mechanisms that exist or that could exist, from debt-to-nature swaps to carbon offsets.

161. **Perry, B. D. (1995):** 'Rabies control in the developing world: can further research help?' *Veterinary Record*, 137: 521-522.

Keywords: Africa/ domestic dogs/ man/ rabies/ control

In Africa rabies is becoming a problem of increasing magnitude. Approaches to control that may be appropriate for Europe and North America may not be suitable for African conditions. Research is needed into more effective delivery of vaccines for dogs (including animals less than three years old) and more effective post-exposure immunisation of humans (less expensive and easier to administer).

162. **Peter, T. F., Anderson, E.C., Burridge, M. J., and Mahan, S. M. (1998):** 'Demonstration of a carrier state for *Cowdria ruminantium* in wild ruminants from Africa.' *Journal of Wildlife Diseases*, 34: 567-575.

Keywords: Africa/ wild ruminants/ heartwater/ carriers

Four wild ruminants, eland, giraffe, kudu and wildebeest were experimentally infected with *Cowdria ruminantium*. Infections were established and transmission by *Amblyomma hebraeum* ticks to sheep and goats was achieved. None of the infected wild ruminants died or developed obvious signs of heartwater, suggesting an innate

resistance to the disease. It is considered that wild ruminants may play an important role in the epidemiology of heartwater and act as reservoirs of *C. ruminantium* infection. Because infection with *C. ruminantium* may be common in African ruminants, it is concluded that there may be significant risks in translocating wild ruminants from heartwater-endemic areas to heartwater-free areas.

163. **Platteau, J. P., (1996):** 'The evolutionary theory of land rights as applied to Sub-Saharan Africa: a critical assessment.' *Development and Change*, 27: 29-86.

Keywords: Evolutionary theory of land rights/ tenure/ market/ privatisation/ constraints

This paper critiques the conventional view that, as population and market integration pressures increase, land rights spontaneously and inevitably move towards individual titling and privatisation. This implies that, when there is competition for scarce land, states are advised to implement formal property rights. Platteau argues that the benefits ascribed to this process are overstated and that, bearing in mind its high cost, informal solutions at a local level are more advisable. He argues for the flexibility and adaptability of indigenous land tenure.

164. **Potkanski, T. (1997):** 'Pastoral economy, property rights and traditional mutual assistance mechanisms among the Ngorongoro and Salei Maasai of Tanzania.' Pastoral Land Tenure Series Monograph 2. London: International Institute for Environment and Development Drylands Programme.

Keywords: Tanzania Ngorongoro/ Maasai/ pastoral economy/ property rights

Author's Preface: The study has two major scientific themes based on anthropological fieldwork among the Ngorongoro and Salei Maasai of northern Tanzania conducted between 1991-1993. The first is a detailed description of the system of property rights in relation to basic pastoral resources, including pastures, water and livestock. This is a necessary introduction to the pastoral ecology and herding strategies in Ngorongoro and Salei areas. Property rights and their distribution among the Maasai should be understood as more than simply a rational system of environmental management.

The second is a detailed description of the pastoral economy, herd dynamics, alternative subsistence strategies, and finally mutual assistance networks which include the redistribution of livestock to needy families. The study shows how Maasai mutual assistance, based on individual and clan-based obligations, is made to work

according to herd problems faced by different local communities. It is also argued that this institution, together with several alternative survival strategies, still operates to alleviate poverty in pastoral society. However, if the process of impoverishment continues over the next few years the Ngorongoro Maasai will cease to be pastoralists, switching instead to full-time cultivation that could threaten conservation of this unique area.

A set of separate, though interrelated, proposals are presented as part of a development project. Community involvement in development planning and management is stressed. Restocking the herds of destitute families, in line with the rules of the traditional redistribution system has been suggested. Veterinary health care services, and controls on cultivation have been set out as key aspects. Attention is also given to creating links between sub-projects, as well as suggesting procedures for the implementation of a viable and self-sustaining programme of activities, both during the project's life and following donor withdrawal.

165. **Pozio, E., DeMeneghi, D., Roelke-Parker, M.E., and LaRosa, G. (1997):** '*Trichinella nelsoni* in carnivores from the Serengeti ecosystem, Tanzania.' *Journal of Parasitology*, 83: 1195-1198.

Keywords: Tanzania/ carnivores/ trichinellosis

A survey of trichinellosis among sylvatic carnivore mammals from the Serengeti ecosystem (Tanzania) demonstrated the presence of *Trichinella nelsoni* in 5 of 9 species examined. Muscle samples were collected from carcasses of 56 carnivores from 1993 to 1995 and frozen before transport and examination. Following artificial digestion of the samples, collected larvae were analysed by the random amplified polymorphic DNA technique. *Trichinella nelsoni* was identified in 1 bat-eared fox (*Otocyon megalotis*), 1 cheetah (*Acinonyx jubatus*), 1 leopard (*Panthera pardus*), 3 lions (*Panthera leo*), and 3 spotted hyenas (*Crocuta crocuta*). The numbers of bat-eared foxes (6), cheetahs (5), and leopards (3) examined were too small to reveal the roles of these carnivore species in the ecology of *T. nelsoni.* The numbers of lions and spotted hyenas examined, with a prevalence of 12% and 23%, respectively, suggest that these species may be reservoirs of *T. nelsoni* in the area under study.

166. **Prescott-Allen, R. and Prescott-Allen, C. (1985):** '*What's wildlife worth? : Economic contributions of wild plants and animals to developing countries.*' London: Earthscan,

Keywords: Developing countries/ wildlife/ animals/ plants/ economic contributions

This publication aims to assess the economic contributions that are made from wild animals and plants to the economies of developing countries. It describes the range and degree of products used and how their contribution is evaluated.

167. **Prins, H. H. T (1992):** 'The pastoral road to extinction - competition between wildlife and traditional pastoralism in East-Africa.' *Environmental Conservation,* 19, 2: 117-123.

Keywords: East Africa/ Serengeti/ Maasai/ wildlife/ conservation

In some developing countries there is a call to open up protected areas and even national parks for low-intensity use by the local population, to alleviate the pressure of the rapidly increasing human population, or because conservationists have been able to 'take' too much land according to others. This conflict in land use has been noted by conservation authorities, and proposals have been formulated to give way to such pressure. Moreover, it has been suggested that there can be a harmonious coexistence between wildlife and livestock, so that opening-up of protected areas would not necessarily be to the detriment of wildlife. It is also noted that the indigenous populations were able to manage wildlife and their habitats in the past, so should be able to do so in the future. The last point in the concerted attack on the status of the protected areas is that 'conservation is an alien concept in Third World countries.'

This paper reviews the question of whether there ever has been such a harmonious coexistence between wildlife and pastoral man in East Africa. Aerial census data from a number of districts in Tanzania and Kenya have been used to demonstrate that livestock out-competes wildlife. At present, 'prestige overstocking' no longer persists, due to the fact that the human population outgrows the livestock population. The author argues that high rates of population growth are at the root of the call for more land, and even if, for example, the whole of the Serengeti were to be handed over to the local Maasai, this enormous, relatively undisturbed ecosystem could absorb the growth of the Maasai population for only some forty years.

According to the author, the key to increased development should not be sought in opening up protected areas, but in payment of *in absentia* benefits by rich western countries. The author argues that this money should be used for developing programmes aimed at population limitation, increased income for the rural poor, and increased, sustainable human densities in areas outside the protected areas.

168. **Roe, D., Leader-Williams, N. & Dalal-Clayton, B. (1997):** *Take only photographs, leave only footprints.* Wildlife and Development Series No 10. London: International Institute for Environment and Development.

Keywords: Tourism/ environmental impacts

Ecotourism is widely assumed to be inherently sustainable, but has the potential to be more environmentally damaging than mass tourism, since it typically occurs in fragile environments. This paper aims to address the lack of research on the environmental impacts of wildlife tourism. The paper concludes that the type and magnitude of environmental impacts (such as disturbance of normal animal behaviour, habitat modifications, increased collection of wildlife products as souvenirs) vary greatly with the type of tourist activity. Four major sources of stress are generated by tourism: permanent restructuring of the environment through construction activities; generation of waste; effects associated with various recreational activities; and changes in human population dynamics, especially seasonal increases in population and population densities.

Tourism often passes through a recognisable life cycle (exploration, development, consolidation, stagnation, decline/ stabilisation/ rejuvenation), and is therefore not necessarily sustainable in financial terms. Patterns of wildlife tourism are often highly concentrated on particular areas and/ or particular species. Diversification should perhaps be encouraged. A complex issue for conservation area managers is how to promote financial sustainability/ self-sufficiency, without detracting from the primary aim of conservation. Private sector involvement in wildlife reserves requires high levels of investment, and is more likely in countries with fewer restrictions on foreign investment and land ownership. In reality, not much tourism revenue accrues to local people from protected area management, and efforts to achieve linkages have been disappointing. Community-based tourism outside protected areas is receiving increasing attention. Political support is essential, as are appropriate institutional structures and rights to ownership of resources.

169. **Roelke-Parker, M. E., Munson, L., Packer, C., Kock, R., Cleaveland, S., Carpenter, M., O'Brien, S. J., Popischil, A., Hofmann-Lehmann, R., Lutz, H., Mwanengele, G. L. M., Mgasa, M. N., Machange, G.A., Summers, B. A., and Appel, M. J. G. (1996):** 'A canine distemper virus epidemic in Serengeti lions (*Panthera leo*).' *Nature*, 379: 441-445.

Keywords: Kenya/ Tanzania/ lions/ canine distemper virus

Canine distemper virus (CDV) is thought to have caused several fatal epidemics in canids within the Serengeti-Mara ecosystem of East

Africa, affecting silver-backed jackals (*Canis mesomelas*) and bat-eared foxes (*Otocyon megalotis*) in 1978 (ref. 1), and African wild dogs (*Lycaon pictus*) in 1991 (refs 2, 3). The large, closely monitored Serengeti lion population (refs 4,5) was not affected in these epidemics. However, an epidemic caused by a morbillivirus closely related to CDV emerged abruptly in the lion population of the Serengeti National Pack, Tanzania, in early 1994, resulting in fatal neurological disease characterised by grand mal seizures and myoclonus; the lions that died had encephalitis and pneumonia. The identification of CDV from these lions, and the close phylogenetic relationship between CDV isolates from lions and domestic dogs is reported. By August 1994, 85% of the Serengeti lion population had anti-CDV antibodies and the epidemic spread north to lions in the Maasai Mara National reserve, Kenya, and uncounted hyaenas, bat-eared foxes, and leopards were also affected.

170. **Rossiter, P. B. (1986):** 'The significance and control of rinderpest and other virus diseases transmitted between domestic and wild animals.' In MacMillan, S. (ed.): *Wildlife/Livestock Interface on Rangelands,* 63-68. Proceedings of a conference held at Taita Hills Lodge, Kenya, 22-25 April, 1985. Nairobi, Kenya: Inter-African Bureau for Animal Resources.

Keywords: Africa/ wildlife/ livestock/ virus disease/ rinderpest

A brief description of viruses and their different cycles of perpetuation in populations of susceptible animals is presented. It is concluded that the only virus disease other than malignant catarrhal fever that could at present pose a threat to combined wildlife and domestic stock ventures is rinderpest. Unleashed it has the power to destroy populations. Co-operation between wildlife and veterinary authorities on research and surveillance of this virus is the best way to prevent such a calamity. Other viruses are unlikely to be capable of such damage but altered circumstances could lead to new strategies of virus perpetuation and to unforeseen losses such as occurred with kudu rabies in Namibia.

171. **Roth, E. A. (1996):** 'Traditional pastoral strategies in a modern world - an example from northern Kenya.' *Human Organisation,* 55 (2): 219-224.

Keywords: East Africa/ Kenya/ drought/ conservation/ Turkana/ livestock/ pastoralism/ Rendille

Traditional pastoral economies of sub-Saharan Africa are frequently characterised as ecologically insensitive. Particularly vilified is traditional herd-maximising behaviour, by which pastoralists

allegedly overstock rangelands to buffer against drought-induced livestock loss. This study analyses household herd data for Rendille pastoralists of northern Kenya to evaluate the effectiveness of herd-maximising behaviour and consider its socio-ecological effects. Results indicate that maximisation remains an effective buffering strategy. However, in the present situation it combines with decreased herd mobility, increased commercial exchange and herd diversification to place additional stress on the modern, sedentary Rendille pastoral economy. Despite this last finding, maximising behaviour may aid the future viability of East African pastoralism by providing a reservoir of highly adapted, surplus animals for restocking programs.

172. **Sandford, S. (1995):** 'Improving the efficiency of opportunism: new directions for pastoral development.' In Scoones, I. (ed.) (1995): *Living with uncertainty: new directions in pastoral development in Africa*, 174-183. London: Intermediate Technology Publications.

Keywords: Africa/ semi-arid/ livestock / pastoralism/ non-equilibrium/ opportunism/ flexibility/ adaptability/ institutional management/ development/ conservation

Sandford presents the overview chapter in which he synthesises the main points addressed in the book:

- Rangelands and grazing in many parts of semi-arid Africa exhibit non-equilibrium dynamics, therefore rangeland productivity is constrained more by density-independent (predominantly abiotic) factors rather than density-dependent (biotic factors).
- Hence livestock has a small impact on productivity of the grasslands in these areas.
- Opportunistic tracking, in which livestock numbers and thus demand for feed match the production of grass, is the most efficient and risk averse strategy.
- Heterogeneity in space and time means that forage cannot be economically transported over distances, therefore herd mobility should be promoted.

It has been suggested that the contour line of 30% CV (coefficient of variation) of annual rainfall is a practical dividing line between equilibrium and non-equilibrium systems. Non-equilibrium systems fall to the drier side of the boundary between the sub-humid and semi-arid zones, closer to the bi-modal rainfall areas of east Africa and further away to the Sahel. It is estimated that half of Africa's domestic livestock population live in such a non-equilibrium environment. Destocking in response to drought, tracking of resources in space and time, and opportunism are practised to some extent. However, Sandford argues that herders usually destock too

late or cannot rebuild numbers fast enough after drought, due to slow reproduction rates of herds and lack of capital to buy in from others when livestock prices are high.

Sandford defines efficient opportunism as the exact tracking in time/ space of feed, and asserts that traditional pastoralism is only semi-efficient (cattle 62% and goats 82% of the stocking rates achieved by efficient pastoralism), leading to lower output. Evaluating these differences, Sandford concludes that it is unlikely that the gap between semi-efficient and efficient pastoralism will narrow by more than 40% of present productivity levels (less than the productivity gain expected from improving technology in crop production). But even if achieved, this would keep *per capita* output at or above present production levels for only 15 years.

New directions

In Botswana: Tribal Grazing Lands Policy was based on the belief that a doubling of productivity in communal areas could be achieved by controlling livestock numbers, improving water and fencing. In reality, commercial and research ranches have had lower land productivity (only a half, according to some indexes) than communal systems. Sandford suggests encouraging pastoralists in non-equilibrium systems to practise opportunism, and supporting policy measures to promote this, as well as finding ways to increase the efficiency of opportunism or preventing it from declining.

Sandford asks if resources should be redirected into re-equipping the pastoral population into non-pastoral occupations (through education, grants of land or capital), maybe as settled agriculturalists or in the rural/ urban wage economy. Pastoralists themselves see their futures as much more secure if buffered by alternative non-farm incomes. Pastoralists are using resources they acquire to diversify other family members' occupations.

Increasing and preserving the efficiency of opportunism

Toulmin's work (presented in the book) describes how traditional mechanisms in society for de- and restocking are becoming less effective, and outside interventions are too costly, except where the pastoral sector is small. Therefore the ability of livestock breeds to survive periods of relatively low feed intake in non-equilibrium semi-arid environments is crucial. The effects of environmental fluctuations on milk production, weight and calving rates are lower in indigenous cattle (e.g. Zebu).

There has been increased integration of livestock and crop activities as land has been cleared for cultivation in the sub-humid zone, opening tsetse-free wet season grazing to transhumant populations in the northern Sahel as they move south. This change in land use is also due to increased pressures on the resource base, and more land taken into cultivation. Where there is sufficient water, cropped land

can often produce more livestock feed in the form of crop residues. However, this is not really a viable option especially in non-equilibrium environments, except for where irrigation is used.

Sandford includes the following as key issues in terms of equity and productivity:

- whether or not crop residues are available when feed is short and
- whether the average annual increase in feed is offset by the increased inter-annual variability in feed availability (i.e. in drought years does a herder get more productivity from crop residues than from natural pasture?)

The author concludes that, except in areas where deep rooting perennial grasses are important, the inter-annual yield of natural grazing is unlikely to be less, but the inter-annual area variability of natural grazing is likely to be less, and more evidence is needed.

Productivity, stability and equity

'My personal opinion is that we social scientists have not yet structured our views rigorously enough to have any clear message for policy makers and practitioners except that everything is very complex, that Hardin (1968) was wrong and that livestock mobility is to be encouraged.' (p 198).

The forms of management and organisational strategies adopted in any given situation depend upon the characteristics of that situation, as well as a consideration of development objectives. For example, different management strategies are required where the objective is equity rather than efficiency; different veterinary services are required depending on population density and household mobility.

Pastoralists trade off stability versus productivity and income in risk minimising strategies. Opportunism is an unstable way to make a living. Pastoralists diversify species and sources of household income in order to be better equipped for change. An important question is to what degree is opportunism enforced by environment, or chosen as a trade off between income stability. The author asks whether there are examples of different communities in the same environment practising different degrees of opportunism (e.g. in the Sakuye section of Borana in Northern Kenya, one group specialises in more drought-tolerant camels while another specialises in more drought-susceptible cattle - how are these choices justified in terms of stability and risk aversion?)

Implications for donors

In the past, costly management schemes have been based on the idea of increasing productivity by controlling numbers and offtake on neat ranges. Some of the marketing strategies (e.g. eradicating disease from areas, which was seen as a prerequisite to getting preferential access to international markets) were compatible with opportunism,

although they underestimated protectionism in markets. Sandford states that the livestock marketing division in Kenya was well focused to serve opportunism but it proved very costly. Veterinary and water developments were often criticised for sometimes giving outsiders access to past resources.

The author calls for more research into stock routes, holding grounds and canning plants, and the removal of livestock while still allowing profit. If livestock are removed early enough, prices encourage destocking and not retention. Canning enterprises may lose profits, but these will be offset by the reduction in potential future expenses of governments and relief agencies if pastoralists have money to buy food and restock later.

173. **SARDC, IUCN, SADC, (1994):** 'Wildlife and protected areas.' In *State of the environment in southern Africa.* Johannesburg, South Africa: Southern African Research and Documentation Centre, International Union for the Conservation of Nature and the Southern Africa Development Community.

Keywords: Southern Africa/ biodiversity conservation/ protected areas/ game ranching/ consumptive use/ non-consumptive use/ sustainable use

The biological diversity of southern Africa's diverse ecosystems is under increasing pressure. This chapter looks at efforts to create and sustain networks of protected areas, and encourage the conservation of biodiversity outside protected areas, in order to ensure that southern African countries can 'afford to maintain wildlife through income generated from wildlife resources' (p 157). Realising the weaknesses of the protected areas approach both within and outside such areas, management strategies based on the sustainable utilisation of resources have been implemented. Such programmes have taken place on both private and communal lands.

Game ranching

The preservationist/ protectionist stance that many colonial governments adopted towards wildlife did little to encourage its 'gainful utilisation' (p 171) on private or state-owned land. As the potential benefits of wildlife were increasingly recognised, game ranching was encouraged, beginning formally in the 1950s. Some of the perceived benefits from wildlife were: better disease resistance than livestock; better adapted to arid conditions; more efficient use of plants; higher reproductive rates and meat production potential; lower maintenance costs and higher overall growth rates.

Changes in legislation and, in the case of South Africa, government subsidies, facilitated the development of ranching with game often in conjunction with livestock. In Namibia and South Africa 'ranchers

own game on their land while in Zimbabwe they are proprietors' (p 171). In Namibia about '80% of wild animals are found on private land'. South Africa practices game ranching on about 10,000 ranches covering 16 million hectares. In Zimbabwe, about 10% of commercial farmers keep wild animals, 8% of Botswana's private land is set aside for hunting and wildlife-based tourism, and Swaziland is setting up game ranches.

The authors argue that 'multi-species game-ranching causes less damage to the environment than livestock alone, as long as stocking densities and mixes are appropriate' (p 171). Wildlife yields economic benefits through consumptive (e.g. hunting for trophies and meat) and non-consumptive uses (e.g. tourism and photography). The sale of live animals also generates income as does the development of tourism infrastructure in these areas. In terms of cash revenues generated, wildlife-related activities exceed that of livestock production. However, studies in Botswana and South Africa have shown that multi-species game production requires a high capital outlay and necessitates high maintenance costs when compared to livestock production, hence it is regarded as 'economically inferior'. Game ranching is also criticised for its physical restriction of wildlife populations and therefore their long term genetic viability.

Community-based wildlife management (CBWM)

As the protected areas approach failed to eradicate threats from poaching, engaging the support of those people who occupy marginal lands near protected areas is now seen as vital to the conservation and management of wildlife in Africa. With the advent of colonial exclusionist/ preservationist conservation policies, people who previously co-existed with wildlife were prevented from hunting wildlife despite its importance culturally as well as threats to their livestock and livelihoods. Consequently, conflicts of interest arose between the state and the local people in areas set aside for wildlife conservation. CBWM aims to enhance the conservation of wildlife outside protected areas and private lands while simultaneously affording rural peoples benefits from the wildlife resources in their areas. According to the authors, its main weaknesses pertain to inadequate control of wildlife by local communities due to communal tenure arrangements. Thus private ownership is advocated as the panacea of CBWM.

Target areas for CBWM are those with abundant and useful natural resources, for example:

- CAMPFIRE (Communal Areas Management Programme for Indigenous Resources), Zimbabwe
- ADMADE (Administrative Management Design for Game Management Areas), Zambia
- Selous Conservation Programme, Tanzania

- Wereldsend Community, Namibia
- Wetlands Programme in the Kafue and Bengweulu flats, Zambia
- LIRDP (Luangwa Integrated Resource Development Programme), Zambia
- Serengeti Ecosystem Conservation, Tanzania
- Lebatlane Community Game Management Programme, Pilanesburg, South Africa

Hunting generates the most revenue and can be used in community projects. Similarly, locals living near game-management/ game-controlled/ wildlife conservation areas in Botswana, Tanzania and Zambia can hunt for only 14% of the market value of the animal. In South Africa people living near national parks receive a share of the revenue from wildlife-based tourism, and in Tanzania, communities near hunting areas receive 25% of the trophy fee.

174. **Scoones, I. (1992):** 'Land degradation and livestock production in Zimbabwe's communal areas.' *Land Degradation & Rehabilitation*, 3: 99-113.

Keywords: Zimbabwe/ rangeland degradation/ degradation indicators/ livestock production/ farmer perceptions/ spatial patterns of soil loss/ range management/ common property resources

Scoones assesses evidence for land degradation and its impact on livestock production in the communal areas of southern Zimbabwe. Rangeland degradation has been assessed in terms of primary and secondary production indicators (e.g. vegetation changes and livestock production parameters such as liveweight). Time series data for livestock is compared to local perceptions of the environmental change in the areas.

Scoones maintains that whereas soil erosion and changes in vegetation are inevitable in the savanna lands, it is important to assess the rate at which current changes are occurring and their economic impacts in terms of the livelihoods affected. Range degradation is defined as: 'an effectively permanent decline in the rate at which the land yields livestock products under a given management system'. Hence, the extent of degradation can only be assessed in relation to the detrimental effect on potential economic returns from a specified type of land use.

Establishing indicators and evidence of an 'effectively permanent' environmental change and 'irreversible reduction of livestock output' at primary and secondary production levels is difficult. Savanna ecosystems are more resilient than was previously thought and are now thought to be best understood in terms of non-equilibrium dynamics. Spatio-temporal variation in resource availability and

importance both complicates assessments of 'degradation' and places different weights on the implications of degradation.

Scoones examines the evidence for rangeland degradation in the communal areas by looking at long-term changes in primary and secondary production. The former are mainly determined by rainfall, although this is mediated by soil type, and the latter is detected using long-term changes in output (e.g. birth rates, extraction rates and draft productivity). In the case of primary productivity, no evidence of directional trends was forthcoming, but sites were subject to 'unpredictable' changes in status, 'often due to the interaction of rare events' (p 101). There was also little evidence for secondary rangeland degradation as defined above, from the data on cattle production (population density; changes in productivity parameters; cumulative stocking rates; extraction rates). Despite protestations of 'imminent collapse', cattle numbers in the communal areas have continued to rise and any density-dependent changes appear to be reversible.

Local perceptions cite lack of rainfall as the main reason for 'lack of grass'. However for those people living on sandy soils, land exhaustion was deemed to be the major constraint. Grass did not return to those areas where settlements were concentrated together, had high concentrations of sodic soils, as in the case of *Colospermum mopane* areas, and where cattle walk to, or concentrate around watering points. Soil erosion is linked to a complex interactions of factors, such as cattle paths to watering points; settlement patterns; allocation of grazeable land; physical factors (e.g. the incidence of heavy rain or strong winds post-drought); illegal activities (e.g. the use of sledges dragged by animals or the cultivation of drainage lines). Land use patterns and their historical evolution are also cited as of consequence in soil erosion. For example, the movement of arable land up the watershed into concentrated blocks, and the establishment of contour ridges under colonial policies, which led to more people being placed on the same amount of land.

Localised land degradation is acknowledged as the result of combined, identifiable processes although it is not perceived as long-term and irreversible.

175. **Scoones, I. (1995):** 'Policies for pastoralists: new directions for pastoral development in Africa.' In Binns, T. (ed.) (1995): *People and the Environment in Africa*: 23-30. Chichester, UK: Wiley.

Keywords: Non-equilibrium/ pastoralists/ management/ opportunism/ policies/ institutional capacity

This chapter examines pastoral development policies, highlighting past failures and recommending policies for future success. One of the main considerations is the proposed paradigm shift from

equilibrium to non-equilibrium ecology. Scoones maintains that many of the past failures in the area of pastoral development can be attributed to imposing equilibrium-based solutions (e.g. controlling carrying capacity/ stocking levels; rotational grazing and ranching) onto non-equilibrium environments. The author provides a detailed account of non-equilibrium ecology for the semi-arid rangelands of Africa.

Policy recommendations support opportunistic management strategies, tracking resource availability in space and time through:

- increasing the amount of locally available feed: importing fodder, managing browse trees or improving the productivity of high-value patches within dry rangelands
- reducing feed requirements by changing water regimes, reducing parasite loads or selecting for indigenous breeds that can tolerate these pressures better than exotics
- moving animals to areas of available fodder through transhumance (as in the seasonal migrations of herds in the Sahel), or localised movement in agro-pastoral areas
- destocking and restocking in response to drought cycles, through sale and repurchase, raiding or loaning arrangements

Tenure, rights of access and use are important issues in non-equilibrium environments, due to the spatio-temporal variation in the availability of graze and water. Pastoral areas are 'traditionally' managed under common property regimes (CPR). Contrary to past thinking, CPR are highly adaptable and complex, involving multi-faceted rights to resources such as open access, communal use with reciprocal arrangements, exclusive use, and privatisation. A key factor in CPR is the establishment of methods for excluding non-members of the regime.

The degree of investment/ management in a resource is related to its value: this will vary according to when and where investment is made, as well as who is perceiving that value. Thus, more exclusive forms of access may be needed in high value patches, for example during drought. The expropriation of pastoral resources is increasing conflict both within and between pastoralist groups as well as between pastoralists and agro-pastoralists, increasing the need for conflict mediation and resolution. This may necessitate legislation to recognise and protect reasonable rights of access and use to key resources in non-equilibrium environments, as well as to specify frameworks for conflict resolution in a range of situations. The author also recognises the increased need for institutional mechanisms for increasingly politicised pastoral groups.

Institutional capacity

Scoones supports increased subsidiarity of management solutions to pastoral institutions at the local level, within a hierarchical arrangement that allows for other regional and national institutions

to intervene in times of crisis (e.g. drought). Local-level institutions are built slowly, within pre-existing frameworks and should be flexible in their composition and roles. For example, permanent groups could form around regular/ common tasks or needs that are widely felt by the community (e.g. secure access to water). More *ad hoc* arrangements can be made to tackle more episodic events. The state has an important role to play in maintaining impartiality in conflict resolution between stakeholders and in providing safety nets/ contingency plans when tracking fails. For example, supporting prices of livestock in drought; food/ cash aid or food for work; nutritional/ veterinary assistance for livestock; and supporting alternative livelihoods that allow pastoralists to re-enter the sector later.

Hence pastoral development strategies should promote flexibility/ adaptability/ subsidiarity and reduced transaction costs, to offer locally relevant solutions that are oriented around multiple objectives involving a range of management tools and approaches.

176. **Scoones, I. (ed.) (1995):** *Living with uncertainty: new directions in pastoral development in Africa.* London: Intermediate Technology Publications.

Keywords: Africa/ pastoralism/ non-equilibrium/ uncertainty/ development / policies

This book addresses the impact of the so-called 'new ecology' of non-equilibrium dynamics on pastoral range management policy and practice in Africa. It questions the use of terms such as 'vegetation succession', 'carrying capacity' and 'desertification' and their applicability in the non-equilibrium environments of the semi-arid rangelands. Productivity in these environments is now thought to be influenced more by density-independent factors, such as variation in rainfall and episodic events such as drought. The chapters deal with the consequences of living with uncertainty, addressing pastoral development planning, range and fodder management, livestock marketing, responses to drought, resource tenure, institutional development and administration issues.

177. **Scoones, I. (1996):** 'Range management science and policy: politics, polemics and pasture in Southern Africa.' in Leach, M. and Mearns, R. (1996): *The lie of the land, challenging the received wisdom on the African environment*, 34-53. Oxford: James Currey, Heinemann.

Keywords: Zimbabwe/ pastoral development/ conventional wisdom/ non-equilibrium/ policies/ paradigms

This chapter examines the historical evolution of the conventional wisdom in rangeland management and pastoral management strategies and looks at how it became the dominant paradigm with only scant evidence to support it. It then discusses the implications for range management policies in Southern Africa, drawing heavily on Zimbabwean experiences. Scoones discusses the philosophical origins of the equilibrium paradigm that has dominated ecological and economic thinking until the past 20 years. This presupposes that abiotic conditions are external to, and of secondary importance to, biotic factors in determining ecosystem functioning. As such, vegetation change is viewed as a linear process with the end point being marked as a 'climax' community, replicable by virtue of environmental factors such as soil type and climate.

Rangeland management in Zimbabwe was typified by the desire to modernise whilst avoiding environmental degradation. This invoked ordered land use policies where stocking levels were regulated to within carrying capacity of the land. Policies to promote this involved settling nomadic or semi-nomadic pastoral populations, in order to increase beef production through increased nutrient inputs to cattle or pasture or 'exotic' breeds of cattle with potentially higher beef production. Rotational grazing systems were promoted on research stations, although the results were not replicated on the rangelands. This was attributed to the 'stupidity' of herders in the communal areas whose attitudes to technological interventions were denigrated though ideas such as Herskovits' cattle complex. Thus communal areas were relegated in terms of rangeland development, and the environmental rhetoric of the US dustbowls and soil erosion focused rangelands management on the sole objective of beef production.

The Native Land Husbandry Act (1952) 'sought compulsion and regulation as the route to planning', but Scoones criticises it for supporting differential access to graze on European-style ranches and communal lands. The need for stock control, better land management and destocking where necessary and post-independence obsessions with technical solutions have diverted attention from 'the basic question about the viability of farming livelihoods in the communal areas' with 'the question of access to land ... continuously side-stepped' (p 42). The environmental degradation argument is being used by the commercial farming lobby to resist the resettlement programme that would open up white commercial land to settlement by black farmers.

As Scoones points out, evidence for environmental collapse is scarce and anecdotal, based more on colonial aspirations of what land should look like. The author maintains that economic estimates of soil nutrient and physical erosion have been overstated, despite having influenced policy so directly. Attempts to foster control through technological intervention, such as orderly fencing and

rotational grazing strategies which make ranches easier to manage and administer (in terms of tax control, veterinary and other infrastructural services), have not resulted in increased output in Zimbabwe's rangelands.

Scoones explores the rise of non-equilibrium ecology that presents a more dynamic explanation of ecological behaviour in the semi-arid and arid savanna regions, and its implications for rangeland management. Rangeland ecology and management strategies have been fundamentally reassessed over the last two decades. Spatio-temporal variation in resource distribution and availability are crucial to this new way of thinking. The primary (and therefore, secondary) productivity of the semi-arid and arid rangelands is now thought to be constrained more by density independent factors such as climatic variability and 'external shocks' to the system, rather than density dependent factors such as stocking rates and grazing pressure, as was previously assumed under the equilibrium paradigm. Hence, Scoones supports Sandford's suggestion of a complete overhaul of livestock policy in Zimbabwe's communal lands to support the opportunistic management strategies of pastoralists, either through mobility or through high stocking rates and short-duration grazing regimes. Herders continually adapt in order to survive in an ever changing ecological and social environment.

178. **Shaw, R. (1998):** 'Crisis at KWS.' *Swara*, 20:6 & 21:1.

Keywords: Kenya/ wildlife management/ financial sustainability

This article raises questions about the current management of the Kenya Wildlife Service (KWS). It argues that the lack of resources for wildlife management is due partly to the decline in the tourism industry, but mainly to misallocation of those resources that do exist. According to the author, field staff are starved of the basic resources necessary to provide adequate protection to wildlife, while disproportionate funds are allocated to workshops, consultants, community wildlife projects and executive staff salaries.

179. **Sibianda, B. M. C., and Omwega, A. K. (1996):** 'Some reflections on conservation, sustainable development and equitable sharing of benefits from wildlife in Africa: the case of Kenya and Zimbabwe. *Southern African Journal of Wildlife Resources*, 26 (4): 175- 181.

Keywords: Africa/ Kenya/ Zimbabwe/ benefit-sharing/ conflicts/ conservation/ equitable/ local communities/ management/ ownership/ resources/ wildlife

Conflicts between local communities and wildlife are exacerbated, as the former do not regard the latter as a priority form of land use, and

because of past historical exclusion or insignificant shares of wildlife-derived benefits. This paper examines the issue of equitable sharing of benefits and costs of wildlife conservation in Africa, and looks at the problems associated with local participation in its management in Kenya and Zimbabwe. The paper investigates the issues surrounding wildlife ownership, effective institutional management and mechanisms to ensure equitable benefit-sharing, and how this is related to local peoples' willingness to provide land for wildlife and hence its sustainable conservation. The paper concludes that local community support is an essential prerequisite to effective and long-term conservation of wildlife and wetlands as part of terrestrial biodiversity conservation.

180. **Southgate, C. and Hulme, D. (1996):** 'Land, water and local governance in Kajiado: a District overview.' *Rural Resources, Rural Livelihoods Working Paper Series.* Paper No. 3. Institute for Development and Management, University of Manchester.

Keywords: Kenya/ Kajiado District/ arid and semi-arid lands/ resource management/ wetlands/ Maasai/ agriculture/ pastoralism.

This paper examines the interactions between the physical environment and human populations in Kajiado district, Kenya, with reference to the changing patterns of natural resource use as well as the nature of the different institutions governing natural resource use at the district level. Households in the arid and semi-arid lands (ASAL) in Kajiado are under increased pressure to exploit the resources they hold. The authors argue that government policies to govern their use are rooted in colonial management policies where the state monopolises the control of resource use. Such policies are increasing the pressure on state institutions at the national, local and district level.

In the agriculturally marginal ASAL, land use practices have diversified in areas of relatively high productivity, such as uplands, and the periphery of rangelands and swamp margins. This has led to an influx of agricultural settlers and an expansion in rainfed and small-scale irrigated cultivation. Despite the contributions to the local and national economies, the social and environmental consequences of agricultural expansion have been felt the hardest by the semi-nomadic Maasai pastoralists. Pre- and post-independence land use and land tenure policies have undermined pastoralism in Kajiado district, resulting in ethnic and political conflicts of interest between pastoralism, wildlife and agriculture.

In terms of aggregate earnings over the past few decades, tourism and agriculture have surpassed livestock rearing in Kajiado District, although the latter is still the most significant in terms of employment. These changes have occurred as the area has been

integrated into the national economy through market forces and policy interventions that have focused on 'modernising' the ASAL through ranches and irrigation schemes. Traditional pastoral institutions that regulated access to land and water have been undermined with the introduction of group ranches and private property regimes.

The stakeholders interested in land use have also diversified. There has been a proliferation of NGO activity in the region and an increase in the numbers of private operators in the area. Although the numbers of Maasai have increased, the Maasai's share of the total district population has decreased from 91% in 1948 to 57% in 1989, and socio-economic inequality has risen, with some groups forming powerful elites and others dependent on famine hand outs. With increased heterogeneity of activities and users, reconciling the interests of different parties becomes more complex. The authors conclude that within Kajiado's wetland areas, achieving sustainable natural resource management seems unlikely.

181. **Stanley-Price, M. R.** (1985). 'Game domestication for animal production in Kenya: The nutritional ecology of oryx, zebu cattle and sheep under free-range conditions.' *Journal of Agricultural Sciences, Cambridge* **104** (2): 375-382

Keywords: Kenya\ diet selection\ water consumption\ rumination\ physiological ecology

Observations on oryx, sheep and cattle under natural grazing conditions in both a wet and a dry season are given and discussed. Dry fecal outputs by the sheep and oryx were less in the wet than in the dry season. Output by the cattle was greater than both, and showed little seasonal difference. Fecal N concentrations showed no interspecific overlap, in the rank order sheep gt oryx gt cattle. All were greater in the wet season, and the rank order maintained. Drinking water intakes were similar for oryx and sheep in both seasons. The cattle's water intake was greater in the wet season. Expressed as ml/ kg W-0.85/ day, there were no overlaps in species' mean intakes, in the order cattle gt sheep gt oryx, in the ratio 100:57:24. In the dry season, the herd walked 16 km on non-drinking days, and a further 7 km on alternate days when receiving water. Under wetter conditions with more forage available, the herd walked only 11 km daily. Slight interspecific differences in the times spent walking, feeding, standing and lying were found over a 48 h period. In the wet season less time was spent walking and feeding, with corresponding increases in the other activities. The oryx were notable in that rumination occupied far less of their daytime activity than for the sheep or cattle although the total times spent ruminating were similar. The results are discussed in relation to differences in the

species' feeding habits and strategies of diet selection, combining the grazing results with observations from penned animals on a common diet. The intakes of water agree with the results from penned animals, confirming oryx's adaptation to hot, dry conditions. The advantages of a low water requirement, met by intermittent drinking, are discussed. The possible detrimental effects on productivity of a regime of day-grazing and night-penning under hot conditions are discussed. In the light of these, some advantages to oryx of scheduling its rumination to the night hours are suggested.

182. **Stanley-Price, M. R.** (1985). 'Game domestication for animal production in Kenya: Feeding trials with oryx, zebu cattle and sheep under controlled conditions.' *Journal of Agricultural Sciences, Cambridge* **104** (2): 368-374.

Keywords: Basal metabolism/ crude fibre/ crude protein/ feed intake/ digestibility/ urine; water consumption/ physiological ecology.

Digestibility trials were carried out with 5 individuals each of domesticated oryx, sheep and cattle, using 3 diets ranging from 12.5 to 7.4% crude protein. Feed intake, water consumption and urine production were measured. Intakes of dry matter (as g/ day or g/ kg W-0.75/ day) did not differ between diets for any species. On a metabolic weight basis the sheep and oryx ate the same amount. The cattle ate more than the sheep of all 3 diets, and more than the oryx in 2 of the 3. For all 3 spp., digestibility of dry matter, crude protein and crude fibre was lower when the lower quality food was given. On any single diet, significant differences in digestive efficiency for any diet component between species were few and small. Total daily intakes of water (ml/ kg W-0.85/ day) were lower for each species when eating the diet with the lowest protein content. On each diet total intakes were significantly different in the decreasing order cattle > sheep > oryx, in the mean ratio 3.3:1.7:1.0. Urine production (ml/ kg W-0.85/ day) varied slightly between diets for each species. On each diet the cattle produced significantly more urine than the sheep or oryx. The ratio of urine produced to water drunk decreased in the order oryx > cow > sheep, in the mean ratios 0.63, 0.34 and 0.27. Despite some inter-specific differences in N concentration, there were few differences in the proportion of total excreted N that as lost through the urine. Calculations of evaporative water loss showed that the loss of water by this avenue was significantly less in oryx than in sheep or cattle, which did not differ significantly. In the absence of any evidence of a more efficient digestion, the low metabolic intake of food by oryx suggests a low metabolic rate. The oryx's low water consumption and small evaporative loss are obvious adaptations to its desert habitat.

183. **Stevenson, P., Jones, A., and Khalil, L. F. (1981):** 'The public health significance of cysticercosis in African game animals.' In Karstad, L., Nestel, B. and Graham, M. (eds.): *Wildlife Disease Research and Economic Development*, proceedings of a workshop held at Kabete, Kenya, September 1980: International Development Research Centre IDRC-179e: 57-61.

Keywords: Africa/ cysticercosis/ wildlife/ public health

Game animals are commonly infected with tapeworm cysts but these are generally tapeworms where the adult occurs in wild carnivores. It is thought that these cysts are not infective to man. The lack of evidence of a public health risk associated with the cysticerci found in wild herbivores in Africa suggests that it may be unnecessary to reject as unfit for human consumption carcasses that are lightly infected. Only on rare occasions have cysts of *Taenia saginata* have been found in game animals.

184. **Stevenson, P., Muchemi, G. and Karstad, L.** (1982): '*Taenia saginata* infection in East African antelopes.' *Veterinary Record*, **111**: 322.

Keywords: East Africa/ *Taenia saginata*/ cysticercosis

A wild topi (*Damaliscus korrigum*) from the Masai Mara was found to have a cysticercus in the shoulder muscles that from the morphology was identified as *T saginata*. One wildebeest (*Connochaetes taurinus*) and one oryx (*Oryx gazella beisa*) were dosed with *T saginata* eggs. No cysts developed in the wildebeest. The oryx was heavily infected with *T saginata* cysts suggesting that this species may be highly susceptible to infection with *T saginata*.

185. **Swanson, T. and Barbier, E. (1991):** *Economics for the wilds. Wildlife, wildlands, diversity and development.* London: Earthscan.

Keywords: Africa/ economics/ sustainability/ wild resources

The authors argue that an economic approach that properly values natural resources offers the best prospects for their survival in the long term. Most of the world's wild areas have been used by local societies who have managed their resources sustainably. Hence their continued participation in this role and the sustainable harvesting of resources is argued to be a vital guarantee to the conservation of wild resources. The book describes an introduction to the economics of valuation of wild areas and resources. The rest of the book is devoted to examining the value of wild resources in the context of: community development in Africa, wildlife tourism, sustainable forest use and poaching. The book concludes that a comprehensive

utilisation strategy is needed to ensure the continued existence of wild resources and the sustained flow of benefits from them.

186. **Swift, J. (1995):** 'Dynamic ecological systems and the administration of pastoral development.' In Scoones, I. (ed.) (1995): *Living with uncertainty: new directions in pastoral development in Africa*, 153-73. London: Intermediate Technology Publications.

Keywords: Non-equilibrium/ pastoralism/ institutional management

Using examples from Somalia and Lesotho, the author discusses potential consequences of non-equilibrium ecological theories for the administration of development in pastoral areas. By looking at pastoral institutions, he argues that three general principles should be followed when designing new forms of administration: flexibility and diversity, subsidiarity, and the reduction of transaction costs.

187. **Talbot, L. and Olindo, P. (1990):** 'Kenya: the Maasai Mara and Amboseli Reserves.' In Kiss, A. (ed.), (1990): *Living with wildlife.* Washington, D.C.: World Bank Technical Paper 130.

Keywords: Amboseli/ Maasai/ conservation/ conflicts/ wildlife/ livestock

The Maasai Mara and Amboseli District Council game reserves were the first major programmes in Africa to incorporate the principle of community participation in conservation, when they were first established over 30 years ago. Although conceived at the same time, the two projects have had widely diverging outcomes. The Maasai Mara is described as 'arguably Africa's most sustained success' in endorsing communities in conservation, while Amboseli Reserve has been subject to various problems and hostile attitudes from local communities, resulting in it returning to national park status. This paper examines the historical, ecological, political, sociological, institutional and economic reasons behind this differential success.

The Maasai Mara is contiguous with the Serengeti ecosystem, lying at its northern limits and acting as a well-watered migration area for wildlife from Tanzania in the dry season. The Amboseli basin however, is a perennial source of water and grazing in an otherwise arid semi-desert savanna at the northern base of Mt. Kilimanjaro. It was, therefore, heavily used by livestock and wildlife in the dry season. Prior to 1961, the western part of the Maasai Mara and all of Amboseli had national reserve status, and were administered by the National Parks. This meant, in both cases, that hunting was prohibited (although crucially, only in the central areas of the Maasai Mara), and limited safari camps were set up under strict management. Both areas were located in Maasailand and therefore

used as grazing lands for pastoralists, but were administered by different district councils (DCs), Narok and Kajiado respectively.

Since the 1930s, conflicts had developed between the Maasai and the wildlife authorities over access to grazing and water. Increasingly the colonial authorities were attempting to curb Maasai use of what was considered their traditional lands. National parks were set up, local populations and their herds were excluded, and hunting outlawed. However, the pastoralist lobby in Amboseli region succeeded in getting Amboseli designated as a national reserve, which enabled some entry and use. However, conflicts increased in the region as populations of humans and livestock increased, and Amboseli's tourist status rose. The Maasai Mara area had less history of conflict with authority, partly due to a sympathetic colonial game warden, but also due to the infestation of tsetse in the area, keeping livestock and wildlife segregated. However, by 1959, as the Maasai managed the area through burning and brush cutting, the tsetse infected area reduced significantly.

In the Maasai Mara, the strategy of reserve management involved the distribution of some of the funds collected at district level through entry fees (charging visitors fees for photography, camping etc.) to those families adjacent to the reserves and using nearby grazing lands. This was considered far-reaching for its time (early 1960s). In 1961, the Kajiado DC negotiated with the Maasai living adjacent to the Amboseli Reserve to set aside 78km^2 free of livestock as a significant wildlife asset. The author notes that by 1968, Amboseli accounted for 75% of the DC's annual income.

The article then describes how the divergence in outcomes for the two areas can be attributed to (in the case of Amboseli): weaker DC institutional management; financial and administrative mismanagement; lack of community 'spirit' due to nomadic pastoralism, and the subsequent undermining of wildlife-funded benefits by conflicts over access to water points in the reserve (leading to the killing of wildlife).

These resulted in the Amboseli reserve being designated as a national park in 1974 (488km^2 compared to 600km^2), after extensive research throughout the late 1960s. The research highlighted sources of conflict and offered potential solutions, such as the provision of a water supply to the communal lands outside the Park, more devolved revenue sharing from the DC, and granting of titles to local Maasai for land remaining which would be owned co-operatively as group ranches.

However, Amboseli has still fared worse than Maasai Mara in the long run, through technological, political, socio-economic and ecological disadvantages. Community relations have never been as strong as in the Maasai Mara region and efforts have been made to increase wildlife extension in the area (Berger, 1993, *q.v.*). The authors conclude that a fundamental lack of participation and

inclusion of the Amboseli Maasai in decision-making surrounding the Park setup, different channels for funding, and lack of training for Park administration in Amboseli have contributed to the different fates of the Parks.

188. **Tarara, R., Suleman, M. A., Sapolsky, R., Wabomba, M. J., and Else, J. G.** (1985): 'Tuberculosis in wild olive baboons, *Papio cynocephalus anubis* (Lesson) in Kenya.' *Journal of Wildlife Diseases*, 21: 137-140.

Keywords: Kenya/ baboons/ tuberculosis

Several baboons in a troop in the Masai Mara in Kenya were found to be lethargic and emaciated. Five were trapped and were positive on tuberculin .testing. On post-mortem examination, gross lesions were found in the lungs, spleen and lymph nodes. On culture, *Mycobacterium bovis* was identified. It is concluded that the presence of bovine tuberculosis in wild baboons suggests that these primates are infected naturally and may serve as reservoirs of the disease. The baboons were from a troop that scavenged a rubbish tip and may have contracted the disease from contaminated waste.

189. **Taylor, R. D.** (1993): 'Wildlife management and utilisation in a Zimbabwean communal land: A preliminary evaluation in Nyaminyami District, Kariba.' Multi-species Animal Production Systems Project Paper No. 32. Harare, Zimbabwe: World Wide Fund for Nature.

Keywords: Zimbabwe/ CAMPFIRE/ wildlife/ management/ conservation constraints

This paper discusses the wildlife management activities and revenue generation from the first three years of the Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) operation in Nyaminyami District, Zimbabwe. Through CAMPFIRE, the Government is seeking to devolve responsibility for natural resource management to the lowest accountable unit, (district, ward, village, household). Nyaminyami District Council was granted 'appropriate authority' status by the Department of National Parks and Wildlife Management Trust (DNPWLMT). The main activities have been hunting concessions, cropping for food, culling of 'pests' such as elephant, and the establishment of law enforcement capability.

Despite a gross revenue from safari hunting of Z$1 million in the three years, which was 85% of the total revenue from wildlife, and despite 40% of the total Z$1.27 million being returned to producer communities, the author argues that people still perceive wildlife as a

cost and not a benefit. Poaching has intensified, in-migration has increased, arable lands have been extended, and livestock numbers increasing. Taylor maintains that financial benefits have not 'reached communities in Nyaminyami as intended, be it at the ward or household level' and although the contribution at the household level is unknown, it is not likely to be a significant contribution to income. He calls for a reduction in costly law enforcement and urges more active participation of communities in control and management of wildlife, which cannot be derived 'on the strength of [financial] benefits alone'.

190. **Thomas, S. (1995):** 'Share and share alike? Equity in CAMPFIRE.' Wildlife and Development Series No.2. London: International Institute for Environment and Development.

Keywords: Zimbabwe/ CAMPFIRE/ wildlife/ equity/ costs/ benefits/ community/ individual

Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) initiatives have thus far focused on wildlife for a variety of reasons, not least the potential foreign exchange revenues it generates through safari hunting and tourism concessions and the potential to realise significant and immediate returns. However, the author maintains that although the benefits of wildlife are shared by the community, the costs of wildlife are predominantly borne by individuals, be they tangible (e.g. physical damage to crops or livestock) or intangible (e.g. anxiety). The author then raises the following question: 'Do individuals get a reasonable and fair return on their contribution to a collective undertaking to regulate a common resource?' This is of particular relevance to wildlife as its fugitive nature means that costs are not evenly distributed.

The report examines how equity is perceived by different stakeholders. The Wildlife Department promotes the distribution of wildlife revenues as cash at the household level in producer communities that bear the costs of living with wildlife. Conversely, the Ministry of Local Government wants to see these revenues invested in infrastructural and development projects at the district level. The author argues that the former perspective is potentially the most successful in terms of common property resource management (CPRM), but is confused by the definition of a 'producer community' in reference to a fugitive resource such as wildlife.

Three case studies look at the distribution of wildlife-related benefits from different perspectives. The Guruve District case study highlights the inequalities of distributing benefits at the district level in agro-ecologically heterogeneous environments. The Bulilma, Mangwe and Tsholotsho case study demonstrates the difficulties of defining 'producer communities' and adhering to definitions when

operating an inter-community programme of inter-communal resources. The Nyaminyami case study highlights the problems of implementing a differential compensation programme from the district- council level for different input costs. All examples stress the importance of adopting dynamic management strategies and devolving more responsibility to local communities.

191. **Thomas, S. (1995):** 'The legacy of dualism in decision-making within CAMPFIRE.' Wildlife and Development Series No. 4. London: International Institute for Environment and Development.

Keywords: CAMPFIRE/ Zimbabwe/ wildlife/ management/ subsidiarity/ institutions

This paper examines the Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) programme and discusses constraints on its success. So far, CAMPFIRE has predominantly involved the management of wildlife, since this has the greatest potential for generating significant financial returns. However, its management is complicated by its fugitive nature which creates problems in (i) assessing the resource base and hence its sustainability and (ii) the potential for overlapping political jurisdictions and therefore conflicts over institutional arrangements for its management. For example, how should 'producer communities' be defined when deciding where to allocate wildlife-derived benefits?

The author assesses the future prospects for successful local institutions within CAMPFIRE by looking at the historical development of the communal areas, the demographic and cultural consequences of their establishment, and their socio-political environment. He provides a summary of the institutional framework for development introduced by the current government in 1984, and the legislation that impinges on CAMPFIRE.

The author maintains that the success of CAMPFIRE will depend upon the willingness of central government to decentralise full control over wildlife resources to local communities, and the willingness and capacity of rural communities to further increase subsidiarity in decision-making. A crucial factor to this success is the legitimacy of local institutional arrangements.

192. **Thompson D. M. (ed..), (1997):** *Multiple land use: the experience of the Ngorongoro Conservation Area, Tanzania.* Cambridge: International Union for the Conservation of Nature.

Keywords: Ngorongoro Conservation Area/ multiple land use/ management/ pastoralists/ livestock/ wildlife.

The Ngorongoro Conservation Area (NCA) was set up in 1958 to promote the conservation of natural resources as well as 'development' of the local pastoral community. It is an integral component of the Serengeti ecosystem, which encompasses over 30,000km^2 adjacent to the Kenya-Tanzania border. It is one of the earliest attempts to integrate human use with the conservation of natural resources in East Africa. There are now 42,000 Maasai pastoralists in the area. Despite their long co-existence with wildlife in the area, the Maasai are undergoing huge changes in lifestyle as an ever-growing population places increasing pressure on natural resources. There is a definite trend towards a more sedentary life with the concomitant increase in cultivation. Management plans for the area stress reconciling the interests at local, national and international levels, and clarifying the role of central and local government as well as formal and traditional systems.

Conclusions; In design, the NCA does not differ markedly from other conservation areas, consisting of a core area (Ngorongoro Crater and Highlands) and a wider pastoral-wildlife buffer zone. However, the management of this multiple land use area reveals a high degree of collaboration between Park and local authorities and local communities. It is concluded that collaborative management is integral to the success of protected area management in consolidating conservation and human development in East Africa.

- Within the core areas, biodiversity values have been maintained, aided by wildlife dispersal areas with relatively low levels of human development pressure, and in which wildlife has traditionally co-existed with human populations.
- The core area-buffer area management scheme is set to increase in importance. In the past, NCA conservation in the core area has taken precedence over development in buffer areas.
- Conservation in the NCA has, to a large degree, relied upon the imposition of enforcements by the NCAA (Ngorongoro Conservation Area Authority), such as a complete ban on cultivation and regulations of forest and pasture use. For the collaborative management by local communities in controlling wildlife resources in buffer zones see Anderson and Grove (1987); Kiss (1990); Brandon and Wells (1992); IIED (1994).

193. Thomson, G.R. (1995): 'Overview of foot-and-mouth-disease in southern Africa.' *Revue Scientifique et Technique de l'Office International des Epizooties*, **14**: 503-520.

Keywords: Africa/ wildlife/ foot-and-mouth disease/ buffalo

The prevalence of foot-and-mouth disease (FMD) in the southern African subcontinent between 1931 and 1990 is summarised,

together with the major features of the epidemiology and control of the disease. The author emphasises the role of wildlife, especially African buffalo (*Syncerus caffer*). A proposal is made for a more structured and co-operative approach to investigating the extent and nature of antigenic variation within the Southern African Territories (SAT) types of FMD virus. Quantification of the economic impact of FMD on the agro- economics of the subcontinent is attempted, and the importance of the social values of rural peoples in this respect is explained.

194. **Toima, P. (1998):** 'Pastoral perspective to livestock and wildlife co-existence.' Paper presented by the Executive Director, Inyuat-e-Maa P.O. Box 2720, Arusha, Tanzania, at a workshop on livestock and wildlife co-existence in east Africa, held at the Department for International Development, London, 23 October 1998. Hosted by the Animal Health, Livestock Production and Natural Resources Systems Programmes of DFID's Renewable Natural Resources Knowledge Strategy.

Keywords: Tanzania/ pastoralism/ community-based organisation/ livestock/ wildlife/ co-existence/ conservation

Author's Summary: 'Inyuat-e-Maa' is a community-based organisation in Tanzania, established in 1993. Its main purpose is to address land tenure issues and resolve land use conflicts in Maasailand. Land insecurity is a major concern for pastoralists today. Inyuat-e-Maa is also concerned with the improvement of social services, education, health care, livestock services and conservation of the environment, including plants and animals. Inyuat-e-Maa collaborates with the African Wildlife Foundation (AWF), an international non-governmental organisation, which promotes the co-existence of wildlife and pastoralists. The two organisations are inter-dependent.

The Maasai face serious threats to their existence. The failure of development initiatives is related to a weakening of our resource base and increasing marginalisation, which threatens our livelihoods. In the past the Maasai used land on a communal basis. Access to range resources, such as water and salt licks, was assumed by membership of territorial sections. The pattern of land use and pasture utilisation involved daily and seasonal movements of animals. The same land is also wet season habitat for wildlife. Livestock and wildlife can live in harmony with the pastoralists, provided each has access to resources necessary for their survival. Maasai pastoralists do not kill wildlife for food and do not deliberately destroy vegetation. In the past, access to range resources was assured, and communities had an active role in habitat management for sustainable forage production.

Recently, however, significant changes have taken place in Maasailand; e.g. the commercialisation of livestock and land resources; and reduction in the extent of rangeland. This has created a major problem for the Maasai. Land has been alienated to wildlife through: the creation of game sanctuaries; farming and ranching; resettlement schemes; establishment and expansion of villages and towns, acting as centres for 'land-grabbing'; and joint ventures between Maasai individuals, or groups, and outside investors. The impact of this land alienation on the Maasai economy has resulted in major losses of dry-season grazing and permanent water sources. Thus, the Maasai have been squeezed into ever-smaller areas, which have to be used year round. Under such circumstances, it is hardly surprising that competition has increased and that conflicts have mounted. These conflicts manifest themselves as competition between livestock versus wildlife, and livestock versus crops. Inyuat-e-Maa and the AWF-supported Community Conservation Service Centre are working together to address this issue.

As pastoralists, we have a feeling that the current conservation of wildlife in east Africa is based on a system of national parks that exclude people. The pastoralists complain that protected areas disrupt long-established pastoral production systems, which were based on the conservation of natural resources for sustainable consumptive use, e.g. grazing, firewood, construction materials and medicinal plants. In other words, for pastoralists, conservation of plants and wildlife is vital for their long-term sustainability; and their mode of production has developed to maximise scarce and widely scattered resources. Nevertheless, many pastoralists now see wildlife as a liability, rather than an asset. They draw attention to the fact that their livestock are attacked by predators, their subsistence farms are destroyed by ungulates, and that their cattle are exposed to deadly diseases, e.g. rinderpest and malignant catarrhal fever. They also complain that despite the fact that wildlife tourism and sport hunting are a major source of income for Tanzania, they do not receive any benefits.

To rectify the situation Inyuat-e-Maa works with AWF, using a participatory approach in pastoral development, to look at options for managing land, vegetation and plants, livestock and wildlife resources. As this process evolves, and conditions change, many of the old, technical distinctions between different types of resources change. Indeed, in areas where wildlife management has been integrated with pastoralism, pastoral communities refer to wildlife as their 'other cattle that give milk when it is very dry'. Conservation should not exclude livestock species and breeds, as they are integral components of biodiversity.

Wildlife and livestock share similar ecological niches. Access to water, fodder and other range resources is essential to their survival. Integrated planning is, therefore, of paramount importance. Like

other forms of production, wildlife and livestock systems are subject to mounting pressure from expanding human populations and increasing levels of consumption. To cope with these pressures, it is essential to recognise what is good and valuable in traditional natural resource management systems and yet, at the same time, to help pastoral people adopt and adapt to changing socio-economic and environmental conditions. Wildlife and livestock require areas large enough for both wet and dry season grazing. Securing access and sustainable utilisation of extensive rangeland areas requires co-operation and joint management of natural resources.

In looking at production systems that combine livestock and wildlife, it is also important to be aware of the different values and uses associated with different resources by women and men. In most cases men may focus on the cash and status value of livestock, whilst women may recognise a broader set of needs related to daily family requirements and risk reduction.

Lands surrounding Tanzania's national parks, the Serengeti, Lake Manyara, Tarangire and Kilimanjaro, are still held and grazed by the Maasai. These lands are also the seasonal dispersal areas of wildlife and provide corridors for movement between national parks. These dispersal areas and corridors are essential for the long-term viability of large wildlife populations. Maintaining the Maasai preference for livestock keeping rather than arable farming in these areas is vital for the conservation of biological diversity, as well as building tourism as part of a broader economic base.

Safari hunting occurs in many of these areas but is not adequately regulated, and the Department of Wildlife does not currently have resources to set quotas based on a scientific system. Virtually all the revenue from hunting is accrued by central government, and thus wildlife does not generally add to the local economic base.

Very significant potential exists to strengthen both the ecological and economic benefits of wildlife/livestock alliance in Maasailand, by promoting the establishment of community-based management regimes, based on sound, but simple, management plans for land and resource use. Inyuat-e-Maa and AWF are keen to promote such management regimes in these areas. A common strategy to achieve this is:

- to combine the political and economic forces of pastoralism and wildlife conservation to restrict the expansion of arable agriculture into pastoral lands
- to minimise and mitigate the conflicts which exist between pastoralism and wildlife management, such as predation and disease
- to use wildlife revenues (from tourism and game hunting) to strengthen and support the pastoral economy, to reduce risk, and to provide some of the essential social services which the

Maasai community aspires to. This can create opportunity for ecological and cultural diversity.

These are a few of the major points which deserve attention for possible follow up and support to ensure the sustainable co-existence of livestock and wildlife in east Africa.

195. **Turton, D. (1995):** 'Pastoral livelihoods in danger: cattle disease, drought and wildlife conservation in Mursiland, south-western Ethiopia.' Oxford: Oxfam Research Paper No. 12.

Keywords: Ethiopia/ pastoralists/ livestock/ wildlife/ national park/ land rights

This paper examines the constraints of cattle disease, drought and wildlife conservation upon the Mursi agro-pastoralists that inhabit the Lower Omo valley of south-western Ethiopia, and how these could be ameliorated. Government plans to encourage ecotourism in the Omo and Mago national parks as well as the construction of hydro-electric dams on the Omo river at the expense of the Mursi are criticised. Lack of secure rights to territorial resources, such as dry season grazing and water points, leaves pastoral grazing lands vulnerable to, and a source of, land-use conflicts, especially from the encroachment of agriculture and national park developments. The author argues that plans by the Ethiopian Wildlife Conservation Organisation (EWCO) to develop the Omo and Mago national parks, through the Southern Ethiopia Wildlife Conservation Project (SEWCP), pose a threat to Mursi livelihoods. Conflicts of interest have arisen over park boundaries which enclose the best agricultural and pastoral resources of the Mursi, and from which they can be excluded. The author calls for more work to reconcile these conflicts of land use, and the adoption of an enlightened approach to wildlife conservation as in the Communal Areas Management Plan for Indigenous Resources (CAMPFIRE) model.

196. **Van Kooten, G. C., Bulte, E. H. and Kinyua, P. (1997):** 'Game cropping and wildlife conservation in Kenya: a dynamic simulation model with adaptive control.' *Agricultural Systems,* 54 (4): 439-462.

Keywords: Kenya/ model/ livestock/ wildlife/ forage/ competition/ policy/ game cropping/ conservation

The authors use a dynamic stochastic simulation model of forage, herbivores, predators and domestic livestock in the Machakos District of Kenya to examine policies related to the multiple use of rangeland resources. The particular policy examined is that of switching from a traditional system, where commercial ranchers do not harvest wildlife herbivores, to one where ranchers are provided

economic incentives to adopt multiple-use management of the range resource. Simulations using an adaptive controller indicate that the effects of the policy change on wildlife populations depend on the conditions of the ecosystem and, importantly, on ranchers' attitudes to risk.

When forage is abundant, and game and livestock do not compete for food, the policy change leads to reduced wildlife populations, especially of the relatively more valuable species. This indicates that game cropping may not be more compatible with nature conservation than standard pastoralist practices. However, in periods of drought when competition for forage occurs, the policy change may dampen the decline in game populations, as risk-averse ranchers may decide to sell more cattle and harvest wildlife instead. Game cropping reduces wildlife populations, but increases their stability.

197. **Vorheis, F. (1996):** 'Making community conservation economically attractive.' *Rural Extension Bulletin*, 10: 19-22.

Keywords: Africa/ incentives/ community wildlife management

This paper examines some of the disincentives facing communities to conserving wildlife, and outlines a strategy for increasing the benefits and reducing the costs to communities of wildlife conservation. Options include granting communities multiple use rights to wildlife, within an institutional framework of checks and balances. The alternative of compensation for loss and damage to property caused by wildlife can create perverse incentives, and implies high monitoring costs. Policies that subsidise agriculture and livestock effectively tax wildlife as an alternative land use. A further example is the allocation of water rights for consumptive use, but not for non-consumptive use (as an integral component of a functioning ecosystem). Subdivision of group ranches also promotes agricultural development at the expense of wildlife conservation.

198. **de Vos, V. (1994):** Anthrax. In Coetzer, J.A.W., Thomson, G.R., and Tustin, R.C., (eds.) (1994): *Infectious diseases of livestock with special reference to southern Africa* 1: 1262-1289. Cape Town Oxford New York: Oxford University Press.

Keywords: Southern Africa/ anthrax/ wildlife/ livestock/ disease control measures

The author presents a comprehensive review of anthrax with a list of the wildlife species found infected in southern Africa. The author considers that anthrax is still a major threat to wildlife populations throughout the world. Vaccination of wildlife is problematic although successful immunisation of roan antelope by aerial darting

has been done. Other control measures include eliminating sources of infection by, for example, fencing off known anthrax areas and ensuring that infected carcasses are incinerated or buried as soon as possible.

199. **Waghela, S. and Karstad, L. (1986):** 'Antibodies to *Brucella* spp among blue wildebeest and African buffalo.' *Journal of Wildlife Diseases*, **22**: 189-192.

Keywords: Kenya/ *Brucella*/ wildebeest/ buffalo

A serological survey of wildebeest and buffalo in the Masai Mara in Kenya is reported. Antibodies to *Brucella* were found in 18% of wildebeest and 30% of buffalo. It is concluded that the increase in numbers of wildebeest and buffalo that share grazing and watering areas with cattle of the Masai people makes the presence of infections by *Brucella* species in wildlife an important consideration in any programme for the control of brucellosis. It is noted that previous studies also found antibodies in zebra and eland but in only two of 249 wildebeest. It had been concluded that wildlife in Kenya was not a significant reservoir of *Brucella* infection. The authors now state that this assumption may have been incorrect.

200. **Walsh, M. (1995):** 'The potential for community management of wildlife related resources in the Luanda-Mkwambi Game Control Area bordering Ruaha National Park, southern Tanzania.' Report by the Natural Resources Institute to the UK Overseas Development Administration.

Keywords: Tanzania/ Ruaha/ pastoralists

This report on the Ruaha Ecosystem Wildlife Management Project (REWMP) concludes that community management of wildlife is viable within the current boundaries of the Luanda Mkwambi Game Control Area near Ruaha National Park in Tanzania. The report recommends continued technical and material support to develop an appropriate institutional framework for community wildlife management. More specifically, the report recommends that: the village management model be adapted to address the uneven distribution of land and wildlife resources across villages, and incorporation of a wider range of community-based institutions. Many of the villages desire to exercise greater control over their resources and exclude outsiders. They are particularly concerned about the activities of resident hunters and commercial poachers. Small groups of immigrant pastoralists are often mobile and poorly represented on wildlife committees (WCs). Some villagers see the WCs as a means to prevent further 'encroachment' by these groups.

201. **Wandeler, A. I. (1993):** 'Wildlife rabies in perspective.' *Onderstepoort Journal of Veterinary Research*, **60**: 347-350.

Keywords: Rabies/ wildlife/ domestic animals

Populations of a number of species of the orders Carnivora and Chiroptera maintain independent rabies epidemics in different parts of the world. However, in large parts of Africa, Asia, and Latin America, rabid dogs outnumber diagnosed wildlife cases. Rabies virus variants circulating in different host populations can be distinguished by the use of monoclonal antibodies and by genomic analysis. Rabies virus strains and their hosts have to be co-adapted in order to allow their prolonged co-existence.

202. **Wells M. P. (1996):** 'The social role of protected areas in the new South Africa.' *Environmental Conservation,* 23, 4: 322-331.

Keywords: South Africa/ biodiversity/ parks/ participation/ integrated conservation-development projects/ communities/ institutions

South Africa contains an extensive, well-managed protected area network which generates considerable economic benefits from tourism, but the extensive land and financial resources required by the parks and reserves are difficult to reconcile with the acute social and economic development needs of poor rural people with very limited access to any kind of resources. Local communities have incurred substantial costs from the establishment of these parks, while receiving few benefits in return. National and provincial governments, as well as conservation authorities, have now recognised that the long-term future of parks and reserves depends on taking effective steps to redress the local imbalance of benefits and costs. Integrated conservation-development projects (ICDPs) are beginning to test a range of specific measures to increase local community participation in the benefits from protected areas. Parks have considerable resources and expertise that they can use to support local development through ICDPs, although it would be unrealistic to expect parks to solve widespread rural poverty amongst their neighbours. Instead, park authorities should take the lead in forming partnerships to mobilise the combined resources and expertise of other national and provincial government agencies, NGOs and the private sector, as well as the local communities themselves. Community participation in wildlife tourism may best be achievable through joint ventures with the private sector or park management authorities.

203. **Wells, M., Brandon, K. E. and Hannah, L. (1992):** 'People and parks: linking protected area management with local communities.' Washington, DC: The World Bank, the World Wide Fund for Nature and the United States Agency for International Development.

Keywords: Africa/ national parks/ reserves/ natural areas/ participation/ management/ development/ conservation

As protected areas come under increasing pressure from expanding human activities beyond their boundaries, conflicts of interest arise between 'parks and people'. The ICDP concept is designed to link conservation and development, reconciling the management of protected areas with the social and economic needs of local people. This study evaluates 23 such projects from Africa, Asia and Latin America, assessing their design, implementation, degree of participation and effectiveness in the field as well as making recommendations for the future. The report emphasises the complexities of establishing links between conservation and development, empowering local people and participating organisations. It maintains that the ultimate measure of success in ICDP projects must be whether or not they have strengthened the ability of protected areas to conserve species and ecosystems, regardless of the success of social and economic development. Future recommendations are made in the following categories: projects as part of a larger framework; scale of projects; organisations participating in projects; project site selection; local participation; financial resources of projects; and project design and implementation.

Relevant case studies: Burkina Faso: Nazinga Game Ranch; Kenya: Amboseli National Park; Niger: Air-Tenere National Nature Reserve; Tanzania: East Usambara Mountains; Zambia: Luanga Integrated Rural Development Project.

Conclusions: The study revealed that, in formulating development strategies that are consistent with ecosystem conservation, ICDPs are locally specific and no clear blueprint examples emerge. The limitations of ICDPs must be balanced by a perception of their success when it is considered that many of the factors that lead to the loss of biodiversity originate far from the region where that loss is occurring (e.g. land tenure regulation and legislation, government mismanagement, vested interests of elites in over-exploiting natural resources). However, well designed ICDPs implemented in well selected sites can address local people-park relationships constructively.

204. **Western, D. (1993):** 'Ecosystem conservation and rural development: the Amboseli case study.' Community-Based Conservation Workshop, Virginia, USA: 18-22 October 1993.

Keywords: Kenya/ Amboseli/ politics

Author's summary: This case study presents a detailed account of the efforts to conserve the Amboseli ecosystem through local participation. The case study describes the historical antecedents to the programme and the progressive expansion of its aims and objectives. What began as an exploration of new ways to integrate wildlife conservation and development within an ecosystem context became inextricably bound up with policy reforms and institutional changes. The paper concludes with a look at the challenges ahead as human and wildlife interactions continue to change in Amboseli. A few remarks are made on community-based conservation in general.

205. **Woodroffe, R., Ginsberg, J., Macdonald, D.W., and the IUCN/SSC Canid Specialist Group. (1997):** 'The African wild dog - status survey and conservation action plan.' Gland, Switzerland: International Union for the Conservation of Nature.

Keywords: African wild dog/ rabies/ canine distemper virus

The African wild dog has declined dramatically over the last 30 years. Between 3000 and 5500 wild dogs remain in total with most being in southern and eastern Africa. Since wild dogs are so susceptible to habitat fragmentation, the highest priority is to maintain and promote the contiguity of wildlife areas. In this comprehensive review of the wild dog, the causes of population decline are discussed. The diseases that can affect wild dogs are mentioned with particular attention being given to rabies and canine distemper. It is concluded that further research is needed to devise better strategies for disease control in wild dogs.

Useful Web Sites

1. www.fao.org/paat/

This is the web site of the PAAT information system: the Programme Against African Tyrpanosomosis. PAAT is an international alliance of FAO, WHO, IAEA and OAU/IBAR promoting integrated trypanosomosis, control through co-ordinated international action. Good links pages to a range of international organisations, government departments, universities and research institutes; FAO field projects and contact points; disease information; press releases; commercial and miscellaneous sites.

2. www.cgiar.org/ilri/

This is the web site of ILRI: the International Livestock Research Institute. ILRI works to improve the well-being of people in developing countries by enhancing the diverse and essential contributions livestock make to smallholder farming www.cgiar.org/ilri/links.cfm provides very useful links pages to other websites.

3. www.fao.org/WAICENT/FaoInfo/Agricult/AGA/lxehtml/policy/contents.htm

This is the web site of the report on Livestock and Environment Interactions. The study was sponsored by the Commission of the European Communities, the World Bank and the Governments of Denmark, France, Germany, the Netherlands, United Kingdom and United States of America. It was co-ordinated by the Food and Agriculture Organization of the United Nations, the United States Agency for International Development and the World Bank under the auspices of Henning Steinfeld, Cees de Haan and Harvey Blackburn.

4. www.oie.int

This is the web site of the *Office Internationale des Epizooties*, the world organisation for animal health. The main objectives of the OIE are to:

- inform Governments of the occurrence and course of animal diseases throughout the world, and of ways to control these diseases
- co-ordinate, at the international level, studies devoted to the surveillance and control of animal diseases
- harmonise regulations for trade in animals and animal products among member countries.

5. www.art.org.uk/

This is the web site of the Africa Resources Trust that has the following mandate. "To support the rights and aspirations of rural communities to secure maximum benefits from the sustainable use of their natural resources, by promoting a favourable regional and international policy environment." It has interesting articles and newsroom dispatches regarding the co-existence of livestock and wildlife.

6. www.campfire-zimbabwe.org/

This is the web site of the CAMPFIRE Trust organisation.

7. www.ansi.okstate.edu/library/

This is the web site of the virtual livestock library with many very useful links, although it relates more to livestock production in the north than in the south.

ODI Research Study

Can Livestock and Wildlife Co-exist?

An interdisciplinary Approach

David Bourn and Roger Blench (eds)

This interdisciplinary approach examines current trends and future prospects for livestock and wildlife co-existence in the semi-arid rangelands of eastern Africa. With increasing demographic pressure, agricultural expansion and finite land resources, it is concluded that pastoral livestock and plains game can and do co-exist sustainably, but only under special circumstances where livestock owners and local communities obtain tangible net benefits. As in many parts of the world, wildlife populations have declined and are concentrated in and around protected areas. Future research and development initiatives to promote livestock and wildlife co-existence as a sustainable livelihood option should, therefore, focus on neighbouring communities and the management of resources on adjoining lands.

ISBN 0-85003-408-6

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Overseas Development Institute
Environmental Research Group Oxford