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**THE ECONOMICS OF WILDLIFE:
CASE STUDIES FROM GHANA, KENYA,
NAMIBIA, AND ZIMBABWE**

By Jan Bojö

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Environmentally Sustainable Development Division
Technical Department
Africa Region
The World Bank

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Ghana, Kenya, Namibia, and Zimbabwe

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Foreword

This study was initiated in 1991 by what was at the time the Environment Division of the Africa Region's Technical Department (AFTEN). Leif Christoffersen, division chief of AFTEN, was instrumental in organizing the study and appointed Emmanuel Asibey and Jan Bojö to serve as joint task managers. As of mid-1992, the current editor became solely responsible for managing the study.

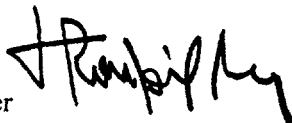
After a difficult period searching for adequate funds to support the study, funding was obtained through a Swedish trust fund for the environment. This generous and untied funding is hereby gratefully acknowledged. National teams in Ghana, Kenya, Namibia, and Zimbabwe were then recruited. A strong and successful effort was made to recruit nationals or at least resident experts on wildlife and economics in the countries involved.

A World Bank reorganization came into effect in January 1993, implying a merging of AFTEN and two other divisions to form AFTES (Africa Technical Department, Environmentally Sustainable Development Division). Under the context of this merger, which resulted in a much smaller Technical Department, the study did not fit well into the ensuing drastically reduced work program; hence, the ambitions for the current study had to be streamlined. An informal compilation of the first three case studies completed was circulated within the World Bank in June 1994. The Zimbabwean case study was published by the World Bank's Environment Department in a modified, shortened version as *Economic Policy, Wildlife, and Land Use in Zimbabwe* (Environment Working Paper No. 68, September 1994). With the completion of the Ghana case and based on the positive reactions to the preceding publications, it was decided to further edit the full set of case studies and publish them jointly in this paper.

The target group for this paper is World Bank staff involved in wildlife-related activities, staff of other donor organizations, nongovernmental organizations (NGOs) with similar interests, as well as diverse groups of people in Africa involved in wildlife management.

Sincere thanks go to all those who have supported the study and above all to the authors, who have contributed so much of their time and expertise to this work. Jan Bojö substantially reduced the volume of the original case studies to distill the substance into a format that would be accessible for a wider audience. He also wrote the introductory chapter. Thanks also go to Liisa Hietala and Caterina Betancourt for many hours of word processing, P. C. Mohan for an initial round of copyediting, and Pamela Cubberly for a thorough job of getting this voluminous manuscript in shape.

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Chapter 1:

The Economics of Wildlife: Background and Lessons from the Case Studies

By Jan Bojō*

This chapter presents the background on this study of wildlife economics in four African countries, defines its objectives, and synthesizes its results.

1.1 Background of the Study

A major source of inspiration for the study was a World Bank technical paper edited by Agnes Kiss and entitled *Living with Wildlife* (Kiss 1990). It addressed a wide array of economic, political, technical, sociological, and institutional issues pertaining to community-based wildlife management. Although economic aspects were given some attention, it was agreed that this theme deserved further consideration in a separate study. As a result, a new study to analyze the following *objectives* was designed:

- Financial and economic viability of (integrated) wildlife management systems
- Actual and potential significance of wildlife as a source of food and income in an economy-wide context
- Policy implications of the above objectives

The current study on the economics of wildlife is built on four country case studies on Ghana, Kenya, Namibia, and Zimbabwe. These countries were chosen to cover a variety of natural, economic, and political conditions and to produce a rich set of experiences to help shape policy and project interventions.

The resulting case studies contain a wealth of information but may appear too voluminous for an audience that is not entirely specialized on the subject. The main editor thought that a more condensed format could reach a wider audience, but the full papers are, of course, available on request.

Little has been published on the economics of wildlife; this work is an initial step in addressing that gap. What is offered is a set of country case studies that will hopefully inspire both a broad policy discussion as well as more localized studies to be undertaken in view of a pending land use decisions by public authorities, communal or private land managers.

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1.1.1 The “Wildlife Advantage Hypothesis”

Another source of inspiration for this study has been what can be called the “*wildlife advantage hypothesis*.” That is the assumption that wildlife embodies a number of advantages in comparison with competing land uses, but that these values are not appropriately recognized by market forces, public policies, or both; hence, the following may be needed:

- Amend market signals so that the full value of wildlife is recognized
- Reform distorted policies that disadvantage wildlife

The case has been made that wildlife possesses a number of advantages over livestock, specifically in terms of:

- *Diversity in resource use.* A mixture of wildlife species can utilize the primary biomass production in a more diversified manner.
- *Primary efficiency.* Wildlife utilizes constrained primary resources more efficiently (water and vegetation).
- *Secondary efficiency.* Wildlife species are more efficient secondary producers (faster reproduction and growth).
- *Resilience.* Wildlife is better adapted to resist diseases.
- *Nutritional value.* Wildlife meat tends to be low in fat while equal or better than beef, mutton, or pork in protein content and much better in vitamin content.

The extent of the advantages summarized here is controversial; the reader is referred to this chapter’s brief bibliography as well as the ensuing case studies for a discussion of these points.

Obviously, the scope of testing the comparative advantage of wildlife must be wider than meat production and include all other revenue-generating aspects, as will be discussed below. The absence of successful ranches in Africa that specialize in wildlife meat production inspires a search for the disadvantages that appear to counterbalance the factors mentioned above.

The initiators of this study hypothesized that a key factor in determining the choice between wildlife and livestock utilization is the *property rights* structure. State ownership and legal restrictions against hunting serve the good intention of protecting the stock of animal species from exploitation. If enforced, it may actually achieve the intended preservation effect; however, by denying local people the right to receive the benefits of wildlife, poaching becomes the only way for local people to reap benefits from this asset. In contrast, livestock systems are generally characterized by household ownership of animals, while the land is often under communal or, formally, state ownership.

Even if legislation delegates usufruct rights to land managers, the *migratory* nature of *wildlife* is a complication. The benefits of livestock products can be privately controlled by the herding of branded livestock on communal land or stall feeding at homesteads. Wildlife management requires either large-scale private units or coordinated communal management over large areas.

In addition to the fundamental factor of property rights, the initiators of this study hypothesized that a number of mostly policy-related factors are probably relevant in favoring livestock versus wildlife management systems: veterinary restrictions pertaining to wildlife, subsidies extended to livestock, high

management costs for wildlife and poor marketing facilities. The reader will find these issues discussed in the case studies.

A final issue the authors of the case studies were asked to pursue was, Is wildlife better adapted to the *environment* than livestock? What is the empirical evidence for this? The answer is less evident than some of the initiators of this study hypothesized.

1.1.2 Some Key Concepts

Before delving into the lessons of the studies, a note on terminology is needed to clarify the analytical approach the case study authors were asked to apply. Three aspects are essential to the analysis:

- Financial profitability
- Economic profitability
- Environmental sustainability

The *financial* perspective refers to the costs and revenues an individual, household, or company pays and receives. Even the impacts on the government's budget can be analyzed from a financial perspective. The prices used are *market prices*.

By contrast, *economic* analysis serves to evaluate the costs and benefits to society as a whole, that is, *the sum total of all individuals affected*. This concept should be distinguished from the *government*, an institution within society that represents the interests of society as a whole more or less well. The prices used in the economic analysis may deviate from market prices to include, for example, negative external impacts on the environment that the market ignores.

Improved financial profitability is generally a necessity for the ranch owner or the household in a communal area to engage in wildlife management as opposed to livestock raising or crop cultivation; however, financial profitability that is based on government subsidies or the neglect of externalities will not pass the test of economic profitability.

Economic profitability can conceivably be maximized by short-term exploitation of a resource such as rangeland. The price, however, may be irreversible damage to the resource. To the extent that the returns from such exploitation are invested in other activities (whether in agriculture, manufacturing, or service production), the economic system as a whole may continue on a sustainable path. In spite of this, the particular section of the rangeland may be devastated as an ecosystem. Although the interpretation of *sustainability* remains a controversial issue, we are interested in exploring if financially and economically profitable management schemes are also compatible with a localized ecosystem-level interpretation of sustainability.

Pasture and rangelands occupy 64 percent of the land area of Africa. These areas are largely unsuitable for rainfed crop production but can often support livestock or wildlife; thus, the discussion is stylized—contrasting a wildlife option to a livestock option. It is understood, though, that the real world offers many opportunities to combine management systems; indeed, some of the examples offered in the case studies include such combinations.

1.2. Lessons from the Country Case Studies

What are the lessons learned from the country case studies? Each country differs from the others but also shares some of their features. Generalizations have their limitations, but four major themes will be addressed. The first three directly relate to the major objectives of the studies as specified above; the fourth point concerns the environmental impacts of wildlife.

1.2.1 Financial and Economic Viability of Wildlife

The first objective of the study was to address the financial and economic viability of wildlife enterprise in comparison with other appropriate forms of land use.

The financial analysis from *Ghana* indicates that private wildlife ranching is superior to the publicly managed in terms of profitability. Furthermore, small-scale farming is more profitable than the large-scale option analyzed. Small-scale grasscutter farming shows the best returns, followed by poultry and rabbit. The study suggests that support should be given to small-scale wildlife domesticated activity in terms of breed development, credit, and technical information.

On ranches owned or controlled by single proprietors or companies in *Kenya*, a number of successful wildlife conservation projects are in place and many more are planned. The key is in control of the land and in well-defined land-use objectives. In contrast, communal lands tend to harbor diverse objectives and inequitable control of land resources, the report argues.

It is the consultants' conclusion that wildlife utilization in *Kenya* is unlikely to be a competitive land use in certain agroclimatic zones with high potential for crop production and livestock rearing. This finding provides a benchmark for formulating land-use strategies and leaves considerable areas where wildlife is likely to be at an advantage. The report suggests that the efforts to conserve and utilize wildlife in dispersal areas should be concentrated in four districts: Narok, Kajiado, Laikipia, and Isiolo. Other areas, such as the Tsavo National Parks, should be assessed for their specific merits with explicit valuation of biodiversity and other possible economic uses.

The detailed case studies included in the Kenyan report attempt to highlight that many avenues for complementarity exist and suggest that wildlife can be used to enhance the returns from land, in addition to other land uses.

The need for community participation and revenue sharing is noted, but so is the vulnerability to misappropriation and inequitable distribution of funds. As argued by the Kenyan study, the investment of returns from wildlife and tourism in job creation and social welfare projects has proved to be the most successful system of distributing revenues. Income paid in cash to group ranch management has not been wisely invested nor equitably distributed in the Kenyan cases studied.

The case study from *Namibia* suggests that the net economic return to commercial and communal livestock farming, particularly in the more arid communal regions of the country, is almost certainly negative. Wildlife utilization (combining tourism, hunting, and cropping) is shown to offer significantly more favorable returns in communal areas, while trophy hunting has proved a growing success on private farms. Despite this evidence, the report argues, a widespread switch to wildlife use from livestock farming is unlikely. Most rural communities in *Namibia* place a high value on livestock—particularly cattle—for cultural and social reasons. Consequently, demonstrating the economic superiority of wildlife utilization will probably not lead to an extensive conversion from livestock production.

In conclusion, it is noted that wildlife utilization does appear to offer significant economic opportunities to rural communities in Namibia. With enabling legislation and some development of the managerial capacity of local communities, wildlife utilization can be a major force for sustainable rural development.

Results from a large sample study in *Zimbabwe* show that wildlife enterprises in the large-scale commercial ranch sector are often more financially profitable than cattle enterprises. A less regulated economy and a liberalized exchange rate in particular would contribute to its profitability. This, however, is also true for the competing cattle enterprises that have been affected by politically depressed beef prices since 1985. Complete deregulation may even favor cattle over wildlife.

Although wildlife may be the most economically efficient option from a social welfare perspective in many arid and semiarid communal areas, it is currently significantly less attractive for the farmers living there than subsistence farming. Along with macroeconomic distortions, the control over the resources at the district rather than the local level has contributed to the wide divergence between national and individual interests. Safari hunting accounts for the bulk of revenue earned in communal areas. A ban on imports of hunting trophies, particularly from elephants, would have a very negative impact on community wildlife schemes.

1.2.2 The Significance of "Bush Meat"

The second objective of the study is to provide data on the importance of bush meat as a source of food and income. As expected, this differs considerably across countries.

The changing importance of wildlife as meat, popularly called bush meat, has been well demonstrated in the *Ghana* paper. Bush meat in the past used to be the most common source of animal protein especially in the rural areas; it is still regarded as the most preferred meat. Grasscutter is the most popular species, not solely because it is abundant but also because of its quality meat. Today, however, bush meat constitutes a small portion of the protein intake of most people, especially those in the rural areas because of the meat's scarcity, relatively high price, and unavailability in small affordable pieces.

In *Kenya*, game meat has mainly been sold in butcheries as a luxury item. Although most bush meat is obtained illegally, game meat sold in butcheries has been cropped on license. Its value can be enhanced two- or three-fold by processing it into such luxury products as smoked, dried (biltong), or sausage products. Wildlife meat is a gourmet food and not necessarily viable if marketed cheaply. If illegally harvested, however, it is cheap enough to be consumed by the low income sector of rural and peri-urban areas. No literature for Kenya quantifying bush meat consumption was found.

In *Namibia*, game is widely utilized by commercial farmers, but only a specialized minority do so commercially. An important reason for this is that commercial game ranching currently suffers from the problem of low prices per kilogram in comparison to livestock. This could largely be alleviated by improved and sustained access to venison export markets. The report concludes that detailed research is needed on this issue.

In *Zimbabwe* the consumption of bush meat has been virtually ignored, although the consumption of rabbits, rodents, and wild flora is widespread. The consumption of larger mammals is almost exclusively confined to isolated communities with large wildlife and small human populations. Assuming that some 25,000 households live in such areas, a rough estimate of the value to the nation of large mammal bush meat is less than US\$1 million per annum.

1.2.3 Policy Implications of the Findings

The third objective of this study is to consider policy implications of the findings under the first two headings.

The *Ghana* report argues that a reduction of interest rates on loans to wildlife enterprises and increase in research on wildlife feed and extension to popularize grass cutter cultivation would greatly contribute to the viability of wildlife enterprises. Although research and extension can be seen as legitimate public interventions, it is less convincing to argue that, for example, breeding of grasscutters should qualify for preferential credits, as compared to other economic enterprises.

Kenya government policy on wildlife management recently has undergone major changes in an attempt to address the fact that the pattern of land tenure is changing swiftly toward one of privately owned land. The Kenya Wildlife Service (KWS) is experimenting with wildlife utilization options. The authors of the Kenyan report argue that government and KWS in particular should consider taking more of a facilitating role and less of a regulatory role with direct involvement.

Present policy and legislation on wildlife utilization in Kenya contains contradictions, mainly in the area of implementation—for example, offtake rates for cropping at well below observed reproduction rates. Agricultural policy seeks to utilize areas for small-scale irrigation that are dry season and wildlife grazing areas or to develop new plant strains that are suitable for arid and semiarid areas. The drive toward increased settlement in these areas is an established strategy, despite obvious conflict with wildlife.

The Kenyan report argues that the evidence from the case studies involving community lands suggests that the key to long-term conservation and utilization of wildlife lies in ownership and management of land. The authors caution, however, that even where key inputs of management and marketing have been provided to group ranches in the Maasai Mara and Kajiado, the pressures that result in a deterioration in the tourism experience continued: these include expansion of cropping and intensification of grazing, the unplanned construction of unattractive buildings and settlements, poisoning of predators and exclusion of grazers, and insecurity and harassment of visitors.

The report from *Namibia* argues that existing legislation presents an obstacle to communities that aspire to realize these gains in communal areas. Locally cropped game meat cannot legally be sold and communities cannot claim revenue from those who utilize it. Legislative reform is therefore necessary for communities to achieve the potential benefits from wildlife.

It is also argued that livestock farming in Namibia continues to be favored by policies that permit a large proportion of the costs to be borne by society as a whole. As a result, livestock farming can be a highly remunerative activity for the individual farmers concerned. The authors recommend that user charges should be introduced and tax advantages limited so that the true cost of owning livestock is borne by the owner.

In *Zimbabwe* changes in the legislation and institutions have transformed the role of wildlife from a state-owned treasure to be preserved and isolated in national parks into an active resource, controlled and utilized by landholders. Wildlife has increased significantly in commercial farm lands as safari hunting, live animal sales, and tourism are incorporated into the farm systems. In the communal farming areas, awareness has markedly increased of the contribution of wildlife, but revenue distribution remains controversial.

Reductions in macroeconomic distortions in Zimbabwe and a more competitive marketing system have resulted in marked increases in district returns from wildlife. Evidence also exists of

increasing empowerment and effectiveness of local communities, ensuring their more active participation in the benefits from and control over their resources; however, poaching and new settlement threaten to overwhelm those areas that still have viable wildlife populations.

1.2.4 Environmental Impacts

Evidence of comparative environmental impacts of wildlife and livestock remains almost completely qualitative and anecdotal. The Namibian report notes that wildlife is better adapted to the country's arid and semiarid environment than livestock. The ability of game to range widely around water points can reduce overgrazing; however, wildlife does not offer an automatic solution to the problems of overgrazing. If farmers are unable or unwilling to destock when the carrying capacity of their land is reduced by drought, game is also likely to be overstocked—and overgrazing will result.

The report from *Zimbabwe* contains a section that explores the environmental impact of wildlife relative to cattle. Some evidence exists that the former is less severe, but the strongest evidence shows that the environmental impacts are related to the *stocking rate* rather than the *type* of herbivore involved. *Wildlife has an advantage* to the extent that financially viable enterprises can be maintained with lower stocking rates than alternative land uses. More important, a wildlife enterprise directly depends on maintaining an environment that can continue to attract visitors.

1.3 The World Bank and Wildlife Projects

Between 1970 and 1992, the World Bank invested in fifteen wildlife-related projects in Africa. The total lending volume was US\$368 million. This corresponds to about 1 percent of the Bank's total lending during the same period. Lending for wildlife projects has increased, with about three-quarters of the lending falling after 1989.

Geographically, wildlife projects are concentrated in East Africa, especially Kenya, with about one third of the lending volume on its own. Other projects with a wildlife component have been supported in Somalia, Malawi, Botswana, Côte d'Ivoire, Zimbabwe, Ghana, Central African Republic, Burkina Faso, and Mali.

Projects have occurred in three types of categories: (a) wildlife-based tourism development, (b) wildlife conservation in protected areas, and (c) wildlife management for the benefit and with the active involvement of local people. Obviously, some projects have activities that cover more than one category, but the latter type of project appears to be increasingly emphasized. The evidence presented here gives further impetus for this drift toward *community-based wildlife projects*, while acknowledging the obstacles to successful implementation that the case studies, in particular from Kenya and Zimbabwe, have brought out.

Most fundamental, the importance of a sound policy framework has been well illustrated in the case studies. *Local property rights* assignment and *financial rewards* to match the economic benefits must be channeled back to local communities and individual farmers. To be able to compete with livestock and other economic activities occupying the same territory, wildlife needs a fair chance and equal "rules of the game." That is an area to which the Bank can contribute in its dialogue with borrowing countries.

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Abstract

The value of wildlife in Ghana, as in most West African countries, is by and large consumptive. Ghanaians have a long tradition of relishing bush meat as a food resource. Despite the intensive depletion of wildlife in Ghana, wild animals and their products continue to play significant roles in the household economy.

This study analyzes the actual and potential significance of wildlife as a source of food and income. Particular emphasis is placed on the grasscutter, which is the most popular and abundant species of bush meat. The study assesses the financial and economic viability of wildlife management systems based on Net Present Value and Internal Rate of Return criteria. Both the policy implications and the relative environmental impact of wildlife exploitation are taken into consideration.

Economic and financial analyses both indicate that private wildlife ranching is more profitable than official ventures, whereas wildlife domestication emerges as the most profitable. Furthermore, small-scale farming is more profitable than large-scale farming. In the financial analysis, small-scale grasscutter farming shows the best returns, followed by poultry and rabbit, whereas poultry and small-scale grasscutter tend to be viable using the economic analysis. In considering the relative return to crops and wildlife, the grasscutter compares favorably to the most profitable cropping activities.

The analysis favors providing support to small-scale, domesticated wildlife in the form of breed development, credit, and technical information. Encouraging such profitable activity in rural areas would enhance income-earning capability and increase protein intake of rural dwellers.

Chapter 2:

The Economics of Living with Wildlife in Ghana

By K. A. Tutu, Y. Ntiamo-Baidu, and S. Asuming-Brempong[†]

Ghanaians have a long tradition of relishing bush meat as a food resource. All species of wild animals, ranging from a variety of invertebrates to monkeys and including termites, snails, reptiles, and rodents, are eaten. In the past, large areas of Ghana's forest and savanna lands supported significant and diverse populations of wild animals. Wildlife was the main source of animal protein, a source of medicines, and a symbol of cultural identity and ethnic origin.

Communities in Ghana managed their wildlife resources through traditional rules that protected some species and regulated exploitation. In the colonial era, the establishment of protected areas under the control of central government was introduced in the 1920s. After independence, new policies were put in place to manage wildlife resources more efficiently.

Ghana's population has grown rapidly in past decades to 16.2 million on a land area of 23.9 million hectares. The increased demand for resources has led to overexploitation of wildlife and extensive modification of wildlife habitats. About 70 percent of the country's original 8.22 million hectares of closed forest has been destroyed, and the deforestation rate is put at 220 square kilometers per annum (IUCN 1988, WRI 1990, IIED 1992). Most wild animal species are believed to be seriously depleted, and at least eighteen of the 222 mammalian species recorded in Ghana are under threat (IUCN 1988).

Despite the intensive depletion of wildlife, wild animals and their products continue to play significant roles in the economy. The current rate of exploitation of forest and wildlife resources, however, is unsustainable. An urgent need exists, therefore, to develop sustainable systems for improving the wildlife resource base. Living with wildlife entails not only increased access to food resources, employment, and sources of income but also the loss of access to traditional lands and crop losses from wild animal damage.

* The original version of this paper (sixty-three pages and nine appendixes) has been edited for the purposes of this publication. The full-length version can be requested from AFTES.

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This chapter contains four sections. Section 2.1 discusses the historical background to wildlife management practices in Ghana and reviews current management policies and utilization. This section focus particularly on the value of bush meat, its acceptability, and contribution to protein intake. Section 2.2 deals with the relative profitability of wildlife management and economic policies related to wildlife. Section 2.3 discusses the relative environmental impacts of wildlife, and section 2.4 presents a summary and conclusions.

2.1 Wildlife Policies and Utilization in Ghana

This section covers Ghanaians utilization and management of wildlife historically, current policies of the Forestry Department, and the significance of bush meat in Ghanaian diets and its potential in game ranching.

2.1.1 The Historical Perspective

Up to the middle of the nineteenth century, exploitation of forests and wildlife resources in Ghana was largely for subsistence. Human populations were small in number and cultivated only a small proportion of forestlands. Farmlands were left to fallow and revert to forest after two to three years. Forestlands teemed with game: elephants, buffalo, hartebeests, roan antelopes, waterbuck, kob, warthogs, and crowned duikers, which were regarded as communal property to be exploited freely by all.

A number of cultural beliefs and practices protected particular ecosystems and habitats (for example, sacred groves, royal burial grounds, sacred rivers, and so on), safeguarded specific animal and plant species (for example, totem and tabooed species), and regulated exploitation of natural resources (for example, closed seasons). Wildlife protection was vested in the community, which ensured that the traditional rules and regulations were enforced. As custodians of community property, chiefs had the ultimate responsibility for wildlife resources.

The rural Ghanaian population depended mainly on bush meat and fish for animal protein. Even as late as 1967, bush meat and fish contributed 77 percent of domestic meat production in Ghana (Clotey 1971). In 1987, meat from livestock and poultry contributed 2 percent to GDP (Ghana 1991). Although bush meat represents under 1 percent of GDP, it is nevertheless important as a source of meat in urban centers and rural areas in Ghana.

The population of southern Ghana in 1891 was about 800,000. The rapid population increase and associated increased demand for wildlife resources and cultivated land were compounded by the introduction of cash crop farming, which surged upward around the middle of the nineteenth century. Introduced cash crops included oil palms, coffee, and *Theobroma cacao*, of which cocoa was the most significant in terms of conversion of natural forestlands into farmlands.

The rapidly increasing rate of destruction of forestlands in the 1900s led the colonial administrators to consider the need for legislation to conserve part of Ghana's forests. They established the earliest reserves in the forest zone in the 1920s and 1930s, whereas the reserves in the savanna zone were established in more recent times.

The colonial administrators' approach to game preservation lacked the necessary human and financial resources for effective implementation. The first game reserves were constituted in 1909. Under the Game Preservation Ordinance, only nonnatives required a license to hunt, a provision that had practically no effect on wildlife protection since nonnative hunters were relatively insignificant. Collins (1961) sums up the result: "Official ignorance and indifference achieved what might be expected: the destruction almost to the point of extinction of thousands of elephants, hundreds of antelopes, monkeys, and pigs, all slaughtered without consideration of age or sex."

In 1953 the colonial administrators put game preservation under the Tsetse Control Unit with the mandate of eradicating the tsetse fly. Ironically, the policy was to eliminate the tsetse fly by the extirpation of thousands of herbivorous game animals. They constituted the Black Volta Game reserve presumably to concentrate the country's big game and its attendant tsetse flies. Again, no resources were made available to manage this or any of the earlier reserves.

Soon after independence in 1957, the new government abolished the Tsetse Control Department, transferred the Game Section of the Tsetse Control Unit to the Department of Forestry, and amended the Wild Animal Preservation Ordinance. It dereserved several depleted reserves and proposed three new reserves: Mole, Shai Hills, and Owabi (Cansdale 1964). The enactment of the Wild Animal Preservation Act formed the basis for the present wildlife conservation practices in Ghana.

In 1965 the government upgraded the Game Branch of the Forestry Department to a full department, the Department of Game and Wildlife, and gave it responsibility for managing Ghana's wildlife resources both within and outside conservation areas. Based on the provisions of the Wild Animals Preservation Act, the government legally established the first batch of six wildlife conservation areas in 1971.

The government adopted the Ghana Wildlife Conservation Policy in 1974. The policy's aims were to survey, conserve, and scientifically manage the country's wildlife resources, placing major emphasis on national parks and other protected areas and establishing wildlife conservation areas that contained representative assemblages of Ghana's fauna and flora. The main deficiencies of the 1974 policy were twofold: its strict protectionist approach (when enacted, essential at that point if any of the country's wildlife resources were to be saved) and its failure to involve local communities in managing their wildlife resources.

A revision of the 1974 policy is currently under discussion by the Department of Game and Wildlife under the Ghana Government/World Bank Forest Resources Management Project. The draft revised policy is based on the conviction that Ghanaians have the right to resources needed for a reasonable standard of living and the right to derive economic and other benefits from wild species. At the same time, they have the responsibility to ensure that their use of wild species is sustainable. The new policy places greater emphasis on conserving the country's wildlife resources for the benefit of local communities and the contribution that local communities can make toward the effective management of the country's wildlife resources.

2.1.2 Current Wildlife Management Practices

Presently, the Forestry Department administers over 280 forest reserves covering a total area of 23,729 square kilometers. About 75 percent of the reserves are exploited for timber, whereas the remaining are protection reserves. The management plans for the forest reserves include no clear wildlife

management practices but do afford a measure of wild animal protection, since hunting requires permission.

Currently, sixteen legally constituted wildlife conservation areas comprise six national parks, one strict nature reserve, six game production reserves, and three wildlife sanctuaries. In addition, the department has proposed two wildlife conservation areas. It has estimated the total area of reserves within this zone at about 1.8 million hectares or 73 percent of the remaining forests in the country. In addition to the forest and wildlife reserves controlled by the central government, a number of small traditionally protected patches of forest are scattered all over Ghana.

The hunting, capture, and destruction of any animal as well as the collection or destruction of any plant is legally prohibited in all wildlife conservation areas. The chief game and wildlife officer has the authority to grant permission for the collection of flora and fauna from reserves but has hitherto exercised this authority only for the collection of specimens for scientific purposes. In the case of forest reserves, the policy is more flexible regarding usage. Production reserves may be given out as timber concessions and are logged under prescribed conditions. In most cases, the local people who originally owned the land retain the rights for hunting and collection of certain forest products from forest reserves with permission from the forestry officer. Farms may also be allowed on small portions of some reserves.

The strategy adopted for the protection of both forest and wildlife reserves involves externally enforced exclusion of local communities. Little or no attempt has been made to encourage participation of local communities in managing protected areas.

The effectiveness of protective measures in forest and wildlife reserves vary from one reserve to the other, but no reserve is 100 percent protected. Forest reserves are under constant pressure from illegal farming, and illegal hunting continues in all wildlife conservation areas. Overexploitation remains the major cause for the decline of wild animal populations in Ghana. In a study of local people's perception and value of forest and wildlife, 60 percent of the respondents attributed scarcity of bush meat and decline in wild animal populations to overexploitation, 36 percent attributed the decline to habitat destruction (through bush fires, farming, and timber logging), whereas the remaining 4 percent attributed it to natural causes such as death and predation (Ntiamoah-Baidu and others 1992).

Quantitative data on populations of wild animals within and outside protected areas in Ghana are scanty. Species records are, however, available for most of the wildlife conservation areas. Mammalian records for the country include fifteen species of primates, seventeen or eighteen species of antelopes, and thirteen species of fruit bats. Antelope species that are still locally common and heavily exploited as bush meat include Maxwell's duiker, bay duiker, black duiker, bushbuck, and royal antelope. Three species of rodents—the grasscutter, the brush-tailed porcupine, and the giant rat—also feature commonly on the bush meat markets.

Although no regular wild animal population studies exist to enable comparison of numbers in the past to what prevails at present, the numbers of wild animals in Ghana have clearly declined considerably over the years. This is evident from the present scarcity of bush meat as compared with the abundance referred to by earlier writers (Collins 1961, Cansdale 1964) and the qualitative descriptions of animal abundance in various reserves in the past as compared to present populations.

Information on public spending on wildlife management and revenue earnings from wildlife are available from the Department of Game and Wildlife (GW). Data on other expenditures, such as costs of pest control, crop losses due to damage by wild animals, and revenue and income from wildlife products and related industries, are not available. GW has an approved staff establishment of 1,051 plus an additional 89 unestablished posts comprising grades such as artisans, drivers, and watchmen. Over 68 percent of the approved professional staff positions remain vacant, whereas only 70 percent of the technical positions are filled. The poor staffing situation of the department is partly due to the lack of graduates with appropriate training and the unattractive conditions for wildlife staff.

Governmental budgetary allocation and actual annual expenditures on wildlife management for the five-year period 1988–92 increased from $\text{¢}1.6$ million (cedis) in 1988 to $\text{¢}3.3$ million in 1992 (constant 1977 cedis). The actual real expenditures fluctuated more than the approved real allocation. The largest fall in real expenditures by 25 percent occurred in 1992, not a healthy development for the wildlife sector, especially since capital expenditures experienced a real fall. In all but one year (1991), 10–40 percent of the approved budget went back to the government chest due to constraints in implementing approved programs, a freeze on expenditure under specific budget lines by central government, or both. The bulk of the money allocated and spent every year went into personnel emoluments.

Compared with government expenditure, revenue earnings by GW are insignificant. The main sources of revenue were licenses on wild animal exploitation and trade (game hunting and export permits), entrance fees to the zoos, and motel/rest house operations. The total earnings over the five-year period 1988–92 amounted to 4.4 percent of the actual expenditures for the same period. This means that wildlife management is still far from being self-supporting and will continue to depend on public funding for a long time.

Land tenure systems in Ghana vary from traditional communal tenure (in which every member of a tribe, clan, or family has the right to cultivate a piece of land and transmit it to their descendants) to customary freeholds (in which a member of a group can enjoy cultivation rights in perpetuity but has limited powers of disposition through sale) to a whole range of land-holding categories, including sharecropping and absolute ownership. Wildlife, however, is still regarded as communal property, and people are free to hunt anywhere outside protected areas including farmlands. This situation could create problems of access and ownership of the animals in the case of private game ranches, unless such areas were completely fenced; this has perhaps contributed to the lack of private investments in wildlife ranches in the country.

Under the Wild Animals Preservation Act, the government has the right of compulsory acquisition of any land considered to be suitable for wildlife conservation without paying compensation to the original owners of the land; it has established most of the country's wildlife conservation areas under this system. More recently, however, a number of communities that owned land within wildlife conservation areas have demanded compensation in lieu of user rights.

2.1.3 Wildlife Production and Utilization in Ghana

This section presents a new survey of the significance of bush meat in the Ghanaian diet, reflects on the experience in grasscutter domestication, and finally discusses the potential for game ranching in Ghana.

The Significance of Bush Meat

The importance of bush meat as a food resource in Ghana is well documented. Surveys initiated in Ghana by Asibey in the 1970s were the first attempt to document the economic value and the high demand for bush meat in the country.

Asibey (1977) estimated that 70 percent of the Ghanaian population ate bush meat, whereas wildlife constituted the main source of animal protein for rural communities. In a survey of nontraditional forest products in selected areas in southern Ghana, Falconer (1992) found that bush meat was one of the most valued forest products, constituting an important source of meat in both rural and urban diets, although eaten in small quantities. Ninety-five percent of the people interviewed in the survey would eat bush meat if it were available. The survey found, however, that the importance of bush meat in rural and urban diets varied greatly and that consumption was declining as a result of unavailability.

Virtually every wild animal species is acceptable as a food resource to some groups. This situation has resulted in serious overexploitation of wildlife and severe depletion of the populations of many species. Presently bush meat is unavailable to most rural communities because hunters prefer to sell their catch and buy cheaper fish to feed their families and it is beyond the means of many urban dwellers.

To assess the current value of bush meat and its contribution to protein intake, the authors selected three sites for a detailed survey: (1) Doryum (a rural community), (2) Mankesim (an urban town), and (3) Accra (the capital city of Ghana). Doryum is a village within the Shai traditional area, 45 kilometers from Accra. Its population was 754 as of the 1984 census. It is the nearest village to the Shai Hills Game Production Reserve in which a major game-ranching venture is planned. The data collected could enable the assessment of the current bush meat situation and the acceptability, as well as possible value, of the meat produced from the ranch to the local communities. Mankesim is situated 105 kilometers west of Accra in the central region on the main Accra-Cape Coast road. The population of the town as of the 1984 census was 8,386. The town and its surrounding villages are traditionally popular for the abundance of bush meat, particularly grasscutters. Fresh bush meat for sale is common along the roadside; a large proportion of the bush meat sold at the main bush meat market in Accra, Kantamanto market, came from this area. This area provides a good comparison with Doryum where, like most rural communities in the southern part of Ghana, bush meat is relatively scarce.

At both Doryum and Mankesim, the study focused on households, using questionnaires to determine the meat preference of members of the community as well as protein composition of their diet, bush meat consumption, and sources of supply. The method of selection involved interviewing in alternate houses. In each household, researchers interviewed one or two persons. In view of the sheer size of Accra, the survey was limited there to chop bars (traditional restaurants that serve both domestic meat and bush meat dishes). Researchers spent three to four hours at each establishment to interview customers. They attempted to interview every person who came to the bar during the period, but some people declined to answer questions. Researchers interviewed a minimum of 20 persons at each chop bar and visited a total of 25 chop bars. These surveys were carried out in May and June 1993. The total number of persons interviewed in each area were: 109 in Mankesim, 88 in Doryum, and 374 in the chop bars in Accra.

* The details of this study can be found in the full-length version of this report

Bush meat remains popular in Ghana, and most people would eat it if it were available. A majority of the people interviewed in all three localities answered in the affirmative when asked the question "Do you eat bush meat?" (Doryum, 95.5 percent of responses; Mankesim, 86 percent; Accra, 92.5 percent). In most cases, however, the answer was followed by a statement like "but I haven't eaten any for a long time because I cannot get it." The few people encountered who did not eat bush meat did not do so mainly for religious reasons.

The meat preferred by the communities interviewed was determined by asking people to indicate their preference (most preferred and second choice), given a choice of bush meat, poultry, pork, mutton, beef, and fish. In all three areas, bush meat was the most preferred meat (Doryum, 51 percent of scores; Mankesim, 37 percent; and Accra, 71 percent), followed by fish. Of the different bush meat species, the grasscutter was the favorite in all three areas followed by the royal antelope. The popularity of bush meat, and more specifically the grasscutter, was further confirmed by the results of the survey of the meat component of meals eaten by customers visiting chop bars in Accra where they had a choice of various types of meat and fish.

Two methods were used to assess the contribution of bush meat to the actual protein intake of the people interviewed: (1) by scoring the number of times bush meat was eaten in a week and (2) by recording the meat items used in preparing the previous day's meals (breakfast, lunch, and supper). Despite the obvious popularity of bush meat among the communities studied, the actual proportion of total protein intake accounted for by bush meat was small. Over 70 percent of the people interviewed in the households in both Doryum and Mankesim never ate bush meat. This trend was confirmed by the low frequency of bush meat in the items used in preparing the previous day's meals, 2.4 percent in Doryum and 4.6 percent in Mankesim. Fish accounted for the greatest proportion of animal protein intake in the communities studied.

The low contribution of bush meat to the protein intake was attributed to unavailability due to scarcity or, in areas where bush meat was relatively abundant (for example, Mankesim), due to high prices and the fact that the meat was not retailed in a form (for example, in small pieces as is done in city markets and chop bars) that the ordinary person could afford.

Market centers in four localities were selected for the study on bush meat exploitation and trade: Accra in the south, Kumasi in the center, Sunyani in the midwest, and Tamale in the north. Apart from the need for countrywide coverage, selection of the four centers was also based on the fact that some studies had been done in those areas in the past (Asibey 1966a-b, and 1974a-d) and therefore they provided the opportunity for comparison. A visit to Tamale in mid-April 1993 showed that the bush meat market there had collapsed. This has been attributed to the decline in wild animal populations and the fact that the hunters preferred to sell to bush meat traders from the south.

The outlet for bush meat in Sunyani was mainly through chop bar operators, each of whom was supplied by a group of hunters. Kumasi had three main bush meat market centers, Atwemonom (Kumasi), Kejetia, and Central markets. The Atwemonom market had a well-organized bush meat trade and served as the main outlet for fresh bush meat, whereas most of the smoked bush meat came to the Central market. Although smoked bush meat was sold in several markets in Accra, the Kantamanto (Accra) market was the main center for sale of fresh bush meat in Accra. The studies concentrated on volume of bush meat trade, species exploited and on the operations of hunters and bush meat traders in the main centers, Atwemonom, Kantamanto, and selected chop bars in Sunyani. Data from each center were collected over a period of one week.

Data on hunters were obtained from the Atwemonom market, where hunters brought their catch directly to middlemen for retail. A total of twenty-five hunters, all males, were interviewed. All of them were part-time hunters whose main occupations were either as farmers, drivers, or artisans. The two primary methods used were shooting with guns and trapping by snares. In the past, communal hunting was common but, with the ban on communal hunting, most hunters operated individually. The hunters' direct costs were the price of the shot gun (often owned by someone else who shared the hunting proceeds with the hunter), the cost of ammunition (¢180–200 per cartridge), the cost of hunting lamp and the cost of a game license (varied with the type of animal hunted, ranging from ¢300 for a grasscutter to ¢12,000 for large game). The average income in 1993 of ¢9,850 per week from hunting compares favorably with the salaries of government employees in grades equivalent to the full-time jobs of the hunters interviewed.

The bush meat trade is dominated by women. Both the “middlemen” (bush meat traders A), who were supplied directly by the hunters, and the retailers (bush meat traders B), who purchased from the “middlemen” for retail to consumers at both Kantamanto and Atwemonom, were mostly women. The few men encountered in the trade were chop bar operators who also bought their meat from traders A and can therefore be classified with the trader B group. The interviews indicated that the business was handed down by family members.

Traders were reluctant to answer direct questions on their income from the bush meat trade. An indication of profits made by traders A was obtained by recording the purchase price and the selling price wherever possible. The profit margin varied with the species of animal but ranged from 30 to 250 percent.

During a one-week survey, every animal that came to the market was recorded, as well as the species, numbers, and prices. The total number of animals recorded were: 742 for Kantamanto, Accra; 534 in Atwemonom, Kumasi; and 276 for Sunyani. The total purchase price in millions of cedis was 3.2, 2.9, and 1.1 respectively for the three areas.

A preliminary analysis of the weights and prices of the most common animals coming into Kantamanto market in 1974, 1985, and 1993 is presented in table 2.1. The mean real prices of all species fell from 1975 to 1993 with the exception of bushbuck, which experienced an increase from 1975 to 1985. This could be due to the reduced real income during the latter half of the 1980s and 1990s compared to 1975. This certainly resulted in a reduction of demand, making the real price go down, and ties in with the finding that there is little indication of decreases in the sizes of animals being hunted.

In the case of the bushbuck, the average weight of animals being marketed in 1993 was actually about twice what it was in 1975. A preliminary analysis of the volume of bush meat coming to the markets also indicated that, whereas there have been changes in the species composition and volume of individual species traded, the overall level of exploitation had not changed much. This would suggest that, although the populations of most wild animal species are believed to be declining in Ghana, sufficient effort continues to be put into exploitation.

Table 2.1: Changes in Price of Common Animals Marketed at Kantamanto Market

Species	Mean price per head constant 1977 (<i>cedis</i>)		
	1975	1985	1993
Grasscutters	38	26	18
Brush tailed porcupines	30	18	10
Giant rats	6	4	3
Maxwell duikers	44	36	18
Black duikers	89	68	47
Red flanked duikers	N/A	39	23
Royal antelopes	22	13	7
Bushbuck	78	91	63
Spot-nosed monkeys	21	15	5

Although the real prices of bush meat were declining over the years compared to other high-valued meat such as beef and mutton, the prices of bush meat were relatively higher. Between 1970 and 1973, the price of grasscutters was higher than beef but lower than mutton, whereas in 1990 and 1993 it was higher than both beef and mutton. The average bush meat price was higher than for beef and mutton in 1990 but lower in 1993. Using prices to value the significance of meat, we see that bush meat in general and the grasscutter in particular is highly valuable and comparable to the main leading meat sources of beef and mutton.

Grasscutter Domestication

In the early 1970s, significant effort was put into the domestication of the grasscutter, the most popular bush meat in many parts of Ghana. The project was initially based within GW, whose extension officers assisted interested farmers in obtaining breeding stock and offered technical expertise. The effort has met with a measure of success: a number of people keep grasscutters in their backyards in Accra; however, GW has not been able to maintain contact with farmers and information on the total number of grasscutter farmers is not readily available.

Grasscutter farming is a worthwhile venture that must be seriously considered in any attempts to increase animal protein supply in Ghana. More research should be conducted into (1) selective breeding to improve litter size, (2) diseases, and (3) feed options with the possibility of developing commercial feed to supplement the natural grass diet during the dry season. Both the Animal Research Institute (Council for Scientific and Industrial Research) and the Department of Animal Husbandry (Ministry of Agriculture) have recently initiated studies to promote large-scale farming of grasscutters.

Shai Hills

The potential for game ranching has not been sufficiently explored in Ghana. The concept of wildlife (or game) ranching is used here to mean the culling of wild animals from habitat managed specifically for this objective, possibly in combination with other activities such as livestock rearing. The concept is also used here to include the keeping and breeding of common wild animals, such as the grasscutter, in a captive environment. No private game ranches exist; the only proposed government wild animal ranch, Shai Hills, has been on the books since the early 1970s. The reserve covers an area of 4,800 hectares and is situated approximately 50 kilometers from Accra, potentially serving a large number of people from the Accra and Tema metropolitan areas in terms of recreation, education, and research. The objective for protection was to conserve flora and fauna to produce bush meat.

The entire reserve was fenced and dams constructed to provide year-round sources of water. Plans for restocking were never implemented and, despite the protection given over the years, animal populations have in many cases declined in Shai. An invasion of the neem tree *Azadirachta indica* has seriously threatened the natural vegetation. The holding pens are still in fairly good shape and require minimal repairs to put them into service, but several sections of the fence are now badly damaged. Of the nine dams constructed in the reserve, only two (those constructed by the local herdsmen) regularly hold water.

Under the World Bank/Ghana Forest Resources Management Project, GW has prepared new management plans for the Shai Hills Game Production Reserve. The proposed management strategy advocates a zonation system to include a 38.5-square-kilometer multiple use zone, whose management objectives would include promotion of game ranching for meat production.

The management plan proposes that animals be captured from Mole National Park and transported to Shai Hills for restocking purposes. The Multiple Use Zone within the Shai Game Production Reserve could support an estimated 924 bushbuck, 543 kob, 231 waterbuck, or 177 roan antelopes.

2.2 The Relative Profitability of Wildlife Management

This section discusses the major land-use options in Ghana, presents a financial and economic comparison of a set of wildlife and livestock activities, reviews the returns to food crop cultivation, and finally highlights a number of links between economic policies and wildlife utilization.

2.2.1. Competing Land Uses

Seven major land use patterns are presented in table 2.2. This means that some annual crops may be found in a fallow area. Savanna woodlands are the largest surface area. The savanna zone is divided into the coastal or Guinea savanna and the north or Sudan savanna. Only about 12 percent of the land is presently cultivated; however, the area for annual crops includes only the area cultivated in a particular year.

The Livestock Sector

The main livestock areas for cattle and small ruminants, sheep, goats, and pigs are in the savanna woodlands. More than 30 percent of farm families keep ruminants. The livestock subsector contributed about 5 percent of agricultural GDP in 1987 or about 2.3 percent of total GDP.

The national herd has risen to an estimated 1,150,000 in 1991 (ISSER 1993). Almost 75 percent of the herd is concentrated in the northern three regions. Most cattle are owned by sedentary farmers and grazed on communal lands for free. There are a few public and joint public/private ranches. It is only during community ceremonial periods that farmers are asked to pay a token fee in cash or in kind. Few farms, if any, grow fodder for livestock feed, and there is little attempt to conserve crop residue for dry

Table 2.2: Land Use in Ghana

Land Use	Area (1,000s of km ²)	Percent of total
Savanna woodlands	71	30
Unimproved pasture	36	27
Forest reserve	21	9
Tree crops	17	7
Annual crops	12	5
Wildlife reserve	12	5
Unreserved forest	5	2
Other	65	15
Total	239	100

Source: Ghana 1990a-b, p. 35.

season feeding. On average traditional farmers own three to five head of cattle. Animals from several compounds may make up the grazing herd, often with Fulani people engaged as herdsman. In most cases, a herd may be comprised of cattle owned by absentee urban dwellers.

It is estimated that there were about 2.56 million sheep and 2.83 million goats in Ghana in 1990 (Ghana 1991). Although a few farmers may have large herds of sheep or goats, large numbers of small farmers throughout the country own two to five animals, which are tethered in or close to the compound or tended by children.

The Crop Sector

Farm size is generally small with 60 percent of all farms less than 1.2 hectares, whereas only 15 percent have a size greater than 2 hectares (ISSER 1993).

Ghana's farming systems depend on long bush fallow periods, mixed cropping and some limited integration of crop/livestock farming to restore fertility. Tree crops, mainly cocoa, oil palm, rubber, and coffee, are grown in the forest zones, and many farmers may cultivate more than one tree crop.

In general, food crop and tree crop holdings are separated, although intercropping of food crops with the tree crops is common while trees are being established. Food crops are generally grown intercropped; common combinations are maize/plantain/cocoyam and maize/plantain/cassava.

Although oil palm is grown in the southern part of the transition zone from bush fallow to forest, the area is marginal for tree crop production. Tobacco and cotton are the main nonfood crops grown. These are grown as sole crops but form part of a farm in which food crops are grown in one of the following cropping systems: intercropped maize/cassava or maize/legumes/cocoyam, solely cropped maize, yams, or legumes or rainfed rice in valley bottoms.

In the Guinea savanna zone, the predominant cropping systems are intercropped sorghum/cowpea, maize/cowpea, singly cropped maize, yam, sorghum, legumes, or rainfed rice in valley bottoms. Cultivation of cassava is increasing in this area, especially since the drought years of the early 1980s. In the drier Sudan savanna zones, intercropped sorghum/millet or sorghum/millet/cowpea are the predominant cropping systems. Crop production technology is mainly traditional with little use of purchased inputs, although input packages are provided by commercial companies for cotton, tobacco, and oil palms. Land preparation is manual in most areas, although the use of oxen for plowing is

common in the upper east region and is spreading to the upper west and northern regions. Some tractors are also used for plowing. Average yields are low and in the northeast. The unreliability of rainfall means that the risk of crop failure is high.

2.2.2 Financial and Economic Analysis

The investments in wildlife and domesticated animals are analyzed in this case study using cost-benefit analysis and taking into consideration both financial and economic perspectives. Prices were not adjusted for inflation, since it was expected that prices of output would change proportionately with the costs of inputs and 1993 was used as the base year.

The assumption when loans were disbursed in the financial analysis is a five-year repayment period, with a one-year grace period and 35 percent interest rate. The corporate tax of 35 percent is applicable after five years of operation.

The interest rate on loans averages around 35 percent a year. The inflation rate in the late 1970s and early 1980s was in the double digits and on two occasions in the triple digits. This, together with low interest rates, resulted in real negative interest rates. The rate of inflation averaged about 40 percent for the 1980s and was 27 percent in 1992 and about 20 percent in 1993. Since 1993 constant prices are employed, a 15 percent real-interest cost was used (the difference between the nominal rate and the inflation rate).

For the financial analysis, the competitive market prices observed by the private investor were used. In the economic analysis, the values used reflected market prices if they were good estimates of economic value, or else they represented shadow prices when market prices were adjusted for distortions. Financial prices of tangible items were adjusted to reflect economic values in three stages:

1. Direct transfer payments
2. Price distortions in tradable items
3. Price distortions in nontradable items

Opportunity cost was used to value all intermediate inputs and outputs; however, for some final goods and services, it is consumption value that sets the economic value, not value in some alternative use. In such instances, the "willingness to pay" principle was used, especially when the good was nontraded. In a competitive market situation, willingness to pay is approximated by the equilibrium prices. Ghana's Economic Recovery Programme has created a competitive market structure for most inputs and outputs as well as for resources used in this study. Constant 1993 prices were used in the economic analysis, as in the financial analysis.

There are two equivalent ways of incorporating the premium on foreign exchange in economic analysis (Gittinger 1982). The first is to get the shadow exchange rate (SER) by multiplying the official exchange rate (OER) by the foreign exchange premium. The SER has been used by the World Bank and in the UNIDO Guidelines (1972). The second way is the standard conversion factor (SCF). The SCF is derived by taking the ratio of the value of all exports and imports at border prices (Squire and van der Tak 1975).

For the past 12 months, the average private market rate has been greater than the official exchange rate by about 8 percent. An analysis done by Danquah (1993) showed that the foreign exchange

premium was about 5.85 percent. The average of the interbank rate and the forex rate was used as the foreign exchange premium. At the time of the analysis, the forex rate was ₵700 to US\$1.00, whereas the interbank rate was ₵680. The simple average as the shadow exchange rate, which was ₵690 to US\$1.00, was used. All other conversions of amounts from cedis to dollars found in the paper were calculated at the rate of ₵700 to US\$1.00.

Direct transfer payments are those that do not represent the use of real resources but just transfer claims to real resources from one person in society to another. These include taxes, subsidies, credit transactions including loans, receipts, repayment of principal, interest payments, and accounts payable and receivable. These were taken out of our economic analysis.

For traded goods, the analysis begins by determining the border prices based on imports of vehicles. This is adjusted to take account of domestic transport between the point of import and the project site. The cost, insurance, and freight (c.i.f.) value of the vehicle were taken and converted to the c.i.f. value using the SER, since no duties apply.

Buildings, land, and feed for bush meat were considered as nontraded. The conversion factors calculated by Danquah (1993) and used at the Ghana Investment Center were applied in the analysis.

A discount factor of 18 percent was used in discounting the net cash flows. It represents the opportunity cost of capital according to the Ghana Investment Center.

Most land is leased or rented but rarely sold. Where land is leased or sold, especially in the Accra Plains where ranching or grasscutter domestication is ideal, the price reflects the market value. In this case, most of the land is idle and the net value could be taken as zero; however, the next best alternative use of the land is cropping mainly of maize. The method to get the economic value of land is to take the gross value of the land's output at market prices and deduct from that all costs of production on the land. The residual is the opportunity cost. The conversion factor used at the Ghana Investment Centre is 1.00. This is expected to be land in the city where the market price reflects its opportunity cost. Since most land in the Accra Plains is idle, the factor was assumed to be 0.4.

Skilled labor was assumed to be fully employed without the project; hence, the market wage represents the opportunity cost. Unskilled labor was assumed to be employed from the rural areas. Whereas the daily wage in the rural area is about twice the minimum wage, at least most labor will be idle for about 25 percent of the year. Since 75 percent employment is expected in the year, a conversion factor of 0.75 shall be used.

Conversion factors for administration and sales expenditures, utilities, fuel and lubricants, insurance, and maintenance and repairs were derived by disaggregating the expenditures into their various components, taking note of the traded and nontraded components and using the proportions and conversion factors that are used by the Ghana Investment Centre.

Two situations are considered. The first one is whether a crop or livestock *farmer* can go into wildlife ranching as a way of diversifying or replacing existing activity. The second is whether *a person who wants to go into farming* will go into livestock, food farming, cash crop farming, or wildlife ranching. The answer will depend on the relative profitability.

Apart from the wildlife reserves, no wildlife ranching exists in Ghana. Through the effort of the Department of Game and Wildlife, the domestication of grasscutters, which are the most common and highly prized wildlife, became popular in the 1970s. Most people who invested in this were officials in the public sector, who did it on a part-time basis. Unfortunately, the support that was given to the potential farmers by the GW waned. Since the new farmers had not gained sufficient experience, the experiment fizzled.

The analysis of grasscutters was based on the estimates of Mr. Ofori who started grasscutter farming in 1974 and still undertakes it on part-time basis. Even for the few backyard domesticated wildlife enterprises that exist at present, there are no time series data. An ex ante returns to investments in wildlife is therefore considered. The return to investments shall be examined in cattle, chicken, and food crop farming. These will be compared to the return to five cases of wildlife ranching, namely:

1. Small-scale backyard wildlife farming (grasscutter)
2. Large-scale wildlife ranching of certain animals (grasscutter)
3. Small-scale backyard rabbit farming
4. Official proposed wildlife ranching
5. Private or communal ranching

The net present value (NPV) and internal rate of return (IRR) serve as the criteria. Each case is investigated to determine whether it is potentially viable by the criteria. In the next step, all the activities are compared. The final step involves a sensitivity analysis of policy variables to profitability.

Investment in Cattle

Before choosing the type of investment to study, the availability of data was considered and private and public cattle ranches were toured. The public ranches had adequate data, but most of them were not financially viable, either because they were research stations or performed veterinary and other services, such as dipping of cattle belonging to private farmers, free of charge. The Aveyime cattle ranch which is a quasi-private company, was selected because it is the best managed among the public ranches. One of the private cattle ranchers whose feeding activity is free-range was also chosen.

The Aveyime Cattle Ranch Ltd. is wholly owned by the Volta Regional Development Corporation (VRDC). It was incorporated on May 13, 1982. The project was cosponsored by the government of Ghana and the European Union (EU). The objective of the company was to breed cattle for sale and provide extension services to private farmers. The company began with two expatriate staff: the general manager (project co-coordinator), and project manager (livestock expert). In 1991 when the last expatriate staff left, there were 52 permanent employees and 13 casual employees.

The two major sections of the company are the animal section, which deals with breeding for sale, and the extension service, which includes work on the ranch and servicing the cattle of the traditional owners.

By 1991 the company had 28 *kraals* (1,470 square meters each), a crush and pen (80 meters long), office buildings, buildings for herdsmen and watchmen, staff houses, cattle building facilities, such as a dip and spray race. The stock of cattle increased by 46 percent between 1985 and 1991 with only a year's decline in 1989.

The net cash flow for both the financial and economic analyses for all the years except 1992 is negative. Using a discount rate of 18 percent, the net present value for the financial and economic analyses were both negative. The unattractiveness of this venture is mainly due to the low proportion of sales and the generally cost ineffectiveness of public projects.

An analysis was made of a private cattle ranch in the Accra Plains about 32 kilometers from Accra. The ranch is owned by Alhaji Munkaila and managed by a retired army officer. The ranch had ten other workers and 807 cattle. Open access feeding was practiced in which each morning, workers took out herds to graze outside the ranch. During dry seasons when grass is rare, the herdsmen take the cattle several miles out to places that have water and grass. There was no secondary feed. A herd consisted of about 80 cattle. They did not have time series data but had data on expenditures and output for 1993. The owner seemed only to be interested in building up stocks since few cattle were sold annually. This is the traditional practice of most cattle owners, especially those from the north. They do not operate it as an economic venture in which mature livestock will be sold. The cost estimates of this private ranch for our proposed investment was used.

Poultry

An analysis was made of a proposed small-scale farm that raises broilers for sale as meat. The data were based on the actual activity of a small-scale farmer who started poultry some two years ago. Small-scale poultry is an activity that can be undertaken by most people due to the relatively little investment cost required. The analysis focused on a small-scale farm with initial stock of 220 and a maximum maturation period of seven weeks. The mortality rate ranges from 5 to 10 percent. In the case of this farmer, the mortality rate averages 20 out of 220. Thus, in a year, 1,200 chickens can be produced using the investment of a building, water containers, and feeding boxes. The financial returns show a negative NPV but the economic returns are high with a positive NPV.

Wildlife

The return to investment in wildlife in the five cases identified above shall be considered. Two wildlife species are analyzed—grasscutters and rabbit—that have experienced domestication in Ghana. The first two cases involve the grasscutter, which was identified based on its popularity, a ready market, and some experience in its rearing. The next species was rabbits, for which a national project was established in the 1970s.

Grasscutter Farming

The only case study that could have been used for the financial and economic analysis was that of Mr. Addo whose farm had existed since 1974. Unfortunately, he did not have any time series data on costs and revenues. Consequently, his present cost estimates are used.

Two small-scale grasscutter-farming activities with a duration of ten years were considered. One was considered to be micro-scale with a yearly stock of 128 animals and the other was known as small-scale with a yearly stock of 260. The two analyses are important because if most farmers want to undertake this kind of activity in addition to other agricultural activities, they might opt for the micro scale because of the relatively small investment and animals involved. The small-scale ones may be undertaken by either retired or retrenched persons or as part-time activity for some workers.

The cost estimates, such as feeding, wooden cage, and prices of grasscutters were obtained from Addo's operations. Two workers for both the micro and small scale were assumed. For the micro scale an income of US\$36 a month was estimated for the owner and US\$17 a month for an additional worker. These amounts are significant in a rural setting in which most of the micro-scale farms would take place. For the small scale, monthly earnings of about US\$62 for the manager/owner and US\$36 for an unskilled worker are competitive in the cities in which the minimum daily wage is about US\$23 a month. These rates are assumed in almost all the other analyses.

The beginning breeding stock comprised four one-year-old males and twenty one-year-old females; this was maintained throughout the period. The yearly stock of animals was 128 with forty-eight males and eighty females.

A small-scale grasscutter farming activity with a yearly stock of 260 animals was also analyzed. The beginning stock comprised sixty with twenty males and forty females. The breeding stock is kept in forty females and ten males.

Potential large-scale grasscutter farming where the yearly stock included 2,440 animals with a yearly sale of 3,200, comprised of 2,360 carcasses and 840 live animals, was examined. This included four workers, the manager, an unskilled worker, driver, and watchman. The investment cost included an office, a fenced yard to keep the animals, and a vehicle to help in feed transportation. Since this involves a more significant investment than the small-scale option, the investment was evaluated over a fifteen-year period.

The IRRs for all scales of grasscutter farming were comparatively high with positive NPVs. The small-scale activity turned out to be the most profitable. It was followed by the micro scale and large scale with IRRs of 60 percent, 48 percent, and 30 percent, respectively, for the financial analysis. The economic analysis had IRRs of 53 percent, 30 percent, and 25 percent for the small-, large-, and micro-scale enterprises, respectively.

The major distinguishing cost item from the small scale is the vehicle. This significantly increases both the repair and maintenance and utilities costs each to about 20 percent of yearly operating cost. Vehicle maintenance alone is 86 percent of total yearly maintenance, whereas vehicle fuel is 93 percent of utility cost.

Rabbit Farming

The financial and economic returns to a small-scale rabbit farm were analyzed. Interviews from Nana Ampratwum and Mr. Mamattah; Opoku and Lukefahr (1990) and Mamattah and Amaning-Kwarteng (1975) showed an average breeding rate of four litters a year with a litter size of five. With this, a yearly stock of 366 and a yearly sale of 640 was estimated, out of which 104 are sold live for breeding purposes.

Rabbits are kept in wooden or steel cages identical to those of grasscutters but with slightly different sizes. The labor requirement is the same as that of grasscutter. The only difference is with feeding. It was not possible to get estimates of local feed. Rather, Nana Ampratwum provided the cost prepared feed and water needed for the rabbits. Although this could lead to higher yields, it costs more than local grass and other food items.

The proposed rabbit project showed a profitable outcome. The private return recorded a positive NPV of US\$730 with an IRR of 4 percent, whereas the economic analysis turned out to be more attractive with an NPV of US\$700 and IRR of 28 percent.

Wildlife Ranching Project

The wildlife ranching analyses consist of two cases. Estimates of inputs and costs in the GW-proposed "official ranching project" over fifteen years are used. The other case considers what a private person or community, like the Shai Hills area, would do if they were to undertake such activity. This was called a private or community ranching activity.

The official ranching project proposed the introduction of six different species of animals, but the analysis here is limited to kob and waterbuck, because their reproduction rates and the market prices are known. A yearly stock of 520 and a sale of 400 for both animals were considered. The initial stock is 100 for each species with twenty male and eighty females. After a year, each female is capable of littering once a year with a litter size of one. Adding a yearly stock of grasscutters of 6,100 and a sale of 8,000 was also considered.

The total investment cost comes to US\$1.48 million with the largest cost item being the fencing of the reserve. The other significant investment items are electricity supply, staff and office accommodation, animal introduction, pipeline connection, and dam construction. The total operating costs come to US\$96,423 with the major cost components being repairs and fuel. Average yearly revenues come to US\$95,143, which is less than the annual operating costs. Both financial and economic analyses show negative IRR and NPV. A sensitivity analysis for a thirty-year period still yields negative returns.

Consider now the community ranching activity. With Shai Hills designated as the project site, the community can own it, collecting a yearly rent of US\$8,471 in addition to any other return that will be derived. They would then appoint a manager for the project. Hunters in the area would be allowed to shoot animals for a small fee. An analysis was made for both fifteen and thirty years.

The difference in cost between official and private estimates was in office, fencing, electricity supply, dam construction, staff accommodation, and animal introduction. Private estimates of these items instead of the official GW ones were used. The costs of fencing and dam construction were significantly lower. The cost of dam construction and fencing was reduced by 76 percent and 33 percent, respectively. The fact that a private person would spend a smaller amount in renting places for the workers while gas lamps would be used instead of electricity, almost eliminating the huge electricity investment, was taken into consideration. The official ranch was planned for seventeen workers whereas the community ranch will have eight workers. The estimates for the introduction of animals were arrived at by taking the market price of the animals and adding transportation costs.

The new cost estimates reduce investment cost by 48 percent. The average annual revenues come to US\$95,714, whereas the yearly operating costs come to only 54 percent of revenues. The financial IRR is only 3 percent with a negative NPV of US\$176,857, whereas the economic IRR is 8 percent with a negative NPV of US\$128,343. When the analysis was done for a thirty-year period, the NPVs were still negative.

It is now possible to summarize the relative profitability of investment in wildlife and domestic livestock as shown in table 2.3.

Type of Activity	Level of Investment (thousands of US\$)	Operating Costs (thousands of US\$)	Revenues (thousands of US\$)	Financial Returns		Economic Returns	
				NPV	IRR	NPV	IRR
Cattle							
Public (Aveytime)	N/A	43	15	-289	N/A	-318	N/A
Private	16	2	5	-9	-1	-6	-.1
Small-Scale Poultry	.87	4	5	-1	N/A	.69	208
Grasscutter							
Micro-scale	.80	1	2	.09	48	.28	25
Small-scale	2	3	4	.62	60	3	53
Large-scale	41	18	28	4.7	30	19	30
Rabbit	1	3.6	4	.73	4	.70	28
State Wildlife Ranch	644	96	95	-1,436	-18	-536	-11
Private Wildlife Ranch	344	52	96	-177	3	-128	8

Considering wildlife activity, it is observed that those with a small amount of investment are micro-scale grasscutter, small-scale grasscutter, poultry, and rabbit. Considering the present lending interest rate of 35 percent a year, the only viable one is the micro-scale grasscutter. The small-scale grasscutter with an IRR of 28 percent is quite attractive with average annual revenues exceeding average operating costs. Poultry and small-scale grasscutters tend to be viable using the economic analysis. Considering both financial and economic analyses, micro- and small-scale grasscutter farming come out as the most profitable.

The large-scale activities turn out to be nonviable economically. The larger the initial investment, the poorer the viability of the project. What comes out clearly is that grasscutter activity is the dominant productive venture. All sizes are profitable using both financial and economic analysis. Furthermore, state ventures are actually or potentially less viable than private activities. The reason is mainly the cost-effectiveness of private ventures. Even for the large-scale ventures, grasscutters tend to be more viable than private cattle ranches.

For the actual wildlife ranch, the private or community ranch with an investment smaller than that of the state has a small positive IRR, although NPVs for both financial and economic analyses are negative. It is interesting to note that the average revenue is 1.8 times the operating cost.

The environmental benefits of maintaining species that are endangered were not integrated into the analysis. If this is considered in addition to a yearly earning of US\$8,471 as rent for the land and the fact that revenues exceed yearly operating costs, a community wildlife ranch can be viable even though the returns do not serve as a strong incentive for a purely private entrepreneur to undertake.

All the analyses show that investment in grasscutters—especially small-scale—is profitable. The large scale is problematic because of feeding difficulty. There is a large demand for grass, which will be difficult to meet during the dry season. The small- or micro-scale level is preferable because of the relatively small amount of investment, which will enable individual farmers to undertake it as backyard

activity. Although it is normally difficult for rural families to purchase a whole carcass due to their low incomes, it can be smoked and sold in little pieces to make it easier for them to purchase the meat once such small- or micro-scale activity exists in the rural areas. It will both supplement the incomes of the farmers and improve the protein content of their diets. Furthermore, the monthly earnings are highly attractive.

Food Crop Cultivation

The cropping activity is relatively inexpensive with total cost averaging US\$154 per acre for the nine activities (table 2.4). The return for the highest activity is an acre of tomatoes and for the lowest is improved, nonmechanized maize. The problem associated with cropping activity is that it is a yearly enterprise whose returns depend on the vagaries of the weather. Thus, cropping activity is far riskier than backyard wildlife farming. Secondly, the returns were based on normal yield and urban prices. But one major problem with the food crop sector is marketing. Farm gate prices are generally lower than prices in urban areas.

Table 2.4: Return to Food Crop Activity
(US\$ per 1 acre or 0.4 hectare)

Activity	Total Cost	Net Return
Mechanized improved technology, maize	147	52
Improved nonmechanized technology, maize	136	35
Improved irrigated rice	224	464
Improved rainfed rice	201	211
Improved technology, tomato	94	749
Traditional technology, yam	173	255
Traditional technology, maize/cassava	133	72
Traditional technology, yam/groundnut	155	217
Traditional maize/cassava/plantain	127	75

Source: Ministry of Agriculture 1991.

In comparing the relative return to crops and wildlife, the two most attractive ventures are examined—micro-scale grasscutter and tomato farming. In the case of grasscutter, there are two workers, the farmer and another person assumed to be a family member. It is further assumed that about 80 percent of the total cost of cropping activity will be labor, which can be composed of one family member or two. For simplicity, this total cost is considered to be only labor cost and the net income as a return to family labor. For the grasscutter, the family income for the two persons comes to US\$743 a year for ten years. In the case of tomato farming the return is US\$843. If the next most profitable scenarios—small-scale grasscutter farming and improved irrigated rice—are considered, the grasscutter is more viable. For these two activities, there is a yearly income of US\$1,386 for grasscutters and US\$688 for improved irrigated rice. It must also be noted that it is easy to combine cropping activity with backyard ranching; this is what most farmers will do since monocultural activity is alien to most communities in Ghana. The issue is not either a choice between wildlife ranching or cropping activity but combining both activities in some proportion. The alternative must be to determine which one of the species of animals should be undertaken. In this case, the analyses indicate that the grasscutter is the most viable option.

If such investments are profitable, why is there a lack of interest? Although small-scale farming in grasscutters and rabbits tends to be more profitable than poultry, the latter is more popular. The reasons stem from a lack of technical knowledge and support and the unavailability of breeding stock. In the case of poultry, for instance, there is significant knowledge through a long period of practice and support from veterinary institutions and firms that conduct research and supply feed and chicken to farmers.

The livestock sector of the Ministry of Agriculture deals with the promotion of poultry, goats, sheep, cattle, and pigs. Wildlife activities are not promoted. Two cases can be used to illustrate the need for support structures for wildlife ranching. First, during the 1970s, when the government vigorously pursued extension services in terms of supplying breeding stock and giving technical know-how to farmers, several civil servants undertook grasscutter farming with success. Second, during the 1970s when the National Rabbit Project was launched, the enterprise came into the limelight and several people started the project. When the director retired in the early 1980s and the emphasis was not continued, interest in the project waned.

2.2.3 Economic Policies and Wildlife

From 1961 to 1982 Ghana pursued nonmarket economic policies. It was only in 1970–71 and 1978–79 that attempts to liberalize the economy were made; however, as a result of economic stagnation during the greater part of the 1970s and early 1980s, the government in April 1983 embarked on an overhaul of economic policies that was enshrined in the Structural Adjustment Programme (SAP)/Economic Recovery Programme (ERP).

The broad objectives of the program were to give incentives to producers, rehabilitate infrastructure and industry, curb inflation, and promote sustained economic growth. The policies included exchange rate reform, budgetary restraint—which resulted in cuts in government expenditures—prudent monetary policies, withdrawal of subsidies, removal of controls, privatization of state enterprises, and removal of trade restrictions. An overview of the policy changes to assess their impact on livestock and wildlife has been undertaken.

The monetary policies since 1961 have been to promote a high rate of economic growth with reasonable price stability and an improved balance of payments position. The general direction was to maintain a tight monetary policy to control inflation, whereas between 1975 and 1985, credit was directed to priority sectors. Part of the objective was to curtail the share of aggregate credit going to the public sector to free resources for increased private sector investment.

Fixed interest rate policy was maintained until 1984. The lending and savings deposit rates were fixed at 10.5 percent and 7.5 percent respectively from 1975 and remained so with slight changes until 1983. Since 1984 the policy has been to operate a flexible system that gives an interest rate higher than the rate of inflation. The objective was to increase voluntary domestic private savings, improve financial intermediation by domestic financial institutions, and increase the inflow of foreign capital. This objective has been reached since 1991. The current lending rate for most transactions is 35 percent.

Since the interest rate was not used as a tool to direct credit, selective credit controls were undertaken. The Bank of Ghana in an August 1974 regulation prioritized the following sectors: agriculture, manufacturing and export trade, construction, transport, communications, and storage. The banks were to lend specified, significant proportions at lower rates to these sectors. Since 1988 all

sectoral credit ceilings and discriminatory lending rates have been removed. The likely negative effect of these policies is a high lending rate, which will make most investments in wildlife unprofitable. There is also the possibility of a lack of credit especially to rural farmers who may want to undertake some small-scale wildlife activities but who may not have the requisite qualifications and collateral to qualify for a loan.

The exchange rate policy has moved from a fixed system since independence with occasional devaluations to the present flexible and market-determined interbank and forex bureaux system. The flexible exchange rate system was adopted to improve Ghana's competitiveness, give incentives to exporters, and encourage the use of more local inputs.

In April 1983, when the ERP was introduced, a system of multiple exchange rates based on bonuses and surcharges applied to specified transactions was tried and abandoned.

In October 1983 the rate was unified at ¢30 to US\$1.00. During 1985 the exchange rate of the cedi was adjusted three times resulting in a rate of ¢60 to US\$1.00. In January 1986 the exchange rate for a dollar was again adjusted to ¢90.

In September 1986 the government introduced an auction system. The existence of the auction did not prevent the flourishing of a parallel market due to some significant differential between the auction rate and the parallel rate. The continued operation of the parallel market despite the auction made the government legislate the setting up of the forex bureaux in 1988.

The auction continued until 1992 when an interbank market-determined exchange rate took over. The exchange rate has continued to depreciate from ¢202.35 to US\$1.00 in 1988 to an interbank rate of ¢690 to US\$1.00, with the forex bureaux rate being ¢710 to US\$1.00 in October 1993. Although imported inputs for the livestock industry, such as drugs, feed, and vehicles, have generally been available during the ERP period, the depreciating exchange rate has significantly increased their cost.

Export restrictions were imposed when there were scarcities of commodities, mainly food items. These scarcities were prevalent between 1982 and 1984. With the promotion of exports of nontraditional products, more food items and animals are exported. With increased exports of wildlife, especially reptiles, the likelihood of extinction if proper management practices are not adopted is high.

The period 1961–83 was generally characterized by strict import controls. A relatively high tariff rate was maintained as an instrument of import control. With the removal of the import licensing system in 1989, the cost of importing was reduced. The tax rates on other raw materials and capital goods were reduced in 1990. These low levels of taxes and the narrowed range have been maintained until 1993. The liberalized import system was expected to improve productive capacity through the availability of imported input and also to generate more tax revenues through the reduction of corruption and a willingness to pay the lower tariffs by importers. This should imply availability of inputs to wildlife entrepreneurs, but the continual depreciation of the currency still makes the cost of imported inputs high.

Prior to 1983 there were significant levels of subsidies on most commodities, including inputs to the agricultural sector. Output prices of most items were administratively controlled; however, with the introduction of the ERP, these controls were systematically dismantled to the extent that, in 1993, there are neither subsidies nor price controls on any commodity.

The broad objective of the livestock sector earmarked in the Medium Term Agricultural Development Programme (MTADP) is to promote the growth of livestock. This is expected to be achieved by improving livestock productivity through improved nutrition, water supply, animal health and breed improvement. Regarding animal health, the full cost of curative medicine is charged. There are plans to give incentives, such as credit, to develop private veterinary services.

The major catalyst of the improvement of livestock productivity will be the improvement of the indigenous breed. The strategy is to utilize livestock owners in a participatory program with government agencies, such as animal research institutes and the universities.

A sensitivity analysis was undertaken for certain policy variables to find their impact on the various enterprises in livestock and wildlife. The main policies examined were taxation, interest rate, wage changes, and feeding cost. In the case of an interest rate, the reduction of the lending rate from the present exceedingly high rate of 35 percent to 18 percent was considered as well as a reduction of the tax rate from 35 percent to 20 percent and an extension of the five-year tax holiday to ten years.

Considering poultry activity, it is found that a 20 percent wage fall and 15 percent fall in the feeding cost changes the NPV from negative to positive. Indeed, labor cost is the most sensitive variable leading to a change from a negative to a positive IRR of 22 percent.

In the case of rabbit farming, in which the original position had a negative NPV of US\$730 and an IRR of 4 percent, wage fall tends to be the most sensitive followed by feeding cost. A tax-free period for ten years was of slight importance.

For grasscutters, the two policy variables that showed sensitivity were the interest rate and tax holiday for both small- and large-scale activity.

For cattle, the policy variables did not make any significant impact on the NPV and IRR. Although the IRR turned from negative to positive, they were all less than 1 percent. Improved productivity, such as improved breeding, may be the most sensitive variable.

The results for wildlife were the same as those for cattle: no policy variable was significant within the ranges tested here. The variables that would affect the profitability of wildlife domestication are wages, feeding cost, interest rate, and a ten-year tax-free period.

The wage rate policy is a variable for the employer since it is now possible to set a wage that is not based on the official minimum wage. It is also a variable that is feasible to manipulate because the average wages per month of about US\$71 for the owner and US\$43 for a second employee are high even by urban standards. Even a 20 percent wage fall, which makes poultry and rabbits quite profitable, results in close to twice the minimum wage.

It has been noted that part of the policy of the government is to undertake research into supplementary feeding. This was highly recommended for rabbits since the cost of grass as feed tends to be enormous. In addition to improving productivity with better supplementary feed, it is likely to reduce costs since local inputs will form a significant proportion.

We found that a lower interest rate and ten-year tax-free period make the grasscutter business highly profitable. As a result, such specific policies can be applied to the sector as an incentive to

promote it. Since small-scale ventures tend to be more profitable, we expect farmers in rural areas to be interested. This is important since the enterprise will improve their incomes and diet; consequently, special credit policies for these activities ought to be developed. Without special policies, it is impossible for most of the farmers who might be interested in the ventures to obtain loans.

2.3 Livestock, Wildlife, and the Environment

Cattle is the major livestock, in terms of numbers that undertake open-access feeding. To a lesser extent, goats and sheep are also in this category. Although cattle, goats, sheep, and poultry have been the main source of meat for the nation, the continuous occurrences of diseases are examples of problems of adaptation to the environment. The prevalence of serious diseases, such as trypanosomiasis, is an important constraint to livestock production. The disease problem is also likely to be due partly to high population growth of ruminants and the development of new breeds.

There is significant institutional support for livestock in terms of research, feed, breeding, and veterinary services. These have ensured the continued growth of the livestock population at the increased cost of importation of relevant inputs. The analysis shows that livestock in general have adapted to the environment as a result of the institutional support given to the sector.

Convery and Tutu (1991) have shown that severe deficiencies exist in livestock feed derived from natural vegetation and crop residues. The result is the threat of desertification, especially in northeast Ghana, partly due to free grazing and lack of supplementary feed. There is also some indication of overgrazing in the coastal savanna areas by cattle (Ghana 1990a–b). Grazing by sheep and goats does not cause widespread environmental hazards, apart from occasional destruction of backyard gardens, which occurs in rural areas.

Indirect degradation of vegetation caused by livestock can be seen in the case of poultry, which consumes a large quantity of grain. The demand from poultry together with that of humans exerts pressure on the land for maize production. A positive relationship between increased maize production and environmental degradation in Ghana has been established (Convery and Tutu 1991).

Wildlife in their natural habitats sometimes feed on crops, as shown by traps that farmers set to capture species that are considered pests. Otherwise, wildlife in their natural habitats have coexisted in equilibrium with the natural environment. Until recently, the situation was sustainable. For those animals in captive environments, such as the grasscutter and rabbit, little disease has been found and drugs have not been used. An insignificant proportion die before they reach maturity. This may be due to the fact that the stocks used are pure domestic breeds. Health hazards have been linked to the drugs that are given to livestock, especially poultry. The fact that the grasscutter can be reared without the use of drugs is a positive health effect for wildlife ranching.

Wildlife ranching, especially in a captive state as illustrated by grasscutters and others, implies an increased demand for feed. As indicated in the analysis, grasscutter domestication will result in increased demand for grass if many people take it up as a vocation. Should this occur, the grass may have to be grown; this is possible in savanna areas.

2.4 Summary and Conclusions

Forestry and wildlife resource management have been undertaken by public agencies since colonial times to the virtual exclusion of the communities interacting with the resources. Yet it has been documented that the most effective method of management is achieved through traditional institutional regulations based on adherence to cultural and traditional practices. Recently, however, observance of regulations has waned with consequent overexploitation. This calls for community participation in the evolution and management of these resources.

The importance of wildlife as meat, popularly called bush meat, has been well demonstrated in this chapter. It has been established that bush meat used to be the most common source of animal protein especially in the rural areas and that it is still regarded as the most preferred meat. Grasscutters are the most popular species and the most abundant among bush meat species. Today, bush meat constitutes only a small proportion of the protein intake of most people, especially those in rural areas because of scarcity, relatively high price, and unavailability in small, affordable pieces.

Although the nation does not earn significant foreign exchange from wildlife, the local market is quite active. Hunters earn incomes that are comparable to workers in the formal sector. The retail market is dominated by a few women who operate in a cartel in segmented areas. This leads to significant monopoly profits earned by the retailers ranging from 30 percent to 250 percent per animal.

Net present value and internal rate of return criteria were used as indications of the viability of the various wildlife ventures. The financial analyses indicate that private wildlife ranching is superior to official wildlife ranching in terms of profitability, whereas wildlife domestication turns out to be the most profitable. Furthermore, small-scale farming is more profitable than large-scale farming. Small-scale grasscutter farming turns out to be the most profitable followed by farming of poultry and rabbits.

The analysis favors providing support to domesticated activity in small-scale wildlife in terms of breed development, credit, and other technical information. Encouraging such profitable activity in rural areas would enhance the income-earning capability of most people and lead to a viable way of increasing the protein intake of rural dwellers, who make up about 65 percent of the population. Such a rural industry would lead to a market in which bush meat would be sold at affordable prices.

Integrating environmental concerns, including tourism, would enhance wildlife ranching viability; it was found that community ownership of a big wildlife ranch, such as the proposed Shai F. Ranch, would prove attractive. A partnership of state and community management is highly desirable.

The profitability of wildlife farming has been found to be sensitive to interest rate. Prudent policies, in terms of curbing huge budget deficits and high money growth rates, would help to bring down inflation and interest rates.

2.5 References

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Abstract

In the past, Kenya has focused wildlife conservation efforts on establishing parks and reserves, often without regard to the total ecosystems used by animal populations; hence, much wildlife still exist on private lands, which owners may legally “develop” as they will. A burgeoning human population is now increasing pressure on both public and private lands, by encroaching on parks and reserves and using private land important to wildlife more intensively.

Kenya’s wildlife has long been a public asset tapped largely for private gain, often by those who do not have to support it. Only with an increase in land-use conflicts has the government recognized that wildlife must return economic benefits to rural populations who compete with wildlife for land and other resources. Although the Kenya Wildlife Service has little jurisdiction over private landowners, this principle now underpins its management strategies in wildlife “dispersal areas” and on private lands with resident wildlife populations.

The chapter begins by presenting the historic context of wildlife management in Kenya, its current status, and wildlife management policies, legislation, institutions, and actions. The authors discuss the influence of demography, economic conditions, legislation, land tenure, management, and social values on wildlife; examine whether wildlife utilization is a viable land use; and consider environmental impacts of both agricultural and wildlife utilization options.

Although the data available for economic analysis are poor, the authors come to several conclusions on wildlife utilization in Kenya. The viability of each land-use enterprise described depends on a range of local factors, such as marketing opportunities, management, and finance. The authors point to population growth as the single most important cause of environmental degradation and unsustainable resource use; all development and conservation efforts are pointless unless this problem is fully addressed. Development organizations and the Kenyan government have not focused sufficiently on this issue.

Kenya’s policies on wildlife management, while changing to address landowners’ influence on the diversity and distribution of flora and fauna, have been limited by agency understaffing, corruption, and poor management. Policies are often contradictory, weak, and unenforced. Unless agencies exercise appropriate control over land use, however, potential benefits from wildlife will not be realized or distributed to rural people.

Wildlife utilization in Kenya is unlikely to be competitive in agroclimatic zones with potential higher than zone V or zone UM5 under the nation’s agroecological zoning classifications, providing a benchmark for land-use strategies. Based on wildlife densities, location of parks and reserves, land tenure, local attitudes, infrastructure, tourism investments, and government budget and management constraints, efforts to conserve and use wildlife in dispersal areas should concentrate in Narok, Kajiado, Laikipia, and Isiolo districts. Additional conservation areas to preserve wilderness and wildlife should be based on objective parameters of plant and wildlife diversity and density; compensation equivalent to opportunity cost should be paid. Communities should be closely involved in deciding how revenues from protected areas are utilized or distributed. The authors also make a number of recommendations on how government policy can encourage sustainable wildlife utilization.

Chapter 3:

The Economics of Living with Wildlife in Kenya*

By Peter V. Byrne, Christopher Staubo, and Jan G. Grootenhuist†

The study team could find few cases in which economics had been applied to the appraisal of wildlife-based projects or policies in Kenya. Even investigations of financial viability of such projects are, in general, absent. Some studies (Mwenge International Associates 1980; Mitchell 1968a; EIU 1979) have discussed the principles of wildlife-generated benefits at the national or regional level but have not concerned themselves with specific areas or projects. The value of specific animals as tourism attractions has been evaluated (Thresher 1992; Western and Henry 1980). Returns (US\$ per square kilometer) from tourism have been calculated (Douglas Hamilton & Associates 1988; EcoSystems 1982b) and compared with alternatives, such as cattle grazing and farming (Norton Griffiths 1995).

Natural resources and land potential in Kenya are described within a system that classifies areas into agroecological zones (AEZs) that are defined principally according to rainfall, temperature, and soil conditions. The use of AEZs has become the accepted form of classification and supersedes the agroclimatic zone (ACZ) system developed by the Kenya Soil Survey; however, the latter is more suitable for broad-based land classification of large areas, such as the arid and semiarid lands (ASAL) in Kenya in which most wildlife occurs.

There is increasing encroachment on national parks and reserves in Kenya, but more important is the growing intensity of land use in “dispersal areas” essential to wildlife. Wildlife clearly is losing the battle, as shown in section 3.3; however, wildlife densities are often highest outside national parks and reserves (table 3.1), because national parks and reserves were demarcated without full appreciation of the total ecosystem utilized by the animal population.

Section 3.1 begins with the historic context of wildlife, followed by a summary of the present status, management policies and actions, legislation, and institutional structures related to it. Wildlife utilization—past, present, and possible—is reviewed. The role and influence of demography, economic conditions, legislation, land tenure, management, and social values are discussed. Section 3.2 examines

* The original report has been shortened considerably and edited to its current form by Jan Bojö, Environmentally Sustainable Development Division, Africa Technical Department, The World Bank. The authors wish to thank all those who contributed information, time, and ideas in completing this study, particularly to John Sutton for being a member of the study team and assisting them in understanding aspects of wildlife management and possible utilization that have received little attention in tourism development.

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Table 3.1: Wildlife Densities Within and Outside National Parks: the Case of Tsavo, 1982

	Wildlife densities			
	Wildlife High	Medium	Low	Very Low
Density (<i>square kilometers</i> ^a)	>10	5-10	2-5	<2
Within parks (<i>percent</i>)	1	19	76	4
Outside parks (<i>percent</i>)	7	30	45	18
Whole area (<i>percent</i>)	6	28	52	14

Source: EcoSystems 1982b.

a. The percent shows the proportion of the area at different wildlife densities for those areas supporting wildlife; high and medium densities of wildlife are found outside the parks in dispersal areas.

the hypothesis that wildlife utilization is a viable form of land use. Specific case studies* are drawn on to illustrate the conclusions. Section 3.3 considers the environmental effects of both agricultural and wildlife utilization options. This may prove to be a principal battleground for choosing among land-use options. To conclude, section 3.4 presents the main findings.

3.1 Wildlife Management Policies and Legislation

This section discusses how wildlife management in Kenya is influenced by its political, economic, demographic, and legal surroundings.

3.1.1 The Policy Environment

There have been considerable changes in the Kenyan government's wildlife policies over the last century, as briefly sketched in this section.

Historical Perspective and the "Conservation Ethic"

Wildlife conservation has a long history in Kenya. The first legislation on wildlife was enacted in 1898 with regulations establishing game reserves and controls on hunting. In 1907 a game department was set up to manage wildlife. Several national parks were established, one of the first, Nairobi National Park, in 1946.

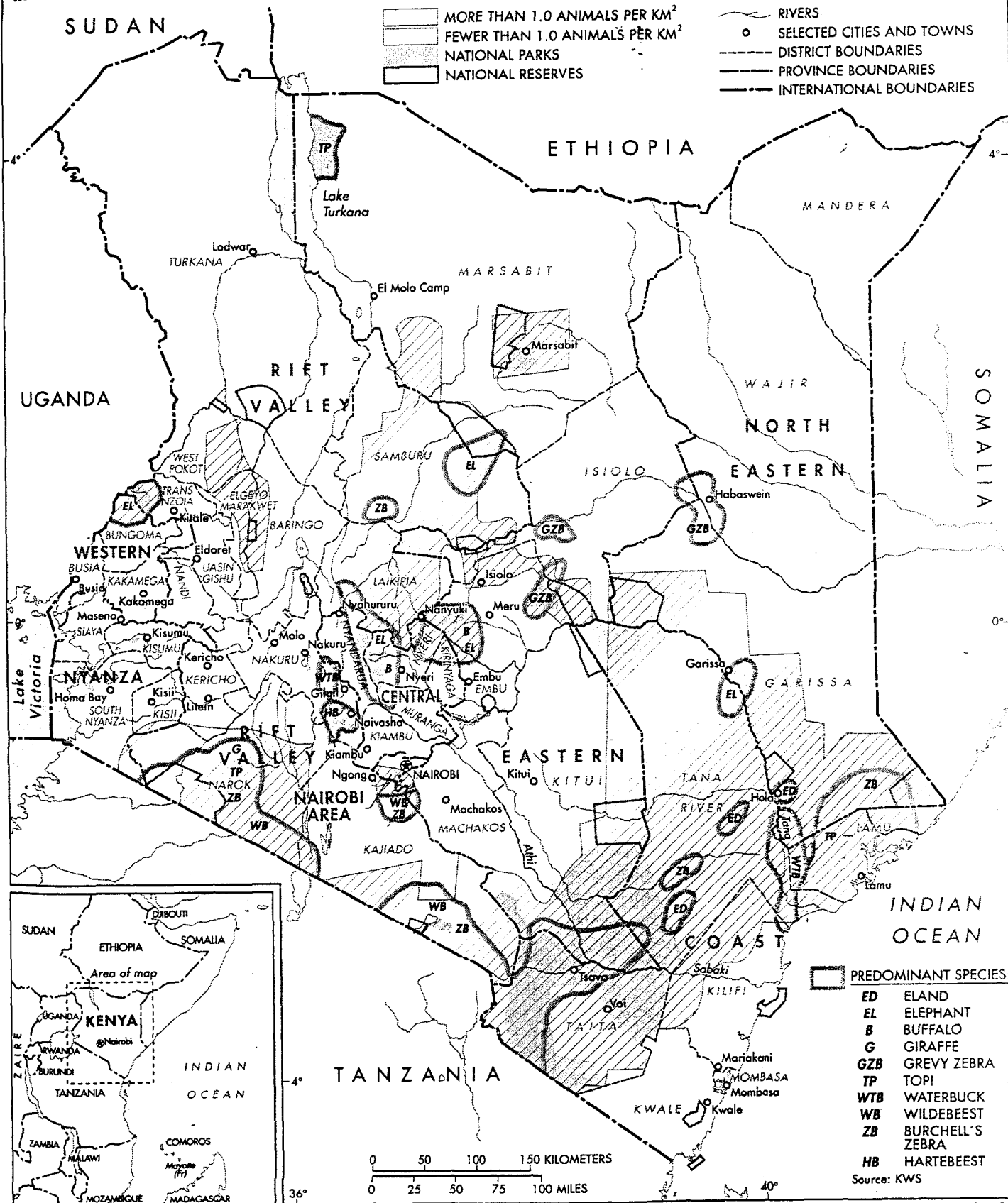
Conservation "for conservation's sake" was the primary goal of government conservation policy in the original ordinance of 1945 (Royal National Parks of Kenya Ordinance) as well as in the Wildlife Conservation and Management Act of 1976. Economic returns were considered, but, with the growth of land-use conflicts, the pendulum has now swung from aesthetics to economics.

In 1976 the Kenya government decided to amalgamate the game department and the national parks into the Wildlife Conservation and Management Department (WCMD). By 1977 rampant poaching caused the government to ban all hunting of wildlife. In the years to come, inadequate funding contributed greatly to poor management standards. Low personnel salaries contributed to extreme demoralization of the staff and an environment conducive to the growth of corruption, especially poaching (Kenya 1990a).

* There are six case studies in the original report, which are not included here.

The boundaries, colors, denominations and any other information shown on this map do not imply, on the part of The World Bank Group, any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries.

KENYA WILDLIFE POPULATION DENSITY LARGE HERBIVORES



This corruption, organized and ordered at senior levels, was heightened even further in the late 1970s by the soaring values of elephant tusks and rhino horns on the international market. Park fees also began to be embezzled. This continued to a practically uncontrollable level until the late 1980s. By this time, the WCMD had presided over reductions in the country's elephant and rhino populations of 85 percent and 97 percent, respectively. During the fifteen years of WCMD's tenure, the infrastructure of the national parks deteriorated sharply. It should be noted that the number of visitors to Kenya increased continuously over these years, despite the decimation of certain wildlife species. It was only in the late 1980s, when their personal safety was threatened due to the security situation in the country, that the number of visitors to Kenya began to fall.

By comparison, wildlife was doing well on private land, which partly assured the survival of the black rhino in Kenya. On the other hand, tolerance of wildlife on private land was strained to the limit by the prohibition of hunting.

Current Wildlife Management Policies

The agency that inherited the role of the WCMD, the Kenya Wildlife Service (KWS), has three principal goals:

- To conserve the natural environments of Kenya
- To use the wildlife resources of Kenya sustainably for the economic development of the nation and for the benefit of people living in wildlife areas
- To protect people and property from injury or damage caused by wildlife (Kenya 1990a)

KWS's main policies emphasize an advisory role rather than a stringent management role in dealing with dispersal areas outside the parks and reserves. KWS has laid out policies for wildlife management, which went into effect in 1991, involving the creation of a national network of protected areas. In other wildlife areas of national interest, primarily surrounding parks and reserves, KWS will ensure that wildlife management is a land use but not to the exclusion of other compatible land uses.

For land outside protected areas devoted to land uses that are more economically beneficial than wildlife, KWS will support conservation of only those species that are compatible with the alternative land use. KWS will assist local governments in facilitating wildlife-based development and also ensure that any development does not harm the protected areas. Finally, it will delegate more responsibilities to landowners to develop their custodial skills and allow wildlife management to compete economically. This also implies permitting consumptive use of wildlife.

Landowners already have rights to use wildlife for tourism and recreation, but certain restrictions govern consumptive and nonconsumptive uses. The state retains ownership of wildlife and will intervene in cases of misuse. User rights will be granted only to applicants with acceptable management plans. Consumptive use rights will be granted only for selected species and only in areas remote from nonconsumptive tourism activities.

3.1.2 Financial and Economic Status of Wildlife

Kenya's tourist industry developed steadily until 1983, after which it experienced extremely rapid growth during a period of worldwide tourism expansion. Several positive factors coincided: the 1980s saw good economic conditions in Europe and the United States, wildlife tourism was in vogue, air

connections were good and developed in response to demand, Kenya's economic climate suited investment in tourist facilities, and a well-trained workforce emerged from colleges and private training programs at staff hotels and lodges throughout the country.

The tourism sector represents Kenya's most successful area of economic diversification; wildlife has been central to this achievement. KWS estimates that more than 50 percent of the earnings shown in table 3.2 were generated by wildlife.

	1977	1985	1986	1987	1988	1989	1990	1991
KES (billions)	0.96	4.18	4.92	5.84	6.98	8.64	10.66	11.88
US\$ (millions)	129	239	306	355	394	420	444	333
Total visitors (thousands)	344	477	542	587	616	696	740	727
Earnings per visitor (US\$)	375	501	564	605	640	603	600	458

Source: Statistical Abstract, Economic Survey 1992.

Note: These figures do not include expenditures billed to credit cards or attributable to other channels of payments.

"The most effective way to ensure conservation of wildlife is to increase human dependence on it. Only if the rural population can be made to see the financial benefits to be achieved from wildlife are allowed to earn those benefits, will conservation be accepted" (Mwenge International Associates 1980). This is the main principle now underpinning management strategies in wildlife dispersal areas in Kenya and on private lands with resident wildlife populations.

The statement "that those who gain most from wildlife are not those who have to support it" describes the conflict in wildlife utilization in Kenya (Douglas-Hamilton and Associates 1988). *Wildlife is a public asset used largely for private gain.* The tourist industry benefits the companies and their employees, usually based outside the wildlife areas, whereas landowners have not been in a position to take advantage of the economic opportunities presented by the animals on their land. Although the government receives revenues from the parks and taxes paid by the companies and individuals who are engaged in the tourist industry, the pastoral areas that support almost all the wildlife on which the industry depends have received a disproportionately low level of public investment and social welfare support.

Little of Kenya's protected areas is suitable for cultivation, but their extensive range and woodland cover are suitable for livestock grazing or fuelwood harvesting. In addition to increased pressure from these activities, farming has spread into marginal areas, placing further pressure on diminishing grazing areas and bringing pastoralists into greater conflict with wildlife. The arid and semiarid lands that are not part of the KWS protected area system form important wildlife dispersal areas, especially during wet seasons, and agricultural development and overgrazing in these areas are threatening to close critical game dispersal and migration corridors.

3.1.3 Wildlife Management and Utilization in Kenya

Kenya's population tripled between 1948 and 1979 and is believed to be growing at about 3.8 percent per annum. By the year 2000, more than 30 million people will live in Kenya.

Some of the fastest rates of population growth in Kenya are in those areas around parks and reserves. For example, there has been a 7 percent per annum population growth in recent years in the remaining Maasai Mara dispersal area (Kenya 1990a).

Simply put, we believe that population growth is the most pressing problem in Kenya, and that all development and conservation efforts are pointless unless this problem is fully addressed and real efforts to reduce family size are incorporated into all community development programs. Unbridled population growth is the cause of environmental degradation and the unsustainable resource use taking place.

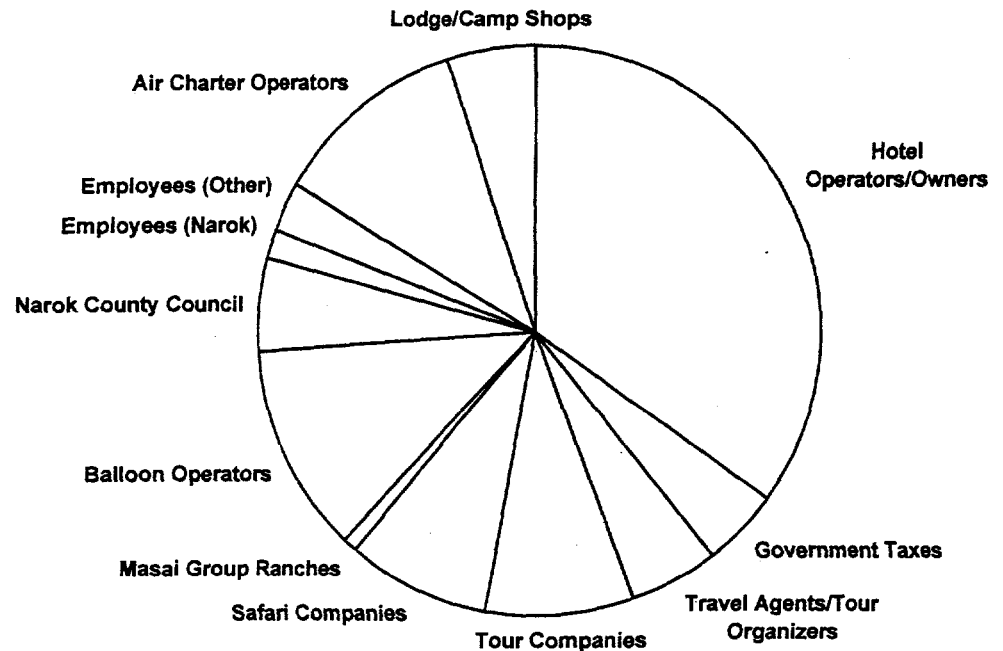
The pattern of land tenure in Kenya has undergone a transformation in the last two decades with land adjudication to individual titles, long-term leases, and group or commercial ranches. Many owners of what was formerly tribal trust land wish to "develop" their property, implying agricultural or livestock infrastructure and, effectively, the loss of wilderness and forms of land use that preclude even wildlife ranching. These rights cannot be denied landowners unless land use bylaws or regulations are contravened.

For many African people, the consumption of wildlife bears a stigma of "backwardness." This is related to the socioeconomic status of those tribes that still rely on game meat. Livestock remains more acceptable to meat eaters, and livestock meats have been more readily available.

In spite of the widespread perception of game meat as second rate, game meat has been sold in butcheries as a luxury item targeted to a limited group of well-to-do customers; however, recently wholesale prices have become competitive with the price of beef. Game meat sold in butcheries has been cropped on license, whereas most bush meat is obtained illegally. Poached or stolen goods are always cheaper than the "real thing." The value of game meat can be enhanced two- or three-fold by processing it into such luxury products as smoked, dried (biltong), or sausage products.

The use of wildlife requires a substantial degree of management, international marketing skills and long-term investment. The exceptions are traditional hunting and simple consumption of game meat. The tourism industry in Kenya is the direct result of this "management specialty," and it is this industry that retains by far the greatest proportion of gross earnings as figure 3.3 shows.

For community-based wildlife projects, this management requirement will remain a constraint and will impose a dependence on technical assistance or partnerships with tourism and wildlife utilization companies. There is also a need to develop among landowners an understanding of the preferences of tourists, hunters, and other consumers and the corresponding investment required.

Figure 3.3: Direct Distribution of Gross Earnings of the Mara Area, 1987

Source: Douglas Hamilton & Associates 1988.

3.1.4 Economic and Political Conditions and Their Influence

Kenya's economy performed well for most of the 1970s and 1980s with a growth in GDP of nearly 5 percent per annum. By the end of the latter decade, deteriorating terms of trade, a slowdown in export growth, high inflation rates, a burgeoning population, and rapid growth in government expenditure had brought a turnaround. In addition, drought and vastly increased expenditure on oil imports contributed to the problems.

Kenya faces a bleak economic future in the short term because of the downturn in tourism and market conditions for tea and coffee, its major traditional exports. An additional economic shock has been induced by lower aid, a result of the political transition Kenya has been undergoing since 1991.

Over the medium term, future economic growth could be low if the government does not tackle problems of deteriorating public-sector efficiency and encourage development of the private sector's potential for accelerated, efficient, and outward-oriented expansion (World Bank 1992). Kenya needs to create 400,000 jobs per year to keep pace with newcomers to the job market, whereas only 80,000–90,000 jobs are being created each year, the majority of which are in the unsustainable public sector. The Kenya government has liberalized crop marketing and foreign exchange controls, causing the Kenya shilling (KES) to slide dramatically in value to KES 66/US\$1 by July 1993.

3.1.5 Land-Tenure Policies and Practices

Private landowners are free to decide what kinds of wildlife, if any, they wish to have on their land and can implement these decisions through habitat modification (for example, burning and plowing) or by limiting movements and entry through fencing. These private management prerogatives are completely beyond the control and influence of the KWS. As a result:

The most extensive natural resource problem in Kenya is probably the reduction in vegetative cover and an unsustainable intensification of crop and livestock production leading to soil erosion and insufficient replenishment of perennial resources. These problems are most severe in the arid and semiarid lands. (DANIDA 1989, quoted in Kenya 1990b).

Government must bear the responsibility for much of the legal inconsistency attending land use in Kenya. This is the result of a combination of history and the persistence of contradictory legislation and policy. In the late 1960s and early 1970s, when group ranches were created, the government realized that the conflict with wildlife would be raised. The government announced that "no rancher in the adjudicated areas should be required to sustain wildlife on his land if this means lower returns" (World Bank 1973, p. 4).

At that time, hunting and other forms of consumptive utilization were possible, and the U.N. Development Programme (UNDP)/Food and Agriculture Organization (FAO) Wildlife Management Project had been formulated to develop mechanisms for community utilization among ranchers and traditional pastoralists. The economics of wildlife utilization were shattered with the government's hunting ban in 1977. Data collected by the consultants for this study indicate that wildlife utilization becomes a competitive and attractive land use only when consumptive utilization, especially hunting, is employed (see section 3.2).

One of the strongest threats to wildlife areas is the *subdivision* of communal land. The pattern of land tenure in Kenya is of conversion from communally owned land, with open access for all community members, to private ownership (long-term leases, gazetted or commercial ranches, private title deeds). There is a continuing trend for group ranches to split into privately owned land parcels.

Traditional Kenyan communities are now exerting strong pressure for their members to own their own land, a development that has resulted from encroachment on communal land by crop farmers; fear of losing land to members of their own communities capable of using power, money, and influence to acquire large holdings; a response to market increases in land values (Kohler 1987); and inequity in the distribution of land revenues from external sources

The overall picture in Kenya's arid and semiarid lands is one of a declining resource base as a result of land clearing, overcultivation, and overgrazing.

3.1.6 Other Relevant Issues

This section reviews the nature of land uses competing with wildlife and sketches a comparative financial analysis.

The Distribution of Benefits and Costs

In some areas near the Maasai Mara, private individuals, usually tour operators, have created agreements in the form of concession areas. These arrangements usually involve paying landowners directly in the form of cash. Another effective way to share revenues is by developing infrastructure and employment for the people in the concession area. More often than not, however, cash has to be handed over as well, since certain kinds of developments may not be interesting to all parties.

Cash revenue sharing may, however, change people's attitudes and lead to other unwanted developments that are not compatible with wildlife. But if revenues are distributed solely to communities for developments, everyone may not benefit (that is, if a school is built, people without children will not feel that they benefit from their conservation activities).

Revenue sharing with landowners has been taking place over a period of about ten years, but relatively unsuccessfully. Figure 3.3 above is a graphic depiction of the fundamental problem in Kenya's wildlife dispersal areas. The portion of revenues shared with the Maasai group ranches is so small that many landowners do not consider maintaining an agreement to conserve wildlife worthwhile. Furthermore, group ranches have not received these shared revenues in proportions that reflect the costs they bear.

An additional major problem is the diversion of money, since the existing distribution systems in Kajiado and Narok, for example, reflect the political power bases of the day. These are old problems (FAO 1975 and 1977).

It is thought that KWS will set up the Revenue Sharing and Wildlife Development Fund (WDF). It is envisaged that WDF will be based on two funded activities, enterprise development and community development and that funding will include both grants and credit. All funding under WDF will have to meet certain criteria and the main issue will be the conservation value to KWS. WDF will not replace other sources of support but merely strengthen areas or groups that bear the major costs of coexisting with wildlife.

Damage by Wildlife

For many Kenyans, living with wildlife means predation of their livestock and destruction of their subsistence and cash crops. There is much injury and loss of life as well from lions, buffalo, and hippopotamuses. To alleviate the problems wildlife poses, the Kenya government instituted a system of compensation in the 1970s. The system never worked and was subject to systematic misappropriation of funds. It has now been officially abandoned.

Areas that have both wildlife and development often necessarily must be fenced in certain areas to prevent further conflict or damage to crops. With such fencing, the question arises: Who is going to maintain it? In Laikipia District, numerous farmers have installed hundreds of kilometers of fence, both to keep the animals in and to keep them out. They have in many instances had their fencing stolen, and, in repairing it, have found themselves unable to keep up with the rate of theft. Fencing to curtail damage by wildlife, therefore, should be done only if the local community is willing not only to maintain fences but also somehow contribute to their construction.

Wildlife and Livestock Diseases

The wildlife-livestock disease transmission route is of less importance than many people commonly believe and is appropriately described in the following words: "It is stressed that wildlife, compared to livestock, plays only a minor role in the spread of a number of viral and bacterial diseases in Kenya" (Paling 1990). The role of wildlife as maintenance host for tick populations and the role of buffalo as a reservoir of the most important cattle disease (East Coast Fever) in addition to being a reservoir of foot-and-mouth disease present direct costs to the farmer. A case study made for this report showed that although the costs of tick control as a result of the presence of wildlife is considerable, it is minor in relation to the cost of grazing competition.

Kenya has been relatively successful in curbing poaching, but the problem is far from over. The conservation community's success in banning the international ivory trade is a controversial issue in countries that have been able to conserve their elephant populations.

Subsistence meat poaching by local people does not occur at anywhere near the levels that have led to the near-extirmination of elephants and rhinos for overseas markets. This form of poaching can be stopped (or legalized and regulated) only by providing a suitable legal environment and through education and community involvement of local people.

3.2 The Economics of Living with Wildlife

This section discusses wildlife utilization as a land use and financial analysis of the viability of a protected wildlife area.

3.2.1 Wildlife Utilization as Land Use

A widely held belief is that the net economic benefits of wildlife utilization will be greater than the return from cattle production on the same area of land. Proponents of this view emphasize that *the whole range of utilization opportunities must be considered and that the issue of sustainability of vegetation, soil, and water must be included in the comparison.*

Little published data either support or negate the hypothesis that wildlife is a resource that offers attractive financial returns on a sustainable basis; however, evidence from the livestock sector shows that cattle ranching is a marginal business (Capricorn Consultants Limited 1992 and Nsibandze 1982). Our case studies indicate returns on investment of 6–8 percent for cattle ranching. Nsibandze found that for nine ranches in the Machakos area the highest financial return on investment was 8.5 percent, the average was 2.3 percent, and two were loss making. It must be added that the government was controlling meat prices at artificially low levels at that time. Costs have soared in the industry, there are virtually no export markets in which Kenya can compete, and a beef-marketing cartel at the high-class butcher/restaurant level is operating in the country.

We have been able to study cattle and wildlife ranching in some detail through the kind assistance of Drs. D. Hopcraft and M. Sommerlatte of Wildlife Ranching Limited. Our conclusions are that game management offers at least a competitive land use option once all aspects of utilization are taken into account and that game and cattle together offer the best option and a return on investment of 7–12 percent. Returns are even greater when correlated activities—photographic and educational

tourism, bird-shooting, hunting, and preparation and sale of trophies and skins—can be added to generate income.

If wildlife offers viable, land use options, alone or in combination with livestock and crops, why has such utilization not emerged as a standard land-use option in Kenya? The answer lies in the restrictive policies and legislation concerning wildlife and perhaps with a traditional “beef mentality.”

Until recently, Kenya left few options that involved wildlife utilization open to landowners. Instead, landowners were expected to live with the migration or seasonal movements of animals and accept the ravages of baboons, buffalo, and elephants under the doctrine that tourism had become Kenya’s main foreign exchange-earning industry. Landowners could, of course, make life difficult for the wildlife—by fencing and even by obtaining permission to shoot pesky game. Large numbers of buffalo, for example, have been destroyed in the past to prevent crop losses in the wheat- and maize-growing areas. But an extraordinary situation prevailed in that landowners by law were not permitted to utilize wildlife culled in this way.

Until 1990 only one game-cropping system existed in Kenya. Since that time, a growing number of projects and community development programs based on wildlife have been initiated.

Competing Land Uses

Crop production is in direct conflict with wildlife land-use options. There is no evidence, however, that in environmental zones where crop production is recommended, wildlife-based land use can compete with agriculture.

Table 3.3 provides official estimates of gross returns from intensive land use in the medium- and high-potential zones* in which there is little or no wildlife land use. The data, therefore, provide upper limits of “average” gross returns from agriculture that could potentially be obtained in wildlife areas.

These can be compared with gross revenues from the Maasai Mara National Reserve in 1988 of approximately K£ 147 per hectare (US\$183) a figure comparable to maize and beans, but less than wheat and barley (the main threats to wildlife range in the Mara area). This estimate does not take into account the wildlife dispersal areas. If these were included, the gross return to wildlife per hectare would be halved. The landowner receives a fraction of this amount. Thus, what finally can be considered a return to the land is insufficient for those who have alternative land uses to even treat tourism as a serious alternative. Even ranching offers a gross return of over US\$11 per hectare, which is much more than the Maasai obtained on Koyaki Ranch, a prime game-viewing area adjacent to the Maasai Mara, in 1992; however, this was for photographic tourism only.

In the marginal agroecological zones in which dryland cropping is not recommended, wildlife-based land uses can offer more competitive returns and offer ecological benefits in terms of long-term land use (provided there is correct management). Crop production in marginal areas is supported by off-farm incomes or technology not available to smallholders.

* Unfortunately, there are little or no data readily available on net returns per unit of land, nor on units of capital invested.

Table 3.3: Estimated Areas, Value, and Value Per Hectare for Selected Commodities

Commodity	Area		Value ^d		Value per hectare	
	(percent)	(rank)	(percent)	(rank)	(K£/hectare)	(rank)
Milk	46.6	(1)	16.3	(3)	70	(16)
Maize and beans ^a	22.6	(2)	16.6	(2)	153	(12)
Root crops ^b	7.9	(3)	8.1	(5)	205	(9)
Sorghum and millet	6.7	(4)	1.5	(11)	48	(17)
Coffee	2.9	(5)	21.6	(1)	1,489	(1)
Wheat	2.2	(6)	2.1	(10)	191	(10)
Cotton	2.1	(7)	0.4	(18)	32	(18)
Fruits	2.1	(8)	3.1	(9)	296	(7)
Sugar	1.7	(9)	-3.6	(21)	-432	(19)
Tea	1.6	(10)	11.9	(4)	1,325	(2)
Sisal	1.1	(11)	1.1	(12)	137	(14)
Vegetables	0.7	(12)	3.4	(8)	913	(3)
Cashew nuts	0.5	(13)	0.4	(15)	162	(11)
Groundnuts	0.4	(14)	0.2	(20)	84	(15)
Barley	0.3	(15)	0.4	(17)	249	(8)
Sunflower	0.2	(16)	0.2	(19)	141	(13)
Pyrethrum	0.2	(17)	0.4	(16)	419	(6)
Rice	0.2	(18)	0.5	(13)	519	(5)
Tobacco	0.1	(19)	0.5	(13)	885	(4)
Beef	c	—	6.8	(6)	c	—
Sheep and goats	c	—	4.9	(7)	c	—
Others	c	—	3.1	—	c	—
Total	100.0^e		100.0^e		170^f	

Source: Kenya, Sessional Paper No. 1, 1986.

Notes:

- Because beans are typically interplanted with maize, the two crops are considered together. Maize alone accounts for 13.3 percent of total value.
- Includes potatoes, which account for 5.3 percent of total value.
- No estimates available.
- Value at farm gate.
- The total area is 5.17 million hectares and the total value is K£ 1,035 million (US\$32 million at 1992 exchange rate).
- Excludes beef, sheep, goats, and "others."

Cash crop (export) agriculture (Sharpley 1986) and tourism (EIU 1979) have similar demands for foreign exchange inputs: approximately US\$0.40 of foreign exchange is required to generate US\$1.00 in earnings in both sectors.

In any case, the wildlife resource in all agroecological zones with farming potential in Kenya is heavily depleted. There are, nevertheless, opportunities for complementary utilization, such as game bird enterprises or intensive farming (for example, ostrich) using crop by-products.

When considering *livestock land uses*, pastoralist and ranching enterprises must be considered separately due to their entirely different structures. Offtake rates among pastoralists range from 6 to 15 percent. Hides and skins, milk, and offals add to the yield. Commercial ranching, with offtakes of meat alone, range from 17 percent to 28 percent. Commercial ranches can achieve offtakes of up to 16.5 kilograms per hectare of meat by applying a fattening/trading enterprise, about 8.8 kilograms per hectare with breeding/growing/fattening, and 12 kilograms per hectare under a mixed operation in which the trading/fattening operation is used to take advantage of feed availability. This flexibility of management is a fundamental advantage of cattle ranching.

Cattle ranching requires substantial investments in water supply, animal handling facilities, roads, buildings, vehicles, and operating cost inputs to ensure these high rates of meat production.

In either case, livestock production is not automatically compatible with long-term wildlife conservation interests because of the grazing resources required for cattle and because of the attendant modifications to the land that normally accompany pastoralism or settled ranching once the livestock system becomes more intensive. One observer has commented that:

Wildlife and cattle only truly coexist under conditions of nomadic pastoralism. The reason for this is that pastoralists lack the physical infrastructure and the management infrastructure to influence wildlife, although habitat modification through the use of fire by pastoralists has greatly influenced the numbers and distribution of wildlife in some areas. (EcoSystems 1982a)

Our findings, however, indicate that coexistence under commercial conditions is not only possible but desirable for maximum forage and infrastructure utilization, greatest meat offtake, and best financial returns. The overlap in food requirements is considerable and depends on the wildlife mix (specifically the biomass of grazers) and season, but the substitution rate is not 1:1, as wildlife utilize additional food niches of trees and bushes for browse, forbs, and litter.

Cattle distributions change radically from season to season as they are herded away from heavily grazed areas to new, green pastures. Usually the wild grazers also are migrating onto rangelands that are "greening up." As cattle feed primarily on herbaceous forage, they will compete mainly with grazers such as zebras, wildebeests, topi, kongoni, and Thomson's gazelles. Sheep and goats are mixed feeders that forage on grasses, herbs, and shrubs. Wild herbivores that are also mixed feeders include elephants, impalas, Grant's gazelles, oryx, roan antelopes, and klipspringers; however, under careful management conflict can be minimized, provided that combined livestock and wildlife populations do not exceed the land's overall carrying capacity. In other words, *conflict is an induced situation, the result of increase in pastoral herds, alienation of land or gradual loss in range productivity. In Kenya, the greatest conflicts between livestock and wild herbivores for food and water occur in the grasslands and shrublands of the southwest (Narok) and southeast (Kajiado) Laikipia, Machakos, and Samburu, especially among cattle, sheep, and goats competing with wildebeests, buffalo, kongoni, topi, Burchell's zebras, impalas, and Grant's and Thomson's gazelles (Andere and others 1981).*

Domestic livestock are generally selective feeders, and certain wildlife species provide an avenue for maximizing land use through increased grazing and browsing. Nevertheless, the consultants' investigations suggest that one zebra displaces an average of 1.8 cattle, although this may be an overestimate (Peden [1984] suggests a ratio of 1.1 zebra per cattle unit).

Cattle ranching has become increasingly difficult to sustain profitably for landowners in a world in which prices have been eroded by inflation (see table 3.4) and a drastic decline has occurred in the value of the shilling. (There is a high import content in essential dips, drugs, and vaccines).

Table 3.4: Declining Real Producer Meat Prices in Kenya

Year	Price (KES/kg)		Deflator ^a	Real Price	
	steak	meat and bone		steak	meat and bone
1978	13	9	71	18	13
1983	18	14	112	16	13
1986	20	17	145	14	12
1991	25	20	227	11	9

Source: Capricorn Consultants and file records.

a. To attain constant prices (1982=100). Prices are maximum wholesale rates.

Wildlife-Based Land Use

A number of studies have considered alternative land uses and possible returns (Norton-Griffiths 1992; Douglas-Hamilton and Associates 1988; EcoSystems 1982b) as a method of establishing the likely course of events or determining minimum compensation levels for continuing wildlife land uses.

It is estimated that wildlife could produce a sustainable biomass level of 75 kilograms per hectare (Hopcraft, pers. com. 1993). At present, it is approximately 30 kilograms per hectare on Game Ranching's ranch at Athi River. Currently, Game Ranching is achieving an offtake of about 19 percent of biomass or 4.9 kilograms per hectare live weight; this provides a return of US\$8.6 per hectare, much higher than a beef enterprise.

Wildlife also has a higher dressing-out rate of approximately 57 percent (some species as high as 64 percent); cattle dress out at no more than 48 percent. Wildlife has fewer input requirements such as veterinary drugs, although the potential economic returns of applying these are not known; however, more roads may be required if shooting is the harvesting technique, and an abattoir/cold room is essential within the cropping area. Wildlife cannot be caught and trucked to abattoirs, as cattle can be.

The marketing of some of the most valuable by-products—the horns and hides—has been prevented by the government, limiting the economic potential of game ranching. Even under more liberal conditions now in place in Kenya, hides must be dehaired and thereby effectively become leather. Whereas all cattle hides and sheep and goat skins must be at least partially tanned before leaving Kenya (blue tanning), wild animal hides must be exported dried only.

Returns from wildlife on meat alone are probably insufficient, in any scenario. The whole range of income-generating opportunities is required to ensure viability: photographic and educational tourism, hunting, sale of trophies, and live animal exports.

Our recommendation is that cattle and other domestic stock be combined with wildlife operations for maximum range use. A rapid and dramatic move to game ranching or cropping would overwhelm the market and is not realistic in terms of subsistence uses of domestic stock (in the case of pastoralists) and management capabilities on commercial ranches. A great deal of technical assistance will have to be provided for extension and monitoring. Maximum freedom should be given to landowners to manage their wildlife resource and its products under the supervision of the KWS. The landowner needs to have the flexibility to determine offtake, species mix and herd structures and not be bridled with "safety level" offtakes that are not based on any of the fundamental factors affecting the landowner: biomass, offtake potential, consumer preferences, market prices, and so on.

Close supervision will be required to avoid “harvesting” operations that are not attended by long term management plans. The distinction needs to be drawn among game cropping, game ranching, and game farming on the one hand and management guidelines and controls applied respectively to them on the other hand.

Price has played an important role in maintaining game meat as an attractive enterprise. It has been consistently higher per kilogram than beef, the price of which had been controlled by the government until 1989. King and Heath (1971) showed that domesticated oryx provided better returns than Boran cattle under the same management regimes, mainly because oryx meat could be sold at a premium and the horns and hides at trophy values.

Table 3.5: Comparison of Beef and Game Meat Prices

Year	Gazelle, etc. (live weight)		Beef (live weight)	
	(KES)	(US\$)	(KES)	(US\$)
1981	14.28		7.00	
1992	45.70	1.27	16.50	0.46
1993	54.20	0.68	25.00	0.31

Note: This assumes 57 percent carcass recovery for game and 48 percent for cattle.

Source: D. Hopcraft, pers. com. 1993.

Wildlife meat is a gourmet food and not necessarily viable if marketed cheaply, although meat from wildlife harvested illegally is cheap and consumed by low income earners of rural and peri-urban areas. We found no literature for Kenya quantifying this type of consumption.

Multiple Land-Use Options

The construction of multiple land-use options for conservation areas has been discussed for both public and private land in Kenya (EcoSystems 1982b; Douglas-Hamilton and Associates 1988); however, the management of such schemes represents a major challenge. This is partly because of the “conservationist” perception that any form of joint use will result in a “give-an-inch, take-a-mile” problem. Another factor is that the conservation ethic in Kenya is overlaid with a historical jealousy over the control of gazetted conservation areas. (In many cases the boundaries and management pattern of parks and reserves can be traced to the individuals who played instrumental roles in establishing them.)

3.2.2 Financial Analysis

There are two aspects to this discussion of a protected wildlife area’s viability: (1) whether a conservation area is financially self-supporting and (2) whether conservation is its most attractive use in economic terms. There are currently 57 protected wildlife areas within the KWS framework, covering approximately 8 percent of Kenya’s land area (Kenya 1990a), of which fewer than half yield any significant revenues. In 1991 KWS collected approximately KES 190 million in revenues from twenty-two national parks and reserves; of this sum, more than 60 percent (KES 140 million) came from only seven national parks (this excludes Maasai Mara National Reserve, which is the highest single earner, and Samburu, Buffalo Springs, and Shaba reserves, which are also high earners). Visits to national parks and reserves dropped steeply from about 1.4 million in 1991 to about 600,000 in 1992, which must have affected gross revenues severely. Unfortunately, data do not allow the determination of *net* financial

benefits (Kenya 1992b). No studies have been done on the economic value of specific conservation areas in Kenya.

Statements such as the following remain totally unsupported by evaluation or experience: "The loss of wildlife habitat in the dispersal areas of the parks and reserves would be disastrous for Kenya's economy" and "Also of national concern are areas that are rich in wildlife and are either earmarked as possible parks or reserves or have high economic potential for tourism" (Kenya 1990a, annex 10, p. iv). Management and development plans for existing and proposed parks and reserves contain no market analysis, financial evaluation, or benefit-cost calculations. In its Policy Framework and Development Programme, KWS concludes that it must undertake further work on "defining the location, extent, and characteristics of the priority wildlife areas," but no mention is made of arguing the case on economic grounds.

Private landowners in the arid and semiarid lands increasingly are pressed to consider alternative forms of land use due to the declining viability of the domestic livestock industries. Sommerlatte (undated) estimates that the reintroduction of safari hunting could earn Kenya US\$12–20 million annually, of which landowners would receive at least US\$2.9 million in the form of trophy and concession fees. With some 1.8 million hectares on ninety ranches (group, cooperative, company, and private) suitable for safari hunting in the country, this figure would represent earnings of US\$1.60 per hectare per annum on the land used. Providing accommodations and other services would present other opportunities to generate income.

Lusiola (1992) reported that 228 ranches with substantial wildlife populations had been identified. By late 1992 KWS had received twenty-six applications for wildlife usage rights; eighteen of the applicants had been issued quotas, and five applications were being processed.

A total of twenty-two game farms (ostrich, crocodile, and so on) and thirty-seven game ranches were in operation at the end of 1992, and several more were being reviewed.

The only case, to the consultants' knowledge, of a recent financial assessment of the returns from wildlife is that of the Koyaki concession coordinated by Ker and Downey Safaris Limited. The concessionaires estimated the returns the Maasai could obtain from alternative uses (including land lease for cropping and construction of a lodge) and have guaranteed payment of an annual fee greater than this amount.

Wildlife management requires large areas of land. In communal areas this means that many landowners will have to cooperate; by implication, this means that they should at least have similar objectives. For investments to take place for wildlife utilization in these areas, a long-term commitment by this group of people is a prerequisite. Is this a reasonable expectation? Even in areas where multiple land use is practiced, conflicts constantly arise because of the difficulty of managing the land to maintain the wilderness element.

Nevertheless, Thresher in FAO (1977) believes that the problem of preventing wild herbivores from disappearing from the ranches around Amboseli National Park technically could be solved by paying ranch members equitably—that is, in proportion to the grazing resource made available in the total ecosystem. The consultants' own observation is that wildlife utilization will remain a secondary enterprise, with livestock management firmly the priority for pastoralists; thus, *avenues for enhancing returns using wildlife to complement livestock* are likely to be most successful.

From *hunting* in 1973, Kajiado District earned KES6 million for Kenya, all in the form of foreign exchange (15 percent of the national total) and a further KES0.4 million directly in fees to landowners (FAO 1975). It was concluded that this form of land use could *by itself* produce greater returns than cattle, yet could be continued in conjunction with livestock husbandry. Hunting offtakes were less than 1 percent of the wild animal population.

KWS has for a period of time held meetings with landowners to encourage landowners to organize themselves into Wildlife Management Units. This program has to date involved six districts; recent meetings indicate that landowners are limited by current policies in terms of generating revenue and want KWS to consider gradual expansion of the use right program. The director of KWS has in principle agreed to the reintroduction of hunting. The biggest problem is the justification to parliament that the activity is needed by the rural people and that it can be controlled.

The last census done on wildlife populations was done in the 1980s, which has little bearing on current population; however, on the basis of fee estimates (see table 3.6) and expected numbers of hunters, it can be estimated that approximately US\$20 million will be generated in direct (gross) revenue from the reintroduction of hunting.

Table 3.6: Estimated Possible Fees from Hunting

	Citizens (KES)	Noncitizens (US\$)
Buffalo	8,000	600
Elands	8,000	600
Giraffes	12,000	600
Zebras	8,000	600
Impalas	4,000	200
Grants gazelles	4,000	200
Thomson's gazelles	3,000	150
Hartebeests	6,000	400
Wildebeests	6,000	400

Source: Consultants' estimates based on interviews with KWS.

Currently there are thirty-one ranches with *cropping* user rights in Kenya. Game cropping is currently only done by special permission from KWS. To some ranches, this has created problems, as they are not able to maintain a healthy number of game on their land. There is a need to crop sufficient numbers to stabilize the population of some of their plains game as they are overstocked with species such as the zebra and Thomson's gazelle, which are the main competitors for grazing with livestock. It is the intention of KWS to increase cropping quotas to many more users bringing it up to its potential.

In 1989 there was only one cropping company in Kenya operating on three ranches (currently five) and producing approximately 45 tons of meat per annum. KWS estimates that possible demand for game meat by the end of 1995 will reach 500 tons per annum, which is much less than the potential production. It is the intention of KWS to generate a cropping market mainly for export. There is great interest in this field for both local and foreign consumption, but stringent European Economic Community regulations on meat imports hinders exports. Current potential markets exist elsewhere in Africa (that is, Somalia) and the Near East for venison where restrictions are less severe. The local

Table 3.7: A Five-Year Projection of Maximum Levels of Game Cropping in Kenya

Year	Ranches	Hectares (1,000s)	Operators	Animals (1,000s)	Dressed Meat (1,000s of kg)	Meat Value (millions KES)	Hides Value (millions KES)	Total Value (millions KES)
1	20	400	4	13.2	545	23.1	1.9	25.0
3	35	700	7	23.1	954	40.4	3.3	43.7
5	45	900	9	29.7	1,226	51.9	4.2	56.1

Source: KWS estimates.

market is poorly marketed with few butcheries selling game meat and only one restaurant specializes in serving game meat on the menu.

Current sales prices for game meat are approximately twice that of beef. Although it is important to give the impression that game meat is not a cheap type of meat but rather a quality product demanding a high price, it is still important to be able to compete with the livestock sector. By introducing additional operators, the prices may well come down; however, one constraint for further development in this field was the government's restriction on hides for export. These restrictions on export of hides are now being reduced, which will increase the return per animal considerably.

Summary: A comparison of land use options

Table 3.8 shows current and estimated gross revenues per hectare for national parks and reserves in Kenya. This is revenue collected by KWS, not total revenue for the areas, that is, lodges and private operators. Agricultural revenue has been calculated by estimating total possible agricultural area according to agroecological zones (AEZ) derived from the Range Management Handbook (1982), with 10 percent off for unsuitable landscapes, such as rocks, rivers, hills, and so on. Although each area may have different cropping options, maize has been used as an economic indicator for all areas. Livestock revenues have been estimated according to areas that are not utilized for agriculture and then calculated with a 10 percent offtake per annum.

Apart from higher ground areas, most of the areas set aside for parks and reserves are not well suited for agriculture and cannot, therefore, compete with tourism, at least not to smallholders that have little technology and few means of improving the land.

3.3 Environmental Impact

Apart from strictly financial and economic concerns about the relative returns to different kinds of land use, there may be additional environmental aspects to consider, as discussed in this section.

3.3.1 Livestock and Wildlife in the Rangelands

On private land on which there is development of infrastructure, such as water sources, and indirect protection through management, populations of wild herbivores appear to have increased markedly during the 1980s. Fluctuations have occurred as a result of the droughts of 1973–75, 1983–84, and 1988, with maximum populations recorded in 1970–73. Elephants and rhinoceroses are special cases that have been subject to devastating poaching.

Table 3.8: Revenue Summary of Tourism, Estimated Agriculture, and Livestock Earnings for National Parks and Reserves

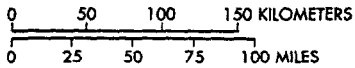
Name	Tourism revenue <i>(KES per hectare per annum)</i>	Agriculture revenue <i>(KES per hectare per annum)</i>	Estimated livestock revenues <i>(KES per hectare per annum)</i>	Agricultural livestock versus tourism revenues
Nairobi N.P.	1,363	17,500	59	16,196
Amboseli N.P.	854	17,500	60	16,706
Lake Nakuru N.P.	1,257	17,500	100	16,343
Tsavo East N.P.	22	17,500	50	17,528
Tsavo West N.P.	23	17,500	60	17,537
Aberdares N.P.	709	17,500	101	16,891
Shimba Hills N.P.	393	17,500	60	17,168
Malindi N.P.	128	—	—	(128)
Meru N.P.	19	17,500	60	17,541
Marsabit N.P.	3	17,500	50	17,547
Mount Kenya N.P.	70	17,500	75	17,505
Mount Elgon N.P.	24	17,500	75	17,552
Kisite Mpunguti N.P.	991	—	—	(991)
Oldonyo Sabuk N.P.	17	17,500	74	17,558
Hell's Gate N.P.	312	17,500	75	17,263
Sibiloi N.P.	1	—	50	49
Ruma N.P.	1	17,500	100	17,599
Saiwa N.P.	1,410	17,500	45	16,135
Central Island N.P.	97	17,500	44	17,447
Mombasa N.P.	3,899	—	—	(3,899)
Watamu N.P.	6,312	—	—	(6,312)
Maasai Mara N.R. ^a	443	17,500	60	17,117

Source: Authors estimates.

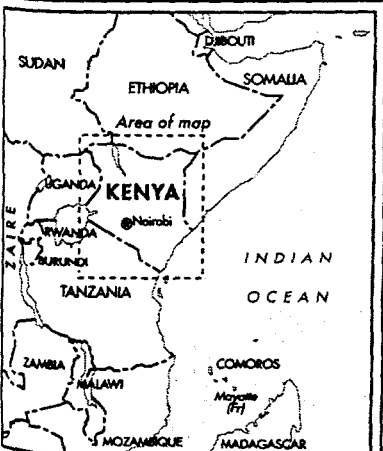
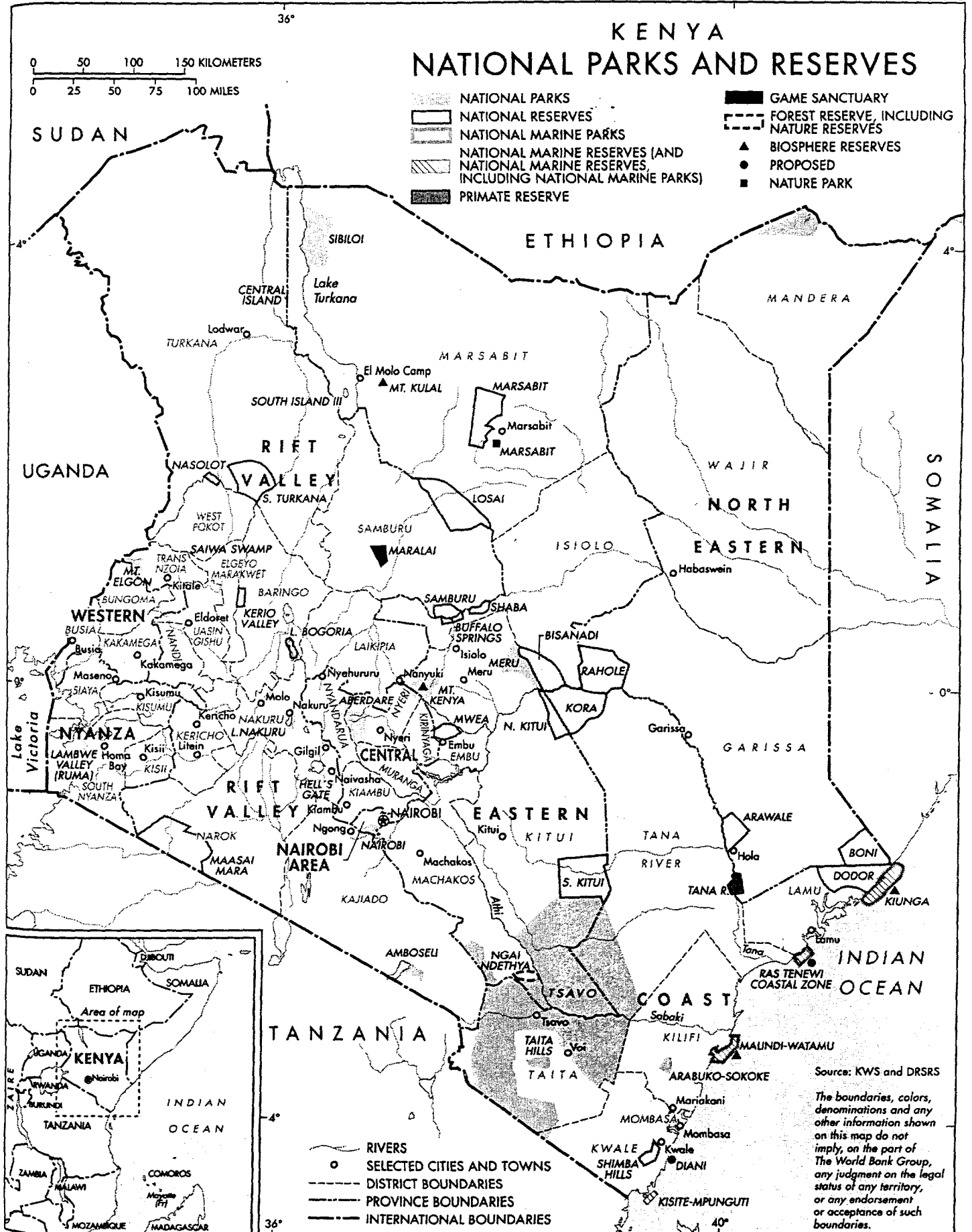
Note: Agricultural revenue is estimated on maize production at an average yield of 2.5 tons per hectare and KES7 per kilogram.

a. This figure is an estimate as the County Council will not release any data.

KENYA NATIONAL PARKS AND RESERVES



- NATIONAL PARKS
- NATIONAL RESERVES
- NATIONAL MARINE PARKS
- NATIONAL MARINE RESERVES (AND NATIONAL MARINE RESERVES, INCLUDING NATIONAL MARINE PARKS)
- PRIMATE RESERVE
- GAME SANCTUARY
- FOREST RESERVE, INCLUDING NATURE RESERVES
- BIOSPHERE RESERVES
- PROPOSED
- NATURE PARK

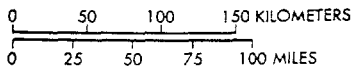


- RIVERS
- SELECTED CITIES AND TOWNS
- DISTRICT BOUNDARIES
- PROVINCE BOUNDARIES
- INTERNATIONAL BOUNDARIES

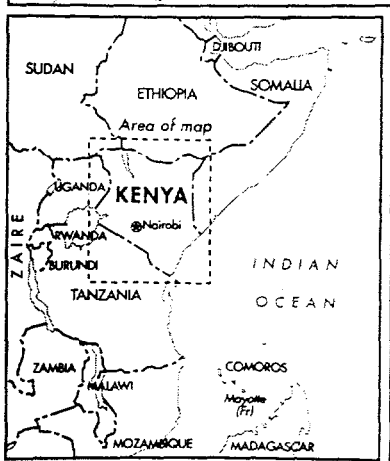
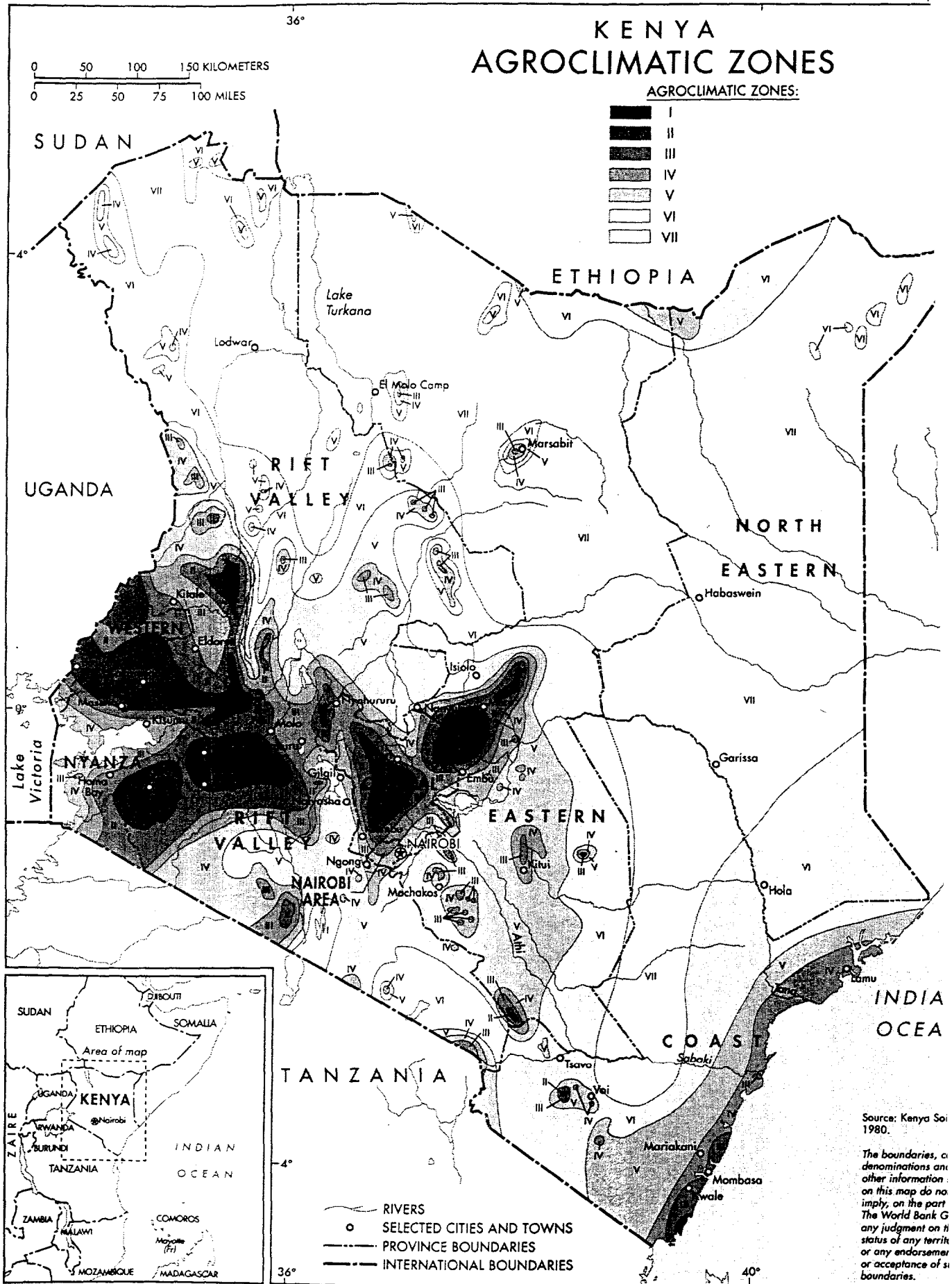
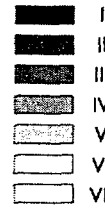
Source: KWS and DRSS

The boundaries, colors, denominations and any other information shown on this map do not imply, on the part of The World Bank Group, any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries.

KENYA AGROCLIMATIC ZONES



AGROCLIMATIC ZONES:



- RIVERS
- SELECTED CITIES AND TOWNS
- - - PROVINCE BOUNDARIES
- INTERNATIONAL BOUNDARIES

Source: Kenya Soi 1980.
The boundaries, denominations and other information on this map do not imply, on the part of The World Bank Group any judgment on the status of any territory or any endorsement or acceptance of its boundaries.

The aerial survey data base on livestock and wildlife populations in the rangelands, however, suggests that wild animal populations there are declining steadily. Cattle, sheep, goat, donkey, and camel numbers, on the other hand, are static (Grunblatt 1989; Peden 1984). Although wide variations in population estimates can be expected from seasonal changes and long-distance movements, the trend appears to be undeniable.

Table 3.9 summarizes livestock and wildlife densities in selected districts of Kenya for the period 1977–83 (Peden 1984). Narok (Maasai Mara), Kajiado (Amboseli), Lamu, Taita-Taveta (Tsavo West), Samburu and Isiolo (Samburu/Buffalo Springs/Shaba), and Laikipia (large-scale ranches) clearly hold the highest wildlife densities, offer low levels of conflict with human populations, and have the lowest agricultural potential. They also have compatible forms of land tenure and therefore offer the best economic prospects for wildlife utilization.

Table 3.9: Average Stocking Levels and Human Population Density for Selected Districts in Kenya, 1977–83

District	Livestock Density (TLU/km ²) ^a	Wildlife Density (TLU/km ²) ^a	Ratio of Livestock to Wildlife	Human Population Density (no./km ²)
Baringo	9.8	0.2	58.8	20.6
Garissa	7.4	2.3	3.2	2.9
Isiolo	9.6	1.4	6.7	1.7
Kajiado	17.5	5.0	3.5	7.6
Kilifi	6.2	1.3	4.8	34.7
Kitui	5.4	1.2	4.5	15.8
Kwale	10.7	0.6	18.1	34.9
Laikipia	18.4	8.9	2.1	13.8
Lamu	2.4	9.5	0.3	6.5
Mandera	7.0	0.4	15.8	4.0
Marsabit	3.3	0.6	5.5	1.3
Narok	24.9	21.4	1.2	13.1
Samburu	7.9	2.0	3.9	4.4
Taita-Taveta	3.4	8.8	0.4	8.7
Tana River	5.1	2.0	2.5	2.4
Turkana	5.7	0.3	20.6	2.3
Wajir	6.4	0.7	9.5	2.5
West Pokot	9.4	0.1	104.5	17.5

a. TLU is a tropical livestock unit, equivalent to a 250 kg steer.

Note: Total density in high-potential districts equals livestock density as wildlife densities were assumed negligible.

Source: Adapted from Peden 1984.

3.3.2 Herbivore Efficiency

The principle underlying wildlife management is that a mixture of wildlife species will utilize the whole vegetation spectrum. Biomass and meat offtake may be much greater under wildlife management and may be more easily sustainable (table 3.10).

In addition, hides and skins of game animals may be of greater and management costs of lower value than those of livestock. For example, some salted, dried zebra hides are sold at US\$100 each (Mugie Ranch, pers. com. 1993) cattle hides are worth a fraction of this amount.

Table 3.10: Comparison of Cattle and Game Productivity

Biomass Management System	Lean Meat Produced	
	(lbs/km ²)	(lbs/acre)
Cattle (pastoralism)	12,000	1.0
Cattle (stock farms)	45,000–50,000	
Plains game (low)	75,000–100,000	7.9
Plains game (high)	100,000–140,000	14.6

Source: SWRL Research and Development 1982.

An extensive literature on the apparently higher productivity of game animals strongly supports this concept and suggests that under management, offtake rates can be high. For example, studies of Thomson's gazelle on Kekopey (Nakuru) and Suguroi (Laikipia) ranches registered annual population growth rates of 60 percent and indicated a sustainable offtake of 40 percent except in dry years (FAO 1975). A joint Texas A & M University and FAO study on Kekopey provided information on population dynamics, growth rates, and quantitative food intake of ranch cattle and two antelope species, the impala and Thomson's gazelle. Game animals had much faster rates of growth than cattle, so that, on a body weight conversion basis, they are more efficient meat producers; however, in relation to body size, the small antelopes consume more food, and it is necessary to compare vegetation trade-off ratios. In a commercial ranching situation, a realistic efficiency for impala was determined as 10–20 percent greater than for cattle. The cattle on Kekopey, however, were well managed and had high growth rates in comparison to cattle held under traditional pastoralist systems. Therefore, the efficiency margin of wildlife is probably much greater than 20 percent.

3.3.3 Vegetation Changes

Documentation of forest cover and rangeland vegetation changes has not been supported by data on grazing potential and rangeland "carrying capacity" performance, so that the environmental impact of pastoralism is still relegated to the "opinion tray."

Mwichabe (1992) studied both unfenced and fenced rangeland areas in the Mara from 1985 to 1987 and concluded that overstocking and overgrazing exist in Koyaki Group Ranch and have led to a "considerable" reduction in vegetation cover. This is the result of the addition of wildlife to the already "optimal" number of livestock and is further complicated by restrictions in the grazing movements imposed by group ranch boundaries and conversion of land to cultivation. Spacing of watering points has significant influence on trampling. The author concludes that "the situation on the demonstration ranch clearly shows that vegetation can be improved by keeping wildlife out of the pastures, introducing rotational grazing, and increasing watering points" (Mwichabe 1992, p. 413).

Land potential often changes as a result of modification of vegetation cover. For example, less bush means less tsetse habitat and expands the economic range for cattle. Fire may also enhance grassland cover.

Both agricultural and wildlife management options have negative environmental effects. There is much discussion of "optimal visitor carrying capacity" in national parks and reserves due to the ecological impact and the maintenance of the wilderness element in "visitor experience" (Gakahu 1999). Vegetation loss due to the impact of vehicles and interference with animal behavior are particular

concerns. Cases in the Maasai Mara have shown that behavioral patterns in feeding have changed with continuous harassment from visitors (Kenya 1990a); however, better management of game viewing, development of road infrastructure and stringent enforcement could reduce this impact, as could the implementation of alternative game-viewing methods such as walking, hides, and observation points.

3.3.4 Sustainability of Crop Production

One argument in marginal areas is that crop production is unsustainable in the long-term due to declining soil fertility and structure. In marginal areas where conflict has arisen (Maasai Mara region, southwest Laikipia, east of Tsavo), the colonization of these harsh areas has been supported by off-farm income. Such areas are not self-supporting for subsistence, but clearly they are financially attractive to large-scale farmers, whose businesses can accept a range of crop yields from year to year. They usually are sufficiently well financed to purchase fertilizers in bulk and cultivate large blocks in a number of locations, thus reducing costs and spreading risks. The environmental impact of crop production has not been studied in either the smallholder areas or the large-scale farming areas, although there is clear evidence that there is an impact (vegetation loss, abandoned cultivation with weed growth, and erosion).

It is important to note that those limited areas in zones V, VI, and VII that are suitable for seasonal farming, irrigation, or both are the critical dry-season grazing areas for both pastoralists and wildlife. Where they are identified on land potential maps as suitable for agriculture, an additional opportunity cost for their utilization—the impact on both pastoralists and wildlife—should be noted.

3.3.5 Carrying Capacities and Offtake

Few studies have been done to establish wildlife carrying capacities. The reason is the complex mix of animals, vegetation types, and feeding niches adopted, which change within and between seasons. Although data on stocking rates for one or two species kept together on game farms is available for specific vegetation types in South Africa, as yet no adequate tools have been developed for modeling wildlife populations in more complex biological frames.

Three methods are used at present: simple estimation, energy production–intake requirement analysis, and large-animal stock unit estimation; however, each ranch must be studied in detail to derive an acceptable estimate of carrying capacity (Bothma 1989). The economic and ecological carrying capacities are not coincident. The latter tend toward a much lower level, determined by interaction of grazing resource and the wildlife community in a constantly changing pattern; the former is established by man's influence through management (species encouragement, fodder management, and so on). Habitat type is the key to establishing the economic viability of consumptive use of game, its cohabitation with domestic animals, or both.

From data gathered during this study and references (Davis 1972; McDowell and others 1982; Sommerlatte and Hopcraft 1992; Stelfox and others 1983), it is possible to infer carrying capacities for agroecological zone V, as represented by the Athi Plains and Northern Kajiado. Here the maximum biomass of cattle is estimated at 90 kilograms per hectare; for wildlife, the limit is believed to be 110 kilograms per hectare. A beef breeding/growing/fattening operation would obtain about 65 kilograms per hectare; only trading allows a higher rate of land use because it provides the essential flexibility.

Wildlife biomass varies with seasonal movements, which makes estimation of “average” biomass problematic. In Kajiado biomass estimates range from 20–36 kilograms per hectare and seldom approach domestic stock biomass. Species composition and distribution obviously have a bearing on biomass, and there is no apparent reason for a specific limit.

It is not clear whether wildlife does not succeed in reaching the full biomass potential (because of droughts) or if there is a “competition instinct” that limits breeding potential (in captivity buffalo and elands, for example, breed prolifically). Predation may be an important factor, and diseases and parasites are known constraints.

Our conclusion is that it is advantageous to have both cattle and wildlife, in a biomass ratio of approximately 70:30 to fully utilize pastoral rangeland areas, and maximize economic returns. Within cattle operation, an element of trading is preferred for flexibility, risk reduction, and forage utilization.

3.3.6 Livestock Diseases and Parasites

Conclusions of the study with respect to the importance of wildlife as disease reservoir hosts are summarized in the following points:

- Data are generally lacking on the prevalence and economic importance of animal disease. This report is the first attempt to quantify the role of wildlife in the economics of livestock production using available data, including the case studies in annex 3 of the full-length version of this report.
- Wildlife and livestock can in general share the same habitat without serious risk of disease transmission.
- Relative to grazing competition, disease is a minor cost factor inflicted by wildlife on livestock.
- The African buffalo is the most important disease reservoir host and is, without preventive measures, incompatible to sharing its habitat with cattle.
- The control of Corridor Disease-East Coast Fever derived from buffalo is technically possible, and its application would not only reduce tick control cost by at least 50 percent but also allow the development of the economic potential of buffalo, mixed with cattle ranching.
- Because wildlife does not require a veterinary input for disease control, it is surprising that wild animals are not used on a large scale and on a sustainable offtake basis for animal production.
- Malignant catarrhal fever, African horse sickness, African swine fever, and bovine petechial fever are examples of diseases of livestock with a defined wildlife reservoir but of relative low importance to the economy of Kenya’s national livestock production.

3.4 Summary and Conclusions

This section discusses the quality of the data base available on wildlife economics in Kenya and the uniqueness of the various case studies described in this chapter. The implications of population growth on wildlife are noted as well as how policies and legislation, land tenure and use, revenue sharing, and economic management and incentives can be used to influence the economic value of wildlife.

3.4.1 The Data and Their Quality

The data base for economic analysis of cases in which landowners are “living with wildlife” is extremely poor; relevant data that can be brought into calculations is scattered in the literature, so that any analysis has to be made using unconnected material. It has been necessary to consider a series of specific case studies, each of which is also limited by data constraints.

Despite its relatively long history in East Africa, game ranching in the region has yet to produce an adequate body of economic data. This situation is partly attributable to the restrictions placed on game ranching in Kenya in the 1980s, insecurity in Uganda, and the socialist economy that prevailed in Tanzania.

The literature search yielded no data on the size and characteristics of the markets that are expected to underpin greater wildlife utilization. The game meat market in Kenya, may be fragile. Hunting remains popular but it is suffering from negative publicity and its market inelasticity (Kiss 1990) requires testing.

In Kenya there has been virtually no economic valuation of the costs and benefits of wildlife utilization. Only one study (Mwenge International 1980) involved economic analysis of some land-use options involving wildlife utilization (notably hunting); one genre of studies has calculated the value of individual animals to photographic tourism (Western and Henry 1980; Western 1984; Thresher 1992); others have evaluated the role of tourism in the economy (Mitchell 1968; EIU 1979; Migot-Adholla and others 1982); several recent works have compared land-use options (Douglas-Hamilton and Associates 1988; Norton-Griffiths 1995). Statements in policy documents concerning the importance of biodiversity, cultural aspects of conservation, environmental impact of transfer of conservation areas to agriculture, livestock, or fisheries, and the value of specific areas to tourism are unsupported by valuation of benefits and costs.

3.4.2 Each Case is Unique

The present study is a timely effort to collate and assimilate available information and highlight possible courses of action and gaps in knowledge.

The literature survey and consideration of case studies illustrates that no two situations are alike. The absence of case study evaluations to guide Kenya means that each case should be considered as a separate land-use enterprise and be evaluated in social, legal, technical, business management, financial, and economic terms in the same manner as a business venture is tested for viability by its sponsors. Common factors dictate potential in all cases, but viability is “localized” and depends on a host of specific factors such as marketing opportunities, management, and finance. Wildlife utilization, like any other form of land use, will be economically dynamic.

3.4.3 The Devastating Implications of Population Growth

In this study we have emphasized the role of population growth and the inevitable rise of poverty as the fundamental, negative force militating against conservation and wildlife utilization. Organizations engaged in development activities in Kenya—including the government itself—have focused insufficiently on this issue. The literature clearly acknowledges the issues, but action dissolves into frustration in the face of the government’s politically motivated unwillingness to accept and implement the hard solutions.

3.4.4 Policies and Legislation

Kenya government policy on wildlife management recently has undergone major changes to address the fact that the pattern of land tenure is changing swiftly toward one of privately owned parcels of land on which the owner can influence the diversity and distribution of flora and fauna. The historic conservation ethic—rooted in concepts of managing “game animals” and “game birds” on state land—out of step with current trends in land tenure and land use.

KWS, however, is still establishing management systems and experimenting with wildlife utilization options. It is probably technically understaffed to handle the plethora of possible projects that fall under its jurisdiction. Policy statements made in documents or by representatives of KWS remain unfulfilled or are receiving no attention. For wildlife management, the decade 1977–86 is regarded as lost—through poor management and corruption. Government, and KWS in particular, should consider more of a facilitating and less of a regulatory role with direct involvement. Incentives, however, require a degree of regulation, enforcement, and monitoring.

Present policy and legislation on wildlife utilization contain contradictions, mainly in the area of implementation—for example, offtake rates for cropping are well below observed reproduction rates. The more serious and difficult conflicts are the contradictions among legislative instruments. Consequently, agricultural policy seeks to utilize areas for small-scale irrigation that are dry-season and wildlife-grazing areas or to develop new plant strains that are suitable for arid and semiarid land areas. The drive toward increased settlement in the arid and semiarid lands is an established strategy, despite obvious conflict with wildlife for resources and with biodiversity conservation goals. Agricultural development action is often in conflict even with traditional pastoralism.

Land-use legislation exists but is weak and not enforced. For political reasons, the measures covered by the law probably are unenforceable and do not offer a solution. We believe that facilitating the use of wildlife offers the best use of resolving the apparent conflict, because it offers to landowners the basic option of treating wild animals as a land resource.

3.4.5 Land Tenure and Control Over Land Use

Conservation of wild animals outside protected areas depends on two forms of land tenure: (1) protection in communal lands owned by pastoralists and (2) management of large holdings owned by individual companies.

The key to long-term conservation and utilization of wildlife in community lands lies in ownership and management of land. Even where key inputs of management and marketing have been provided to group ranches in the Maasai Mara and Kajiado, deterioration in the tourism experience has resulted due to continuing pressure from conflicting land uses with expansion of cropping and intensification of grazing, unplanned construction of unattractive buildings and settlements, poisoning of predators and exclusion of grazers, and insecurity and harassment of visitors. Game cropping has limited potential on traditional lands because of the lack of infrastructure needed to meet processing standards and because of the limited size of the export and local markets. Consequently, the immediate potential lies in tourism.

The pressures of population and demand for land are increasing. Management structures on the group ranches have, in nearly all cases reviewed, led to inequitable distribution of revenues from

wildlife; the management skills and aspirations of the management committees do not coincide with game conservation in an environment of competition for resources. The control necessary to continue to preserve the wilderness and game does not exist, nor does the desire to do so. Traditional communities want to move on to better housing and social conditions, not to continue living in traditional houses—even though cultural villages may be preserved or constructed anew for tourism.

In contrast, in Kenya a number of successful wildlife conservation projects are in place and many more are planned on ranches owned or controlled by single owners or companies with clear corporate objectives. The key is in control of the land and well-defined, land use objectives.

Our conclusion is that, unless control over land use is exercised by agencies that understand what is required in terms of wildlife management, tourism marketing, or both, it is improbable that changes in land use that lead to a deterioration in potential benefits from wildlife can be averted. It is difficult to imagine being able to ensure that the objectives of conserving wilderness areas can be reconciled with the aspirations of group ranch members. This implies that alienation of the management (not ownership) of the land is the only possible solution, a strategy that is unacceptable to group ranches and probably politically unacceptable also (Douglas-Hamilton and Associates 1988).

It is essential to remove the emotionalism from the wildlife utilization-conservation complex and concentrate on the issue of land use; what is of concern is to identify, plan, and manage the land to its best sustainable use with the resources available. The term best ascribes social, economic, technical, and legal considerations. If evaluation concludes that wildlife utilization is not the best form of land use outside demarcated conservation areas, then it should be accepted that people come first and the land should be turned over to its best use.

It is the consultants' conclusion that wildlife utilization is unlikely to be a competitive land use in agroclimatic zones with potential higher than zone V or zone UM5 under the agroecological zoning classification (see figure 3.5). This provides a benchmark for land-use strategies. Although small-scale agriculture and opportunistic large-scale farming take place in zones 5 and 6 in Kenya, these forms of land use take place because they are externally funded; in the case of smallholder farming, repatriated earnings from family members working elsewhere supplement incomes and consumption. Large-scale farming is based on low land-lease costs and minimum-investment methods of farming that ignore long-term land management investments such as erosion embankments and tree windbreaks. Cropping would not otherwise be viable nor sustainable as a sole land use activity in zones V, VI, or VII.

Consideration of wildlife densities and location of national parks and reserves, land tenure, local attitudes, infrastructure, tourism investments, government budgetary constraints, and ability to manage suggest that the efforts to conserve and utilize wildlife in dispersal areas should be concentrated in four districts: Narok, Kajiado, Laikipia, and Isiolo. Any other areas with perceived vital importance, such as East and West Tsavo National Parks, should be assessed on their specific merits with explicit valuation of biodiversity and other possible economic uses and comparison with alternatives.

The principle of establishing conservation areas to preserve wilderness and wildlife is an accepted social, cultural, and scientific necessity for any country. These should be determined using objective parameters of plant and wildlife diversity and density. Areas essential to this heritage should be identified and land use regulations applied thereto; in these areas, compensation equivalent to the opportunity cost should be paid.

3.4.6 Revenue Sharing Administered by Communities

The concept of revenue sharing is controversial mainly because of its vulnerability to misappropriation and inequitable distribution of the funds distributed to communities. The investor returns from wildlife and tourism in job creation and social welfare projects has proved the most successful system. Cash paid to group ranch management has not been wisely invested nor equitably distributed in the cases studied. The more communities are involved in deciding how revenues are to be utilized or distributed, the more likely it is that equity will be achieved.

3.4.7 Economic Management and Incentives

To encourage wildlife utilization, policies will need to reflect the values put on the resource by government. This could be done through such measures as punitive taxes for those wishing to destroy wildlife in zoned conservation areas, subsidies (technical assistance and credit) for those who preserve wildlife, or both. Furthermore, zoning would be accompanied by strict land-management legislation concerning structures such as fences and ditches that interfere with wildlife movements.

Government policy on agriculture is explicit in its assertion that the country contains extensive tracts of idle high- and medium-potential land and that agricultural production could be much more efficient. This implies that the high degree of pressure on marginal lands is unnecessary and that government services, such as extension, are inadequate.

The involvement of government in encouraging and even enforcing offtake through marketing livestock from pastoral areas dates from the 1950s when it was determined that pastoralists kept large numbers of surplus animals that in turn caused degradation. Although the link between overstocking and degradation can still be made (Shaabani and others 1992), the traditional livestock management strategies of pastoralists are now better understood; it is clear that even if the range is overstocked, no amount of marketing advice is likely to persuade producers to sell if they have no surplus animals after meeting their subsistence requirements or if they have no need to sell for cash or the prices are not attractive.

Government's facilitating (rather than direct) role in livestock marketing is appropriate although presently ineffective. This includes development and maintenance of the roads in arid and semiarid lands, enforcement of the use of designated stock routes and veterinary movement regulations, provision of basic facilities at holding grounds and on stock routes, and arrangement and publicity of markets and auctions.

3.4.8 Research and Development

The term "research" is intended in its widest use and not restricted to scientific endeavor; this is applied to testing land- and wildlife-management systems, wildlife utilization (both consumptive and nonconsumptive), and product marketing. Perhaps "adaptive" is an appropriate term in the sense of adapting wildlife utilization to land use. KWS should be prepared to allow landowners a great deal of freedom to undertake land use with wildlife and desist from the time-consuming approval system that currently delays many projects.

The land use situation in marginal areas is dynamic: livestock production economics is changing, disease challenges are altering (for example, increasing resistance to trypanosomic drugs that presently

allow cattle to be managed in tsetse areas), and research is allowing new land uses in marginal areas (new varieties, techniques such as agroforestry, and underexploited crops).

We also recommend a feasibility study to investigate the setup of an institutional framework under control of the land users rather than the national government.

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Abstract

Namibia is known as a land of wide, open spaces and has a growing reputation for its wildlife. At the same time, much of this land is arid or semiarid and faces severe environmental pressures due to drought and overgrazing by livestock. To date, little is known of the role played by wildlife in the nation's economy and the potential it has to contribute to sustainable development. This lacuna is particularly evident with regard to communal land, on which most of Namibia's population lives.

This paper attempts to assess the current and potential economic role of wildlife in Namibia, with an emphasis on communal areas. Case studies are used to illustrate the returns to wildlife, both absolute and relative to livestock, and some of the institutional issues that have to be addressed if the potential of this sector is to be realized.

Our findings are that, where rural communities have been able to establish a stake in the utilization of their area's wildlife, the community, government, and wildlife have benefited. Yet, it has to be said that much of the discussion is in terms of potential benefits from wildlife utilization. Existing legislation presents an obstacle to communities that aspire to realize these gains in communal areas. Locally cropped game meat cannot be sold and communities have no legal basis for claiming revenue from those who utilize the wildlife in their locality, whether they are tourists or trophy hunters. Enabling legislation is, therefore, necessary for communities to achieve many of the potential benefits from wildlife we have identified. Yet, it is far from sufficient. In some areas, nongovernmental organizations (NGOs) have acted as catalysts to bring together local communities and tour operators. Further work is needed to establish an institutional framework in which community representatives, private business, NGOs, and local government can devise development strategies that effectively utilize wildlife resources.

As for a comparison of the returns to livestock and wildlife, our research suggests that the net economic return to livestock farming, particularly in the more arid communal regions of Namibia, is almost certainly negative. Other research quoted in this study suggests the same is true of commercial livestock production. Wildlife utilization (combining tourism, hunting, and cropping) is shown to offer significantly more favorable returns in communal areas, whereas trophy hunting has proved a growing success on private farms. Despite this, widespread switching to wildlife use from livestock farming is unlikely.

Economic factors provide some of the explanation for this rigidity. Livestock farming in Namibia has, and continues to be, favored over other forms of land use by policies that permit a large proportion of the costs of livestock production to be borne by society as a whole. As a result, livestock farming can be a highly remunerative activity for the individual farmers concerned. Noneconomic factors are also very important in understanding the reluctance to utilize wildlife in place of livestock. Most rural communities in Namibia place a high value on livestock—particularly cattle—for cultural and social reasons. Consequently, demonstrating the economic superiority of wildlife utilization should not be expected to lead to widespread switching from livestock production in the short term.

Chapter 4:

The Economics of Living With Wildlife in Namibia^{*}

By Gil Yaron, Tim Healy, and Chris Tapscott[†]

Namibia is known as a land of wide, open spaces and has a growing reputation for its wildlife. At the same time, much of this land is arid or semiarid and faces severe environmental pressures due to drought and overgrazing by livestock. To date, little is known of the role played by wildlife in the nation's economy and the potential it has to contribute to sustainable development. This lacuna is particularly evident with regard to communal land, on which most of Namibia's population live.

This paper attempts to assess the current and potential economic role of wildlife in Namibia, with an emphasis on communal areas. Case studies are used to illustrate the returns to wildlife, both absolute and relative to livestock, and some of the institutional issues that have to be addressed if the potential of this sector is to be realized.

The structure of the paper is as follows: section 4.1 provides an overview of wildlife policies and utilization in Namibia from both a historical and current management perspective; a description of land uses that compete with wildlife is given in subsection 4.2.1, whereas subsection 4.2.2 contains the financial and economic analysis of the wildlife resource. Subsection 4.2.3 provides an assessment of the major policy issues that affect wildlife utilization in Namibia. The factors determining the adaptability of wildlife to Namibia's environment are discussed in section 4.3, and section 4.4 presents the conclusions.

4.1 The Historical Perspective

Namibia, situated in the southwestern part of Africa, occupies a land mass of 824,269 square kilometers. The country consists of three major physiographic regions. The Namib Desert, which extends along the western coastal plain, comprises about 15 percent of the land area and is characterized by low rainfall. To the east, the altitude rises rapidly to an interior plateau, which covers more than half of the total land surface area and stretches across the country from the northern to the southern border. The

* The authors would like to thank the Ministry of Wildlife, Tourism, and Conservation, in particular, Mick de Jager, for their assistance in our undertaking this research. The original report has been edited and shortened considerably by Jan Bojò, for the purposes of this publication. The full-length report (seventy-five pages and ten appendixes) can be obtained on request from AFTES.

† Gil Yaron and Tim Healy undertook this research when they were freelance consultants and research associates of the Namibian Institute of Social and Economic Research (NISER), University of Namibia. At the time, Chris Tapscott was director of NISER. Different subsections of this paper are attributable to each of the authors: this introduction, sections 4.2.2, 4.2.3, and 4.4 were completed by Yaron; 4.2.1 and 4.3 by Healy; and 4.1 by Tapscott.

Abbreviations

CGG	Community Game Guard
DVS	Department of Veterinary Services, MAWRD
IRDNC	Integrated Rural Development and Nature Conservation
MAWRD	Ministry of Agriculture, Water, and Rural Development
MWCT	Ministry of Wildlife, Conservation, and Tourism
NAPHA	Namibian Professional Hunting Association
NEPRU	Namibian Economic Policy Research Unit
NGO	Nongovernmental organization
NISER	Namibian Institute for Social and Economic Research, University of Namibia
SADF	South African Defense Force
SRT	Save the Rhino Trust
SWA	South West Africa
SWAPO	South West African People's Organisation
VCF	Veterinary Cordon Fence

third region is the Kalahari semiarid zone, which lies along most of the eastern area and which is characterized by sands and limestone and an almost complete lack of surface water.

With a mean annual rainfall of approximately 250 millimeters, Namibia has the driest climate sub-Saharan Africa. Just 54 percent of the total land mass is classified as "arable," but even in areas of high rainfall in the north, arable agriculture is precarious. Elsewhere, an erratic rainfall regime and sandy and sodic soils, with high absorptive capacity and poor fertility, renders the land generally unsuitable for cultivation.

The wildlife of Namibia corresponds to the three most important physiognomic groups: desert vegetation, savanna, and woodland. The desert region supports species adapted to the arid conditions, especially ostriches, springboks, and oryx. The savanna supports wildlife species characteristic of savanna regions elsewhere in Africa. Woodland vegetation, which is restricted to the northeast, supports species not found elsewhere in the country; these include sables, roan antelopes, tsessebes, and buffalo.

4.1.1 Pre-Independence Wildlife Utilization Policies

Despite resistance from the indigenous population, Namibia was proclaimed a German protectorate in 1884 (German South West Africa). The first game reserves in the colony were established in 1907. With the exception of the desert preserve, all these areas fell outside the area occupied by white settlers. Loss of access was thus felt most directly by the indigenous population.

With the South African takeover of the country in 1915, there was a reduction in the amount of land allocated as nature reserves. In 1947 the major part of the Kaokoland reserve was degazetted to create a "homeland" for the local ethnic population. Following the recommendations of the Odendaal Commission in 1963, which advocated the extension of South Africa's apartheid policies to Namibia,

additional reserve land was degazetted and incorporated into various ethnic "homelands." Despite these losses, however, the amount of land set aside for conservation (8.7 percent) was comparable with surrounding African countries.

Under colonial rule, the Directorate of Nature Conservation of the South West African (SWA) Administration administered the state-owned national parks, nature reserves, and national recreational areas. The primary functions of the directorate were care of the animal population, administration of licensed hunting, combating of wildlife-borne epidemics, research, and the maintenance of recreational facilities. Significantly, the directorate perceived its role to be predominantly one of preservation rather than conservation.

The most important piece of wildlife legislation to be enacted under South African colonial rule was the Nature Conservation Ordinance (1967). Under this ordinance, commercial farmers (virtually all of whom were white) effectively gained full ownership of the wildlife on their farms. With this incentive, many farmers sought to utilize their wildlife for domestic consumption, trophy hunting, and sale. This practice, in turn, led to the build-up of wildlife numbers in many areas outside the national reserves.

In contrast, within the designated communal areas, hunting was officially prohibited. In consequence, under this administrative system, the importance of bush meat in the diets of most of the indigenous population declined to negligible levels. Hunting, for most households, became a clandestine activity, which carried with it the risk of high penalties. Despite these restrictions, however, wildlife numbers in the communal reserves declined rather than increased during the decades leading up to independence. This was due to increased population pressure, a succession of droughts, and widespread poaching by both the South African military and by community members.

4.1.2 Current Wildlife Management

Independence in March 1990 brought with it a new impetus for the conservation of wildlife in Namibia. The new constitution committed the state to the maintenance of ecosystems, essential ecological processes, and the biological diversity of Namibia and the utilization of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future.

Pursuant to this philosophy, the newly formed Ministry of Wildlife, Conservation, and Tourism (MWCT) has embarked on a broad program to promote sustainable use of wildlife resources. This entails the formulation of policy to address the ownership of game, the financial benefits to communities, the economics of conservation, sustainable utilization regimes, the creation and structure of conservancies, and the role of different organizations and interest groups in the utilization and management of wildlife. Particular efforts are being made to ensure that local communities are involved in all consultative and decision-making processes.

4.1.3 Areas Currently Used for Wildlife

At present, Namibia is in the unusual position of having more than 90 percent of its wildlife, particularly larger mammals, located outside formally proclaimed conservation areas and mainly on agricultural land. About 80 percent of the larger game species are found on privately owned commercial farms, which comprise 44 percent of the surface area of the country but which accommodate less than 5 percent of the national population. In contrast, the communal areas, which comprise 41 percent of the

country and which accommodate 67 percent of the total population, support around 9 percent of the larger game species.

At present, there are twenty-one designated conservation areas in Namibia covering some 108,000 square kilometers or 13 percent of the surface area of the country. Since independence, two new national parks have been proclaimed in the Caprivi region and plans are afoot to establish an additional six reserves. An investigation is also under way into the establishment of a buffer zone system adjacent to conservation areas.

A community-based wildlife management program has existed in northwestern Namibia for the past decade. The approach, involving community game guards, has met with considerable success. Poaching has decreased dramatically and livestock numbers are increasing. The project, initiated by the nongovernmental organization (NGO) Integrated Rural Development and Nature Conservation (IRDNC) has since been recognized MWCT and has become a model for similar projects elsewhere.

4.1.4 Wildlife Numbers and Economic Significance

Although relatively accurate game censuses have been undertaken in national parks and in the commercial farming areas, statistics on the communal areas are generally based on estimates and informed guesses. More formal counting of wildlife in the northern communal areas was complicated by nearly two decades of bush warfare. Such statistics as do exist for the country as a whole reflect a consistent pattern: a general increase in wildlife numbers in the commercial areas and, to a lesser extent in the national parks and a secular decline of game in most communal areas.

In contrast to other communal areas, results from regions in which community-based game management has been introduced have been encouraging. As most communal areas adjoin national wildlife reserves, they retain important roles as corridors for the movement of game and ultimately for the maintenance of genetic diversity within given species.

Accurate data on public and private expenditure in this sector are weak. Reflecting a stronger government commitment to conservation, the annual budget for nature conservation within MWCT has seen a 50 percent increase from R12 million in 1990 to R18 million in 1993.*

Within the private sector, evidence of an increase in investment may be seen in the increased number of guest farms from twenty-seven in 1987 to thirty-five in 1991. At the same time, there was a 102 percent increase (from 217 to 440) in the number of rooms at rest camps and game farms between 1987 and 1991 (Namibia 1992b).

The income derived from wildlife-related activities may be divided into consumptive and nonconsumptive activities. Consumptive activities relate to trophy and sport hunting, culling, live game dealing, and shooting for own consumption. Data from 1989 and 1990, although limited, give an indication of general increase in returns from this sector (see table 4.1).

* This research predates introduction of Namibian currency; hence, all costs and revenues are shown in rands (R), the currency at the time. US\$1 = 3.3 rands (1993).

Table 4.1: Game Utilization: 1989-90

	1989	%	1990	%	1989	%	1990	%
Sport Hunt	11,227	16.9	21,235	23.9	2.43	12.5	8.18	24.8
Trophy Hunt	2,711	4.0	7,323	8.2	6.04	31.1	14.05	42.6
Game Hunt	43,029	53.3	32,285	6.6	3.26	16.8	3.09	9.4
Game (Live)	6,074	9.2	4,893	5.5	6.53	33.6	5.26	15.9
Shot/Sold	4,026	6.1	6,829	7.7	1.17	6.0	2.39	7.3
Own Use	8,283	12.5	16,282	18.3	-	-	-	-
Total	66,350	100	88,847	100	19.43	100	32.97	100

Source: Du Plessis 1991

The Namibia Professional Hunting Association handles about 1,500 clients a year with an average of about 1.75 observers accompanying each hunter—a total of about 5,000 clients. During 1991 an estimated R44 million was earned in foreign exchange from trophy fees, accommodations, air fares, and trophy export charges (Attwell 1991).

Income from the nonconsumptive sector is less easily quantified. The Directorate of Wildlife Conservation and Research administers nine rest camps and seven reserves, totaling 2,400 beds. Apart from that sector of the tourist market that is self-catering (own vehicle, camping, and so on) most tourists deal with tourist operators. These operators are represented by the Touring Safari Association (TASA). The association has 36 members, comprised of fly-in safaris (3), coastal operators (4), fully-inclusive tours (2), camping safaris (6), and guest farms, hotels, and lodges (21).

The employment derived from the wildlife sector is difficult to compute as workers may not be engaged full-time in activities related to game management. The Directorate of Wildlife Conservation and Research currently employs 1,600 individuals, of whom 700 work in their various resorts. An approximate figure relating to those directly or indirectly involved in wildlife-related employment would amount to some 15,000 employees.

4.1.5 Current Property Rights

Private commercial farmers effectively own the wildlife on their land; however, this ownership is regulated by a range of permits and licenses. These relate to “specially protected game” (ten species, including elephants, white and black rhinos, hippos, and giraffes), “protected game” (thirty-one species, including leopards, cheetahs, crocodiles, and a range of antelopes), “hunnable game” (six species, comprising buffalo, oryx, kudus, springboks, warthogs, and bush pigs) and “problem game” (six species, including baboons and rock hyraxes). “Specially protected game” and “protected game” may only be hunted with a permit granted by the Namibian Cabinet, although small numbers are readily attained each year. “Hunnable game” becomes the property of the owner, provided the land is adequately fenced or exceeds 1,000 hectares (Attwell 1991).

Irrespective of ownership, there are several other categories of users who may gain access to game with the appropriate licenses. These are trophy hunters (who generally operate through professional hunting firms), sport hunters (who hunt for venison with the consent of a farm owner), game harvesters (who undertake nocturnal culls on private farms), commercial shooting for sale (undertaken by farm owners), and live game capture (undertaken by professional capture teams).

Farmers whose farms contain wildlife may shoot game for their own use without a permit provided this is "huntable game." Statistics on game utilized in this manner are generally underreported. Given that there are 6,000 registered private farms in Namibia, offtake of this form could be considerable if a conservative estimate of five animals were consumed per farm annually.

Within the communal areas, wildlife utilization continues to be retarded by existing legislation; however, as indicated, the introduction of community-based wildlife management methods is likely to improve this situation. The returns to communities from such systems derive from both concession fees and meat culled. Concession fees in the Damaraland region have been channeled into community-based projects. Despite these changes, however, game meat cannot be said to be an open access resource in Namibia. Only a small proportion of the population (possibly 10 percent or less) might realistically gain access to this resource.

4.1.6 Land Use and Government Policy

Despite the obvious potential of wildlife in Namibia, its quantifiable and direct contribution to the Gross Domestic Product (GDP) remains relatively small. In consequence, the economic potential of the sector appears not to have been fully recognized by some policy-makers. Game farming is seen as a supplement to livestock farming. As such, it is not recognized as a formal agricultural activity and game farms are ineligible for the tax deductions and loans that farmers might normally expect.

Land used exclusively for game farming is seen by many Namibians as underutilized. In a context in which land is scarce and nearly 70 percent of arable land is in the hands of a small white community, this issue remains politically charged. Despite the fact that much of the land currently utilized for wildlife production is agriculturally marginal and hence unsuitable for small-scale redistribution, its current use is seen by some as an unnecessary luxury, the argument being that the land could be more fruitfully utilized for livestock farming.

4.1.7 Bush Meat Consumption and Marketing

With the exception of the San population in the region formerly known as Bushmanland (fewer than 4,000 people), there are no communities in Namibia that rely to any significant degree on game meat. Game meat is consumed by both owners and their employees on commercial farms on which wildlife is utilized. Within commercial outlets in urban areas, bush meat is sold as a delicacy (as dried meat preserve, for example, biltong and venison).

At present, there is a slump in the international market for venison. This is in part due to a decline in buyers from South Africa since Namibia's independence and, as argued by Du Plessis (1991) in part due to changes in Eastern Europe and the opening up of new markets. Even assuming the existence of a strong demand for venison, the infrastructure necessary to transport carcasses from the commercial farms to the processing facilities in Namibia is inadequate.

4.2 Land Use Options: Financial and Economic Assessment

This chapter first reviews the competing land-use options in three categories of land ownership. It proceeds to assess their financial and economic reforms and finally addresses some related policy issues.

4.2.1 Competing Land Uses

Namibia can be divided into three categories of land (see figure 4.2 in section 4.2.2) as follows:

- “Commercial areas” owned predominantly by private landowners and covering 44 percent of total land
- “Communal areas,” also known as “reserves” or “homelands,” designated for subsistence living by native black Namibians, covering 41 percent of total land
- “State land,” composed primarily of nature reserves and Diamond Area 1 (which forms part of the Namib desert), covering 15 percent of total land

Commercial Areas

Joubert and Mostert (1975) showed that 60 percent of the game species in Namibia occur on privately owned land; however, estimated game population figures for all the various species have shown that approximately 90 percent of actual game numbers occur in the commercial areas. Joubert and Morsbach (undated), commenting on a game survey in 1982, stated that there were surprising and comforting facts based on the relatively constant information on many species from 1975 to 1982.

The distribution of game on commercial land reflects the quality of grazing available to both domestic livestock and game in the savanna region, as shown in table 4.2. The central region (predominantly areas A, B, and C) has high densities of springboks, kudus, and gemsboks. In addition, the central eastern region (areas D and E) has high densities of red hartebeests, the central western region (areas D, E, and F) has Hartmann’s zebras, whereas the central northern region has elands and giraffes in the mountain savanna and Kartsveld. Meanwhile, commercial land in the southern region (areas E, F, and G) are relatively poor open parkland with Karoid shrubs. This has a high number of springboks and some gemsboks.

Area	Farming Units		Hectares		Mean Hectares	Official Carrying Capacity (ha/LSU ^a)
	Number	%	Total	%		
Areas A and B (beef cattle)	1,851	43.5	12,517,565	34.6	6,763	8–10
Areas C, D, E (sheep and cattle)	923	21.7	6,287,247	17.4	6,812	12–15
Areas E and F (sheep/high)	1,129	26.6	11,967,599	33.1	10,600	18–30
Area G (sheep/low)	348	8.2	5,392,469	14.9	15,496	36–60
Total	4,251	100.0	36,164,880	100.0	8,507	8–60

a. Large Stock Unit, which is equivalent to an animal with an approximate mass of 500 kilograms.
Source: Namibia, Department of Agriculture, Water, and Rural Development, raw data, 1991.

The competing land uses in areas suitable for wildlife management depend on the enterprises in each region, as shown in table 4.2, showing land with high productivity for grazing; however, land

classified as "A" grade may also have potential for dryland agronomy in which rainfall is above 500 millimeters per annum (Adams and Werner 1990). The conflicts of interest with different enterprises discussed in this chapter for livestock farming and dryland and irrigation agronomy. Forestry or woodland utilization are not discussed as this form of land utilization is not practiced commercially or used for subsistence living in the commercial areas.

The farming of domestic livestock covers almost the entire commercial area, principally for the production of beef from cattle (43.5 percent of the total area); however, this area includes a small amount of dairy farming in the vicinity of most large towns. Meanwhile, 32.8 percent is used for sheep farming in the south of the commercial area, whereas the remaining 21.7 percent is used for sheep and cattle production in parts of the southern region.

The livestock is often kept at conservative stocking rates, whereas the carrying capacities of different areas have changed from year to year (Namibia 1991b). Farmers in the commercial areas, during drought years, avoid selling the cattle for as long as possible, as prices will have dropped rapidly throughout the country (Bester 1993, pers. com.).

Disease transfer from game to domestic stock using the same land poses no significant problem; however, the introduction of buffalo into the commercial areas as requested by the Namibian Professional Hunting Association (Vaatz 1993, pers. com.) does pose a serious danger with the transfer of foot-and-mouth disease (R. Paskin 1993, pers. com.).

The conflict of interest between land use for agronomy and wildlife in Namibia is not significant due to the small scale of crop production in commercial areas; however, points of dispute that may arise are described subsequently.

Communal Areas

The distribution of wildlife in communal areas as described in this subsection represents a share of the 40 percent of game species and 10 percent of the population of game species for Namibia as a whole (Joubert and Mostert 1975). The distribution of key species within the formerly named communal districts are shown in table 4.3.

Table 4.3: The Population of Key Species in Communal Areas

Areas/ Species	Bushman- land	Caprivi East	Caprivi West	Damara- land	Herero- land	Kaoko- land	Kavango	Nama- land	Owami
Gemsbok	198	—	—	1,374	669	665	350	—	40+
Springbok	—	—	—	7,856	500	1,646	—	4,400	50+
Eland	150	—	10	—	237	—	500	—	—
Kudu	325	45	200	—	145	—	200	200	40+
Buffalo	11	421	^a	—	—	—	—	—	—
Lechwe	—	1,630	—	—	—	—	10	—	—
Elephant	401	3,000 ^a	^a	198	19	30	200	—	50+
B. Wildebeest	400	—	^b	—	117	—	150	—	10+
Cheetah	—	—	—	—	—	—	100+	—	—
Leopard	—	—	—	—	—	—	100+	—	—
Total	1,485	5,096^a	210^a	9,428	1,687	2,341	1,610	4,600	150+

Source: Adapted from Du Plessis 1991.

a. These species are seasonal migrants with fluctuating numbers.

b. Species present.

The competing land uses involving wildlife are similar to those addressed for commercial areas. The communal areas vary in their utilization of the land, but they can be categorized as follows:

- In Rehoboth and Namaland, the land is grazed principally by goats and sheep.
- Damaraland can be divided into sectors, with cattle on approximately 25 percent of the land in the southern sector and goats on approximately 25 percent of the land in the northern sector, whereas the remaining area is predominantly unused for grazing due to its condition.
- Approximately 66 percent of the land in Kaokoland is utilized by cattle and goats, whereas the remainder is predominantly unused due to its condition.
- The land in Owambo is used entirely by cattle and goats.
- In Kavango approximately 80 percent of the land is used for cattle and sheep production.
- The land in East Caprivi is used predominantly for cattle and sheep rearing.
- The land in Bushmanland is not used for grazing by domestic livestock but for hunting and gathering by the bushmen.

Domestic livestock farming in the communal areas aims to satisfy a subsistence living; however, community management of land has been lost in many areas leading to excessive numbers of stock. This has been partly due to large human populations surrounding towns or villages in the communal areas, particularly Owambo, with over 400,000 people.

A recent report for Namaland suggested that the carrying capacity for that region was approximately 27 hectares per Large Stock Unit (LSU). This figure is almost half the carrying capacity suggested by South West Africa's Five-Year Plan in 1966 (Adams and Werner 1990). It is reasonable to assume that the figures for carrying capacities for the remaining seven communal areas are equally unreliable. The justification for this statement can be based on the mass degradation of vegetation since the 1960s, when the Five-Year Plan was formulated by the SWA Administration.

A danger to communal farming practices in northern communal areas concerns the damage by elephants on wells and boreholes, particularly in Kaokoland and Damaraland, where elephant numbers have increased recently with successful conservation projects. Local people have had to combat this problem by constructing large stone walls around the boreholes (G. Owen-Smith 1993, pers. com.).

Dryland cultivation is present in the northern communal areas. The area cultivated in Owambo was 2.7 percent of the whole region (Adams and Werner 1990). This fact places the cultivated area into context; the important fact, however, is the number of independent units in Owambo (approximately 61,000 units based on the area cultivated and average size of each unit). Irrigation agronomy has been adopted by some farmers in East Caprivi to sell their products rather than live by subsistence only. The most common crop grown in East Caprivi is maize sold within the region.

Dry woodlands cover 20 percent of Namibia. Of this, approximately 12 percent may be classified as forested (central Caprivi) and about 2 percent (1.9 million hectares) is estimated to be commercially exploitable forest (Namibia 1991a). This woodland occurs from Caprivi to near Ondangwa extending

south approximately 300 kilometers to the Botswana border. The impact of wildlife on woodlands in northern Namibia may include increasing demand for wood to protect crops and damage to trees, particularly by elephants.

State Land

State land is managed or leased by the government, covering 8.8 million hectares, and the diamond concession area, covering 3.5 million hectares. There are conflicts over some conservation areas due to the demand for land in parts of Namibia. Parks with potential for mining could pose a serious threat to wildlife in the future. Local people want to open up Etosha Park, situated next to Owambo, in which there is excessive overgrazing, to allow free movement of their livestock. Natural migration of wildlife from the Skeleton Coast to Etosha Pan has been curtailed by the fencing of the park, in which a wildlife corridor used to allow the passage of animals from both areas. This had the effect of minimizing overgrazing throughout the area.

4.2.2 Financial and Economic Analysis

This section reviews wildlife utilization, primarily in communal areas, from a regional perspective. At the end of the section, wildlife utilization in commercial areas is also discussed.

Wildlife Utilization in Namibia's Communal Areas

The potential offered by wildlife utilization is illustrated by the case studies in this section. Individuals on communal lands in Namibia face a big disadvantage with respect to wildlife utilization. Wildlife on communal land belongs to the state and can only be hunted under specific circumstances only with the involvement of MWCT officials. This, a priori, rules out CAMPFIRE*-type projects in Namibia. The government has, in principle, accepted the right of inhabitants of communal areas to get economic benefits from the utilization of wildlife in their neighborhood. The precise form of such rights will find expression in legislation that could be enacted in 1994.

With the possible exception of game farming, the options for wildlife utilization set out here are consistent with livestock farming. Occasionally, the supply of water is so limited that livestock offer competition to wildlife. Competition can also arise if poor dry-season grazing is combined with fences that prevent game movement or if tourism is set back by the presence of livestock in wildlife areas. In general, however, the ability of game to utilize a far greater area around a water source than domestic animals permits water sources to be shared. Even where the same range is shared, differences in browsing and grazing behavior provide some complementarity.

Although wildlife can often supplement livestock farming, the scope for outright substitution is generally limited. Livestock—cattle in particular—have an important social, religious, and economic role for most traditional societies in Namibia. The question of whether to farm wildlife in place of livestock is meaningless in societies in which “a man without cattle is not a man.”

This report's analysis of communal areas is structured by region, which is complicated by the recent (1992) delimitation of new regions in Namibia. The previous ethnically based map has been redrawn—in some cases leading to significant changes in regional boundaries. These are illustrated in

* Communal Areas Management Program for Indigenous Resources (CAMPFIRE). See chapter 5 on Zimbabwe for more background.

the subsequent maps. Figure 4.1 indicates current regional boundaries and provides some data on their areas, whereas figure 4.2 is drawn on the basis of the previous boundaries and indicates rainfall across the country.

Kunene Region

The objective of the following case studies is to illustrate the interaction of the various elements of community wildlife utilization. This region, which covers 144,000 square kilometers but is home to only 25,000 people, is predominantly arid rangeland. The case study area within it, the western census region, covers for game count purposes approximately 25,000 square kilometers and has a population of less than 1,000. The area is at the forefront of community-based wildlife utilization. Community game guard and tourism levy projects have been replicated in other areas.

Community Game Guards

The community game guard (CGG) project operates predominantly in the northwest of Namibia on communal land that lies above the veterinary cordon fence (VCF). Much of this land consists of privately operated tourist concession areas. Although generally arid, this area has traditionally supported significant populations of black rhinoceroses and elephants.

The 1979–81 drought, however, led to local communities losing 80 percent of their cattle and a desperation to rebuild herds. At the same time, local people received no officially sanctioned benefits from the wildlife in their area. The South African Government also issued 2,000 rifles to people in Kaokoland to “counter the SWAPO threat,” while a ready market existed for rhino horn, ivory, and game skins. This combination of factors led to a massive upsurge in poaching.

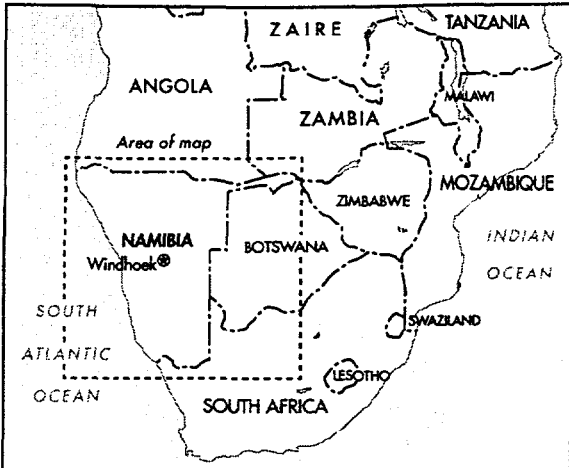
By 1981 almost no elephant or rhinoceros remained in Kaokoland. . . Burchell’s zebra were extinct in Kaokoland. Assertions this was due to the drought should be balanced against the fact this species had survived previous droughts. (Carter 1990, p.13).

The first CGGs started work in 1983. There are currently more than forty CGGs in communities across the region, each receiving a R240 ration/cash income package per month from IRDNC—the NGO operating the scheme. CGGs use local means of transport (mainly donkey carts) and, initially, were paid only food rations. This constitutes an important source of employment. Funding for CGGs is provided by various donor agencies.

The CGG scheme is generally credited with the sustained recovery of wildlife numbers recorded in this region (Carter 1990). In less than one decade (1984–93), the black rhino population in what was formally Damaraland and Kaokoland has risen 100 percent. The holders of tourist concessions in the region also attribute the sustained increase in wildlife numbers in these areas to the CGGs. Although the returns from wildlife have only been modest, it is the community support for the CGG scheme that underlies these gains.

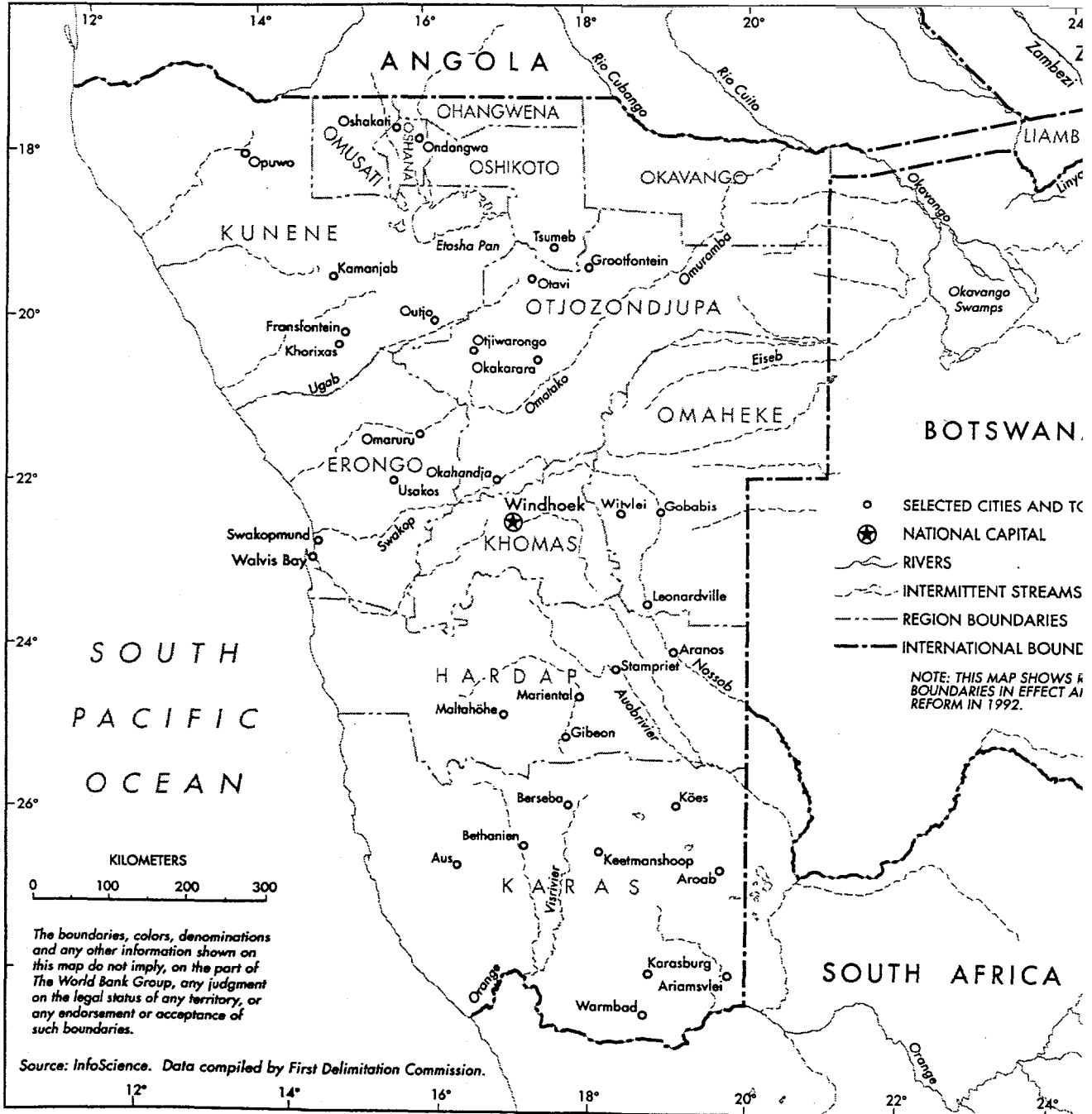
The Purros Project

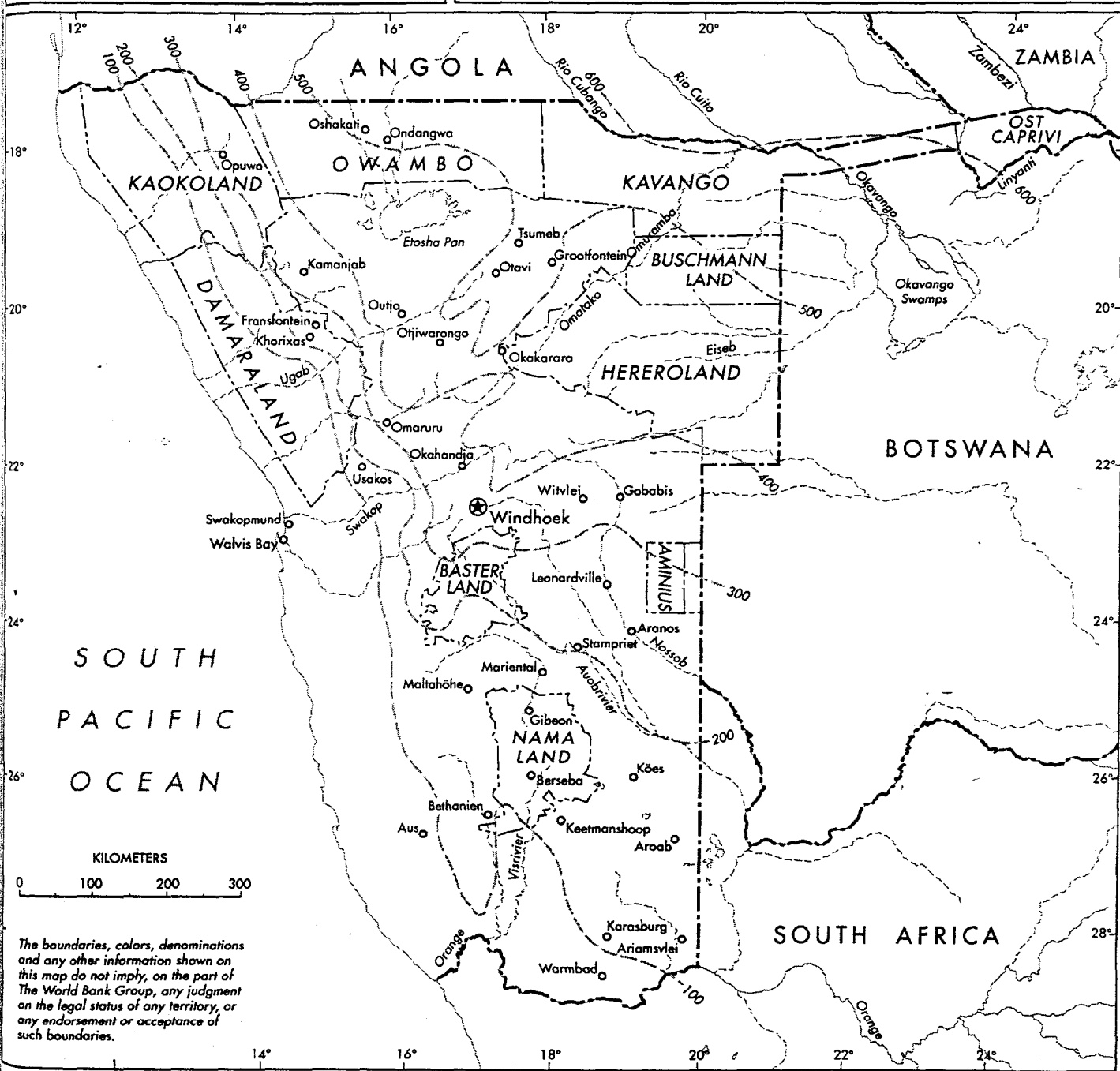
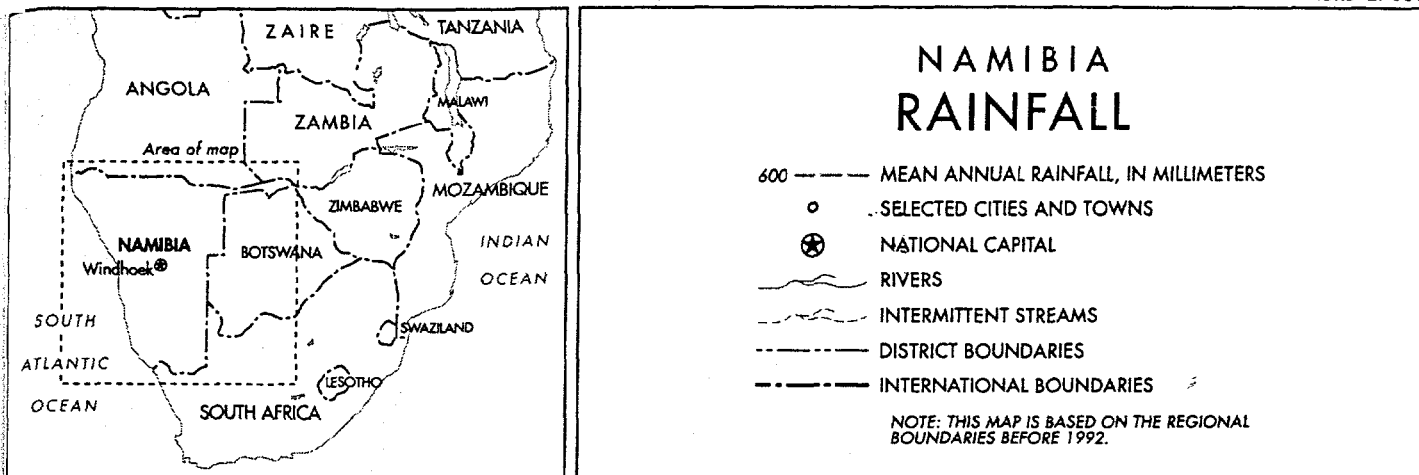
The Purros project was started in western Kaokoland in 1987. The plan was to derive revenue from a voluntary levy negotiated with tour operators visiting the Purros area. Tourists would pay an additional US\$8 if staying overnight or US\$1.60 for a morning or afternoon visit. Craft sales would also provide informal employment opportunities to local people. Payment would be made bimonthly to a



NAMIBIA CURRENT REGIONAL BOUNDARIES

REGION	AREA (SQ.KM.)	PERIMETER (KM.)
1. KUNENE	144,254.641	1,907.137
2. OMUSATI	13,637.554	526.793
3. OSHANA	5,290.943	337.651
4. OHANGWENA	10,582.016	599.090
5. OSHIKOTO	26,607.162	914.144
6. OKAVANGO	43,417.523	1,005.503
7. LIAMBEZI	19,532.277	1,072.853
8. ERONGO	63,719.781	1,264.645
9. OTJOZONDJUPA	105,327.781	2,047.672
10. OMAHEKE	84,731.992	1,475.112
11. KHOMAS	36,804.672	1,383.350
12. HARDAP	109,888.070	2,029.431
13. KARAS	161,324.500	2,112.536
TOTAL:	825,118.875	5,411.764





The boundaries, colors, denominations and any other information shown on this map do not imply, on the part of The World Bank Group, any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries.

committee of lineage (family) heads. Five years on, the project has managed to achieve most of its objectives.

Although only one tour operator was participating in this project as of 1994, the economic gains to the community have been substantial. Some US\$19,000 has been generated by the tourism levy and sales of crafts produced over the past five years. Annual earnings are now approximately US\$6,300. This has been shared by roughly 100 people in eight extended families. The cost of establishing the project was limited to the staff time of the NGO involved.

Livestock continues to be kept. Indeed, tourism revenues facilitated the rebuilding of herds decimated by the drought of the early 1980s and cushioned the effects of the 1992 drought.

This area is a critical conservation area based around a fresh water spring in the dry Hoarusib river bed. It provides essential water for big game in their movement across northern Kunene; however, by the early 1980s, massive poaching in the wake of a serious drought had all but eliminated big game from this area.

The Purros project appears to have engendered a feeling of “community ownership” of local wildlife resources. This naturally deters poaching by community members and provides a solid base for a community game guard project—designed to combat poaching by outsiders. Elephant and rhino populations have now reestablished themselves locally and the MWCT has translocated oryx and giraffe to this area.

Lions periodically visit the area, leading to a number of incidents of livestock loss. As cattle have an important religious, social, and economic role in Himba and Herero society, this has potential serious implications; however, people are now prepared to give MWCT the chance to translocate lions out of the immediate area.

The community now negotiates directly with the tour operator concerning the levy and problems that arise. This has turned local people from being largely objects of curiosity to active participants in tourism business. Most tourists are reportedly happy to be able to contribute to the local community when the use of these funds is explained. This also has to be seen in the context of paying a US\$8 levy for a holiday package costing US\$1,590. Nonetheless, no mechanism exists for collecting the levy from those who decline to pay it. These are the majority of tourists; the councilor to the headman for this area was concerned that they did not pay any contribution to the local community.

Game Cropping for and by Local Communities

Local communities (as well as those in other parts of the region) have also benefited from occasional game cropping (in 1987–89 and 1991–92). Only state-organized cropping has been allowed. The 1992 crop was a major exercise with professional teams shooting 130,000 kilograms for distribution to local communities in Kaokoland and Damaraland. This operation presented some major logistical difficulties. Although most wildlife is found above this border, veterinary restrictions permit only zebu (which are not vulnerable to foot-and-mouth disease) to be brought southward. The desire for fresh meat required the use of freezer trucks in difficult terrain, and hunting itself in such terrain led to vehicle damage.

It is estimated that the cost of this operation was greater than the financial value of the meat obtained (R. Loutit 1993, pers. com.). The MWCT has now decided to allow the communities themselves to undertake this year's cull with MWCT staff acting as monitors.

The attitude of the various communities involved appears to vary from enthusiastic to anxious—depending largely on their view of the hunters in their midst. Legal restrictions preclude the sale of any cropped meat, which many feel gives an incentive to the hunter to consume a large proportion of what is shot.

Wildlife Utilization and Concession Area Use

Prior to independence, the then Damara Administration awarded the right of exclusive tour operations in five areas. This chapter concerns itself with two of these areas (Palmwag and Etendeka), which cover a significant proportion of the western census area. The main gains from wildlife have been in terms of community game guard employment and meat cropped from the area. The tented camp at Etendeka and the larger lodge and camping operation at Palmwag have brought some employment and opportunities for craft sales. Nonetheless, livestock herding around the natural springs in these concession areas remains the principal economic activity.

Both the concession holders and local people accept that a greater return to local communities from their environmental assets should be possible. One option, agreed with Etendeka and under discussion with Palmwag, is for a tourism levy—as with the Purros project. In return, livestock would be kept away from tourism-intensive areas. Local involvement in the tourism industry has also increased with the establishment of a camp site by the Khowarib community with assistance by Save the Rhino Trust.

The opportunities presented by such tourism-centered development need to be compared with that offered by livestock farming and also that offered by trophy hunting. If, as is expected, future legislation confers wildlife utilization rights on local communities, trophy hunting will become a potential source of revenue for communities in this area.

The view of the concession holders spoken to was that zoning of the area for hunting and photo-safaris would be difficult and that the two could not be mixed. Consequently, photo-safari and trophy hunting activities represent alternative development opportunities for this area. The actual returns to tourism (photo-safari) and livestock farming in these areas and the potential returns to trophy hunting are presented in tables 4.4–4.8.

Livestock farming is moderately profitable for the farmers concerned. Slightly more than US\$16,000 is estimated to be earned by the hundred or so families that graze animals in and around the concession areas; however, as veterinary services and boreholes (two) are provided by the state, economic costs are greater than the financial (private) costs borne by farmers. Once these are accounted for, the net (economic) return is negative. Indeed, the true economic return to livestock is likely to be even lower than that indicated in table 4.8 as no account has been taken of the effects of localized overgrazing. This has evidently hindered the recovery of grazing in the vicinity of some settlements in the wake of the 1992 drought, and this loss of productivity has an economic cost.

Table 4.4: Potential Revenue From Livestock Kunene Western Census Region

Area:		13,370 square kilometers			
Population:		100–200 households			
	1	2	3	4	
	Estimated offtake (number)	Revenue/beast (rands)	Livestock revenue p.a. (rands)	Unit mass (kg)	
Cattle	112	800	89,600	270	
Horses	2	250	500	200	
Donkeys	4	200	800	180	
Sheep and goats	750	80	60,000	35	
Total	868		150,900		
Total/ha	0.11				
Total/kg	0.16				

Source: Authors' estimates. See full-length report for background.

Table 4.5: Livestock Costs, Kunene Western Census Region

	Financial (Private)	Economic (Social)
Veterinary services/animal (R^a/kg)		0.07
Labor/animal (R/kg)	0.10	0.10
Annualized borehole capital cost/animal (R/kg)	0.01	
Diesel pump maintenance/animal (R/kg)		0.01
Fuel and oil/animal (R/kg)		0.005
Livestock in region (kg)	953,565	953,565
Total livestock cost, Kunene (R)	98,888	184,097
Total cost (R/kg)	0.10	0.19
Total cost (R/ha)	0.07	0.14

Source: Authors' estimates. See full-length report for background.

a. R = rand.

Wildlife utilization is estimated to provide a far higher net financial and economic return per area than livestock rearing. The divergence between financial and economic wildlife costs is due to costs of game protection borne by those outside the local area (by the Government of Namibia and agencies). Despite these costs, the net returns to wildlife utilization remain substantial. Nonetheless argued here, the existing culture and socioeconomic structure of local communities make wildlife a supplement to, rather than a substitute for, small-scale livestock farming.

Trophy hunting and photo-safari activities appear to offer similar net economic revenues. Table 4.8 illustrates a potential division of these returns based on similar shares to those used (for trophy hunting) in CAMPFIRE projects. In practice "fair" net revenue shares will have to be negotiated by the parties concerned. It is also important to note that the net revenue attributed to the state in table 4.8 assumes that all game protection costs are borne by the state—wildlife protection being financed by trophy hunting. Currently, the costs of wildlife protection are partially borne by donor agencies.

For the potential revenue from wildlife utilization to be realized, legislative changes are required. Some progress may be possible using a voluntary arrangement such as that used in the Purros project. However, a statutory arrangement is likely to be fairer as it would affect all concession holders equally and would also be more easily administered if it constituted a fixed proportion of the concession fee. (The study has taken 50 percent as an illustrative figure in table 4.8.)

Table 4.6: Summary of Total Revenue and Costs of Wildlife Utilization Kunene Western Census Region (rands)

Gross Revenue			Financial Costs	Economic Costs
Total trophy fee revenue	145,663.0	Trophy hunting annualized capital costs	124,160.5	124,160.5
Trophy animal meat value	33,990.0	Trophy hunting operating costs, including tender fee	363,945.0	363,945
Hunter days	190.0	Additional aerial census	0	20,000
Observer days	332.5	Game protection, CGG	0	80,000
Revenue from hunter days	381,000			
Revenue from observers	99,750.0	Photo-tourism annualized capital cost	66,243.6	66,243.6
Revenue from craft purchase by hunters	5,225.0	Photo-tourism operating cost	1,282,388.8	1,282,388.8
Subtotal for trophy hunting	665,628.0	Game protection, CGG	0	80,000
Trophy hunting revenue/ha	0.5			
Trophy hunting revenue/kg wildlife	0.4			
Live capture (net) revenue	754,500.0			
Cropping (net) revenue (local market)	72,711.1			
Commercial photography fees	5,000.0			
CGG scheme spending-local employment etc.	80,000			
Photo-tourism revenue	1,522,945.0			
Photo-tourism revenue/ha	1.1			
Photo-tourism revenue/kg wildlife	0.8			
TOTAL (with trophy hunting)	1,577,839.1	TOTAL COSTS (based on trophy hunting)	488,105.5	588,105.5
Gross return per ha	1.2	Trophy hunting cost/ha	0.4	0.4
Gross return per kg	0.9	Trophy hunting cost/kg wildlife	0.3	0.3
TOTAL (with photo-tourism)	2,435,156.1	TOTAL COSTS (based on photo-tourism)	1,348,632.4	1,428,632.4
Gross return per ha	1.8	Photo-tourism cost/ha	1.0	1.1
Gross return per kg	1.3	Photo-tourism cost/kg wildlife	0.7	0.8

Source: Author's estimates. See full-length report for background.

Table 4.7: Net Revenue for Wildlife Utilization and Livestock Production, Kunene Western Census Region

	1	2	3	4	5
	Gross Revenue	Financial Cost	Economic Cost	Net Revenue (Financial)	Net Revenue (Economic)
Livestock (<i>rands</i>)	150,900.0	98,888.2	184,097.2	52,011.8	-33,197.2
Livestock (<i>rands/ha</i>)	0.11	0.07	0.14	0.04	-0.02
Livestock (<i>rands/kg</i>)	0.16	0.10	0.19	0.05	-0.03
Wildlife ^a (<i>rands</i>)	2,435,156.1	1,348,632.4	1,428,632.4	1,086,523.7	1,006,523.7
Wildlife ^a (<i>rands/ha</i>)	1.82	1.01	1.07	0.81	0.75
Wildlife ^a (<i>rands/kg</i>)	1.32	0.73	0.78	0.59	0.55
Wildlife ^b (<i>rands</i>)	1,529,839.1	488,105.5	588,105.5	1,041,733.6	941,733.6
Wildlife ^b (<i>rands/ha</i>)	1.14	0.37	0.44	0.78	0.70
Wildlife ^b (<i>rands/kg</i>)	0.83	0.27	0.32	0.57	0.51

Source: Author's estimates. See full-length report for background.

a. Photo-safaris, game capture, and cropping

b. Trophy hunting, game capture, and cropping.

Table 4.8: Net (Economic) Revenue Division: Kunene Western Census Region (*rands*)

	1	2	3
	Local Community	State	Private Business
Livestock	52,012	-85,209	0
Wildlife ^a	562,188	359,889	84,447
Wildlife ^b	612,089	317,550	87,695

Source: Author's estimates. See full-length report for background.

a. Photo-safaris, game capture, and cropping

b. Trophy hunting, game capture, and cropping.

Although table 4.7 shows the net economic return to photo-safari tourism and trophy hunting be similar, there are reasons to believe that photo-tourism offers a greater scope for this area's development. One local community is actively involved in running and developing camping facilities (Khowarib) and, with some support from the Save The Rhino Trust, they have begun to establish themselves as a tourist destination. The objective is now to develop local managerial skills to progressively add value to their tourism operation.

In the foregoing analysis, we have assumed that those farming livestock in this area would constitute the community gaining the "community share" from the area's wildlife. This would yield approximately US\$1,750 per family and would appear to be targeted to those living in proximity to the wildlife resource and making a real difference to the income of the recipients. In practice, however, the returns to wildlife may be more widely distributed. For example, meat from previous cropping exercises was distributed to the needy in towns some distance from the cull sites. In the future, the fact that local communities will themselves be doing the cropping suggests that they will also receive the meat.

It is also uncertain whether the government would be willing to allow a 50 percent share of the revenue from the live capture and sale of the black rhinoceros to accrue to the communities in this sparsely populated area. They will certainly face pressure to spread these returns to the politically articulate local town dwellers. There is clearly a need to establish an institutional framework for allocating the return to wildlife to the people involved in nurturing this resource. The role of tradition

and district council structures has to be clarified and an appropriate unit of involvement has to be agreed on. It is unlikely that a uniform model can be applied across regions, given the variation that prevails in social structures and attitudes toward traditional authorities.

Caprivi Region

The Caprivi, in northeast Namibia, appears to present a different environment from the Kunene in which to assess the viability of community wildlife utilization. Average rainfall is approximately 650 millimeters per annum and fishing and arable agriculture play an important role in the region's socioeconomy in addition to small-scale livestock farming. Nonetheless, there are important similarities in that the colonial period has seen communities alienated from their wildlife resource, which has subsequently been decimated by local and South African Defense Force poachers.

The region has had a game reserve in the western section since 1907 and two small reserves in the more densely populated eastern section since 1990. Animal populations have begun to increase in the region and trophy-hunting concessions have been awarded since 1988. This situation coexists with growing photo-safari tourism.

There are two recent developments that are likely to improve the sustainable utilization of wildlife by local communities. The first is the extension by IRDNC of the Community Game Guard system to the region. Second, the hunting safari company that won the tender for the region's concession areas has agreed to assist the Barakwena Bushmen in establishing their own tourism camp on the Okavango river. This area has significant potential as a center for photo-safaris in and around the west Caprivi game reserve. The relative returns to livestock and wildlife utilization in this region are summarized in tables 4.9–4.10.*

Table 4.9: Net Revenue for Wildlife Utilization and Livestock Production: Caprivi

	1	2	3	4	5
	Gross Revenue	Financial Cost	Economic Cost	Net Revenue (Financial)	Net Revenue (Economic)
Livestock (rands)	5,727,428	2,973,942	5,171,059	2,753,486	556,369
Livestock (rands/ha)	2.93	1.52	2.65	1.41	0.28
Livestock (rands/kg)	0.20	0.10	0.18	0.10	0.02
Livestock (rands/household)	799	415	722	384	78
Wildlife ^a (rands)	7,494,969	3,926,424	4,383,174	3,568,545	3,111,795
Wildlife ^a (rands/ha)	3.8	2.0	2.2	1.83	-1.59
Wildlife ^a (rands/kg)	0.9	0.5	0.5	0.41	0.36
Wildlife ^a (rands/household)	1,046	548	612	498	434

Source: Author's estimates. See full-length report for background.

a. Hunting and photo-safaris, game capture, and cropping.

* The full set of results used to derive these summary tables can be found in appendix 5 of the full-length report referred to at the beginning of this chapter

Table 4.10: Net (Economic) Revenue Division: Caprivi (rands)

	1 Local Community	2 State	3 Private Business
Livestock	2,753,486	-2,197,117	0
Wildlife ^a	1,949,143	372,051	128,628

Source: Author's estimates. See full-length report for background.

a. Hunting and photo-safari, game capture and cropping.

Livestock farming in this region provides income from plowing by oxen, as well as from live sales or slaughter. It is estimated to be a profitable activity from the communal farmers' perspective—yielding almost US\$120 per rural household. Naeraa and others (1993) reported that 70 percent of rural Caprivian households interviewed own cattle, which makes the actual return from livestock per cattle owning household approximately US\$176. This, however, excludes the costs of veterinary services and water supply, which are borne by society at large. Once these economic costs are taken into account, the return to livestock farming falls from R0.1 per kilogram of livestock to R0.02 per kilogram.

To these economic costs need to be added the loss in range potential from overgrazing. This cost is likely to be limited in comparison with those of other communal areas, as this region has suffered far less than most others from overgrazing, despite the rise in livestock numbers from approximately 40,000 in 1984 to the current figure of approximately 110,000.

The estimated financial returns to wildlife are approximately 30 percent higher at US\$159 per rural household than the returns to livestock. Moreover, the costs of game protection are small relative to the costs borne by taxpayers for the production of livestock. These lower estimated economic costs lead to a rather higher net economic return—US\$138 per rural household in comparison to US\$25 for wildlife per rural household. As the return to livestock is achieved with far less animal mass, the estimated economic return per kilogram of wildlife is eighteen times greater than the return per kilogram of livestock.

Tourism is by far the most important component of net economic revenue (almost two-thirds) with live capture and cropping contributing slightly more than 20 percent and trophy hunting almost 10 percent. It is important to note that unlike the case studies from the Kunene region, trophy hunting and photo-safari tourism currently coexist in Caprivi; hence, at current volumes of tourism, the wildlife resource is capable of supporting both forms of utilization. Although, if the new tar road to the region does bring a large increase in tourism to the region, conflict of access may well arise.

The returns from wildlife currently flowing to local communities in this region are limited. It is also worth reiterating that rural communities in Caprivi do not view livestock ownership simply as a "means to a living." The centrality of cattle, in particular, to rural culture implies that despite the fact that wildlife has far greater economic potential than livestock, one is not about to witness the imminent demise of pastoralism.

Even if households were willing to switch to the economic activity with the highest return, they are likely to stick with livestock farming as long as the state bears a significant proportion of the cost. Under a revenue-sharing arrangement yielding local communities almost two-thirds of net financial tourism and trophy hunting revenues would be substantially less remunerative than the net financial revenue accruing to livestock farming. The current estimated level of subsidy to livestock production in the region would make a switch to wildlife utilization unprofitable from the farmers' point of view.

Ojozondjupa Region

This region covers areas previously known as Bushmanland and parts of Hereroland, as well as commercial farming areas. For the purposes of sensibly discussing wildlife utilization on communal land, it is necessary to use the previous regional delimitation as reference points.

Bushmanland: Wildlife utilization has been a central feature of the Ju/Wasi bushmen's existence for many thousands of years. Their hunter-gatherer lifestyle relied on making use of some 60,000 square kilometers of land. Consequently, the creation of an enclave a tenth of this size by the South African Administration and the incorporation of many bushmen as trackers for the South African Defense Force (SADF) led to profound changes in the pattern of this people's lives. Some attempts, without much success, have been made to develop livestock and arable agriculture in this region, which has 450 millimeters of rain per annum on average but sandy soils.

Traditional hunting has continued in the area originally designated by the Odendaal Commission as Bushmanland, the Bushmen or San being the only people allowed to hunt on communal land without a permit and professional hunting license. They are, however, restricted to using traditional weapons and hunting for their own use. Despite the limited offtake of game that this involves, wildlife populations were greatly depleted by poaching in the 1980s and have only recently begun to recover. Trophy hunting has been suggested as being an ideal means of generating revenue, which could be utilized by the community of up to 4,000 people in what was previously known as west and east Bushmanland.

The costs of a trophy safari operation suggest that the returns to the local community at the estimated existing stocking rates would be small indeed, as an operation is unlikely to be profitable.* In addition to these estimates, the study has some actual data on the trophy-hunting safari operated in 1988 and those thereafter. These figures suggest that trophy hunting does present a significant opportunity for revenue generation in the region, and a substantially more remunerative one than livestock farming. Indeed; this is perhaps the only area of Namibia in which livestock has no particular cultural significance and can be considered purely for its economic value. The mechanism for local community access to the revenue generated from trophy hunting remains to be formalized.

The vast reservoir of tracking skills and unique understanding of wildlife among the Ju/Wasi presents the opportunity to develop ecotourism in this region. An active partnership between the local community and a professional tour company, perhaps with NGO support, would offer an important additional means of sustainably utilizing local wildlife.

Table 4.11: Potential Gross Revenues from Wildlife and Livestock Population

	At estimated current stocking rate (rands)	At estimated maximum future stocking rate x 0.75 (rands)
Wildlife		
Daily Rates	76,860	230,580
Concession and Trophy Fees	70,700	212,300
Cropping and Harvesting	4,242	163,205
Subtotal	151,802	606,085
Livestock	8,849	174,994

Source: Cumming 1990.

* The costs of a trophy safari operation are described in the full-length report.

Hereroland

Wildlife numbers have been severely depleted in much of this area, in which the primary economic activity is livestock farming. In fact, livestock production in this area is the most commercial of all the communal areas with a number of farmers supplying weaned calves for the South African market. The existence of farmers with commercial experience, an average annual rainfall of approximately 400 millimeters and a position south of the veterinary cordon fence (VCF) gives this a potential for game and mixed game and livestock farming. Fairly high concentrations of game could, theory, be farmed and cropped for export; cattle, however, remain central to Herero culture; it is likely that game would only be farmed in addition to livestock.

Any expansion of animal biomass in this area has to be approached with caution as severe overgrazing has already been noted in recent studies (German Office of Cooperation 1991). At the same time, there is a significant area of unsettled land in this region—estimated at 2 million hectares by the Namibian Economic Policy Research Unit (Namibia 1991b). Developing this unsettled land for livestock farming would involve huge fixed costs—primarily for boreholes—with the consequence that the estimated net financial return is strongly negative. An alternative that deserves further consideration is to develop this area for game farming. This would require far fewer water points and the chances for financial viability would be correspondingly much higher.

Erongo Region

Farmers in this region rely on an average rainfall of 50 millimeters in the arid west to 200 millimeters in the semiarid east to raise livestock, mainly goats. This area, comprising much of former Damaraland, was perhaps hardest hit of all communal areas by the 1992 drought. Tourism to this region has, in contrast, been relatively healthy, the attractions being wildlands and wildlife in addition to important historic sites. Community gains from wildlife utilization have been largely in terms of employment.

There is a significant population of elephants that use the Huab river valley for both food and water. Although this offers tourists the chance to see elephants in an unfenced, wild environment, farmers in neighboring areas have frequently been in conflict with elephants, mainly over damage to boreholes. Photo-safari and ecotourism offer the potential for these farmers to gain from the presence of elephants. To succeed in practice, this requires a significant investment to develop the tourism management resources of local communities.

The superior adaptation of wildlife to semiarid environments, the situation of Erongo south of the VCF and a limited cultural commitment to livestock among the Damara people all suggest that wildlife farming might substitute for livestock in this region. Indeed, springboks have been successfully farmed on equally arid commercial farms in the south of Namibia. In terms of gross revenue, springboks (R4 per kilogram) appear to have the advantage over goats, typically sold at R80 for a 25–35 kilogram animal (R2–3 per kilogram). Once the costs of water supply for livestock and veterinary services are added, the gains in terms of net economic revenue from wildlife production begin to look substantial. There is good reason to believe that the negative net economic returns to livestock identified for Kunene would be even lower in the Erongo region—there are, for instance, far more boreholes on isolated cat posts in Erongo. The problem of overgrazing and loss of range productivity is also particularly acute in many parts of this region.

Game farming does, therefore, appear to offer significant potential as at least a partial substitute for livestock in this area. But is this a realistic proposition? There are, unfortunately, a number of obstacles to be overcome. Firstly, the private costs borne by livestock farmers in this region are low. Provided owners pay only a proportion of the total costs of livestock production, it is a profitable exercise from their perspective. This naturally reduces the incentive for any individual farmer on communal land to abandon livestock farming. Such farmers have also invested in acquiring expertise in livestock farming, only some of which is transferable to game farming. This adds to the risk of undertaking a new venture—a variety of investments have to be made with far from certain returns. It is reasonable to suppose that farmers with limited savings and facing catastrophic consequences from an unsuccessful venture will be risk averse.

A further issue, which requires serious consideration before encouraging policies to facilitate a switch to game farming, is whether problems of overstocking and overgrazing would be prevented by such a switch. Here too, caution is required. The causes of current overstocking include the following:

- Farmers are not well connected to the commercial auction system—transport is limited and animals brought to auction virtually have to be sold—imposing a weak bargaining position on these farmers. As a result of poor offer prices, a culture of not selling to white farmers to avoid exploitation has arisen.
- Farmers may not have a bank or post office account, which means that cash from stock sold in dry periods is not easily kept for restocking when grazing improves. Even those with savings accounts often have problems of access to them in an area in which transport and infrastructure is poor.
- Land is not owned nor long-term usage rights guaranteed, which reduces the incentive to make long-term investments in that land. Consumption of environmental capital is therefore encouraged.
- Livestock owners sometimes live in towns, leaving herd management to farm workers who lack the training or incentives to manage resources optimally.
- All complementary resources (water pumping, veterinary services, and so on) are heavily subsidized by the government. This tends to lead to overutilization of these resources; one manifestation of overutilization is overstocking.

The above suggests that many of the pressures that have led to the overstocking of livestock in the Erongo region would also be present if farmers switched to game production. Consequently, farmers are also likely to overstock and overgraze any ranched wildlife.

Omusati, Oshana, Oshikoto, and Okavango Regions

The first three of these regions constitute the major part of the region formally known as Owambo, in which more than half of the country's entire population lives. Wildlife populations have been reduced to negligible proportions, existing only in isolated areas in which limited or saline water prevents extensive human settlement. One such area lies north of the Etosha pan. If the legislation were in place to confer usage rights over wildlife to local communities, trophy hunting and photo-safaris in this area could bring significant benefits to local communities. Trophy hunting currently occurs in two

areas of Okavango. To date, however, the gains of local communities have been limited to seasonal employment and the meat from shot animals. As in other areas, legislative changes would permit local communities to gain from developing the wildlife resources in these areas. There is also likely to be scope for game ranching or at least mixed game and cattle ranching in the Mangetti area and currently unsettled land in eastern Oshikoto and southern Okavango.

Wildlife Utilization in Commercial Areas

As noted in section 4.1.4, the commercial use of game on private farms accounts for approximately two-thirds of the numbers of animals utilized by this sector; however, as shown in table 4.12, only a specialized minority of farmers actually shoot game for commercial purposes. The vast majority are livestock farmers (see table 4.13) who utilize the wildlife that happens to be on their farm: for their families, friends, and workers.

Game Use	Average/Farmer	Proportion of Farmers Utilizing Game for Use (percent)
Rations (for workers)	17	67
Own use	8	77
Grants to friends, etc.	3	46
Shot for marketing	22	14
Night culling	4	4
Sport hunting	6	15
Trophy hunting	23	17
Live capture	5	6
Total	88	

Source: Derived from MWCT 1992 survey data for 671 farmers with average ownership of 1.4 farms (940 in total).

Property type	Proportion owned by game-utilizing farmers (percent)
Private nature reserve	5
Game farm	5
Guest farm	4
Hunting farm	14
Livestock/crop farm	95

Source: Derived from MWCT 1992 survey data. 671 farmers surveyed with average ownership of 1.4 farms (940 in total).

Note: Multiple farm ownership means that the table percentages sum to more than 100 percent.

To understand why relatively few of Namibia's commercial farmers specialize in wildlife, it is helpful to look at a particular case history: the Wisenfels farm.

Mr. Lombard farms some 15,000 hectares approximately 120 kilometers southwest of Windhoek in an area in which annual rainfall is usually between 120–180 millimeters. This part of Namibia has been used for karakul sheep (pelt) farming for much of the century. In the 1960s, 80 percent of the farm was utilized for karakul sheep. In the early 1980s, the price of karakul pelts fell sharply and Lombard

moved to cattle and a limited amount of mutton sheep farming. Guest facilities have recently been upgraded to cater to the growing number of tourists who pass by the farm on route to the coast.

He has found some conflict between livestock and game farming resulting from the fencing used for rotational grazing. Some twenty years ago, there were roughly 300 springboks on the farm. Over the years, as the number of grazing camps was increased (to 75 at present) the numbers of springboks declined. Currently there are no more than twenty. Lombard attributes this primarily to the greater success rates of jackals and cheetahs when their prey are fenced in and unable to escape.

Approximately 300 Hartmann's zebras live in the mountains bordering this farm. These are seen as problem animals by local farmers as they move onto the farms in the dry season and consume valuable grazing. Perhaps surprisingly, they are not seen as a readily utilizable resource: hunting in mountainous terrain is too specialized for local farmers—animals are difficult to locate and vehicles are easily damaged—and the meat is not eaten by farmers or served to tourists. According to Lombard, the key economic factor is the value of the skins, which have fallen from R300 to less than R75 in the past five years.

Some years ago, night culling was regularly carried out in this area using teams with their own refrigerated truck, and so on; however, the depletion of game in the area has stopped this from happening. Currently, game is utilized indirectly. Tourists who stay on the guest farm like to eat game and to see live game on drives or walks.

On this farm, as on many others, wildlife serves to complement the livestock operation, tapping a new source of income and helping to spread risk. There are, however, limited incentives to switch to more specialized game utilization such as ranching or trophy hunting. These include the development of most livestock farms over a number of years to provide rotational grazing and water supply via a large number of camps. Game ranching requires the removal of much of this infrastructure, which has the benefit of reducing operating costs (fence repairs, and so on) but, once a transition is made, the costs of returning to cattle farming would be prohibitive.

Aside from the risk, there is a widespread belief among farmers that game farming and ranching for meat is less profitable than livestock farming. The price of venison has been depressed on international markets. Certainly, the purchase price per kilogram for game in Namibia is below that of cattle or small stock. This suggests that a major, if not key, determinant of commercial game meat production in Namibia is the strength of the market for Namibian game exports and the ability of Namibian producers to reach that market. If a sufficiently large marketing niche in the European venison market can be developed, an increase in local game meat purchase prices will result.

Trophy hunting offers a significantly higher revenue per animal than either livestock or game farming. The Namibian Professional Hunting Association has recommended prices for trophy hunting on private land of R580 per springbok, for example. In addition, a hunter could expect to pay approximately R1,000 per day for accommodations. Despite offtake rates that can be a tenth or less of those used for game cropping, trophy hunting is generally regarded as the most profitable use of wildlife on Namibia's commercial farms.

The number of farms offering trophy hunting has been increasing steadily. Child (1990) reports 96 in 1977 and 289 by the early 1980s. Survey data suggests that this figure may have risen to 850

private farms in 1992. Although future expansion of this sector is likely, it is limited by the expense of advertising and marketing abroad and the absence of big game on most farms.

4.2.3 Policy Issues

Economic policy, by default or by intention, affects wildlife utilization. This section discusses the impacts of livestock subsidies, international trade agreements involving veterinary restrictions, and allocation of tourist and hunting concessions.

Livestock Subsidies

Moll (1991) identifies three major sources of subsidy to the commercial farming sector: concessionary finance, direct support (for example, drought relief), and veterinary assistance. These were estimated at R49 million, R5 million, and R5 million respectively for 1990—R59 million (US\$19 million) in total. Moreover, tax concessions permitting “standard values” rather than market prices for livestock valuation, tax rate averaging over five years and sales tax exemption were calculated to be worth R47 million (US\$15 million).

The question that we face here is the extent to which these subsidies and tax concessions are livestock specific. If this is the case, their removal or reduction would favor wildlife farming. Although detailed treatment of Namibia’s tax regime is beyond the scope of this paper, it is possible to conclude that the bulk of this state support is directed toward commercial farmers per se and is potentially available to game farmers. The criterion for drought relief, for example, has been when herd sizes (livestock or wildlife) fall below 60 percent of their normal levels. The VCF can also be said to be necessary for game as well as livestock exports to the European Community market.

In contrast, subsidies in the communal areas are inherently livestock-specific, as the residents of these areas are precluded from owning game. Price support for stock sales in drought-affected communal areas could only, therefore, apply to livestock. Even with legislative changes to confer wildlife utilization rights on those living in communal areas, veterinary services are likely to continue to be directed primarily toward livestock populations. Thus, it makes sense to consider the effect of introducing user payments for veterinary services on livestock. Likewise, the provision of boreholes and pumps for animal use, as many of these water points are not necessary for more wide-ranging wildlife. To illustrate the potential effect of the elimination of this subsidy, we consider charging the full cost of water supply for approximately one-eighth of the boreholes in the Caprivi region—a broad estimate of those directed toward livestock use.

Introducing veterinary and water charges (the former being the main one in this communal area) would effectively transfer the costs currently borne by the state to the farmers concerned. Thus, net financial and economic revenues would be equal. Net financial revenue now falls to the same level as net economic revenue, that is, R0.28 per hectare. Livestock production would, therefore, be significantly less attractive to farmers than it now is. This is illustrated in table 4.14. In this scenario, unlike the base case, livestock production is less remunerative for local communities than potential wildlife-based economic activity.

Table 4.14: Potential Net (Economic) Revenue Division, Caprivi Region (rands)

	1 Local Community	2 State	3 Private Business
Livestock	556,369	0	0
Wildlife	1,949,143	372,051	128,628

Source: Author's estimates. See full-length report for background.

International Trade Agreements and Veterinary Restrictions

Since independence, Namibia has been able to export beef to the European Community market. This provides premium prices for cattle of sufficient quality, produced south of the VCF. Both game and livestock produced north of the VCF on communal land have been restricted to local consumption and limited processed exports. To develop the commercial farming potential of the communal areas, the government has introduced a series of quarantine camps and has declared its intention to move the VCF northward to the Angolan border.

Should this occur or export markets be developed that take animal products from above the VCF, new opportunities will arise for communal farmers in northern Namibia; however, as livestock prices per kilogram of live weight are now equal north and south of the VCF, their livestock is too light for the European Community quota, and local marketing infrastructure is poor, the likely gains for small-scale livestock farmers are arguably limited. In contrast, game cropping for export has the advantage that culling teams could travel to the game—rural infrastructure permitting—which helps to overcome the paucity of transport and local marketing resources.

To get an indication of the increase in revenue from wildlife utilization that this might yield, we again consider the example of the Caprivi region. If access to export markets would allow the prices paid for cropped meat to double (to an average of R4 per kilogram), we predict a 2 percent rise in net economic returns. This translates to households receiving R443 per annum as opposed to R434—a rather small increase. There are, in addition, many other possible effects of moving the VCF that are not incorporated in this analysis. For example, trophy hunting north of the VCF may become less popular if big game are more easily introduced onto private hunting farms. What is clear is that any research into the effects of moving the VCF should examine the possible effects on wildlife in addition to considering livestock.

Allocation of Tourist and Hunting Concession Areas

Concession areas constitute a significant resource for Namibia; it is important that they are allocated in such a way as to maximize revenue and preserve the environmental capital of the area. The utilization period should not be “too short” or else investments will not be made or, worse, environmental capital will be consumed. There is almost certainly a trade-off between raising the maximum revenue in the current tender and preserving the long-term value of the concession area. This is typically dealt with by defining various “quality” criteria that a bid must satisfy in addition to the bid price. The challenge is to find relevant and clearly defined criteria.

The value of a tourist concession is derived, at least in part, from being able to restrict entry to the concession area to those who pay for access. Currently, this sanction cannot be applied in concession areas that are not official nature reserves.

4.3 Relative Environmental Impacts of Wildlife

The key aspects of wildlife representing important adaptations or assets in an arid and semiarid country relate to their behavior, that is, feeding, physiological attributes, and their interaction with the environment.

4.3.1 Behavior of Wildlife

The behavior of wildlife can be associated with their feeding practices, localized movements, and migration. These will reflect the adaptability of wildlife to the environmental constraints. The feeding practices of wildlife are diverse due to the different feeding preferences of species. Herbivores can be classified into three main groups according to their way of feeding, that is, as grazers, browser (feeding on both shrubs and trees), or mixed or intermediate feeders. The feeding groups of wildlife have an advantageous potential for integrated management with many species and domestic livestock. Browsers such as kudus will complement grazing cattle and sheep. Thus, where grazers predominate, browsers may actually help to maintain an open canopy (German Office of Cooperation 1991).

Gemsboks, springboks, and red hartebeests are not water dependent (Bothma, unknown), and appropriate for arid and semiarid zones. Kudus are a water-dependent species, as a result, this species inhabits bushveld areas. Wildlife living in the arid regions of Namibia have the capacity to utilize condensed fog, dew, and water vapor. Gemsboks and ostriches are known to restrict their feeding to the early hours of the morning, when the humidity is at its maximum.

4.3.2 Physiological Attributes of Wildlife

Populations of wildlife respond to natural conditions. The reproduction of females is partly controlled by the quality of vegetation, which can retard puberty, or the start and finish of the mating season; however, once game has conceived, it has a remarkable resistance to detrimental effects. This is necessary as most game species need to survive throughout the winter, when there is limited and poor vegetation.

The breeding period of animals varies for different species. The blue wildebeest tends to breed as a herd during a short synchronized period. Since the animal is not generally social, this method of limiting the calving period for all the females minimizes the predation of individuals throughout the year. Burchell's zebras are social animals, whose breeding pattern is individually spaced through the year when other members of the herd protect the calves (Louw and Seely 1982).

A comparison study of impalas and Dorper sheep on arid, sweet bushveld by Eloff (1973) showed that between birth and maturity the body mass of impalas compared favorably with Dorper sheep. This was unexpected as the sheep were bred selectively for meat production, whereas the impala is an "unimproved" species that evolved through natural selection for survival. The results of the study showed that the impala justified its existence in the bushveld from an economic perspective to a full extent, particularly as the animal does not compete for vegetation.

Indigenous wildlife in Namibia, such as gemsboks, can maintain "normal" body temperature within the range of 34–42 degrees Celsius (Louw & Seely 1982); however, the thermoneutral zone of Namibian dairy cows of north European origin is 0–16 degrees Celsius. These cows can suffer from

stress when the temperature humidity index is at its highest during November to March in Namibia (Du Preez 1992). The result of heat stress can critically interfere with general health, udder condition, production, and reproduction.

The shape of extremities in species from arid and semiarid countries facilitates heat loss. This includes ears with large and flat conformation and large dewlaps (loose skin hanging from the animal's chest) (Louw & Seely 1982). The thickness of the pelage is lower for animals that frequent hot and dry savannas. Indigenous species of animals in hot climates try to minimize water loss with the storage of heat, reabsorption of water from fecal material, concentrated urine, and a low metabolic rate.

4.3.3 Interaction with the Environment

A combination of events led to the development of wildlife management in Namibia. An outbreak of foot-and-mouth disease restricted the movement of cattle on farms between 1961 and 1964, which led to the degradation of land. Over the following years, farmers were encouraged to reduce their stock numbers, which was followed by a period of high rainfall with low numbers of stock. The result of a reduction in pressure on the carrying capacity with good vegetation growth increased populations of wildlife dramatically.

Previous management had caused overgrazing and encouraged bush development, which was the principal diet of kudus. This led to a population explosion of kudus culminating in large-scale mortality and an outbreak of foot-and-mouth disease. These events set in motion the development of game farming as people responded to the interaction of wildlife with the environment.

Bush encroachment is still a major problem in Namibia with approximately 10 million hectares (12 percent of the total) of land encroached on by bush (Marsh 1992). There is definite potential for the browser, particularly kudus, to reverse the trend and encourage the development of grassland for the grazer. Grazers may be cattle, goats, or sheep or, alternatively, wild grazers such as red hartebeests. This could be encouraging since the limitation on red hartebeests shot in Namibia has led to the expansion of their range in commercial lands and an increase in population from 12,000 in 1972 to approximately 18,000 in 1982, when 3,500 animals were utilized (Joubert & Morsbach, undated). This shows the potential for managing wild resources; however, it is important to note that a study by Stuart-Hill and Tainton (1988) showed that if browsers are included in a system, the stocking rate of grazers may have to be reduced because of the apparent negative influence of browsing on the growth rate of grass. Equally, excessive grazing was shown to encourage bush development. This leads to the theory that an appropriate stocking of both browsers and grazers would deliver the desired effect of stability; however, the populations would have to be monitored constantly, to take into consideration natural changes in densities of species and the fluctuating influence of the climate.

Utilization of riverine vegetation on the Kuiseb within the Namib Desert showed oryx had a seasonal pattern to their grazing, whereas the goats grazing in the area had no seasonal pattern; however, the goats showed a decrease in utilization of land at their limit with peak utilization of grazing near their water supply (Huntley 1985). This shows the dependency of domestic stock to be herded to sources of nutrition, whereas the gemsbok shows greater foraging skills and efficient utilization of an area.

The impact of people on the natural interaction of wildlife has often been negative. During the period from 1977 to 1984, the total number of springboks, gemsboks, zebras, and ostriches in the Namib-Naukluft Park dropped from 12,000 to 2,000 as a result of high mortalities. This evolved due to a

combination of poor rainfall, particularly between 1981–82, and a 500-kilometer fence on the east side of the park preventing the movement of wild animals to and from the desert (Berry 1992). Similarly, there have been outbreaks of anthrax due to environmental stress and cases of starvation in springboks at Etosha Park. The overstocking of Etosha due to the enclosed nature of the area is leading to overgrazing and degradation (Bester pers. com. 1993).

Wildlife in Namibia is capable of responding to fluctuating food reserves, as rainfall plays a major role on plant growth. The adaptive nature of wildlife is essential in a country with extreme variability at a spacial and temporal level.

4.4 Summary and Conclusions

In Namibia, where rural communities have been able to establish a stake in the utilization of their area's wildlife, the community, the government, and wildlife have benefited. The Community Game Guard scheme illustrates the significant gains that can be made from a combination of grass-roots participation and modest economic returns to the communities concerned. Nonetheless, much of the discussion in this paper has been in terms of potential benefits from wildlife utilization. Existing legislation presents an obstacle to communities that aspire to realize these gains in communal areas. Locally cropped game meat cannot be sold and communities have no legal basis for claiming revenue from those who utilize the wildlife in their locality. Enabling legislation is, therefore, necessary for communities to achieve the potential benefits from wildlife we have identified.

In some areas, NGOs have acted as a catalyst to bring together local communities and tour operators. Further work is needed to establish an institutional framework in which community representatives, private businesses, NGOs, and local government can devise development strategies that effectively utilize wildlife resources. Photo-tourism, in particular, but also game cropping and trophy hunting offer significant development opportunities for local communities; however, donor and NGO support is certain to be required to realize these opportunities.

Our research suggests that the net economic return to livestock farming, particularly in the more arid communal regions of Namibia, is almost certainly negative. Other research quoted in this study suggests the same is true of commercial livestock production. Wildlife utilization (combining tourism, hunting, and cropping) is shown to offer significantly more favorable returns in communal areas, whereas trophy hunting has proved a growing success on private farms. Despite this, widespread switching to wildlife use from livestock farming is unlikely.

Economic factors provide some of the explanation for this rigidity. Livestock farming in Namibia continues to be favored by policies that permit a large proportion of the costs to be borne by society as a whole. As a result, livestock farming can be a highly remunerative activity for the individual farmers concerned. It can only help the long-term performance of the Namibian economy if user charges are introduced and tax advantages limited so that the true cost of owning livestock is borne by the owner.

Game is widely utilized by commercial farmers, but only a specialized minority do so commercially. An important reason for this is that commercial game ranching currently suffers from the problem of low prices per kilogram in comparison to livestock. This could largely be alleviated by improved and sustained access to venison export markets. Detailed research is needed on this issue.

Noneconomic factors are also important in understanding the reluctance to utilize wildlife. Most rural communities in Namibia place a high value on livestock—particularly cattle—for cultural and social reasons. Consequently, demonstrating the economic superiority of wildlife utilization should not be expected to lead to widespread switching from livestock production.

Wildlife is better adapted to Namibia's arid and semiarid environment than livestock; the ability of game to range widely about water points can reduce overgrazing; however, wildlife does not offer an automatic solution to the problems of overgrazing. If overgrazing results from the inability and unwillingness of farmers to destock when the carrying capacity of their marginal land is reduced by drought, game is also likely to be overstocked—and overgrazing will result. Despite these cautionary notes, wildlife utilization does appear to offer significant economic opportunities to rural communities in Namibia. With enabling legislation and some development of the managerial capacity of local communities, wildlife utilization can be a major force for sustainable rural development.

4.5 References

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Abstract

Changes in the legislation and institutions in Zimbabwe have transformed the role of wildlife from a state-owned treasure to be preserved and isolated in national parks into an active resource, controlled and utilized by landholders. There has been a significant increase in wildlife on commercial farmlands, as safari hunting, live animal sales, and tourism are incorporated into farming systems. In communal farming areas, there has been a marked increase in the awareness of the contribution of wildlife, but the institutions developed so far still do not effectively link costs and benefits.

Wildlife enterprises in the large-scale commercial ranch sector are often more financially profitable than cattle enterprises. A less regulated economy and a liberalized exchange rate in particular would contribute to its profitability. This, however, is also true for the competing cattle enterprises, which have been affected by politically depressed beef prices since 1985. Complete deregulation may make cattle enterprises more competitive.

Wildlife may be the most economically efficient option from a social welfare perspective in remote, arid communal areas, but it is currently significantly less attractive than subsistence farming for the farmers living there. The relatively closed marketing system, control over the resources at district rather than local levels, and macroeconomic distortions, particularly an overvalued exchange rate, have contributed to the wide divergence between national and individual interests. Safari hunting accounts for the bulk of revenue earned in communal areas. A ban on imports of hunting trophies, particularly from elephants, would have a negative impact on community wildlife schemes.

Reductions in macroeconomic distortions and a more competitive marketing system have already resulted in marked increases in district returns from wildlife. There is also evidence of increasing empowerment and effectiveness of local communities, ensuring their more active participation in the benefits from and control over their resources; however, poaching and new settlement threaten to overwhelm those areas that still have viable wildlife populations. Until the local population receives their full share of the benefits, such that both their opportunity and direct costs are covered, they will continue to encourage elimination of wildlife through poaching and habitat destruction.

An annex to this paper explores the environmental impacts of wildlife relative to cattle. There is some evidence that the former are less severe, but the strongest evidence shows that environmental impacts are related to the stocking rate rather than the type of herbivore involved. Wildlife has an advantage to the extent that financially viable enterprises can be maintained with lower stocking rates than alternative land uses. In addition, wildlife enterprises are more directly concerned with maintaining an environment that can continue to attract visitors.

Chapter 5:

Economic Policy, Wildlife, and Land Use in Zimbabwe*

By Kay Muir and Jan Bojö with Robert Cunliffe on Environmental Impacts†

Zimbabwe has chartered its own unique course in terms of wildlife management and transformed the role of wildlife from a state-owned treasure to be preserved into an active resource, controlled and used by both commercial farmers and smallholders in communal lands. This chapter starts with an overview of wildlife policy and utilization in Zimbabwe, in both private and communal areas. The core of the chapter is concerned with a comparative financial and economic analysis of livestock, wildlife, and crop production, as they are partially competitive forms of land use. Finally, the chapter discusses how the policy environment affects the future of wildlife enterprises. An appendix discusses the environmental impacts of livestock and wildlife.

5.1 Wildlife Policy and Utilization in Zimbabwe

The wildlife utilization industry in Zimbabwe's private sector developed rapidly once legislation had been changed to allow landowners to benefit from wildlife conservation through utilization. This concept has resulted in significant increases in wildlife in commercial ranching areas and has effectively halted the systematic elimination of wild animals in these areas.

Wildlife service and commodity prices have been undermined by macroeconomic distortions and, particularly in communal areas, the relatively closed marketing system. More competitive marketing has changed this significantly in the last two years. Better access to foreign currency and effective currency devaluation have moved market prices closer to opportunity costs; however, market prices can never reflect the true social value of wildlife resources when environmental impacts, genetic resources, and existence/bequest values are not incorporated. When the externalities are significant, attempts could be made to internalize them through a system of taxes/subsidies.

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The most lucrative outputs from the wildlife industry in Zimbabwe are photographic tourism and safari hunting. Hunting is important for developing the wildlife option in areas with lower concentrations of wildlife and poor infrastructure. Some specialist wildlife production units are also offering lucrative options, for example, crocodile and ostrich farming. Meat, hides, and horns are outputs of minor significance, and ivory sales are negligible because of CITES (Convention on International Trade in Endangered Species of Flora and Fauna) regulations.

Zimbabwe is well endowed with large mammals, including elephants. The central high veld* is intensively farmed with limited wilderness and wildlife but with some opportunities for recreational tourism. The periphery, particularly along the northern, southern, and western borders, has large concentrations of game. The large-scale ranching areas are not allowed to run buffalo with cattle. Buffalo were totally eradicated in these areas to comply with European Union veterinary regulations. The lack of buffalo significantly reduces returns to wildlife ranching, but there is a movement to reintroduce buffalo in some ranching areas. Buffalo were not eradicated in those communal areas in which tsetse flies precluded cattle and the communal areas that still have buffalo and elephants play an important role in the hunting industry.

Zimbabwe follows a policy of sustainable utilization and views all its mammals as renewable natural resources to be managed. Protection of species and species diversity takes precedence over protection of individuals and groups. The estimated elephant population in 1960 was 32,700, and by 1988 it was up to 52,000, despite the fact that 44,500 elephants were culled during those twenty-eight years (Martin, Craig, and Booth 1989). At the end of 1992 it was estimated that there were some 80,000 elephants in Zimbabwe, and there are increasingly serious conflicts as elephant populations exceed carrying capacity in national parks. Elephants are important in wildlife enterprises, particularly in the peasant farm sector where they account for some 70 percent of the revenue.

5.1.1 Development of Wildlife Industry on Privately Owned Land

From 1960 farmers were given permits to utilize and trade in wildlife. The Department of National Parks and Wildlife Management (DNPWLM) noted the positive response and how quickly wildlife numbers recovered in certain areas. The Parks and Wildlife Act (14/1975) was implemented in 1975. It allocated full custodial rights over wild animals (except for "specially protected" species) to appropriate authorities (landholders) while the animal is on their land. "Specially protected" animals can only be killed in defense of life, and they and their parts and derivatives may not be traded. Restricted species may be utilized on receipt of special permits. Local committees may also declare a species "specially protected" within its own area. In most instances the animals do not benefit from this protection, since it is loss of habitat rather than hunting that is the major danger.

No person can hunt, capture, or remove any animal or plant from privately or communally owned land without the appropriate authority/landholder's permission. Landholders may hunt or mark any plant or animal on their land (except those species listed as "specially protected" or "restricted"). To market a live animal or trophy, however, the landholder must first obtain a specific permit. Under the

* Open country with grass, bushes, or shrubs or thinly forested, characteristic of Southern Africa.

1975 Act, appropriate authority was immediately granted to all private landholders. In the communal areas where the land is formally owned by the president of the country, authority remained with the state, which became the wildlife custodian on behalf of the peasant farmers on communally owned land.

The introduction of wildlife legislation allowing landholders access to their resource was successful in the large-scale farming areas of Zimbabwe. It resulted in widespread increases in wildlife in all the less arable farming areas and even in the intensive cropping zones where farmers are reintroducing game. In 1960 there were only three game ranches and 350 square kilometers were designated for wildlife outside state land. By 1990, 55,000 square kilometers had been partially or completely allocated to wildlife enterprises in commercial and communal farming areas with an additional area of about equal size in the parks and wildlife and forest reserves. A Wildlife Producers Association (WPA) has a membership of over 10 percent of Zimbabwe's large-scale farmers. Although membership has increased in recent years, it has been the movement from passive to active membership that has been significant. Safari hunting is the most important component in large wildlife enterprises and registered safari operators have increased significantly since 1980. In the more predominantly agricultural zones, wildlife tourism is an increasing and supplementary enterprise with some farmers investing in visitor camps, lodges, and recreational facilities.

The large wildlife enterprises are found in the arid areas of Zimbabwe where farmers concentrate on extensive game or mixed game and cattle ranching. The wildlife is not used for meat production; most of the meat that is generated is sold locally at prices significantly lower than beef prices. Safari hunting is the dominant income earner. Ranch hunting is often sold as a complement to hunting safaris on state hunting concessions and in communal areas. Hunting requires less infrastructural development and lower animal densities than are necessary for general tourism. Once the infrastructure has been developed and areas become less remote and provided wildlife density is relatively high, the greater volume feasible with photo safaris may make tourism ventures more profitable than hunting.

Gross income from international safari hunting increased from US\$2 million in 1984 to US\$9.3 million in 1990. Jansen (1990) estimated that if the entire hunting quota (2 percent of animal populations in state hunting and communal areas) was sold to foreign clients, it would earn US\$13 million, which together with an estimated US\$7 million by commercial ranchers indicates that hunting revenues could have been doubled.

Photo safaris and wildlife-related tourism have grown significantly and rely heavily on the continued viability and attractiveness of the national parks and state wildlife reserves. During 1972–82 there was effectively only one tour operator, but by 1990 there were over fifty registered operators.

The value of live animals for breeding purposes has increased dramatically. The DNPWLM operated a central allocation system with long waiting lists for animals, and a thriving private trade emerged in the late 1980s. In 1989 there was a waiting list for approximately 5,250 animals to restock private land with wildlife from the DNPWLM. Live animal prices in the private sector rose some 400 percent in three years. The development of private trade in live animals has been hampered by veterinary regulations and by the 1992 drought.

Crocodile ranching has been encouraged since 1960, and producers are required to return a proportion of hatchlings to the wild. Wild numbers have increased significantly and earnings in the crocodile industry have increased from US\$300,000 in 1983 to US\$2.6 million in 1989.

The encouragement of ostrich ranching has been successful. Where wild eggs are harvested, a proportion of the chicks are returned to the wild. As with crocodiles, those returned are a slightly greater proportion than has been estimated would normally survive to that stage. Crocodile and ostrich ranching have successfully increased both domestic and wild populations.

Ivory sales are important only in the state and communal sector where they earned almost US\$10 million between 1981 and 1988 from approximately 31,000 tusks (Martin, Craig, and Booth 1989). Current elephant ivory stocks held by the DNPWLM are valued at over US\$10 million with a significant proportion due to be repatriated to peasant communities when sales are made. The CITES ban has meant that little ivory is sold, with most of the sales being made to Zimbabwean carving companies for sale in the local tourist market.

5.1.2 Development of Wildlife Industry on Communal Land

Since 1980 the DNPWLM has managed the wildlife in these areas on behalf of the communities. They have leased hunting rights and collected the fees on behalf of the communities but were required to pass the revenue earned to the national treasury. Treasury was then supposed to reallocate those revenues to the concerned communities on presentation of proposals for development projects. In practice, Treasury retained a large proportion of the money earned: of the Z\$5.8 million* earned by safari hunting in communal areas in 1987–88 only Z\$3.3 million was paid out to district councils (Zimbabwe 1988).

The Parks and Wildlife Act of 1975 enabled the minister of Natural Resources and Water Development to designate district councils in communal lands as appropriate authorities with full custodial rights to their wildlife, but this only began to be implemented in 1988 under CAMPFIRE† (Communal Areas Management Programme for Indigenous Resources). The limited wildlife revenue generated in communal areas, which was returned to district councils, is used for development throughout the district, although only a few communities in the district pay the cost and actually live with the wildlife that generated these revenues. For the most part, these communities view the eradication of wildlife favorably. They see no contradiction in eliminating the species that cause depredation while maintaining those species that contribute so significantly to their subsistence diets. As a result, outside poachers are both encouraged and assisted.

Effective in 1988, legal control over wildlife resources was granted to districts who apply for it provided they meet specified requirements. In 1993 there were twelve communal lands in Zimbabwe with appropriate authority and more than 19,500 square kilometers of communally owned land officially designated to include wildlife in the land use system and managed under the CAMPFIRE program.

*

Zimbabwean dollars (Z\$) per US\$	
Year	Average Rate
1990	2.45
1991	3.43
1992	5.09
1993	6.47

Source: IMF. 1994. *International Financial Statistics*

† Much has been written on CAMPFIRE; see the original documents by Martin (1986), Murphree (1988), Jansen (1990), Child and Peters (1991), and Murombedzi (1992).

It was anticipated that communities would form natural resource cooperatives or management trusts or companies with membership open to all adult males and females in the community. Each community would draw up their own constitution. The allocation of rights would be affected by the population/resource ratio. Defining the boundaries of a communal resource area in the CAMPFIRE program would be a process of negotiation between the national, district, and village representatives. Water, forestry, and wildlife would be closely controlled with specified community management and access strategies but with arable land being accorded individual responsibility.

In fact, appropriate authority is only granted to the district council, and local communities have yet to be given the opportunity to form effective resource management units. Most CAMPFIRE projects are still a long way from achieving the objectives of granting control over resources to local communities.

CAMPFIRE has, however, succeeded in generating debate over access to resources and may eventually fulfill some of its original goals. Some communities currently see CAMPFIRE as a means of increasing agricultural potential, whose development could eventually reduce wildlife and undermine CAMPFIRE, thus creating tension between villagers and implementers.

The local communities still have little sense of ownership or control in some districts, and subsistence hunting is still illegal. One of the major concerns is that district council authorities receive all the wildlife revenue and then allocate these revenues over a much wider population than that living with wildlife. Both wildlife and tree resources are generally viewed as belonging to all Zimbabweans, but progress is being made in some districts, which have recognized that for people in these marginal areas "their wildlife is their cattle."

5.1.3 Wildlife and the Economy

It is extremely difficult to ascertain the value of Zimbabwe's wildlife industry. The consumption of bush meat has been virtually ignored, although the consumption of rabbits, rodents, insects, and wild flora is widespread throughout the country. The consumption of larger mammals is almost exclusively confined to isolated communities with high wildlife and low human populations. Assuming that there are some 25,000 households living in such areas, a rough estimate of the value to the nation of large mammal bush meat is some Z\$4 million per annum based on the 60 percent contribution to total income made by wildlife to household income in Angwa, Zambezi Valley (Murindagomo 1988).

The contribution of the wildlife industry to the formal sector is also difficult to ascertain. Published statistics do not separate tourism or wildlife-based industries as a proportion of GDP. Ministerial statements have indicated that in recent years tourism has earned between Z\$300 million and Z\$1 billion per annum or between 2 and 5 percent of GDP. The most credible revenue estimate appears to be around Z\$500 million in 1990–91. Safari hunting and wildlife management services add another Z\$50 million. Crocodiles and ostriches at Z\$35 million and other game products (skins, meat, and ivory) at Z\$1 million contribute more than formal sector sheep and goats but still account for less than 0.5 percent of agricultural income; however, as with agriculture, the multiplier effects of tourism and wildlife are strong, and they are important contributors to foreign exchange earnings. Tourism operations qualifying for the export retention scheme claimed Z\$165 million in 1990–91. It has been crudely estimated that, during this period, the wildlife sector generated Z\$344 million in foreign exchange earnings (Jansen 1992a); national data on export earnings are not available for this period yet, but this is probably in the area of 20 percent of total.

The industry has strong backward linkages with the manufacturing sector as well as some forward linkages with the informal sector: the curio and clothing industries. Most tourist industry inputs are locally manufactured. In the large hotel sector, 80 percent of fixed costs are local expenditures, whereas it is close to 100 percent for the safari camps and lodges. For all tourism ventures, 85 percent variable costs are local, the major linkages being food and beverages. The industry is a high foreign currency converter but relies heavily on adequate transport and communications facilities, which are foreign currency-dependent. The forward linkages are mainly in the form of arts and crafts.

Tourism has grown significantly since 1987; bed occupancy is up to 50 percent in 1990 despite an increase of 86 percent in beds available. Employment grew 20 percent in three years compared with nonagricultural employment elsewhere in the economy, which grew 0.5 percent. Nonconsumptive tourism is considerably more labor-intensive than sport hunting; over 50 percent of hotel and lodge employees could be drawn from unskilled local populations (Bond 1992).

The role of wildlife in the economy is significantly increased if adjustments are made to reflect the opportunity cost of the foreign currency earned by the sector (see table 5.1). For most of the 1980s, various estimates indicated the average overvaluation was 50 percent, climbing to over 70 percent by 1990. From mid-1991, the government started a deliberate policy of devaluation to realign the currency. According to Jansen and Rukovo (1992), the local currency was overvalued 77 percent in 1990 based on a ratio of tradable to nontradable prices.

Table 5.1: Adjusted Contribution of Wildlife to the Economy, 1990–91^a

Sector	Total earnings (Z\$ million)	Forex earnings (Z\$ million)
1. Tourism	731.0	531.0
2. Hunting	81.5	81.1
3. Wildlife management services and live animals sales	6.2	^b
4. Game products (meat, hides/skins, horns)	1.0	^b
5. Crocodile production	26.6	26.6
6. Ostrich production	35.4	35.4
Total	881.7	674.1

Source: Jansen 1992a

a. Based on Equilibrium Exchange Rate. All of the figures must be considered rough estimates due to severe data limitations.

b. Negligible.

Tourism in Zimbabwe is based on wildlife and wilderness and has significant potential for expansion. The high numbers of large mammals, particularly elephants, and the relatively sophisticated infrastructure give Zimbabwe certain advantages. The current structural adjustment program will encourage investment in export industries with more realistic exchange rates and easier access to imported inputs. The international recession will have less effect on tourism to Zimbabwe, which relies most on high-income tourism. The negative publicity associated with the drought was a short-term phenomenon, and tourism was recovering by the end of 1993.

5.2 Economic Development and Wildlife

This section views wildlife management in the context of the national economy, presents an economic analysis of wildlife both in large-scale commercial and in small-scale communal areas, and finally compares the returns to competing land uses.

5.2.1 The National Economy, the Resources, and Land Use Systems

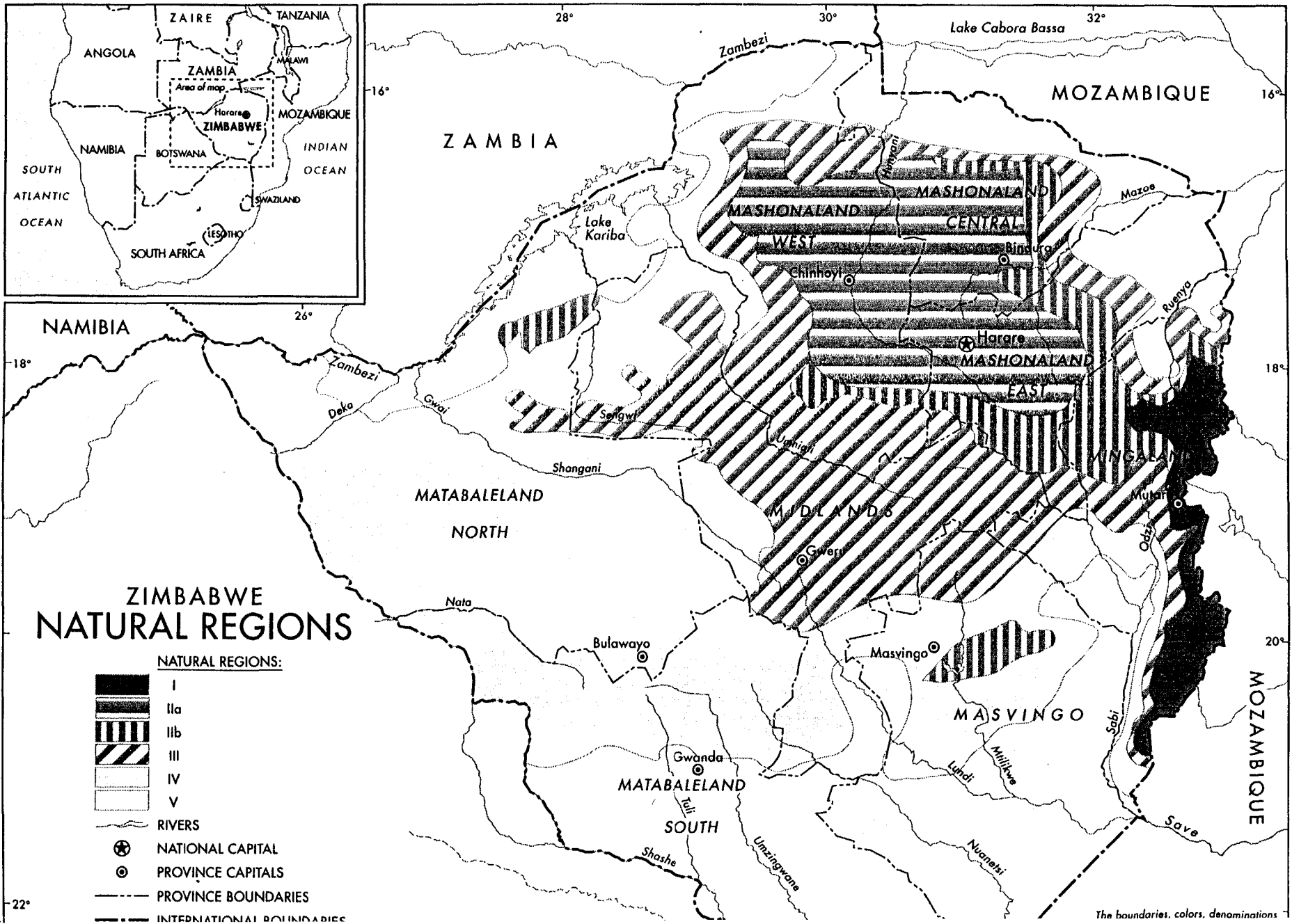
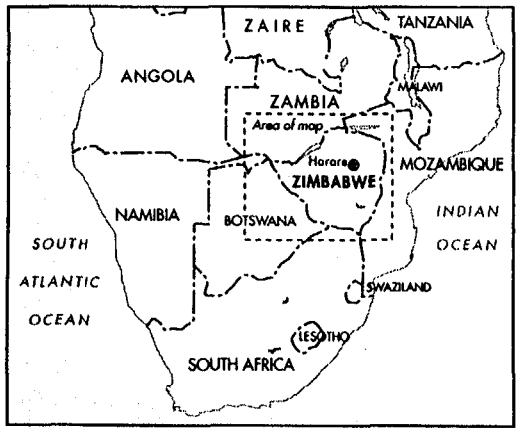
Zimbabwe lies within the tropics, but, given altitudes of between 600 and 1,200 meters, most of the country has a subtropical climate, which is perfect for year-round tourism. The rainy season coincides with northern winters, but even during this season the days are mostly sunny, with the rain occurring in sporadic thunderstorms and late afternoon showers. Although agriculture accounts for only some 10–14 percent of GDP, it has a major impact on growth through its backward and forward linkages, its contribution to export earnings, and both formal and informal employment.

There have been some significant advances in the provision of social services—including decreases in infant mortality and increases in education and access to physicians—since independence; however, these achievements together with high defense expenditures, a large expansion of the public sector, and parastatal subsidies resulted in significant increases in government expenditures; by 1990 Zimbabwe had a long-term external debt of some Z\$12 billion. The economy is highly regulated and biased toward large-scale production, and barriers to entry abound. With significant subsidies to the industrial sector, a large proportion of GDP spent on government consumption expenditures and rapid population growth have resulted in disappointing economic performance, with GDP per capita declining 7 percent since independence.












Zimbabwe is broadly categorized into five natural regions, dominated by rainfall. Region 1 has the highest rainfall, but, because of topography, production is dominated by exotic timber plantations, tea, coffee, and horticulture. Region 2 normally has more than 700 millimeters and is the main crop-growing region in the country. Regions 3, 4, and 5 are increasingly arid and, although cultivated in communal areas, are predominantly only suited to extensive livestock production. The annual variations are large, and the reliability of monthly rainfall is much lower than the seasonal total and decreases in general from north to south.

Only 37 percent of the country receives more than the 700 millimeters annual average considered necessary for semi-intensive farming, and in most parts less than a third of this area is actually arable. In the intensive farming systems followed in Zimbabwe, the natural growing season is confined to the rainy months and both the total rainfall and its distribution during the season are the overriding limiting factors in agricultural production.

The indigenous vegetation is *savanna grassland* along the central plateau with *wooded savanna* throughout most of the rest of the country and some *montane forest* in the eastern districts toward the border with Mozambique. In general, the topography, soils, and climate of Zimbabwe are not favorable for intensive agricultural production. More than 75 percent of the country is subject to conditions that make dryland crop production a risky venture.



ZIMBABWE NATURAL REGIONS

- NATURAL REGIONS:**
-  I
 -  IIa
 -  IIb
 -  III
 -  IV
 -  V
-  RIVERS
-  NATIONAL CAPITAL
-  PROVINCE CAPITALS
-  PROVINCE BOUNDARIES
-  INTERNATIONAL BOUNDARIES

The boundaries, colors, denominations

Since independence in 1980, there are no longer de jure racial divisions, but land-size categories remain effectively unchanged, with permission to subdivide almost impossible to obtain. Ownership of the land in the former Tribal Trust Lands is officially vested in the president but is farmed along traditional communal tenure arrangements. This implies good security over homestead and arable land, but effectively open access to the grazing and woodland areas. Land allocation remains a source of conflict within communal areas, with local government, political parties, and tribal authorities all having varying degrees of control. The commercial sector is made up predominantly of large-scale farms (the former white farming area) and a few smaller-scale freehold farmers (from former African Purchase areas). The communal sector is that which is communally farmed and includes resettlement schemes in which tenure is not freehold but retained by the state.

The government is involved in an active land resettlement program and has declared its intention to take over 50 percent of the large-scale sector for reallocation to smallholders. Tenure arrangements in the resettled areas are uncertain, with settlers having permits to reside and cultivate for as long as they farm it "correctly"; the lack of tenure may have serious implications for environmental integrity. The uncertainty of the resettlement program has also created long-term insecurity for large-scale farmers, which could also affect the environment. For most of the population, however, there are high expectations that old wrongs will be redressed soon by land redistribution. Given the limited capacity for government to implement the program expeditiously, a serious crisis of expectations may result in attempts to settle people on any available land. This could have serious consequences for communal areas with low human population densities and ones that are developing wildlife systems.

Zimbabwe's population is growing at 2–3 percent per annum and, given the extreme poverty of communities in the marginal lands, these population pressures could be translated into demands for access to resources in neighboring parks. The overgrazing and cultivation of poor land have led to widespread erosion and depletion of the forest and grass cover, so that the neighboring parks are seen as having the resources needed to support an increasing population.

Almost 90 percent of the parks and Wildlife Estate is situated in areas unsuitable for cropping, as is 75 percent of communally owned land. Increasing person/land ratios and growing cultivation of marginal land is causing widespread deforestation and erosion.

Political support for wildlife is negligible, and the wildlife sector receives small allocations from the central government. This may change with the increased awareness of the potential role of wildlife in generating growth through foreign currency generation and the strong backward linkages that exist in Zimbabwe for the tourist industry. The wildlife sector, despite the advances made with CAMPFIRE, is still seen as white dominated and is much resented. Black entrepreneurs need to be given exposure and opportunities to participate in this growth industry.

5.2.2 An Economic Analysis of Wildlife Utilization

There is a sharp dichotomy in Zimbabwe between the large-scale, privately owned ranching sector and the more subsistence-oriented and small-scale, communal sector. Both have found their own way of effectively utilizing wildlife as a viable enterprise. This warrants separate discussions in the following section.

The Large-Scale Commercial Ranching Sector

Child (1988) carried out a detailed time-series analysis of cattle and wildlife on Buffalo Range in the Southeastern low veld. The analysis showed that the cattle-section gross profits increased during the 1960s but fell rapidly from a peak in 1975 to losses in 1984. The falling profits were a result of declining herd productivity with calving rates dropping and live mass gains falling off dramatically, even before the major drought. This was primarily a result of veld degradation caused by overstocking.

The wildlife populations on Buffalo Range, however, continued to grow, and the range was less degraded in that sector of the farm. In 1973 Taylor carried out transects on the ranch to compare environmental conditions, but the results between the cattle and wildlife sections were indeterminate (Taylor in Child 1988). These transects were repeated in 1985; this time environmental conditions in the game section were significantly better than in the cattle section. Child concluded that, despite the heavy implicit subsidies for beef, which favored the cattle section in most years, and the overvalued exchange rates, which greatly disadvantaged wildlife, wildlife offered the most lucrative and sustainable option for Buffalo Range (Child 1988).

Jansen, Bond, and Child (1992) carried out a survey of eighty-nine cattle, wildlife, and combined cattle/wildlife ranches in 1989–90 in the more arid Natural Regions 4 and 5 to determine the relative profitability of cattle and wildlife. They estimated returns to investment and the comparative advantage of ranching cattle only, wildlife only, and a combination of cattle and wildlife. The survey year was an average rainfall year with no unusual occurrences that would mean unusually high or low profits for either commodity.

Cattle-only enterprises had an average 1.8 percent financial (private) return on investment, and the return to cattle on ranches combining cattle and wildlife was 2.6 percent. The weighted average return of cattle enterprises was Z\$2.78 per hectare. Only four of the seventy-seven ranches producing beef had a greater than 10 percent return on investment. The speculative return on holding land was excluded from all analyses. Only three cattle enterprises had returns greater than Z\$25/hectare. Thirty-nine percent of the cattle enterprises had a negative adjusted net revenue, and, to continue in operation, most of the ranches were destocking or borrowing. Wildlife-only ranches were the most financially viable with average returns on investment of 10.5 percent. Over half of the wildlife enterprises had a greater than 10 percent return on investment and only four had negative adjusted net revenue. The weighted average return of wildlife enterprises was Z\$5.8 per hectare.

An economic (social) analysis of these returns was carried out using estimated opportunity cost prices to incorporate the effects of market prices not reflecting true social values with respect to the price of cattle, the exchange rate, price of land, the interest rate, and the cost of degradation from overstocking. Jansen, Bond, and Child (1992) vary their assumptions in a number of sensitivity runs, but all the conclusions essentially remain the same. The base-run assumptions assumed a particularly conservative estimate of overvaluation of the Zimbabwe dollar to avoid favoring the wildlife option.

The analysis showed both cattle and wildlife to be more economically (socially) than financially (privately) profitable with the average rate of return on investment for wildlife enterprises at 21.5 percent and 13.1 percent on cattle. The returns to land, however, were higher for cattle than for wildlife after adjusting for government-controlled prices and exchange rate distortions, with average economic return to land for cattle at Z\$17 per hectare and for wildlife at Z\$14 per hectare.

The financial results from Jansen and others' study are consistent with the reported drift into more wildlife enterprises, in that these, pure or combined, show a higher net absolute return per hectare than cattle enterprises even when combined with minor wildlife activities. Returns to enterprises are generally low per area unit, but it should be emphasized that the average farm in the sample is large—some 22,000 hectares—and that returns are net of production costs. Furthermore, the possibility of offsetting losses in these enterprises against capital gains elsewhere while maintaining a certain lifestyle, the prospect of speculative returns to land holdings and attachment to sunk investment, as well as the unfamiliarity with wildlife enterprises all serve to explain the inertia in leaving a financially unprofitable business.

It is clear from a comparison across financial and economic results that the profitability is currently greatly depressed by economic policy interventions. Both cattle and wildlife enterprises show much higher profitability under economic prices. In addition, the profitability of cattle is actually improving more than that for wildlife enterprises in the economic calculations. The main factor is the politically determined depression of beef prices since 1985. Prior to this, beef production had been heavily subsidized both explicitly and implicitly in most years since the 1930s. Liberalization of the internal and external beef markets may swing the balance back toward cattle.

With respect to employment, wildlife enterprises are less wage-labor intensive and require more skilled manpower than cattle enterprises, making cattle the preferred option from an employment perspective. This results from the current heavy concentration of the wildlife enterprises on safari hunting. Tourism ventures have much greater employment capacity and are becoming an increasingly important component of the wildlife industry. On the other hand, net foreign currency earnings are greater for wildlife than for cattle.

The Communally Owned Small-Scale Farm Sector

Between January 1989 and April 1991, twelve districts received "appropriate authority" over their wildlife, although in many of these districts not all wards have a wildlife resource. All these districts are engaged in obtaining revenue from wildlife utilization (by entering into contracts with safari-hunting companies and tour operators), attempting to manage their wildlife (by protecting it and setting quotas for its exploitation), and finally distributing benefits to the participating wards and "producer communities." Administratively, communal areas are divided into district councils, which have legal status and are serviced by the Ministry of Local Government and Housing. These district councils are then further subdivided into wards with Ward Development Committees (WADCOs), comprising a number of villages with Village Development Committees (VIDCOs). The WADCOs and VIDCOs are recent political institutions and are more effective in some areas than others.

By 1992 CAMPFIRE had grown to encompass both a large area and a large population, among whom the benefits of the wildlife are to be shared. Safari hunting dominates the revenue earned. Most districts now put their hunting quotas out to competitive tender. The safari operators then market the hunting internationally. International safari hunting accounts for over 85 percent of the revenue in most CAMPFIRE areas. The bulk of the revenue is derived from elephants. *Any ban on imports of elephant trophies into the major client regions—Europe and the United States—would have a negative impact on community wildlife schemes.* Quotas used for culling are normally restricted to those animals that have a limited safari market, for example, impalas; no districts have yet established mechanisms to legalize, allocate, and manage subsistence hunting. The communal areas play an important role in the safari-

hunting industry and complement the plains game hunting sold on most commercial ranches; 52 percent of all elephants and 39 percent of all buffalo trophies came from communal areas in 1990 (Bond 1992).

CAMPFIRE Revenue Generation and Distribution

Although CAMPFIRE programs are administered by district councils, there are usually only a few wards that have the wildlife resources to be actively involved in wildlife projects. It would be desirable to devolve authority to ward or even village levels, but this is not possible because the district council is the lowest level of government with legal authority as opposed to advisory powers (Petersor 1992). In addition, the migratory nature of the resource and the large areas required for safari hunting would make cooperation between neighboring producer units important.

The total gross income from wildlife accruing to the district councils from CAMPFIRE was Z million in 1991. Total wealth generated but accruing more widely (for example, including safari operators and airlines) is considerably greater. The DNPWLM has issued "Campfire Guidelines," which recommend that no more than 15 percent of revenue be allocated to the district council in the form of a levy and no more than 35 percent be spent on management costs, so that at least 50 percent of revenue can be passed on to the community in the form of cash or project benefits. These guidelines were not met in four of the nine districts for which data are available. In Nyaminyami and Guruve, community benefits were distributed as ward dividends but represented only one-third of revenue and, in Binga, they represented only 40 percent. In Hurungwe, none of the wildlife revenue was distributed to the producer communities: the council spent all of it on a truck. In contrast, ward dividends represented considerably more than 50 percent of revenue in four districts.

Not all of the earned revenue is available for the provision of benefits to the communities, since there are costs incurred in managing the wildlife. The larger programs, such as Nyaminyami and Guruve have wildlife managers who receive salaries and are provided with vehicles and housing. Many districts choose to employ game guards whose main tasks are anti-poaching and problem animal control.

Capital costs, principally vehicles and electric fencing, have been provided by donors in several districts; thus far, earned CAMPFIRE revenue has generally not had to be used for capital costs. There is a danger, however, that the recurrent maintenance and eventual replacement costs of the donated capital assets may lead to increased management costs and thus result in a smaller percentage of the revenue being available for community benefits.

The budget of Nyaminyami Wildlife Management Trust (NWMT), shows a build-up of a "wildlife management bureaucracy." Recurrent costs have increased 360 percent in two years, whereas revenue increased by 79 percent. If the cost of living with wildlife remains higher than the benefits received in the producer communities, then the policing costs will continue to escalate as locals continue to encourage poaching and in-migration. The NWMT has capital assets of nearly Z\$800,000. In 1991 it withheld 15 percent of its net revenue for a depreciation reserve further reducing the revenue available for distribution.

In districts where the CAMPFIRE program has been implemented more recently, the proportion of wildlife revenue distributed to the wards is considerably higher. This may be because the "wildlife management establishment" has not yet had an opportunity to be created. Alternatively, perhaps districts that are only just now beginning to implement CAMPFIRE (and the NGO collaborative groups who assist them) are learning from the mistakes of the "pioneer" districts (Nyaminyami and Guruve) and w

try to keep wildlife management costs within or below the 35 percent guideline. Mechanisms could be established that would give full control over utilization and poaching to the concerned villages. This would give them hunting access to those animals not attractive to those involved in the more lucrative safari hunting; but local hunters should pay royalties to the local village community to avoid overexploitation. The management costs in wildlife protection would be significantly reduced as the villagers would have greater incentives to police themselves and report outside poachers. It is widely accepted that self-policing is much less expensive and more effective than centralized regulation in theory; the challenge is to develop appropriate institutions for self-regulation.

Benefit/Cost Analysis of Wildlife Utilization in Communal Areas

Jansen (1992b) undertook a cost-benefit analysis in three districts. The analysis projects forward, covering a ten-year period and begins with the first year of the CAMPFIRE program in each district. *Scenario 1* assumes no change in management, dividend distribution, poaching, and human immigration. This leads to a further decline in revenue and increases in costs and in poaching and immigration in Nyaminyami and Guruve. In Mahenye, by contrast, the status quo is based on continued good management and control of poaching and immigration. Macroeconomic reforms are not implemented, and the Zimbabwean dollar remains overvalued. All values are presented in constant 1991 Zimbabwean dollars.

In Nyaminyami there have been substantial increases in recurrent costs during the first three years. This is in part due to the inexperienced management and to the decision to employ sixteen game guards with conditions of service similar to that provided by DNPWLM. It is important that the community find more cost-effective poaching-control mechanisms. *Scenario 1* assumes that this situation is not rectified: efforts to date to do so have failed. As a result, it is assumed that recurrent costs increase at an 11 percent rate in real terms.

Capital costs, which have been substantial and almost totally financed by donor aid (Zimbabwe Trust), are assumed to represent replacement of existing assets plus the additional buildings planned for NWMT. No distinction is made between the source of finance for the capital costs, since they represent use of resources that would presumably be available elsewhere in the economy if they were not used for NWMT. Despite the problems of continuing with the status quo, the NPV for the district is positive—Z\$1.5 million using a discount rate of 10 percent and Z\$333,000 using a discount rate of 40 percent. This would probably not be true over a longer period or if the assumptions of the negative effects of poaching and immigration are too conservative.

Scenario 2 is a more optimistic scenario, including 25 percent adjustments for overvaluation of the Zimbabwe dollar. It assumes that the Economic Standard Adjustment Program (ESAP) succeeds, local management improves, and poaching and immigration are controlled. As a result, the net present value to the district, based on a 10 percent discount rate, increases to Z\$3.6 million. The optimistic scenario assumes that present constraints on performance, particularly in Nyaminyami and Guruve, are eased and ESAP succeeds. It also assumes increases in revenue by 10 percent annually as a result of devaluation of the Zimbabwe dollar and good wildlife populations due to declines in poaching activity and immigration. Finally, this scenario assumes that (1) recurrent costs do not increase in real terms after 1993 due to improved management, (2) capital costs are restricted to replacement, (3) immigration is controlled, and (4) population increases by 3.5 percent. Ward benefits are distributed only to producer wards.

This type of analysis fails to take into consideration the distribution of the net benefit stream. If the net benefits do not accrue to the producer community, the link between the benefits and costs of wildlife will not be made and the current trend of encouraging wildlife eradication, immigration, and increased cattle stocking will continue.

Scenario 1 assumes that the ward benefits continue to be spread evenly among all twelve wards. As a result, benefits per household never exceed Z\$100 per annum and in fact become negative after year seven. Thus, even though this project has a positive NPV for the district, it *should not* be implemented, unless some alternative mechanism of allocating the net benefits is instituted. In other words, a positive NPV is a necessary but not sufficient criterion for going ahead with the project. If the project is to be implemented as an alternative to some other land use option, then its NPV will need to be higher than the competing options, and since wildlife is a less well-recognized option it will need to be considerably higher before it is chosen in place of conventional options.

Scenario 2 shows that under a more optimistic scenario with respect to revenue generation, cost control, lower tax levy, and lower population increase, the benefit per household increases and is Z\$470 per annum (in real terms) in year ten. This assumes that the dividends are paid in the form of household cash dividends with social service or infrastructure projects paid directly by farmers.

Similar benefit/cost analysis for the CAMPFIRE project in Guruve District shows that, like Nyaminyami, the project has received substantial capital investment donated by Zimbabwe Trust and has good revenue from hunting and tourism. Also like Nyaminyami, it has sizable and increasing recurrent wildlife management costs. If the ward dividends were to be split in future between all eight wards, as is the case in Nyaminyami, scenario 1 shows that the benefits per household diminish and in fact become negative by year ten. Under the optimistic scenario 2, with benefits split between only three producer wards, the distribution increases to over Z\$500 per household and could result in a viable wildlife utilization option. This assumes that the link between the benefits and wildlife resources is successfully established. This is not yet the case but the situation is improving steadily as institution building at the ward and village level is taking place. It should be noted that, under both scenarios, the NPVs are positive but the distribution per household is significantly different.

Benefit/cost analyses of the CAMPFIRE project in the Mahenye ward of Gazaland District (Chipinge) indicates that the hunting revenue is considerably smaller there, but so are the recurrent and capital costs. As a result, the NPVs are not much lower than in Nyaminyami and Guruve. Scenario 1 shows the effect of poor macroeconomic policies, but, with wildlife revenues distributed solely to the producer community, household dividends peak at Z\$813 in 1993 and decline thereafter. Under the optimistic scenario 2, the household dividends steadily increase and are significantly larger than in Nyaminyami and Guruve, exceeding Z\$1,000 per household from 1993. Although revenue potential for the district is lower, there are considerably fewer households involved even if Nyaminyami and Guruve focus the benefit distribution more carefully. This indicates the importance of limiting the population benefiting from wildlife if revenues generated are to be meaningful to households and change their decision making to favor wildlife.

Summary of Necessary Conditions for Success of CAMPFIRE Projects

There are a number of principles that can be universally applied. The most important of these is that the *benefits must outweigh the costs for the residents* if they are to encourage wildlife by reducing poaching and habitat destruction. A uniform distribution model of the benefits shared between all the

wards in a district—or even all the wards with some wildlife—is unlikely to result in benefits outweighing costs in the important producing areas. Where wildlife revenue is used to fund social services and infrastructure projects in a district, the links between costs and benefits become weak.

With the migratory nature of wildlife, it is difficult to closely define the producer communities. Even when it is possible to define boundaries, it is difficult to ensure that those paying the highest costs receive the greatest benefits. Within wards, there are differences in animal densities and in crop and livestock damage due to wildlife. Defining the producer community is difficult, even when the district has decided that the residents “living with wildlife” should be the principal beneficiaries. A number of criteria can be used—according to animal densities, according to the exact location of where the trophies were taken, or based on relative crop and livestock damage. This cannot necessarily be done at ward level, and, as in Beitbridge district, it may be one or more village (VIDCO). It is only when wildlife is accepted as “belonging” to those who both live with it and pay its costs that the various models that enable the producer communities to receive larger shares will be accepted without creating community strife.

It is important for communities to play an active role in deciding how the wildlife revenue is to be distributed, but, even if they are closely involved, there is often a problem with the implementation of community projects. This is largely due to a lack of implementation skills at the district and ward levels. In many wards, the ward dividends remain in the bank where their purchasing power erodes due to the high inflation rate in Zimbabwe. Also eroding is the link between the wildlife costs and wildlife benefits: the costs are felt immediately in terms of crop damage and threat to human life, while the benefits are delayed. These delays unfortunately parallel the delays these communities experienced in the past in getting wildlife revenue back from the Treasury.

It is also essential that the communities receive an adequate proportion of the value of the wildlife sold from their land. Safari hunting involves high overheads in marketing and operations, but it is only with the introduction of more open and competitive marketing that prices paid by operators increase. *The local communities need to establish openly competitive systems and to be trained and assisted in marketing their resources to operators.*

Comparative Analysis of Wildlife and Subsistence Agriculture in Communal Areas

In the communal areas in Zimbabwe, animal production regimes largely consist of cattle, which are used primarily for draught power, as a store of wealth, and for providing manure and milk. Small domestic animals are part of most household economies and in some of the more remote areas, wildlife plays an important role in subsistence income. In a few isolated areas where tsetse flies still exist, wildlife dominates and even small domestic livestock are limited. Household surveys have shown that, in the more arid areas of the country, nonfarm income is important and that without off-farm income, government-sponsored drought relief is necessary even in average rainfall years.

Most agricultural officers and farmers prefer irrigation as a strategy for increasing incomes and generating revenues in the marginal areas; however, the irrigation schemes are generally uneconomic unless the costs of establishing water sources are not included. Even when the water provision costs are excluded, the IRRs are normally around 10–15 percent. The higher return schemes tend generally to be small schemes with limited infrastructural investment.

The analysis of agricultural projects seldom includes any of the subsistence benefits from wildlife since hunting is illegal. The value of woodland resources are also seldom incorporated as an opportunity cost to clearing land for cultivation (Bradley and McNamara 1993). This may be partially due to the fact that the irrigation schemes do not necessarily deplete much of the surrounding woodland but the increased population pressure will do so in the long term. These resources play an essential role in coping with drought and in improving the quality of nutrition, particularly for children; the impacts of reducing access to these resources must be incorporated in all development strategies, particularly in arid areas (Chimedza 1992).

The real and perceived benefits of cattle are high for peasant farmers, while the costs are low, since the farmer's costs of food and care are negligible. The community bears the costs of depleting the open access to grazing resources, and the government bears most veterinary costs through their animal health and animal-dipping programs.

In a recent attempt to compare household returns from agriculture and wildlife, a survey was carried out in four wards in the Sebungwe region of the Zambezi Valley (Murindagomo, forthcoming). The survey showed that in Gokwe over 80 percent of annual household income is from cropping (including grain retentions), 8–10 percent from off-farm employment, and 5–15 percent from livestock sales. If wildlife earnings had been paid out in cash, they would have represented 2–4 percent. In the Omay, on the other hand, over 70 percent is from off-farm employment and only 17 percent from cropping. Livestock sales were around 3 percent, and the household revenue from wildlife would have been 4 percent if it had been paid out in cash and not retained by the ward for projects. The survey also showed that incomes in noncattle areas are half those in cattle areas. Similar income differentials were observed in Gutisa (mid-Zambezi valley) between houses with and without access to draught power (Barrett 1992; in most communal household surveys throughout Zimbabwe, access to draught power has been the most important variable in determining income levels. This is explained by the importance of draught in adding value to crops through the expansion of area cultivated and timely cultivation.

Even though the CAMPFIRE project is active in three out of the four wards surveyed and considerable wildlife still exists in these areas, it plays a small role in household revenue generation, particularly when these revenues are retained at ward level for projects. It plays a more significant role in household costs (through crop and livestock damage and time spent protecting resources and people from wildlife), but these have not been estimated.

Both the Omay and Nenyunka, which have relatively abundant wildlife populations, are faced, given tsetse fly eradication, with potential land pressures from immigrants with cattle. At this stage of development, when access to land is not the limiting factor, the existing households welcome immigrants because they bring potential access to cattle for draught power and because increased populations give them more lobbying power to gain access to government services (roads, schools, clinics, and so on).

Under poor agronomic conditions, it is only under particular circumstances that wildlife can substitute for cattle at the household level, unless a considerably increased proportion of the revenue generated by wildlife can be retained by producers. Since draught power is the most valuable output from cattle, it is possible that, where wildlife and cattle cannot be compatible, other forms of draught power may reduce the opportunity costs of wildlife versus cattle for the households. Measures to reduce wildlife predation (for example, fencing of cropping zones) may also reduce opportunity costs. Localized control systems that include allowing individual hunting may also result in substantial increases in household welfare at small losses—and possibly substantial gains—in wildlife numbers.

Despite the importance of cropping of maize in revenue generation in the nonwildlife areas, maize gross margins are mostly negative when the cost of the farmer's own labor and draught power is included in the calculations. The decision to grow maize is rational when the cost of producing the maize is compared to the cost of importing it from major urban centers, particularly when the risk of poor access is added to the cost of purchase. The lack of cash resources to purchase maize also encourages home production. It is, therefore, possible that, if markets were more effectively integrated, householders would not need to rely on expensive self-sufficiency strategies. Wildlife production systems that include high value production of specialty outputs may become more financially attractive to peasant households and considerably increase both rural and national growth, but food market reliability would then become an important factor (Muir 1987).

Given the difficulties of comparing cattle and wildlife in peasant farming communities, since cattle are mostly an input, it may be better to estimate opportunity costs of cattle by comparing the "with" and "without" scenarios. This is carried out in table 5.3 in which the assumption is made that having cattle and population densities similar to those in Chireya 3 precludes the option of wildlife but brings with it concomitant increases in average household incomes. The subsistence incomes are higher as a result of direct income generated by livestock, increased cropping incomes, and reduced losses from wildlife. Total area cultivated also increases because there are more households that are farming. It is assumed that the increased income would be evenly distributed among households. Income distribution is highly skewed in rural areas, and less than 20 percent of the population normally own adequate cattle for draught.

Wildlife has the potential to reduce—or at least not to increase—income differentiation if the new institutions developed to manage and share benefits and costs are carefully established. If, however, households in the densely settled areas with access to cattle and little or no loss to wildlife predation benefit equally with those in the wildlife areas, socioeconomic stratification will increase.

Under current revenue distribution in communal areas, wildlife is only rarely more viable to the individual householder than subsistence agriculture. The question remains: is wildlife the more economically viable option in communal areas at the national level? An example is given in table 5.2 of the opportunity costs of wildlife and subsistence agriculture using Nyaminyami District. The analysis shows that the best option from an international economic perspective is wildlife production with improved agricultural output but with no increase in population. This is because the increase in human population does reduce wildlife revenue and, as the international community as a whole benefits by 20 percent more than the nation, it has a larger stake in the wildlife option.

The best option from a national economic perspective is wildlife production with human population increasing to 7,500 households; this is due to the additional income generated by more people farming in the area. The crude assumption is that household farm income doubled with improved agriculture in a best case scenario in which wildlife revenue only declines by 12.5 percent. If agricultural incomes cannot be improved while retaining wildlife, the wildlife-only option is preferred from a national social welfare perspective.

* These estimates all assume that the immigrants are moving from overcrowded areas and that all the slack created by their exodus is taken up by the remaining population. This is not likely to be true in the short-term.

Table 5.2: Comparative Analysis of Wildlife and Subsistence Agriculture: Total Revenue Estimates Using Nyaminyami District, Zimbabwe Wildlife Revenue Estimates and Allocation^a
(1992 US\$ per annum)

Direct Revenues from:	International	National	District	Household	All Households	Wildlife Households
Hunting	1,034,066	827,252	212,000			
Tourism	781,250	625,000	7,200			
Total	1,815,316	1,452,252	219,200	70,667	14	35
Airfares	450,000					
Outfitting	200,000					
Taxidermy	51,703	51,703				
Curios	10,000	10,000		6,000		
Meat	20,000	20,000		10,000		
Ivory ^b	-	-		-		
Total US\$	2,547,019	1,533,956	219,200	86,667	17	43
Environmental protection ^c						
Genetic resources ^c						
Bequest value ^c						
Existence value ^c						
Total Wildlife^c						

Source: Authors' estimates. See notes below for background.

Table 5.3: Alternative Land Use Scenarios for Nyaminyami^a
1992 US\$ per annum

Options	International	National	District	Household	All Households	Wildlife Households
Subsistence agriculture with wildlife						
5,000 households' agricultural income	262,000	262,000		262,000	52	52
Total including wildlife income	2,809,019	1,795,956	219,200	348,667	70	96
Subsistence agriculture with no wildlife						
10,000 households	1,048,000	1,048,000		1,048,000	105	105
5,000 households	524,000	524,000		524,000	105	105
Retain wildlife with reorganized and improved agriculture						
7,500 households	3,014,641	2,128,211	219,200	872,667	122	148
5,000 households	3,071,019	2,057,956	219,200	610,667	122	148

Source: Authors' estimates. See notes below for background.

- "International" refers to revenue generated for the world population. "National" refers to the revenue generated that remains within Zimbabwe. "District" refers to the proportion paid to a district council. "Household" refers to proportion of income accruing to producers. "All households" refers to per household distribution based on 5,000 households. "Wildlife households" is based on 2,000 households living with wildlife.
- No ivory revenue is recorded.
- Not estimated, but could be substantial.

Notes to tables 5.2 and 5.3:

- Hunting revenue.** The estimated total value from hunting sold, based on projected international hunting prices for 1993 with 5 percent deducted for international inflation. International safari prices have not in fact risen; it is possible that the 1992 value should be the same as that for 1993, but a conservative estimate was preferred. Precise 1992 data were not easily available.
- Hunting revenue retained in Zimbabwe.** A deduction of 20 percent to cover external marketing costs and wholesaler and agent commissions and fees. The remainder is what is paid into the economy of Zimbabwe.
- Hunting revenue retained by the district council.** The trophy and concession fees paid to the district council (Z\$1,060,000 converted to US\$ at a ratio of 5:1).

4. **Tourist revenue generated by Nyaminyami wildlife.** An estimate of the revenue earned by Bumi Hills Safari Lodge and Tiger Bay Lodge because of the wildlife in Omay. If there were no wildlife, it is estimated that Bumi would lose 50 percent and Tiger Bay 25 percent of its customers. (It is closer to the national park and caters more heavily to fishermen.) Both were estimated at 5,000 bed/nights: Bumi at US\$250 per night and Tiger Bay at US\$125 per night, with full board and tours.
5. **Tourist revenue retained in Zimbabwe.** A deduction of 20 percent for external marketing agents' fees and so on. This is probably too high as much of the marketing costs and fees may be retained locally.
6. **Tourism revenue paid to district council.** Tourism numbers for 1992 were calculated as lower than 1991 (particularly for Bumi) because of the effect of drought on international visitors. Assuming that the per visitor fee to be paid to the district council in 1992 is higher, the revenue to the district council is assumed to be the same as in 1991 (Z\$36,000).
7. **Hunting and tourism revenue allocated for wards.** Assumes that the district council pays 33 percent of its total earnings as ward dividends (as for 1991).
8. **Ward allocation to individual households.** Assumes 5,000 households in Nyaminyami. Assumes that the ward dividends are distributed evenly among the 5,000 households (whether as cash or projects).
9. **Ward allocation if only to wildlife households.** Assumes that the revenue is shared only by those living in areas with substantial wildlife resources. The number of households is estimated to be 2,000.
10. **Value of airfares of incoming hunters.** It is guesstimated that there are 145 hunters and companions, based on the number of hunts. No airfare value is given for those coming in for tourism on the assumption that they would fly to Zimbabwe, even if there was no Nyaminyami wildlife.
11. **Value of guns and so on.** Assumes that each safari party spends US\$1,400 in their home country on equipment, ammunition, and outfitting (safari outfits and so on).
12. **Value of taxidermy.** Each client spends 5 percent on mounting trophies.
13. **Value of curio sales.** An estimate based on Binga sales of Z\$80,000. It is estimated that the handicraft center at Bumi will earn Z\$50,000.
14. **Value of curio sales to households.** The producers retain 60 percent. Although averaged over all Omay residents, it is likely the income will be concentrated among certain households and not easily represented in the individual household dividends.
15. **Value of meat.** Includes meat, hides, and so on from cropping of animals and problem animal control—assumes meat is less available but at a higher price so revenue remains the same as in 1991. National social price is doubled as meat was sold at a subsidized price. Opportunity cost value was not adjusted at the household level because, for those individuals, the opportunity costs are hunting time and illegality risk, which may be even less than the money saved by access to cheap meat.
16. **Current value of subsistence agriculture in Nyaminyami.** Based on Z\$262 per household per annum currently generated by crop, livestock, and beer sales and grain retentions (average crop returns for Negande Ward in Murindagomo 1992). Most household income is from off-farm work and drought relief. Z\$262 by 5,000 households was converted to US dollars.
17. **Value of subsistence agriculture with cattle and no wildlife.** Using survey results of VIDCOs with and without cattle, average farm income doubles. This would be a result of increased access to draught power, immigrants with greater access to cash or credit for input purchases, and reduced wildlife depredation. It is assumed that there are no agronomic differences among the VIDCOs, which may have caused the differential. It is further assumed that, with the elimination of tsetse flies and increased demand for land, immigrants move in, doubling the population and increasing habitat destruction and poaching, which reduces wildlife to insignificance. The calculation doubles Z\$262, multiplies it by 10,000 households, and converts it to US dollars.
18. **Household value of subsistence agriculture with cattle and no wildlife.** This assumes that the increased incomes are evenly distributed, when they are actually usually highly concentrated among those who own cattle. The current residents will benefit from increased access to cattle and more people in the area to lobby for services and to sell beer to, but it is unlikely that they will in fact double their current incomes.
19. **Value of wildlife and subsistence agriculture with a project to reorganize agriculture.** Some wildlife experts maintain that it is not currently desirable to incorporate cattle into subsistence agricultural systems in wildlife areas and, furthermore, that any increases in population would not be sustainable; however, it seems that reorganization, including possibly greater separation of people and wildlife, access to alternative draught or livestock-holding pens, and so on could be used to try to enable increased agricultural production alongside continued wildlife enterprises; this has been achieved in the commercial ranch sector. It is more difficult in the communal sector but may be possible.

This option would also be best for the households, since they would achieve increased incomes from better agriculture as well as the wildlife revenue. *If* agricultural incomes cannot be improved with wildlife production, then the best option for the farmers is to eliminate wildlife and encourage immigrants and cattle.

The calculation assumes that the same per capita agricultural productivity is achieved by diminishing wildlife revenues by only 12.5 percent but with bringing in only half the new immigrants so that the population is 7,500 households. If agriculture is improved but there is no immigration, then wildlife revenue remains the same. In reality it would probably improve if the subsistence agricultural system had been reorganized to allow for the interface.

It is imperative to ensure that the “trickle-down” revenue is considerably greater than it is at present. The issue of greater producer participation in CAMPFIRE has been repeatedly addressed in this paper and in Murombedzi (1992) but is essential to the continued existence of wildlife in this area. The issue of greater producer share in hunting and tourism industry revenue is essential if wildlife is to continue to be available; districts must develop institutions that return a greater share to the producers. The safari operators must find mechanisms to ensure that a greater proportion of the revenue generated is returned to the districts.

5.3 The Policy Environment and Its Impact on the Future of Wildlife

The Zimbabwean economy is characterized by its highly centralized and heavily regulated structure with widespread state ownership and parastatals. International borrowing subsidized the expansion of the civil service and social services. Exports have increased but total imports have stagnated as debt service payments rose to 37 percent of exports in 1987. Real GNP per capita stagnated in the 1980s. Zimbabwe has embarked on an economic structural adjustment program (ESAP) designed to facilitate growth.

5.3.1 The Impact of Macroeconomic Policies on the Wildlife Sector

General macroeconomic policy, such as exchange rate, monetary, and fiscal policies, are designed with their own objectives, divorced from any considerations about the impacts on wildlife. Nevertheless, there are important links between such general policies and the utilization of wildlife, as discussed in this section.

Foreign Exchange

For most of the 1980s, overvaluation was greater than 50 percent, but with ESAP this had fallen to 15–20 percent by the end of 1993. The overvalued exchange rate has had a negative effect on the wildlife industry. The limited access to foreign exchange has severely constrained access to imported inputs, particularly vehicles, spare parts, and the luxury commodities that high-value tourism and hunting demands. The regulations pertaining to access have significantly increased transaction costs and have favored established industries and firms, affecting industry growth and effectively reducing returns to CAMPFIRE. In a survey of safari operators, the most significant constraint to growth was cited as the shortage of foreign exchange.

Recent changes under ESAP have considerably improved the wildlife sector's access to foreign exchange especially with the introduction of the export retention scheme (ERS) in July 1990. This scheme allows exporters the right to utilize 35 percent of export earnings to import inputs that are not on the negative list. Although it favors existing operators, ERS quotas are now tradable at a premium of between 20 and 50 percent; this has helped new entrants. There are still considerable transaction costs in accessing these rights and delays in clearing imported inputs, but the situation has improved. The increased retention has reduced incentives to engage in illegal foreign currency deals and under-invoicing. Some of the items on the "negative list" (imported luxuries and vehicles above a certain value) are necessary for the wildlife industry and will need to be included for wildlife enterprises.

Fiscal Policy

The Zimbabwean government has greatly enlarged its bureaucracy since independence, and expenditure on salaries is extremely high. The budget deficit and high government expenditures have directly contributed to the need for tight monetary controls. This has affected the wildlife sector at a time when it appeared ready for major expansion. Continued fiscal imprudence with expenditures directed toward ruling party rather than national priorities is a serious threat to the entire Zimbabwean economy, including the wildlife sector. The Ministry of Environment and Tourism (which includes DNPWLM) accounted for 0.68 percent of total government expenditures in 1990-91. DNPWLM received only half of the expenditures that were allocated to Veterinary Services and only 60 percent of that allocated to the Ministry of Political Affairs. This is an indication of the low priority accorded wildlife despite its potential for growth.

Monetary Policy

One area in which the government does appear to be committed to structural adjustment is monetary policy, through which interest rates have been forced up by requiring the banks to remain liquid. This has been part of the policy to contain inflation; unfortunately, this tight monetary policy has not been matched by a tight fiscal policy. The position has been made significantly worse by the drought, which has forced government to incur large deficits in importing essential food and raw materials normally produced locally and exported. Given the lack of progress by government in containing nondrought-related expenditures, the prognosis for the future must include the burden of high national debt. Monetary policy alone can only control inflation at the expense of growth, with supply severely constrained by high interest rates. These high interest rates also affect the wildlife industry. This situation excludes new entrants with limited collateral and will, therefore, exacerbate the trend of a white-dominated industry, unless an affirmative action program with special credit facilities and training is put in place.

Employment

The government is concerned about increasing employment and reducing underemployment. The industrial sector cannot grow fast enough to absorb the rapidly increasing population, however, the agricultural resettlement program is supposed to assist to accommodate this pressure. The exercise is considerably slowed by the requirement that full facilities and services are provided for the resettled farmers so that they can be productive. The slow pace means that the current trend of informal settlement will continue to threaten communal areas that are not overpopulated, including many of the CAMPFIRE areas. Most wildlife options in communal areas at the moment are land intensive and absorb few people relative to subsistence agriculture. It is important to develop institutions and technologies that enable wildlife systems to employ or at least accommodate more people without reducing wildlife densities. This could be achieved either by developing more labor-intensive wildlife options or by reorganizing the subsistence communities and wildlife areas in such a way that they can accommodate more people.

Investment Policy

The Zimbabwe Investment Center (ZIC) has been established to facilitate private sector investment. Government policy places a premium on investment in the mining and manufacturing sectors as compared to the wildlife sector.

5.3.2 The Impact of Sectoral Policies on the Wildlife Sector

Moving from the general policies to the more specific sectoral interventions, it is clear that public policy, by default or intention, has important ramifications for the wildlife industry.

Sectoral Allocation

The viability of the wildlife industry in Zimbabwe rests heavily on an effective national park structure. Capital expenditures for DNPWLM in 1991 had declined 27 percent since independence. Recurrent expenditure for the department has fallen 6 percent in real terms since 1988, despite the fact that there has been a significant increase in the demand for DNPWLM services. The result of inadequate financing has been a decline in the capacity of this department to service the rapidly expanding wildlife industry and to sustain the national parks estate. In addition to the low budget, DNPWLM has had to service an increasing mandate and has had to face significant increases in poaching. Time, skills, financial, and other resources have been directed away from traditional concentration on park management and research to service all these new demands. The decline in funding has resulted in deterioration of roads, boreholes, buildings, plant, vehicles, and equipment. It has also affected research, extension and interpretive services, park management, and law enforcement, thus threatening wildlife conservation, habitat protection, and the economic productivity of the wildlife sector as a whole.

Land

The current land policy aims to reallocate half the land in the large-scale freehold sector to the small-scale sector but will retain the same basic dualistic structure. There is considerable concern that farms with wildlife enterprises will be targeted for resettlement. These fears arise from the belief that wildlife is considered a luxury and not a productive land-use system by some bureaucrats and politicians. *There is, therefore, an urgent need to disseminate information on the productivity of wildlife.*

The country is to introduce a land tax that will encourage large-scale farmers to utilize currently underutilized areas of their properties. On areas that cannot be used for agriculture, there may be increasing investments in wildlife and recreational tourism; this would increase the growth of the wildlife sector. Regulations that discourage subdivision will reinforce this trend since the farmers will not be able to sell the land they are not using for agriculture. There is some uncertainty as to the nature of the land tax, with some inference that it may be used to affect production systems. If this is the case, the subsequent distortions will have severe impacts on the economic efficiency of agriculture and, given the generally negative attitudes toward wildlife as a productive land-use system, will prejudice it.

The negative attitudes of most of the agricultural bureaucracy to wildlife derives from uncertainty over its actual economic value as well as lack of expertise in and technologies for wildlife enterprises. This has more serious consequences in the communal areas and resettlement schemes in which land use planners hesitate to allocate land to wildlife. Those responsible for resettlement find that wildlife is land intensive and restricts their mandate to resettle the maximum number of people from overcrowded communal farming areas.

Marketing and Price Policies

In the large-scale sector, cattle are the major competitor with wildlife for land. Beef production has been heavily supported by the government since the 1930s. This includes large marketing and processing investment in beef by the state. Producers or consumers (and at times both) have been directly and indirectly subsidized by government marketing and pricing policies for beef over the decades. The distortions created by the implicit and explicit support for beef have particularly affected the development of the goat industry and have probably had similar effects on game meat. Since independence, the Cold Storage Commission (CSC) has received subsidies of Z\$40 million per annum. Prior to 1985 producers and consumers were subsidized; subsequently, inefficient marketing and consumers have been subsidized by the state and indirectly by farmers who received prices, that is, income, below export parity.

Veterinary and Health Controls

The erection of fences and the eradication of buffalo from large-scale ranches have had negative effects on both the economy and the viability of wildlife enterprises on ranches. It is unlikely that the value of the buffalo eradicated to allow for beef exports to Europe can ever be recouped despite the high prices obtained from privileged access to their controlled markets. No analysis has been carried out on the economics of the fences nor on their impact on wild animal migrations. The continued effect of disallowing buffalo in cattle areas affects wildlife profitability, since buffalo add significantly to the value of hunting on ranches (Child 1988). Movement controls implemented to satisfy European Economic Community requirements considerably increase the cost of live animal sales by requiring long quarantine periods. There are also a number of municipal and national regulations that restrict the free movement of game meat sales and require various inspections.

External Trade Controls

Exports of wildlife products and of live animals are subject to various permits, licenses, and restrictions. These restrictions are normally either to fulfill the requirements of international conventions (for example, CITES) or are an attempt to build up the local industry. The restrictions on the sale of live

animals are controversial and tend to result in industry concentration. The export of game meat and other wildlife products is severely restricted by the importing countries.

Sale and Utilization Controls

Although landholders and appropriate authorities may utilize wild animals found on their land, the method used and sale of various services and products are controlled (Booth 1992). In the communal areas, residents are still prohibited from hunting any wild animals even in districts that have been granted appropriate authority. Subsistence hunting continues, but negative attitudes to wildlife result from these prohibitions. The Zimbabwean economy is highly regulated, and these national, municipal, and industry restrictions often act as barriers to entry and have restricted the growth of wildlife and tourism ventures.

5.3.3 Conclusions

Wildlife in the commercial ranch sector is often more financially profitable than cattle, particularly in the more arid parts of Zimbabwe. An improved macroeconomic environment and a less regulated economy will contribute to its viability and continued growth but will also benefit cattle enterprises greatly and may even tilt the balance in their favor vis-à-vis wildlife. In the remote, semiarid communal sector, the CAMPFIRE program appears to be the most economic option from a social welfare perspective, but it is seldom the rational choice for households living in these areas. More effective mechanisms and institutions need to be developed so that the gainers compensate the losers.

The direct benefits to the world community from retaining wildlife can be considerable. If these are added to the *global environmental advantages* of the wildlife option over subsistence agriculture (through greater species diversity, less degradation, and greater tree coverage) and the bequest and existence values of the animals, then in certain areas the international community clearly benefits from land allocated to wildlife. Institutions and mechanisms, such as the Global Environment Facility (GEF), that link costs and benefits at the international level need to be made more accessible.

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Appendix:

Relative Environmental Impacts of Wildlife

Concerns about overgrazing and rangeland degradation have played a central role in the shaping of the national livestock policy, giving rise to schemes of limiting stock numbers and in some cases of actually destocking.* Attention has also been drawn to the impacts, especially of elephants, in the destruction of woodlands. Degradation is seen as manifesting itself when a plant community that is dominated by perennial grasses changes to a community that includes a greater proportion of woody species, annual grasses, and bare ground. Thus, rainfall, which was used efficiently in the production of a relatively stable supply of fodder, is now wasted; less fodder is produced; and the fodder supply is more variable from year to year.

Initially, utilization results in changes in the herbaceous species composition of the veld,† especially from perennial grasses to a combination of annual grasses and less palatable perennial grasses with reduced vigor. Ground cover and litter cover decreases, leading to increased soil compaction and crusting and thus enhanced runoff and erosion. Rainfall infiltration is reduced substantially and, because the density of grass roots near the soil surface is lower, a greater proportion of the water that does enter the soil becomes available to more deeply rooted woody species. This gives them a competitive advantage, which they are able to maintain at the expense of grasses, so that the supply of fodder is permanently reduced. As bush encroachment and the above induced drought conditions continue to develop, sheet and gully erosion become more widespread and previously permanent streams become more intermittent.

The Evidence for Herbivore Impacts on Zimbabwean Rangelands

Both livestock and wildlife can have significant impacts on their natural surroundings. The body of hard, quantitative evidence of this is limited, however, and there is little directly comparative research. This gives rise to large discrepancies in the interpretation of the relative impacts.

National Surveys

For Zimbabwe as a whole, over the ten-year period from 1963 to 1973, closed woodland and open woodland declined in area by 4 percent and 16 percent respectively, while the area of sparse woodland and cultivated land increased by 12 percent and 8 percent respectively (Whitlow 1980). The main decreases in woody vegetation were recorded in areas of high to moderate population densities, particularly within the communal lands. This was ascribed primarily to the expansion of cultivated lands, and to a lesser extent to the collection of firewood and building materials. Attention was also drawn to the rapid rate of destruction of woodlands on some of the state land in the west and northwest of Zimbabwe, which was ascribed mainly to the buildup of high elephant densities within these areas.

* This appendix is based exclusively on the background paper prepared by Robert Cunliffe.

† Open country with grass, bushes, or shrubs or thinly forested, characteristic of Southern Africa.

Commercial Livestock Production Systems

Stocking rate has repeatedly been shown to have a marked effect on both rangeland composition and animal productivity (Clatworthy 1989). There is a consistent trend for perennial grass cover to decline with increasing stocking rate. For animal performance, both wet season gain and dry season losses are affected by stocking rate, with the former decreasing and the latter increasing as the stocking rate is increased; however, for a given stocking rate, the wide range of grazing procedures examined have had almost no differential effects on botanical composition nor on the condition of the veld.

Kennan (1969), O'Connor (1985), and Clatworthy (1989) all emphasize that the impact of livestock on veld condition depends on both rainfall and soil conditions. A number of studies have demonstrated that long-term rainfall variability has an overriding effect on herbaceous compositional trends, independent of grazing regimes, particularly in the drier rangelands, where rainfall is more variable and primary production is strongly limited by soil moisture availability. In moister savannas, annual variability in rainfall is lower and the relationship between vegetation production and rainfall is less marked. The influence of grazing varies, with the most pronounced effects being observed in low rainfall regions.

Wild Herbivore Systems

Despite the diversity of large herbivores, which is characteristic of African savanna communities, only a limited number of species have been reported as having dramatic effects on the environment. Analysis shows that communities tend to be dominated by a few large species such as elephants, hippopotamuses, buffalo, zebras and wildebeests (Cumming 1982). It is these species, particularly the elephant, which have been reported as having dramatic effects on the environment.

Craig (1992) and Martin (1992) have calculated that elephant densities need to be held below about 0.5 animals per square kilometer to maintain existing woodland canopy cover intact. This is far lower than the densities currently occurring in many of the national parks and safari areas, which in 1991 were estimated to range from 0.25 to 2.12 animals per square kilometer.

Communal Land Agro-Pastoral Systems

Since early in the colonial period, overstocking and degradation of communal land rangelands have caused concern. For much of this century and continuing to the present, government officials have sought ways in which to control or even reduce livestock numbers in the communal lands. Stocking rates in the communal lands, frequently on the order of two to three hectares per livestock unit, are typically higher than those found on other types of land. Livestock, particularly cattle, form an integral part of the agropastoral farming system, particularly through the provision of draught power and manure, which is widely used to maintain or improve soil fertility. Recent studies, such as those by Swift and others (1989) on nitrogen cycling in communal-land farming systems and Barrett (1992) on the economic role of cattle in communal land farming systems, indicate that the majority of households do not own sufficient livestock to satisfy their needs for draught power and manure.

Despite the widespread concern about the deterioration of communal land rangelands, remarkably little research has been directed at this problem. This has been highlighted by a number of recent studies that question the official view of the extent and significance of degradation in these areas (Abel and Blaikie 1989; Barrett and others 1991; Sandford 1982; Scoones 1990; Warren and Agnew 1988).

Scoones (1990) examined livestock production records over several decades for seven, heavily stocked, communal lands in southern Zimbabwe. Government officials in 1944 considered the stocking rates of six of the seven communal lands studied by Scoones to be in excess of the recommended carrying capacities for these areas. Yet for each communal land, the 1986 cattle population density was considerably in excess of its 1944 stocking rate. Despite large fluctuations in response to rainfall, cattle populations appeared to have been successfully maintained over the last twenty-five years for all communal lands. There were obvious signs of soil erosion on the rangelands,

and yet there was no evidence that cattle populations were declining and neither was their potential productivity being detrimentally impacted. Scoones (1990) suggested that the impact of erosion on secondary production is sufficiently low as to not be felt on a relatively short timescale, or else that the sites where erosion is occurring might not contribute significantly to the overall livestock production, or both.

The Save study (Campbell and others 1989), however, perceived the environment as being degraded through deforestation, overgrazing, loss of soil, loss of soil fertility, siltation of rivers, and increased runoff. It concluded that there was a severe imbalance between the human population and the resource base, such that the environment was less able to satisfy the needs of current and future human populations.

Comparative Studies

Kelly and Walker (1976) undertook a comparative study of four sites under different land tenure, which were apparently similar in every respect except for the type and intensity of grazing and browsing by large herbivores. De Jager (1988) repeated measurements of vegetation and range condition. Kelly's study concluded that the intensively utilized communal land site was in fact degraded in comparison to the other three sites in that the perennial grasses had largely been replaced by annual grasses; herbaceous production was more variable between years.

De Jager's follow-up study failed to reveal any firm evidence of directional trends that could be related to differences in the intensity of utilization by herbivores. The herbaceous vegetation of the communal land site was still dominated by annual grasses as opposed to perennials on the other three sites. Basal cover of grasses was also lowest for the communal land site, as was the litter cover and the rate of infiltration. There were indications that the communal land soils were now of lower fertility than those of the other three sites, but none of these differences were significant. Woody vegetation had changed considerably in density, and the heterogeneity among plots within sites tended to mask differences between sites.

A comparison of separate game and cattle enterprises, which have been run since 1960 on adjoining, ecologically similar areas under the same overall management, was undertaken on Buffalo Range (Child 1988). Rangeland condition has been assessed in detail in 1973, in 1986 (Child 1988), and 1990, although the results of this latest survey have not yet been made available.

In 1973 the cattle section was ecologically in better condition than the game section. Thirteen years later, there were definite indications that range condition on the game section had improved, whereas it had deteriorated on the cattle section. The area under cattle now exhibited twice as much erosion as that under game, and, although there was an increase in soil capping on both the cattle and game sections, the increase on the former was threefold that of the latter. These changes in range condition can be related directly to trends in secondary production. The levels of meat harvested fluctuated but, over a twenty-six-year period, show the two systems yielded similar amounts of meat. Cattle productivity, however, was reduced by declining calving rates.

Child (1988) relates declining cattle productivity to the overstocking. The stocking rate of wildlife fluctuated considerably, increasing rapidly during the high rainfall years of the 1970s but declining massively during the drought years from 1982-84. After 1984 populations increased through natural growth at a slower rate than on the cattle section, which was restocked with cattle from elsewhere. At no point in time has the stocking rate of wild herbivore grazers on the game section ever exceeded that of cattle on the cattle section. At the time of the 1986 measurements, the cattle stocking rate was some 1.5 times that of game.

This study suggests that the meat production potential of the cattle and game enterprises is similar and that rangeland impact is largely a function of the stocking rate of herbivores. Child (1988) makes the important point that the generation of revenue from the cattle enterprise is directly related to the secondary production of beef, whereas for the wildlife enterprise the major form of revenue generation is through safari-hunting operations, thus enabling more conservative stocking rates to be maintained.

The Major Factors Influencing Environmental Impacts

There is no single biologically optimal carrying capacity that can be defined independently of the different management objectives associated with different forms of animal exploitation. Thus, for semiarid rangelands, which are subjected to erratic rainfall and characterized by large fluctuations in plant species composition, cover, and biomass, the problem becomes one of distinguishing between drought-induced fluctuations and permanent changes in vegetation states. It is doubtful that our current knowledge of savanna systems allows these distinctions to be made at present with any degree of confidence.

Comparisons of herbivore community structure between wildlife and domestic livestock systems, in terms of the biomass contributions of the different classes of feeders, leads to the important conclusion that the impact of wild as opposed to domestic herbivores on the environment, is more likely to be a question of degree rather than of a fundamentally different kind, associated with the unique effects of different herbivore species (Cumming 1982). The comparison of Child (1988) between wildlife and a commercial cattle system suggests that the environmental impacts of wildlife and cattle are determined largely by the stocking rate, rather than the different types of herbivores; this is supported by the literature reviewed by Clatworthy (1989). The research reviewed above further suggests that, particularly in semiarid environments, vegetation changes are unreliable indicators of rangeland degradation. Rates of soil loss and changes in soil chemistry and physical properties may be more reliable indicators.

Given that the *environmental impacts of different herbivore communities are determined essentially by the stocking rate rather than the types of herbivores involved*, some consideration of the stocking rates required to meet the specific objectives of different animal production systems becomes important. Data from Buffalo Range illustrate that *wildlife can be profitably stocked at a significantly lower rate than that required for cattle*, due to the high values associated with hunting safaris. Studies of communal-land farming systems show that the current high livestock numbers consistently fall far short of the populations required to satisfy the multiple needs of farmers. Thus, the communal lands are likely to continue to be heavily stocked.

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