

# USAID/Kenya Strategic Plan: Environmental Threats and Opportunities Assessment

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## 1. Executive Summary

This report, *USAID/Kenya Strategic Plan: Environmental Threats and Opportunities Assessment*, provides an overview of key trends in Kenya's environment and natural resources sector and highlights the primary threats and opportunities that exist today. Related to this assessment, Annex 6 contains a review of environmental sustainability in the USAID/Kenya Strategic Plan (2000-2005), in particular its attention to tropical forests and biodiversity conservation.

### 1.1. Institutional and Socioeconomic Framework

Kenya is experiencing difficult times, not only in maintaining a healthy environment on which to build its economy, but in other facets of life as well. The population, riddled with HIV/AIDS at increasing rates, is nevertheless still growing at an estimated 2.9 percent per year – far faster than food production or the economy is growing. The under-five mortality rate for children – on the decline for half a century until recently – is steeply on the rise. Average GDP growth, spurred along at 6.5 percent per year in the 1970s, dropped to 2.3 percent in 1997 and 1.8 percent in 1998. Mismanagement of public goods is increasingly politicized and driven by self-interest; the economic analysis and accounting firm Deloitte and Touche (1999, p.3) noted that "those who have been managing the Kenyan economy owe Kenyans an explanation." Development assistance has declined dramatically in the last decade; donor nations and institutions agree that poor governance and abuse of public property is eroding development achievements rapidly. Poverty shackles at least 43 percent of the population, and agriculture and livestock still form the main source of livelihood of the Kenyan people. Kenyans, who attach strong importance to land, have an average of less than 1/5 hectare per rural inhabitant for cultivation – an amount well below the average for the rest of the continent.

In this context exist the environmental problems described below. These negative trends are enhanced through inadequate planning, lack of adoption of sustainable land uses, and ineffective governance. There is a need for an improved set of policies supporting conservation and equitable natural resources management in Kenya as well as an attitudinal change in support of sustainable development.

### 1.2. Ecological Systems and Land Use Trends

**Overview.** The most serious underlying threats to Kenya's natural resources today are population pressures, inappropriate land tenure and land use policies, lack of awareness about the benefits of wildlife, and government and other decision-makers' inattention to these issues. These issues drive additional causal factors of environmental degradation – particularly conversion of land to agricultural use – affecting every ecosystem and region of the country.

Today, the most endangered ecosystems in Kenya are forests, terrestrial wildlife habitats, and freshwater and coastal wetlands. Coral reefs will be increasingly threatened if uncontrolled development, existing pollution, and sedimentation from upstream agricultural areas are not slowed. High potential agricultural areas risk losing productivity due to excessive subdivision and poor soil management. Agricultural conversion and division of forests, wetlands, and marginal lands threaten some traditional livelihoods, such as pastoralism, and push people farther into habitats that are better suited for wild animal management. These and other factors underlie steep declines in Kenya's wild animal and livestock numbers, degraded water quality, deforestation, and other negative impacts on environmental health.

**Terrestrial biodiversity and wildlife.** Within the wildlife sector, the situation is mixed. In most of the country's arid and semi-arid lands – which represent an estimated 80 percent of Kenyan territory – wild animal and livestock numbers are declining due to rangeland degradation and fragmentation. Migration corridors are being fenced and farmed in many districts. Rapid growth of human populations in some key wildlife areas will have serious detrimental effects on wildlife;

for example, in the Maasai Mara ecosystem the human population is increasing 7 percent annually. Protected areas and protection efforts that draw together local communities are making it possible for wildlife numbers – at least some species – to increase in some areas, while in other areas parks are being encroached on for livestock grazing, forest cutting, and agricultural use. The capacity of the responsible agencies to continue protecting these areas – particularly the extensive, non-protected range areas of the wildlife they house – is in question, for many observers.

These trends in the wildlife sector are likely to have serious impacts on tourism revenues and, if trends go unchecked, vital species and globally important wild animal migrations could be lost forever from Kenya and perhaps the whole of East Africa. Other forms of biodiversity, including plants, wetland inhabitants, and marine species, are beginning to receive more attention as well.

**Freshwater and coastal resources.** Freshwater and coastal ecosystems provide a multitude of rich resource for Kenyan livelihoods and the national economy. Kenya is endowed with richly diverse coral systems, which house and support critical fisheries and coastal stability. A number of these aquatic systems are also international recognized for their unique ecological attributes and role in regional bird, wildlife, and marine species migrations. But they are fragile systems, many only seasonally available, and most – 80 percent – are unprotected. And water is under threat in Kenya. Unsustainable extraction, pollution from agrochemicals and industrial waste, and sedimentation in dams and coastal outflow areas are increasing. For coastal areas, increasing pollution from inland sediments, oil shipping, industrial dumping, and expanding human waste streams is a serious concern. Overextraction of coastal and marine resources and inadequate controls on tourism add to the pressure on reefs. The population is growing most rapidly in water-rich areas, and competition for water is rising in wildlife areas, agricultural lands, and coastal areas. Institutional responsibilities for ensuring protection of water is not adequately invest in conservation agencies, and more importantly, they lack the mandate to draw other sectors, such as agriculture, forestry, industry, etc., into the discussion. Health impacts of degraded water quality are not well understood. Thus integrated water resources management is largely absent. In the struggle for water, stronger forces usually win over weaker or subsistence-oriented proponents. A new wetlands policy, now being drafted, may provide hope for the distant future.

**Forests resources.** Forest conversion for agriculture, degazetting of protected forests for political reasons, fuelwood collection for domestic use and markets, excessive timber and non-timber product collection, and plantation mismanagement are rapidly depleting natural capital in Kenya. Woodfuels provides an estimated 98 percent of all domestic fuel/energy resources in Kenya today, and population pressures add an enormous strain on those resources. Forests provide Kenya's only watershed protection mechanism and when they are gone, downstream water quality will decrease and sedimentation and flooding will increase. In addition to decreased density and acreage of native hardwood and indigenous fruit trees, the extent of coastal mangroves has decreased by an estimated 70 percent in this century. Some farm-based tree resources are increasing, providing the future potential to lessen pressures on nearby forests, but to date this approach has been wholly inadequate in its use and replication. The opportunity to address increasing forest and tree resources in Kenya will have enormous repercussions on other regions and systems throughout the country, including soil fertility and retention, the health of streams and rivers, the productivity of coastal fisheries, habitat for plant and animal biodiversity, etc. A new forests bill, recently released for comment, addresses some of the forces behind these trends, but its legal force is not expected to be implemented for years to come.

**Agricultural and land resources.** Agriculture employs 70 percent of Kenya's workforce. Due to the country's high population density, it only provides an average of 1/5 ha per rural inhabitant. Thus agricultural resources are much in demand; all arable land is vulnerable to “grabbing” in Kenya's current political climate. Currently, subdivision of commonly held lands and conversion of forests, wetlands, and drylands to permanent agricultural use is driving environmental degradation in many areas. Traditional livelihoods, such as livestock management, are also constrained by the need for grazing areas, water scarcity and competition for water resources, and

low market values. Official land use and tenure policies are ambiguous and do not support planning approaches that would help alleviate some of these problems.

Soil is another lynchpin resource showing negative trends. Rural migration from high to low potential areas, overgrazing, and lack of access to appropriate soil management techniques are contributing to soil productivity declines, erosion, and siltation in inland and coastal waters. Some areas where agroforestry methods are being adopted are showing gains in soil fertility.

**Energy and Urban resources.** Kenya's cities and towns are growing; even desert areas are seeing slums go up in rings around city centers. As they do, existing water supply, energy, sewerage and sanitation, and transportation services are under increasing strain. For example, energy for domestic use is a critical factor in forest degradation in Kenya, and dams for hydroelectricity are negatively impacting aquatic ecosystems and downstream agricultural lowland areas. In many urban areas, city services are incomplete and poorly maintained. In the absence of waste removal systems, untreated pollutants, both municipal and industrial wastes, go directly into street gutters, urban waterways, and eventually natural freshwater and coastal ecosystems. Such linkages between urban and rural areas are not widely recognized despite the strong connections they support.

### 1.3. Conclusion

All sectors are estimated here to have potentially negative health, ecosystem, and economic/social impacts. For health – land, water, urban, and to some extent forests are likely to have the most severe consequences and/or to pose the gravest threat to the Kenyan people. For ecosystems – land, forests, and aquatic systems face potentially "catastrophic" threats if swift remedial action is not implemented; wildlife and biodiversity faces critical consequences if changes are not enacted. For economic/social issues – wildlife, land, and forests pose the most severe problems for Kenya and her people.

Despite this grim scenario, there is cause for optimism. The media is freer than in past years, and it regularly monitors environmental crises and scandals. Popular demand for better governance of natural resources is growing. At local levels, interest is increasing for participating in and benefiting from the wise use of resources. Thanks to the Kenya Wildlife Service community conservation program, local constituencies for wildlife have grown. There are signs that the tourism sector – particularly inland wildlife tourism – is slowly recovering. Key institutions are working to get internal management systems in order, and knowledgeable people in the environmental community in Kenya have high hopes of the new policies mentioned above.

**Annex 6: FAA Section 117/118/119 Assessment.** USAID/Kenya's strategic plan supports programs in health, democracy and governance, agriculture, and natural resources management. Through careful activity design, synergies between them will ensure environmental sustainability of the Mission's program as it is implemented over the next five years. Most important in this regard are the programs in agriculture and biodiversity conservation. The Mission's draft agriculture program is being reworked to detail its underlying approach to environmental – and closely related social – sustainability issues. The biodiversity program takes a tested, community-based approach that encompasses some forest conservation as well. Lack of staffing and financial resources, however, restrain all Mission programs, limiting its ability to respond comprehensively to environmental protection.

## 2. Background

This threats and opportunities assessment is a formal requirement<sup>1</sup> of the USAID strategic planning process and is designed to support the priority-setting process of the USAID/Kenya Mission in developing its next

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<sup>1</sup> *Technical Annex B. Environment of ADS 201-51m2\DR-CD8*

five-year plan. The guidance notes that an assessment should consider the “full range” of threats and rank them using the Agency’s three environmental objectives for “sustainable development” countries:

- Safeguarding the environmental underpinnings of broad-based economic growth
- Protecting the integrity of critical ecosystems
- Ameliorating and preventing environmental threats to public health

In addition, the guidance helps interpret USAID internal regulations on environmental sustainability and tropical forests and biodiversity. These regulations are in place to help Missions make the best use of current scientific and social research on environment in their decision-making processes. A draft version of an assessment of the Kenya Mission’s compliance with these regulations can be found in *Annex 6*.

During 1999, the Kenya Mission supported a highly praised participatory process to ensure that its move into a new environmental program addressed the issues as defined by a range of experts working with its many partners in country and in Washington. This document supports that process by providing a broad overview of threats facing the environment in Kenya, based on available data and interviews with expert informants within and outside the Mission. These specialists also helped judge the relative severity of the threats facing each sector. Where suggested by informants, general opportunities are also included.

As noted in the guidance, the “relative severity of problems need not necessarily dictate environmental priorities and assistance strategies.” Similarly, the opportunities section of this assessment is provided for a broad range of parties who might be interested in addressing “environmental threats in Kenya.” Nevertheless, the threats analysis – along with the opportunities and linkages between sectors as noted in *Annex 6* – provides a framework in which to consider activity-level and synergistic programming options during the five-year period of the Integrated Strategic Plan.

### **3. Scope and method**

The paper addresses the status and severity of environmental problems in relevant sectors in Kenya in terms of USAID environmental objectives and in accordance with USAID guidance for strategic plans. The assessment was undertaken through a desk review based in Washington, DC; a visit to Kenya to acquire additional data and views; and a wrap-up period in Washington. In both locales, relevant documentation was reviewed and key informants were interviewed.

Although it is difficult in reality to draw lines between environment sectors (e.g., between biodiversity and forests or between agricultural resource use and rural water availability), this paper has done so to allow readers to focus on specific interest areas. To overcome the artificiality of the separations, specific interest areas are cross-referenced. A “general statistics and trends” section describes each sector, including (where available) an assessment of the importance of Kenya’s resources on a global, regional, and local scale. This is followed by a discussion of some key areas where informants and recent studies indicate that environmental threats are significant. Each sectoral section ends with an overview of the relative severity of threats in that sector, according to expert opinion. Agricultural resources are defined here to include livestock, water, soil, and land itself.

### **4. Overview: Kenya today**

Kenya is experiencing difficult times, not only in maintaining a healthy environment on which to build its economy, but in other facets of life as well. The population, riddled with HIV/AIDS at increasing rates, is nevertheless still growing at an estimated 2.9 percent per year – far faster than food production or the economy is growing. The recently completed census notes that the total population has now reached 29 million. The under-five mortality rate for children – on the decline for half a century until recently – is again on the rise. Average GDP growth, spurred along at 6.5 percent per year in the 1970s, dropped to 2.3 percent in 1997 and 1.8 percent in 1998. Comparatively speaking, even Ugandans, whose country suffered through a violent civil war over part of 1997-98, saw an improvement in their living standards higher than Kenyans – Uganda’s GDP grew 8 percent per year. Observers noted that “those who have been managing the Kenyan economy owe Kenyans an explanation.” (Deloitte & Touche 1999, p. 3).

Mismanagement of public goods is transparently and increasingly politicized and driven by self-interest. Development assistance has declined dramatically in the last decade; donor nations and institutions agree that poor governance and abuse of public property is rapidly eroding development achievements. Poverty – defined as earning less than \$1 a day – shackles at least 43 percent of the population, and agriculture and livestock still form the Kenyan people’s main source of livelihood. Kenyans, who attach strong importance to land, have an average of less than 1/5 hectare per rural inhabitant for cultivation – an amount well below the average for the rest of the continent.

In this context exist the environmental problems described below. These negative trends are increasingly made worse through inadequate planning, lack of adoption of sustainable land uses, and ineffective governance. There is a need for an improved set of policies supporting conservation and equitable natural resources management in Kenya as well as an attitudinal change that supports sustainable development.

## 5. Key environmental sectors facing threats in Kenya today

### 5.1. Wildlife resources and terrestrial biodiversity

#### 5.1.1. General statistics and trends.

**Globally and regionally important resources in wildlife and biodiversity.** According to the World Conservation Monitoring Centre in the UK, Kenya is among the world’s top 50 countries in terms of species richness; neighboring Tanzania and Uganda also fall into that range. Kenya’s tropical moist montane forests, East African woodland/savanna areas, and Rift Lakes wetland areas rank it among the highest geographic priorities for USAID’s biodiversity conservation goals, according to the Agency’s unpublished *Biodiversity Strategy* of 1996. Other global conservation rankings support this conclusion: Kenya encompasses habitats identified by Conservation International’s list of “hotspots,” World Wildlife Fund’s *Global 200* ecoregions recommended for conservation, BirdLife International’s *Endemic Bird Areas of the World* list, and World Resources Institute’s *Reefs at Risk* indicator. This international consensus supports USAID/Kenya’s emphasis on wildlife and biodiversity conservation.

The threat to many of Kenya’s animal and plant species is considered to be high, relative to other countries with similar rankings of species-richness and endemism. Table 1 illustrates this point with recent statistics from the IUCN *Red Lists*. Note that the **percentage** of mammals threatened in Kenya is higher than all other countries listed except Madagascar, which has experienced widespread habitat loss; Kenya has one of the highest numbers of total mammal species in Africa; Kenya’s percentage of threatened plants is also quite high. This helps indicate the relative severity of threat to Kenya’s biodiversity, in the global and African context.

**Table 1. Number of globally threatened<sup>2</sup> species in Kenya, compared to select other high-biodiversity African countries**

| Country    | Mammals                                   | Birds                                     | Freshwater Fishes  | Plants  |
|------------|---|---|--|---|
| Kenya      | 359(a)<br>21(b)<br>43(c)<br><b>12 (d)</b> | 844(a)<br>6(b)<br>24(c)<br><b>2.8 (d)</b> | unknown (a)<br>unknown (b)<br>20 (c)<br><b>unknown (d)</b> | 6000(a)<br>265(b)<br>158(c)<br><b>2.6 (d)</b> |
| Namibia    | 154(a)<br>3(b)<br>11(c)<br><b>7.1 (d)</b> | 469(a)<br>1(b)<br>8(c)<br><b>1.7 (d)</b>  | 102(a)<br>un(b)<br>3(c)<br><b>2.9 (d)</b>                  | 3128(a)<br>un(b)<br>23(c)<br><b>.74 (d)</b>   |
| Madagascar | 105(a)                                    | 202(a)                                    | 40(a)  | 9000(a)                                       |

<sup>2</sup> *Threatened* is defined by WCMC/IUCN as *critically endangered*, *endangered*, or *vulnerable*. Note: Threatened status underestimates the threat to biodiversity because the data are usually old or insufficient, and by the time a species is registered as threatened, many years have often passed since the threat began to take its toll.

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|          | 84(b)<br>46(c)<br><b>44 (d)</b>           | 104(b)<br>28(c)<br><b>14 (d)</b>           | un(b)<br>13(c)<br><b>33 (d)</b>            | 6500(b)<br>189(c)<br><b>2.1 (d)</b>             |
| Uganda   | 338(a)<br>6(b)<br>18(c)<br><b>5.3 (d)</b> | 830(a)<br>3(b)<br>10(c)<br><b>1.1 (d)</b>  | 291(a)<br>un(b)<br>28(c)<br><b>9.6 (d)</b> | 5000(a)<br>un(b)<br>6(c)<br><b>.12 (d)</b>      |
| Tanzania | 316(a)<br>12(b)<br>33(c)<br><b>10 (d)</b> | 822(a)<br>24(b)<br>30(c)<br><b>3.6 (d)</b> | un(a)<br>un(b)<br>19(c)<br><b>un (d)</b>   | 10000(a)<br>1122(b)<br>406(c)<br><b>4.1 (d)</b> |

Biodiversity: (a) total number of known species, (b) endemic species, (c) threatened species, and (d) percent of those taxa that is threatened.

(Source: Adapted from *1996 Red List*, World Conservation Monitoring Centre and World Conservation Union.)

These trends are supported by Kenya-specific studies. For example, recent analyses of Kenyan government aerial survey statistics found that over the last 20 years, wildlife numbers in the country's arid/semi-arid lands (roughly 80 percent of Kenyan territory) suffered distinct declines (De Leeuw et.al. 1998; Githaiga 1995). Together these areas, (excluding data from Narok District, which encompasses the vast transboundary migrations of the Mara ecosystem and is therefore difficult to monitor), experienced a decline in national herbivorous wildlife numbers of 16 percent between the early and late 1990s (Githaiga 1995, p. 11). See Section 5.1.4 for a discussion of recent studies relating to land use conversion and impacts on wildlife.

David Western (2000) notes that "the Githaiga report [also highlights] ...an emerging difference from the past, with some species holding their own or increasing in some places while going down in others. The differences are instructive and begin to show the impact of community involvement in areas such as Laikipia, Amboseli and Machakos." He adds that this "key finding" supports community-based wildlife management approaches such as those USAID has supported and continues today to support.

**Plant species biodiversity in Kenya.** According to the 1997 WCMC-IUCN *Red List* of plants, 31 plant species in Kenya appear on the "endangered" list. Endangered plant taxa are defined as those "in danger of extinction and whose survival is unlikely if the causal factors continue operating." Included are taxa whose numbers have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction" (Walter and Gillett 1998).

The Eastern Arc Mountains, which includes Kenya's Taita Hills and the coastal forests of Shimba Hills and Arabuko-Sokoke, is identified by Conservation International as one of the world's top 25 "hotspots." Hotspots are priority areas for conservation due to the representative nature of their flora and fauna and the high level of threat they face. Along with the upland and coastal forests of neighboring Tanzania, this area of Kenya houses "a concentration of plant species that not only surpasses anything else in such a small portion of tropical Africa, but ranks with some of the densest concentrations anywhere in the tropics" (Mittermeier et.al, p. 205). There are at least 4,000 plant species, representing 13 percent of all mainland tropical Africa's 30,000 plant species, in just 0.1 percent of the region's territory. An estimated 35 percent of these species are endemic to the area and represent a far higher number of endemics than that well-known group of "islands of diversity" – the Galapagos Islands of Ecuador (Lovett 1998a; Polhill 1988).

**Locally important resources in wildlife and biodiversity.** Wildlife species are important to Kenya for more than their global significance, however. Kenya has set aside an estimated 7 percent of its territory in national parks and reserves (Bergmark 1995). See Annex 7 for a map of Kenya's protected areas. Undocumented estimates are that approximately 75 percent of the country's wildlife live *outside* of protected areas, and even those within the system are affected by incursions, weak institutional oversight, drought, and other factors. These species draw an active

flow of tourists (see Section 5.1.2 for more information about tourism in Kenya today), which can send substantial revenues into government, private sector, and some community coffers. Wildlife products have (in the past) been used for ceremonial purposes in many areas, and medicinal species are critical to traditional health systems, which predominate in most people's physical and spiritual lives. These species are also under a degree of threat. A study conducted by TRAFFIC, a nongovernmental organization that monitors wildlife trade, examined medicinals in East and Southern Africa from 1995-97. Its findings (see Section 5.1.6) have implications not only for plant and animal medicinal species but also point to significant constraints that may be impending for traditional health systems throughout the region, and for conservation programs that hope to protect wildlife.

The USAID/Kenya Mission and its partners have identified five key areas as being of continuing importance and interest in its new program, called the Conservation of Biodiverse Resource Areas (CORE); it has written a program brief on natural resource management and biodiversity issues in these areas, which is attached in Annex 5. This annex is a detailed analysis – conducted by USAID partner organizations, particularly Pact – of potential "focal" areas the mission's planned programs could work in, based on previous work there and other current criteria. These areas include the following:

- Laikipia – Samburu area
- Greater Amboseli area
- Taita-Taveta area
- Greater Maasai-Mara area
- South Coast area

These areas are under threat from a range of pressures and to different degrees. All afford some protection to wildlife. All continue, however, to see conflicts with the needs of people, whether private landowners and ranchers; smallholder agriculturalists; inappropriate numbers of tourists; or, pastoralists seeking adequate water supplies for their flocks (Ndirangu 2000). These are key issues affecting Kenya's wildlife and biodiversity conservation sector throughout the country.

### 5.1.2. *Wildlife tourism.*

Tourism for wildlife viewing is an important component of the national economy and a source of pride for many Kenyans. In 1996, tourism in Kenya supported 11 percent of GDP and 18 percent of wage employment (Watson 1998). The tourism sector consists broadly of two primary types: beach-going vacationers largely from Europe and wildlife/safari tourism. Additional nature-based activities, such as snorkeling and scuba-diving, rafting, hiking, and boating, are gradually on the rise. Wildlife tourism is of far higher value *per tourist* than beach tourism; it contributed a full 5 percent of GDP in 1996 (USAID/Kenya 2000). In addition, its revenues are more widely distributed and benefit a greater number of Kenyan people as safari tourists generally are more mobile, visiting two to three parks and protected areas on average.

Both types of tourism have been affected negatively in recent years, eroded by external fears of internal conflict, long periods of bad weather, the U.S. Embassy bombing, and a perceived danger for foreigners in Kenya from crime and illness. Yet while these factors have been affecting tourism for three years, there do not seem to be many attempts within the Kenyan government to redress the problems. For example, the road network continues to decline. A recent economic survey of Kenya notes that there was a "further decline in the performance of the tourism sector [in 1998]: tourist arrivals fell by 10.6% from 1,000,000 to 894,300 while...the average length of stay fell by 18.6%, all resulting in a 22.7% drop in tourism earnings in 1998." (Deloitte & Touche 1999). There was a corresponding drop in wildlife tourism, which has caused noticeable difficulties for community income-generation projects dependent on tourist dollars, and for KWS, which derives a significant percentage of its operating budget from wildlife-related tourism. Thus despite the efforts of projects like USAID Conservation of Biodiverse Resource Areas (COBRA) to promote devolution of tourism income to communities living in proximity to parks and wildlife,

changes in behavior have been difficult to ascertain. Incentives have not been sufficiently large or regular to support conservation among many communities who bear the costs of damage to farm and family from wildlife incursions.

A survey of tour operators in the US, UK, and Germany who market tours to Kenya indicated that safari holidays are likely to experience the most rapid growth in the next five years; interest in trekking holidays to Africa is also expected to grow rapidly. These interests, however, do not favor specific countries. Kenya will have to compete with other East and Southern African countries for these tourists. Its strengths, according to the survey, are in its wildlife, guest accommodations, and nice beaches. Its weaknesses include crime, political instability, and "bad press." Other factors included "mass tourism," poor roads, lack of marketing [for tourism], and corruption (TTCI 1999).

In November 1999, ecotourism interests in Kenya held a workshop to discuss the country's prospects in that field and the issue of developing a successful ecotourism market. According to the workshop summary, some participants felt that Kenya needs to establish a rating system or certification program to allow it to be marketed through international ecotourism channels on a wider standard and scale (KTF, 1999). Doing so would allow safari and other environmentally-oriented tourism activities to address two of the major constraints identified in the survey mentioned above: the issue of "lack of marketing" of Kenya for such tourism, and "mass tourism," which causes environment-minded tourists to be concerned about sustainable impacts on fragile ecosystems.

#### *5.1.3. Community-based wildlife management programs.*

A primary pressure on wildlife derives from the economic needs of rural communities, who are asked to forego agricultural, ranching, and other uses of land needed for parks or other protection mechanisms. Community-based wildlife management is an approach developed to address this issue, yet it has not entirely fulfilled its promise. USAID and other donors have supported such approaches for more than a decade in the hopes that revenues from ecotourism, for example, could be directed more fully to these communities, thereby giving them an incentive to protect the animals. Sadly, only a small percentage of the revenues are returned to local communities – an estimated 5 percent, for example, in the Laikipia-Samburu system – through these programs (Ndirangu 2000). Some areas have achieved a better record and some a worse one; yet the consensus remains that the potential exists to achieve much more.

Since CBWM is such a key component of many donor and NGO environmental protection programs globally, many conservationists see Kenya's lack of CBWM results as a significant threat to the country's wildlife protection efforts as a whole. Many communities who have participated in wildlife protection schemes have become disillusioned and have regressed to using the damaging practices and behaviors seen before these efforts took place. Some have maintained the new perspective, that wildlife is sometimes beneficial. Changing such perceptions can be extremely difficult. According to David Western (2000), former head of KWS, it is the biggest obstacle to wildlife conservation in Kenya, and yet Kenyans are widely aware of and proud of the country's natural heritage.

#### *5.1.4. Livestock/wildlife/people interactions.*

Land use change throughout Kenya is having impacts on the numbers of wildlife existing both outside and inside protected areas and parks. In addition, these shifts are impacting the nature of the interactions between wildlife, people, and livestock. The ecosystems in which these conversions are occurring are also experiencing significant degradation, which may have even more profound and negative impacts on Kenya as a whole in the future. For example, findings from one of the aerial survey analyses mentioned above indicate that not only have wildlife numbers declined widely, but there have also been declines in numbers of livestock, indicating

that rangeland productivity in general is in steep decline (De Leeuw et.al. 1998). Land and soil as a specific resource sector are discussed in more depth in Section 5.4.

A 1996 study comparing wildlife – people interactions from two decades before to the current situation, in southeastern Kajiado District, between Amboseli and Tsavo West National Parks, found an increasing number of conflicts occurring. Many of these conflicts relate to the increase in agriculture as a livelihood, including among former pastoralists. In 1977, for example, access to grazing land and water was not an issue reported to by farmers as one in which conflicts arose with wildlife. In 1996, however, 13 percent of farmers responding identified this as a problem, indicating an increasing competition for open land and land near rivers, streams, and swamps. Similarly, no herders identified wildlife “trampling crops” and “bothering people” as issues in 1977, yet 20 years later, 49 percent of herders said the former was a problem, and 58 percent identified the latter (Campbell/LUCID 1999a).

#### 5.1.5. *Access to range/habitat.*

There is an active debate occurring not only within Kenya but also throughout East and Southern Africa, about the issue of wildlife habitat, animal migration, protected areas, and conflict with livestock and agricultural interests. In Kenya, numerous nongovernmental institutions support KWS in its effort to protect not only wildlife in national parks, but also in surrounding areas, common lands, and privately held lands and reserves. Increased conflict is a consequence of decreased habitat needs for wildlife and increased needs of humans for farm and rangeland.

According to data from one central district (Mbeere), which is seen as experiencing trends that are typically occurring in the country’s densely populated semi-arid areas, immigration from higher-productivity areas and in particular, changes in tenure law have forced extremely rapid subdivision of the land. The result has been that nearly all natural vegetative wildlife habitat is now gone from that area (Olson/LUCID 2000).

The consequences for wildlife are clear; when habitat is cleared, animals either move on or they gradually reduce in number and die out. Farmers face the loss in directly economic ways; for example, the lack of wild plant nectar in the study area mentioned above prevents the establishment or maintenance of bee colonies.

Some areas have seen some wildlife numbers *increase* due to increased habitat. Laikipia District is a case study. This catchment area lies between two major rivers and comprises about 20,000 km<sup>2</sup>. This rather unique area’s lack of protected lands has not affected its wildlife negatively, according to Georgiadis (2000). Local landowners have worked with research institutions, communities, and government to establish an open range area as wildlife habitat, with the long-term goal of building a new center of safari tourism. For example, costly systems to protect the highly endangered rhino have been established on private ranches there, where commercial profits from tourism make the protection efforts worthwhile.

Land use in Laikipia is following three major trends: expanding populations of poor farmers are moving gradually down from montane areas to find land; outside individuals and organizations are buying large areas of wildlife rangelands; and insecurity in rangeland areas is on the rise due to transboundary cattle raiding. In this context, landowners organized to join their land areas without fencing each, hoping to draw tourism and its benefits to the area. Communities are being encouraged to participate in this effort by establishing lodges and other safari facilities.

Numbers of endangered species, including Grevy’s zebra, have been rising in this area, while others decline. See Table 2 for a sample of data for herbivores provided by Mpala Research Centre, based in Laikipia District.

**Table 2. Herbivore counts for Laikipia**

| SPECIES                  | Apr. 1985     | Sep. 1987     | Feb. 1997     | Feb. 1999     |
|--------------------------|---------------|---------------|---------------|---------------|
| <b>Burchell's Zebra</b>  | 20,217        | 26,286        | 35,859        | 32,725        |
| <b>Impala</b>            | 10,253        | 5,320         | 8,436         | 5,714         |
| <b>Grant's Gazelle</b>   | 6,123         | 3,476         | 6,997         | 5,254         |
| <b>Thomson's Gazelle</b> | 6,775         | 6,672         | 5,150         | 4,035         |
| <b>Eland</b>             | 6,467         | 3,020         | 3,667         | 2,933         |
| <b>Buffalo</b>           | 2,318         | 3,318         | 2,655         | 2,717         |
| <b>Elephant</b>          | 1,648         | 2,546         | 1,847         | 2,645         |
| <b>Hartebeest</b>        | 3,786         | 2,019         | 2,131         | 1,724         |
| <b>Giraffe</b>           | 1,902         | 1,229         | 1,856         | 1,543         |
| <b>Oryx</b>              | 1,286         | 825           | 1,385         | 1,128         |
| <b>Waterbuck</b>         | 36            | 438           | 621           | 279           |
| <b>Grevy's Zebra</b>     | <b>416</b>    | <b>298</b>    | <b>870</b>    | <b>1,002</b>  |
| <b>TOTALS</b>            | <b>61,227</b> | <b>55,447</b> | <b>71,474</b> | <b>61,699</b> |

(Source: Georgiadis, Nicholas, Mpala Research Centre 2000).

While the data is not conclusive for all herbivores as a group, it would point to the hope for certain species that the Laikipia experience is a positive example and its lessons should be studied further and shared with other parts of Kenya.

#### 5.1.6. *Threats to wildlife medicinal species.*

According to a study completed in 1997, wild animals and plants are harvested throughout the East and Southern African region to make medicines for the millions of rural and other residents without access to – or who prefer not to use – “western” health practitioners. The study found that in many areas, the demand exceeds the supply, and demand is expected to increase substantially in the future (TRAFFIC 1998). Traditional practitioners of medicine long sought such species as the endangered black rhino and green turtle as well as the common baobab, which is used to treat dysentery. The baobab is now scarce in Eritrea and Sudan, adding to the pressures on that species in neighboring countries.

#### 5.1.7. *Relative severity of threat to wildlife and biodiversity in general*

In summary, the significant threats to wildlife and biodiversity in Kenya consist of large-scale conversion of land use from contiguous, open-access scrub/forest habitat to fenced, fragmented, agricultural use; population/immigration pressures from high-productivity agricultural areas to low or marginal areas; farmers’ and ranchers’ negative perceptions of wildlife; competition for resources; and the lack of adequate incentives, organizational capacity and support that could make a better balance between users of the system – both people and wildlife. It is difficult to apply one level of the severity of this threat to the entire country, as Kenya is endowed with a wide range of habitats and the degree of threat varies accordingly. Nevertheless, some systemic indicators of the problem award this threat a “extremely severe” label, indicating that swift action is required.

## 5.2. Freshwater and coastal resources

5.2.1. *General statistics and trends.*

**Global and regional importance.** Kenya has been granted a richly diverse range of aquatic systems and resources (See also: Table 4.3 in Annex 4; Maps 2 & 3, Annex 7). Its notable endowments include the Rift Valley soda lakes, frequented by an estimated 80 percent of the world's flamingoes, seasonal swamps and lakes that provide life-giving water for hundreds of charismatic wildlife species and livestock in dry periods, and intact coral reefs rare along East Africa's coastline. In addition, the country lies at a key point for migrating bird flocks, both Eurasian and tropical species all dependent on existing water systems.

Some of Kenya's water systems have been noted on an international level for their importance. Lakes Nakuru and Naivasha have been recognized as globally significant wetlands through the Ramsar Convention; in fact, the Lake Naivasha Riverine Commission won the Ramsar award in 1999 for the participatory and comprehensive nature of its management plan. Distinct, measurable improvements have been documented in the biophysical health of the lake ecosystem (Koyo 2000). At least 17 other potential Ramsar sites have been identified by the Government of Kenya (1990). The four most likely to be nominated include the Mzima Springs in Tsavo West National Park, the Tana River Primate National Reserve, the dry-season swamps of Lake Amboseli, and the Lake Bogoria area (Ole Nkako 1991).

Kenya's coast is important on an international level as well. Its protected areas encompass regionally important breeding grounds for migratory seabirds, marine mammals, and turtles.

**Local importance.** Aquatic resources have been a vital component of human existence in Kenya for millennia; in addition to water for domestic use, these ecosystems provide key materials for food, agricultural subsistence, cultural traditions, grazing, and many other products. They are vital components of the hydrological cycle, regulating runoff, collecting pollutants and wastes, trapping silt, and recharging ground water. They provide essential breeding and feeding habitats for many fish, birds, and other wildlife. The water systems' location and periodicity strongly determine the spread and vitality of the country's diverse biological resources. For example, about 25 percent of Kenya's bird life is dependent on wetland habitat for survival (Gichuki and Gichuki 1991). Wildlife migrations are driven in large part by their search for water. Human settlement in a largely arid country is also determined by access to water, as illustrated by the importance of seasonal wetlands to pastoralists' herds and to smallholder farming.

Kenya's wetland grasses have long been harvested as fodder for milk cows and its sedges for thatching. Other wetland-based activities include honey gathering; collection of wetland plants for food, shelter, medicine, and baskets and traps; collecting clay for building and pottery; hunting; and as sites for ceremonial purposes.

Coral reefs and wetlands harbor a vital source of food for the Kenyan and other East African populations, and provide an important source of fishing income to local people. See Table 4. They also provide a potentially lucrative source of tourism revenue for commercial and community-level operators.

**Table 4. Kenya marine and freshwater data**

| Location             | Avg. annual marine catch | Avg. annual freshwater catch | Per capita annual food supply from fish/seafood |
|----------------------|--------------------------|------------------------------|---|
| Kenya                | Up 86 % since 1983-85    | Up 112 % since 1983-85       | Up 12.4 % since 1983-85                         |
| Tanzania             | Up 68 % since 1983-85    | Down 21 % since 1983-85      | Down 8.5% since 1983-85                         |
| Western Indian Ocean | Up 59 % since 1983-85    | N/A                          | N/A   |

(Source: adapted from World Resources 1998-1999, pp. 314-316).

**General facts: Freshwater and other inland aquatic resources.** Kenya is endowed with a wide range of wetland types, including tidal swamps, estuaries, mudflats, floodplains, seasonal and dryland depressions, lakeshore and riverine wetlands, and lakes. Wetlands cover less than 3 percent of the country's land area. Spatial distribution is uneven, leaving vast dryland areas with only seasonal wetland sites – key oases during droughts for people, livestock, and wildlife. Most of Kenya's wetlands occur in high-rainfall montane areas, the coastal strip, and the Lake Victoria watershed (Nyamweru 1991).

The Rift Valley lakes are small, shallow lakes existing in volcanic soil depressions in the rift floor. Some are saline, some freshwater, such as Naivasha, which has the most diverse wetland bird life in Kenya with about 400 species (Hartley 1985). Naivasha's freshness comes via inflow from the Malewa river, a source that is now threatened by the human diversion of water to Nakuru's agricultural grounds.

The Tana River is Kenya's longest – approximately 850 km in length and supporting a catchment area of 95,000 km<sup>2</sup>. The river's tributaries begin in the Aberdares and on Mount Kenya. Tana River delta flooding is frequent and a necessary part of its high productivity. In the permanent inland and coastal riverine lakes, aquatic plant growth is profuse, providing habitat to fish, fodder for the livestock of local farmers, and grass as an important thatching material.

Kenya has highly productive swampy areas and lakes along the coastal band and in the Tana Delta. In addition, surface runoff and groundwater feed two large lakes in the Mt. Kilimanjaro foothills: Lakes Jipe and Chala. All these coastal lakes play an important economic role in water for livestock, household use, and for fish protein. They provide good quality water as they are away from pollution sources.

Approximately 80 percent of Kenya's fragile freshwater and inland aquatic ecosystem resources are unprotected. An estimated 15 percent of all coastal wetlands and 9 percent of inland wetlands have been irretrievably degraded since the early 1990s (DGIS 1999). The KWS is the authority responsible for implementation of Kenya's commitments to the Ramsar convention, but is understaffed and undersupported by government and donors. A wetlands policy now under development may help, but that effort will not be in force for years and thus its potential impact is not yet clear. The National Environment Management and Conservation Law – passed in February 2000 – defines and recognizes wetlands as a key ecosystem type in need of protection. The most important advance, according to Anderson Koyo and Ben Zech at KWS' Wetlands Programme, is that there is at last formal recognition of the conservation value of wetlands to Kenya. Next steps require that KWS receive enhanced authority – and financial support – to coordinate between agencies, for example, via community- and landscape-level land use planning for watersheds, including for areas extending *outside* of protected areas (Koyo and Zech 2000; Njuguna 1991, p. 96). Protection is a priority step because increasingly, there is a threat from population pressures, such as the need for agricultural land, and other human activities, including major threats from pesticides (Krhoda 1991), pollution, siltation, reclamation, and damming (Njuguna 1991).

The second priority, according to Koyo and Zech, is protection in some form for biodiverse wetland areas linked to the existing protected areas system, e.g., the Tana River Delta. Agreement between a variety of stakeholders needs to be achieved on the sustainable *level* of exploitation and the *distribution* of access to the resources people need. In estuaries, for example, traditional land use practices used resources but also maintained the ecological balance for millennia, whereas recent degradation is negatively impacting the system, according to a recent UNEP report (1999). Agricultural conversion is increasing rapidly in swamps, floodplains, and other low-lying water systems. Increasingly, soil erosion from upstream agricultural areas – particularly arid and semi arid areas – is becoming a problem. The Tana River, for example, is estimated to carry more than 7 million tons of sediment during flood periods (Krhoda 1991); it discharges some 3 million metric tons of sediment each year, both into the Ungwana Bay (between Malindi and Lamu) and into the Tana Delta. The Sabaki is the second longest river, also traversing extensive agricultural

lands on its course to the bay, where it discharges 2 million tons of sediment per year. According to a recent UNEP (1999) report, “such a high rate of sediment discharge is threatening the sustainability of marine and coastal ecological biotopes, such as mangrove, seagrass meadows, and coral reefs.” And there are eight other seasonal rivers that also drain into the coastal region from arid and semi arid areas. Sedimentation also causes flooding and changing of rivercourses downstream, which can impact tourism, fisheries, agriculture, and grazing practices. The impacts need to be researched further and economic downstream effects quantified.

**General facts: Coastal and coral resources.** Kenya has 536 kilometers of coastline. It is endowed with a variety of rich coastal ecosystems, including mangroves, coastal forest, grassland and bushland, wetlands, beaches and dunes, and coral reefs. Kenya’s corals are among the African continent’s few “true” coral reefs (Shumway 1999, p. 35) and its southern area houses the world’s largest continuous fringing reef (McClanahan and Obura 1996).

In the coastal zone extending from Somalia to Mozambique and Madagascar, more than 33 million people are living, according to World Bank figures (1995). Of these, Kenya has 1.8 million – 6 percent – of its total population of 28.8 million people (Hinrichsen 1998) living near coasts. Compared with some other countries in the region – e.g., Madagascar and Tanzania – this percentage is relatively low, nevertheless it is increasing and the development accompanying it is unplanned.

Kenya’s mangrove ecosystems extend 53,000 ha – estimated to be down 70 percent from the pre-agricultural period (UNEP 1999). This vegetation provides habitat for a highly diverse range of flora and fauna, not only for the local residents but also as a stopover in the annual migrations of many key African bird species. The role mangroves play in coastal ecosystems is vital to the livelihoods of many local human residents as well: “artisanal, commercial and subsistence fisheries all rely on mangrove for a large part of the catch” (UNEP 1999, p. 26). The UN report makes the point that other uses are also quite important in the local economy, including poles, tannin and dyes, boat materials, domestic fuel, medicines, food, fodder, fishing stakes, and housing materials, etc.

#### 5.2.2. *Threats to coastal and coral systems in Kenya.*

Kenya has been proactive in protecting a number of its coastal ecosystems. See Map 1 of Kenya's protected areas. The country has gazetted four marine parks and six marine reserves, most with enforcement capacity, according to the World Bank (1995). These sites protect approximately 5 percent of Kenya's reefs (CDA et.al. 1996). Kenya is obligated to establish integrated coastal area management (ICAM) programs through the Arusha Resolution of 1993 (CDA 2000).

Significant problems, however, affect Kenya’s coasts and reefs. The population growth rate is estimated at 2.6 percent per year in Kenya, and many people are moving to the coast in search of a livelihood that is not available elsewhere. Erosion and sedimentation load in freshwater sources are increasing due to land degradation and subdivision upstream in agricultural and semi-arid or marginal lands. For example, the beach near Malindi Marine Park has expanded 500 meters farther into the ocean due to rainy-season sedimentation washed down from the uplands by the Galana-Sabaki River. Agricultural chemical runoff from all of Kenya’s coastal watersheds, and industrial wastes from Nairobi and Mombasa drain directly into freshwater systems that dump them into the ocean. Coral bleaching of some areas has been severe due to temperature changes occurring in recent years.

Mombasa provides the most important port facilities for Burundi, Rwanda, Uganda, and eastern Zaire, as well as Kenya (CDA 1996). Oil spills and normal tank cleaning operations by oil tankers can often be a problem for Kenya’s coasts and especially reefs. Hinrichsen estimated that on any given day, there are approximately 200 oil tankers passing through the western Indian Ocean on their way to or from markets in Europe or America (1993).

Kenya's fishing industry is comprised largely of artisanal and small-scale fisheries; nevertheless, the fisheries close to the coast are overexploited, due to increasing numbers of fishermen and to the destructive practices, including fine mesh nets, uncontrolled spearfishing, and weighted seine nets. Farther out, trawlers from China, Japan, and South Korea are increasingly fishing Kenya's marine resources. FAO data estimated that between 1990 and 1992, these foreign fleets increased their catch by 25 percent (Hinrichsen 1998).

Mangroves in Kenya are cleared for subsistence activities, some shrimp aquaculture, and salt production. The larger patches of remaining mangroves are found round the Kiunga Marine Reserve, near Lamu, from Diani to Shimoni, and near Kilifi (Hinrichsen 1998).

The coasts are also visited every year by thousands of tourists, many from wealthy European countries. These visitors, while welcomed for the revenue they bring, demand resort-quality treatment during their stay, which requires higher consumption of water, energy, and other resources, and creates greater amounts of wastes, in the already underserved coastal areas. Access to sufficient quantity and quality of water is a serious coastal constraint. Boreholes and wells in the coastal region are subject to seawater intrusion; in *urbanized* coastal areas an even greater intrusion issue, affecting the health of many people, is pollution from pit latrines and septic systems. Currently, there is a water supply deficit, and an increasing population, especially in and around urban areas. Many tourism centers and establishments are drilling their own boreholes, drawing down groundwater levels along the coasts; all drilling is currently unplanned and unmonitored.

Mombasa provides an illustration of the urban-coastal threats to water in Kenya. Mombasa is home to many people, all contributing sewage to the city's sewage treatment facilities; the latter are out-of-date and able to treat only a small percentage of the waste. The city grew at an estimated 5 percent per year during the early 1990s, and is expected to roughly double its population of that period before the year 2019, leading to the inevitable conclusion that more effort needs to be made in establishing safer sanitation provisions.

### 5.2.3. *Agricultural development and water resources*

Conversion of Kenya's wildlands for agricultural development, as noted above, is at the root of much degradation and environmental loss throughout the country. Wetlands are especially vulnerable to this trend, both because they are fragile systems and because their soils are more fertile than most dryland areas.

Hydrological schemes for irrigation and energy production are particularly problematic. In 1991, 59 large-scale dams were in place or underway in Kenya (Keter 1991). For example, the Sasumua Dam in the Aberdares provides water to Nairobi and to irrigation sites nearby; sites including Kamburu, Gitaru, Kindaruma, and Kiambere on the Tana River are dammed; and a new dam recently created the Turkwell Gorge Lake. Irrigation projects, including Mwea-Tabere, Yala, Sondu, West Kano, and Ahero, had reclaimed some 7,800 ha for growing rice and sugar by 1991 (Mavuti 1991) and have probably been significantly extended since. A power project on the Tana River at Masinga has in its few years of existence received large volumes of silt and may become a floodplain within a few decades (Nyamweru 1991).

Agriculture is generally a damaging practice, unless soil conservation measures and environmentally benign inputs are carefully applied. Sadly, this is the exception rather than the rule. Yala Swamp, covering 17 km<sup>2</sup> in the northeast corner of Lake Victoria, has been partially reclaimed for agriculture. The Yala Swamp houses some of Kenya's endemic bird species, including the Papyrus Yellow Warbler. In one corner of the swamp is Lake Kanyaboli, which support a rich fishery and key nursery for important subsistence fish species, producing an estimated 250 metric tons in 1981. It is a "living museum" representing what Lake Victoria's fishery would have been like before the 1960s, yet it is threatened by increasing salinity – up 100

percent from 15 years ago, due to the diversion of the Yala River and construction of a dyke (Mavuti 1991).

Pesticide use is higher compared with other developed countries (Kallquist and Meadows 1977) and is especially a danger to wetlands with no outlets, particularly from persistent toxins (Krhoda 1991). Kenyan farmers use more than 300,000 metric tons of fertilizers and 7,000 tons of pesticides per year. Metal-based compounds, particularly copper oxychloride, used as a fungicide, and manganese compounds, are used commonly in Kenya, especially in Rift Valley farm lands where copper is missing from soils (Gitonga 1991). An article recently appeared pointing to massive die-offs of flamingoes in Rift Valley lakes from metal poisoning, which may have derived from a battery plant as well.

Added to this mix is a fairly new engine of economic growth, the horticultural export industry. Horticultural exports are estimated to occupy about 50 square miles of high-potential agricultural land in Kenya, where intensive methods are used to produce flowers, vegetables, and some fruit for European markets. Environmental concerns include pollution and water use. Pollution derives from pesticides, fertilizers, and plastic ground-covers. According to one export company, Homegrown Inc., herbicides are not a problem as weeds are controlled by hand (Labuschagne 2000). Kenya's export associations, in particular the Kenya Flower Council and Kenya Producers of Export Agricultural Products, have developed guidelines to minimize the abuse of pesticides. Homegrown, Inc. also notes that its water use is strictly minimized – 80 percent of its farms use drip irrigation and a tool called the neutron probe to fine-tune level of water released.

Horticulture is raising environmental – and some social – issues nevertheless. Export producers are known to use several carcinogenic and/or environmentally damaging chemicals that are banned in some western nations, including Carbosulfan 25EC and especially methyl bromide (Kweyuh 1994; PAN 1995). Residents in horticultural production areas report salinization problems and a chemical taste in the water when runoff is occurring upstream of them. Poverty and gender biases are also increasing in areas subject to agricultural intensification through horticultural export. As products are commercialized and begin to bring in significantly larger amounts of cash to farm families, men are taking over the decision-making roles from women. One example cited was that in an extensive study comparing local activities over a two-decade span, in 1975-76, village meetings to discuss agriculture-wildlife-people interactions drew many women; in 1995-96, men had replaced the women almost entirely (Campbell/LUCID 1999).

#### *5.2.4. Access to water, safe water supplies, and environmental health.*

Competition for water resources, safe supplies, and health issues related to water quality are increasingly important in Kenya. For example, the 1996 LUCID study in the Amboseli – Tsavo area found that both wildlife and poor farmers are facing increasing difficulty accessing water sources they have long used. This is increasingly true in drylands as well as in the wetter montane regions. Kenya government policy dictates that potable water should be within 4 km of every homestead by year 2000. Although government and donor programs have tried to provide water in outlying arid lands, abandonment rates of boreholes in areas of northern and eastern Kenya is high – 21.9 percent – as sedimentary rock does not hold water well (Keter 1991).

Rural environmental health issues – those related to water – include access to clean drinking water; access to safe sanitation and sewage disposal; indoor air pollution; and prevention of vector-borne disease, such as malaria (which increases when land is cleared and water is found in standing pools). Water transports pathogens and water-borne disease is a major factor in illness rates. Malarial mosquitoes can be a problem in the irrigation schemes, especially Mwea and Tabere (Mavuti 1991). Bilharzia is also prevalent – in irrigation areas in particular – due to snail infestations.

Occasionally, the definition of water-health issues is broadened to include water pollution from agricultural sedimentation or from fertilizer and pesticide runoff or contamination. All rural

inhabitants are made more vulnerable to illness and disease when water quality is degraded, and a notable cause of water quality degradation in Kenya is land conversion from forest, shrub, or bush cover to agricultural purposes. Negative environmental health conditions particularly impact the health of infants and children and contribute to the diseases, diarrheal diseases in particular, to which they are subject. The infant mortality rate for Kenya is 62 deaths per 1,000 births (Macro International 1993), compared to 90 for all other “low human development” countries, as defined by the 1998 United Nations Human Development Report. The percentage of the Kenyan population with access to safe water has also increased from 17 percent in 1975-80 to 53 percent in 1990-96. These are very positive trends; nevertheless 53 percent with access to safe water is still quite low compared to many other countries in the same range of economic growth and development (see Table 5.).

Whereas the under-five mortality rate for children in Kenya was in a steady decline for the last 50 years, it has recently risen again to 112 per 1,000 live births – an increase of 24 percent from the last decade – according to the 1998 Demographic Health Survey for Kenya (Macro International 1998). This is probably related to a number of factors, and again it is not clear what links there are to environmental degradation. Macro International, however, is conducting an analysis of the data that may soon illuminate that kind of linkage (Strong 2000).

**Table 5. Access to safe water: comparison of countries**

| Country | Population with access to safe water (1990-96) | Real GDP per capita, 1995 (purchasing power parity) |
|---------|--|---|
| Kenya   | 53%  | \$1438  |
| Togo    | 55%  | \$1167  |
| Lesotho | 62%  | \$1290  |
| Burundi | 52%  | \$637   |

(Source: UNDP 1998, p. 149.)

There has been an increase in malaria in highland areas after heavy rains, where it essentially was never seen before. Malaria there is particularly virulent because there is no immune system resistance in that area. The increase is partly due to an increase in highlands cultivation, where a trend of agricultural conversion from woodland and forest has been noted in recent years. This increase in malarial infection is likely to be related to these environmental trends because mosquito larvae can only survive where pools of standing water exist and are warm enough (i.e., probably not shaded as in the past) to allow them to breed (Masbayi 2000).

Nutrient pollution is a primary factor in the eutrophication of Lake Victoria, a critical source of water for drinking, domestic use and small-scale irrigation, for inhabitants living near the lake. Pollutants derive from agricultural runoff, untreated sewage, and deforested areas surrounding the water (ICRAF/Future Harvest 1999).

#### 5.2.5. *Other threats to freshwater in Kenya.*

**Global climate change.** The rise in global sea levels expected to result from global warming will negatively affect the topography of Kenya’s coastline and therefore also its marine wetlands (Nyamweru 1991, p. 7). Rift Valley lakes – already subject to wide variations in volume and depth levels – are likely to see ever greater changes as global warming and agricultural encroachment increase, and will therefore provide less hospitable habitat for wildlife. Plateau wetlands, such as Lake Amboseli, which are totally dry for long periods, are yet more vulnerable to climate change and land use impacts (Nyamweru 1991, p. 11). Montane bamboo and other high altitude grass will be invaded by lower altitude woody vegetation as a result of global warming, the extent of colonization depending on rate of temperature change and soil depth in those high altitude areas (Kamweti 2000).

**Invasive/introduced species.** Salvinia, water hyacinth, and water lettuce are a problem in coastal waters. These three species of floating aquatic weeds were usually originally imported to ornament private garden pools. They have no natural predators in Kenya and therefore proliferate in nutrient rich habitats, creating thick mats through which boats, wildlife, birds, livestock, and people cannot go. Worse, they consume all available oxygen and thereby pressure indigenous species. There have been successes in addressing these with biological controls, such as weevils, however, which is recommended as the most environment friendly approach for Kenya (Njuguna 1991).

ICRAF researchers have detected nutrient pollution sources that are contributing heavily to eutrophication of Lake Victoria, the world's second largest freshwater lake and a critical source for the Nile river basin as well as for inhabitants of the countries ringing the lake. Pollutants derive from agricultural runoff, untreated sewage, and deforested areas surrounding the water. Their presence has caused extensive fish kills, toxic algal blooms, and the spread of water hyacinth, an oxygen-depleting weed and a serious obstacle for boat traffic (ICRAF/Future Harvest 1999).

Nile perch, introduced in 1958, were ecologically damaging – causing a massive extinction of multiple fish species – and economically damaging – causing the decimation of fisheries, transport, and other aspects of life around Lake Victoria.

#### 5.2.6. *Relative severity of threat to freshwater resources.*

Observers say the level of threat, while not yet devastating, will soon become so if measures of improved protection are not put in place today. The difficulty in coordinating between governmental and donor agencies involved in the various aspects of watershed management increases the potential inherent in this threat, as it may end in years of delay before actions are taken.

#### 5.2.7. *Relative severity of threat to coastal and coral resources.*

In Kenya's coastal regions, human activity has taken its toll. In a ranking of the world's most diverse and most threatened reef habitats, Kenya's reefs appear – highlighted in red to indicate the highest level of threat – on map done by the World Resources Institute (Bryant et. al. 1998). Yet the region also provides one of the “signs of promise” – Mombasa Marine National Park – noted in the report documenting some of the world's most important *Reefs at Risk*. While assessments of threat levels vary, it seems clear that again, these fragile systems will be at severe risk of degradation on a large scale if planning does not take place now to avoid it.

### 5.3. Forest resources<sup>3</sup>

#### 5.3.1. *General trends and statistics.*

**Global and Regional Importance of Kenya's Forests.** Forests are under extreme threat throughout the East Africa region. Kenya's are the most diverse (Sayer et.al. 1992). See Map 4 in Annex 7. Kenya's forests – classified as either indigenous (natural) or plantation – comprise a number of regionally rare and globally threatened ecosystems and habitat sites. Some indigenous forests, for example, are more than 500 years old, which is rare in Africa, and they provide habitat for unique and important animal and plant species. Little is known of the endemic species they house, especially about the aged forests (Mwangi 2000). Conservation International has designated the Eastern Arc Mountains, including Kenya's Taita Hills forests, among its top 25 global "hotspots" for urgently needed protection. The Hills is a major water catchment area and high source of plant endemism, surrounded on all sides by plains, and its richly diverse resources are just beginning to be recognized within Kenya as being in need of monitoring and protection.

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<sup>3</sup> Note: this section draws on Kamweti, 1999; key informant interviews (Mwangi, 2000; and Kamweti, 2000); and additional sources.

A new initiative of the Forest Health Management Centre, supported by the United States Forest Service through USAID, will help do so with satellite imagery, ground plot monitoring, and consultation with local people. As noted in Table 6, Kenya's rate of loss/gain of forest cover is largely similar to other countries within the region. Some transboundary effects are being seen, however (e.g., vast quantities of timber for poles [e.g., electricity, telephone, construction, etc.] have begun to be imported from Tanzania in the last three to four years to fill needs Kenya can no longer supply internally [Mwangi 2000]).

**Table 6. Kenya, neighboring countries: forest resource profiles**

| Country                                | Forest and Other Wooded Land 1990 Extent (000 ha) | Forest Area          |                           |                      |                           |                      |                           |
|--|---|----------------------|---------------------------|----------------------|---------------------------|----------------------|---------------------------|
|  |   | Total Forest         |                           | Natural Forest       |                           | Plantation Forest    |                           |
|  |   | 1990 Extent (000 ha) | Annual % Change (1981-90) | 1990 Extent (000 ha) | Annual % Change (1981-90) | 1990 Extent (000 ha) | Annual % Change (1981-90) |
| <b>Kenya</b>                           | 16,816  | 1,305                | 0                         | 1,187                | -1                        | 118                  | 2                         |
| <b>Uganda</b>                          | 16,023  | 6,366                | -1                        | 6,346                | -1                        | 20                   | 0                         |
| <b>Tanzania</b>                        | 68,497  | 33,709               | -1                        | 33,555               | -1                        | 154                  | 13                        |
| <b>All Greater Horn Ctrs. (Region)</b> | 231,807   | 100,270              | NA                        | 99,402               | NA                        | 868                  | NA                        |

(Source: Adapted from Veit, ed. 1998, p. 423.)

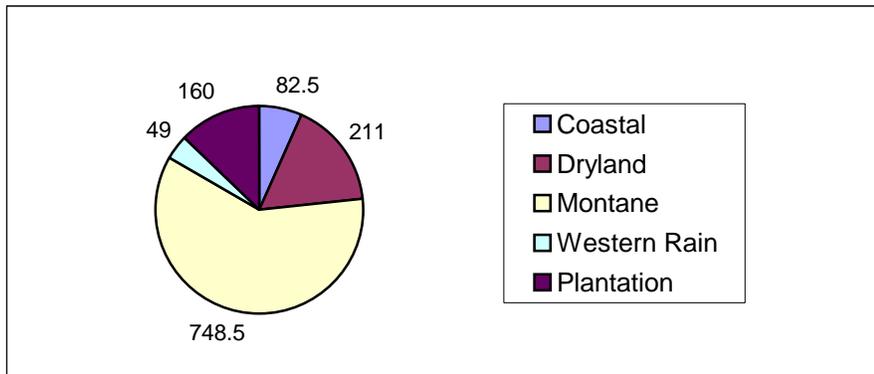
**Local importance of Kenya's forests.** This mostly arid country relies heavily on its forests as the only protector of its critical water catchment areas. According to Kamweti (1999), "net sustainable benefits from indigenous forests are in the order of Kshs. 1 billion" (about US\$13.9 million) annually. He adds that potential resources from plantation forests could triple that amount, if conditions were right. Local subsistence use of forest resources may add yet more to this total, if calculated. Although efforts were made for this assessment to find studies quantifying national or local economic impacts of forest and other resource degradation, the consensus among key informants was that such linkages are yet to be well researched. Nevertheless, it is clear that loss of watershed protection alone endangers agricultural production and hydroelectric power systems, and therefore has significance for Kenya's national economy as a whole.

Forests also provide significant cultural and subsistence resources for the Kenyan people. The Kaya forests of the coast are small but important patches of lowland forest, now protected by local custom for sacred ceremonies of nearby villages. Sadly, even this protection does not guarantee their safety, however. Tree poaching and clearcutting were recently discovered in a raid in Kwale District, where large and small trees suitable for carving and building were destroyed (Nation 2000). In a country suffering from such extremes of poverty, however, it is hardly surprising.

**General Facts.** Forests are under enormous pressure in many countries, providing the only source of available land for farming and resources for fuel for rural migrants. Kamweti (2000) estimates that if forest degradation in drylands and gazetted areas continues as it is today, Kenya's forests will disappear within three to five years. Forests – comprising montane forests, coastal forests, dry woodlands, plantations, and rain forests – cover only 2.1 percent of the total land area. Much of this area (1.64 million ha) has been gazetted – protected in forest reserves – in varying amounts: indigenous (1.06 million ha); plantation (0.16 million ha); and lowland (0.42 million ha) areas are protected. This protection is critical for keeping the remaining forests intact, as they occur largely

in densely populated-high potential agricultural areas, covering 10 percent of the land in that zone (Kamweti 1999). Other protected indigenous forest occurs in national parks and reserves.

**Figure 1. Land area under major forest types, 000 ha**



(Source: Data from Kamweti 1999. Note: Dryland forests include grassy areas as forests if they have 10-40 percent woody plants.)

Kamweti (1999) notes that some common constraints facing indigenous forest types are:

- High population pressure that puts enormous strains on limited resources
- Inadequate involvement of local communities, including lack of incentives for local people to conserve indigenous forests
- Limited alternative resources to offset pressure on forest resources
- Low agricultural yields as a result of which forest land is encroached (i.e., excision to make room for food production)

The most severe threats noted include the need for fuelwood, as current population pressures on these resources make the level of extraction unsustainable (Mwangi 2000), and the permanent conversion of forests to agriculture, especially in marginal/low productivity areas. As these are low productivity areas to begin with, they produce little, which drives further conversion. “Such extended cultivation has drastically reduced the once [wide] dispersal area of wildlife, with typical cases being the areas under wheat cultivation in Narok District and other new settlements around the Aberdares Forests. Wildlife has as a result been confined to the protected forests and national park areas. Degradation of protected areas, such as Tsavo National Park and the Aberdares National Parks, particularly at the Salient areas, are a result of wildlife confinement” (Kamweti 1999). The failure of sustainable agroforestry practices to be successful on a national scale after decades of investment in research points to inadequate support for practical approaches and incentives for community woodlots, on-farm tree management, and private sector plantation management.

Kamweti’s (1999) conclusion from a perspective of several decades of forestry work in Kenya is that “most of the constraints are institutional in nature.” For example, although there is a national ban on cutting down indigenous forests, trees are illegally cut down anyway. Part of the problem is the lack of political will to implement the policies and laws already in place. They could also be greatly improved; a newly proposed Forest Bill, released in March 2000, bears the weight of many hopes for such improvement. On-farm tree planting has increased; this may also be supported further once the bill becomes law.

### 5.3.2. Fuelwood and charcoal use

Out of the 22 million tons of wood products used every year in Kenya, 2 million tons are required for the country’s production of paper, construction, poles, etc.; 20 million tons are used for fuel. Fuelwood use for domestic needs is increasing, according to Mwangi (2000). He estimates that while in 1981 about 92 percent of domestic energy needs came from fuelwood and charcoal, in 2000 roughly 98 percent come from these sources. In urban areas only 10 percent of the

population use non-wood sources for fuel, thus 90 percent still require wood-based fuels transported and sold in urban areas. As charcoal is lighter to transport, it is the more common fuel, despite its inefficient use of wood.

Policy documents do not recognize the problem of charcoal/fuelwood use as a cause of deforestation. The draft forest bill suggests that 10 out of the 350 Ksh. paid by urban dwellers for each bag of charcoal should go back to the forest areas, especially drylands, and be used for reforestation. Even this small step may need further fine-tuning before it can be implemented, however (Mwangi 2000).

#### *5.3.3. Degazetting and encroachment*

As noted, by far the most severe pressure on forests is their permanent conversion to agriculture. Recently, there has been a spate of illegal encroachments and excisions and this is seen as a precursor of official degazetting of forest reserves. As 2002 elections approach, this is expected to continue to be used as a short-term safety valve to calm populations clamoring for more agricultural land. The current Forest Act, CAP 385 permits the Minister to degazette forests areas with very little public notice. Fortunately the proposed Forest Bill makes excision procedure very cumbersome by introducing requirements such as undertaking of environmental impact assessment and final concurrence of the Parliament before excision takes place. In addition, the Bill makes a provision for a watchdog quasi-independent board to oversee such decisions (Mwangi 2000). The board may include institutions, such as the Kenya Forest Service, KWS, Moi University, and National Museums of Kenya. Observers anticipate policy statements to be implemented through the new bill which will be enacted by the end of the calendar year. Penalties for removal of forest products will also be higher, based on 10-50 percent of the market value – higher for higher value products (Mwangi 2000).

#### *5.3.4. Forest productivity*

Plantation forests in Kenya are generally very low yielding at the present time. Almost all plantation areas have been severely degraded, degazetted, and converted to agriculture, or just generally mismanaged. Kamweti (1999) postulates that if these areas were to be brought back under active and sustainable management at 30-year rotations, there would be 5,333 ha annually to be harvested. At an annual yield of 20m<sup>3</sup>/ha, total volume would be 600 m<sup>3</sup> per ha at harvest or 3 million m<sup>3</sup> from an area of 5,333 ha. At a royalty of Kshs.1000 per m<sup>3</sup>, income would be Kshs.3 billion. If the costs of establishing and maintaining a forested area are about 30 percent, a balance of Kshs.2 billion could be put back into forest conservation and the rest could go to the Treasury.

#### *5.3.5. Relative severity of threat to forest resources in general.*

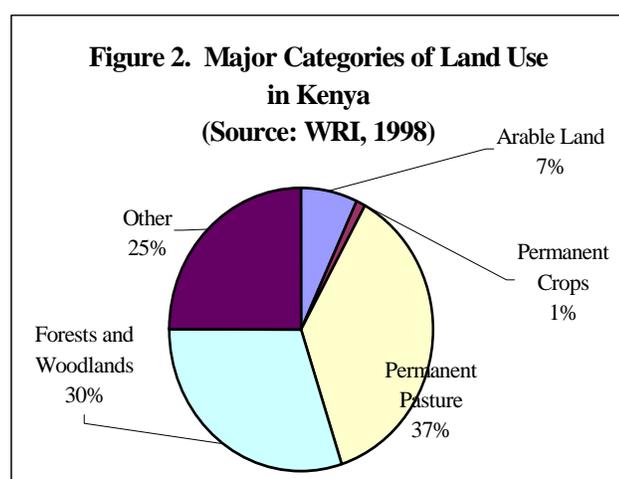
If the pace of change and loss continues as today, the severity of threat to forest ecosystems and plantations is very severe indeed – possible disappearance within five years! Disappearance, however, is not the only difficulty with forest loss – there are inevitably also impacts on related ecosystems to consider. Through erosion and increased sedimentation of waterways, water catchment stability is the biggest potential impact on downstream ecosystems. Even today, deforestation in montane areas, such as the Aberdares, Mt. Kenya, and Mt. Elgon watersheds, is a serious threat to ecosystem health downstream (Kamweti 2000). Connections with energy needs in Kenya are a significant factor in deforestation and demand for wood products, and are inadequately addressed in the forestry sector.

How the new forestry law, once in place, will change the situation is unclear. Certainly, more power will be in the hands of local communities, District environmental officials, the private sector, and the NGO community to participate in decision-making about forest use, gazettement and degazettement, and other activities (Ministry of Environment and Natural Resources 1999). How well it is enforced will determine its level of success.

## 5.4. Agricultural resources and land use

### 5.4.1. General statistics and trends.

Land is the most sought-after resource in Kenya. Land has deep cultural importance for Kenyans, and in the current economy, represents the only livelihood option for many. Sadly, agricultural development, competition for agricultural resources (e.g., productive land, water, livestock, and market access), and degradation of existing resources are at the heart of many of Kenya's environmental problems, as noted in previous sections of this paper. USAID/Kenya's 1996-2000 strategic plan (p. 50) noted that "the key to economic growth in Kenya lies with its agriculture, which dominates the economy and employs 70 percent of the country's work force." Competition for the wherewithal to establish viable agricultural livelihoods, increasing populations, and marginal land quality are driving much of the degradation and destruction of wildlife, water, forest, and coastal resources across the country. **Figure 2** illustrates the current percentage each land use category manifests. Arable lands are notably a small percentage of the whole. Arid and semi-arid lands (ASALs) comprise 88 percent (GOK 1992). These lands are not only highly susceptible to seasonal aridity, drought and in some areas desertification, but also to periodic floods – as in 1997 and 1998, wind erosion, and increasing conflict over resources.



As noted in Table 7., Kenya has experienced changes in land use similar in some respects to its neighbors (e.g., domesticated land overall as a percentage of land area is almost on a par with domesticated land in Madagascar, Tanzania, and Uganda). Kenya's population density, however, is higher than that of these neighbors, except Uganda, and both Kenya and Uganda have lost land classified as "other" since the early 1980s. In Kenya's vast grasslands and savannas, more cropland is replacing former wildlife habitat.

**Table 7. Kenya, Neighboring Countries: Land Area and Use Data**

| Country           | Land area (000 ha) | Population Density (per 1000 ha) 1996 | Domesticated land as a % of land area 1994 | Land Use (000 hectares) |                        |                   |                        |                     |                        |            |                        |
|-------------------|--------------------|---------------------------------------|--|-------------------------|------------------------|-------------------|------------------------|---------------------|------------------------|------------|------------------------|
|                   |                    |                                       |  | Cropland                |                        | Permanent pasture |                        | Forest and Woodland |                        | Other Land |                        |
|                   |                    |                                       |  | 1992-94                 | % change since 1982-84 | 1992-94           | % change since 1982-84 | 1992-94             | % change since 1982-84 | 1992-94    | % change since 1982-84 |
| <b>Kenya</b>      | 56,914             | 488                                   | 45   | 4,520                   | 6                      | 21,300            | 0                      | 16,800              | 0                      | 14,924     | -2                     |
| <b>Madagascar</b> | 58,154             | 264                                   | 47   | 3,105                   | 3                      | 24,000            | 0                      | 23,200              | 0                      | 7,849      | -1                     |
| <b>Tanzani</b>    | 88,359             | 349                                   | 44   | 3,660                   | 24                     | 35,000            | 0                      | 33,067              | -2                     | 16,632     | 0                      |

|               |        |       |    |       |   |       |   |       |   |       |     |
|---------------|--------|-------|----|-------|---|-------|---|-------|---|-------|-----|
| <b>a</b>      |        |       |    |       |   |       |   |       |   |       |     |
| <b>Uganda</b> | 19,965 | 1,015 | 43 | 6,780 | 9 | 1,800 | 0 | 6,300 | 5 | 5,085 | -15 |

(Source: World Resources 1998-99, p. 298) (Note: Other land is defined as grassland not used for pasture, wetlands, marginal lands, etc.)

All key informants and literature consulted for this paper agreed that land policies are problematic in that they are either not well defined or are actively supporting destructive trends at the local level, in terms of migration of groups farther into marginal areas and in division of land into parcels often too small to support livelihoods. Although there is no clear change in policy foreseen, studies have been done in recent years that point out these difficulties so there is some impetus in that direction.

#### 5.4.2. Productivity of agricultural lands – high, arid/semi-arid, range, and marginal

See Map 5 of Kenya's arid districts. Kenya is endowed with extended lands suitable for pasture and dryland crops; has a smaller area suitable for crops with medium-level moisture requirements; and has even less suitable land for high levels of production of crops with high-level moisture requirements, these being found largely in montane zones and low-lying wetland areas. FAO studied the suitability of Kenya's agroecosystems for these varying levels of production and cropping in rainfed conditions; see Table 8 for examples of its findings.

**Table 8. Areas (km2) of land in Kenya suitable for rainfed crop production**

| Crops                                 | Suitability rating |                     |                     |              |
|---------------------------------------|--------------------|---------------------|---------------------|--------------|
|                                       | Very suitable      | Moderately suitable | Marginally suitable | Not suitable |
| <b>Pasture</b>                        | 14,323             | 15,551              | 36,943              | 289,993      |
| <b>Fuelwood (not nitrogen fixing)</b> | 9,583              | 22,509              | 27,599              | 412,221      |
| <b>Tea</b>                            | 1,785              | 8,926               | 10,035              | 536,029      |
| <b>Barley</b>                         | 4,771              | 7,030               | 17,689              | 519,458      |
| <b>Rice</b>                           | 95                 | 1,572               | 8,960               | 541,515      |
| <b>Banana</b>                         | 0                  | 647                 | 5,253               | 563,470      |

(Source: FAO, 1993).

Clearly, even for the crops and land uses for which Kenya is well known, such as pasture and tea, only a small percentage is suitable out of the total area for producing these crops, when considering soils, climate, length of growing period, rainfall, erosion potential, etc.

Agricultural research and promotion institutions have for several years been advising an approach of intensification and increased market focus in high-productivity areas, which they felt would alleviate some pressures on arid/semi-arid and marginal lands. The primary aim was to assist smallholder farmers, many of them women, to make more efficient and profitable use of the resources they had. Smallholders contribute about 75 percent of all agricultural production in Kenya. Sadly in many areas this has led to excessive individual ownership and subdivision of land for private plots too small for production. Increasingly, this trend is moving "downhill" (i.e., into medium, low, and even marginal potential areas) where to produce the needed yields for survival, farmers must convert ever-larger plots.

Some areas, such as Machakos District, have worked for decades to build soil productivity despite the natural depletion present in many semiarid soils, by building terraces and using other conservation measures. Machakos is largely devoid of wildlife, however, perhaps indicating the eventual incompatibility of the two land uses.

Pastoralism may be ending as a way of life in Kenya within the next few decades. As noted in a recent study, "due to the limitations of an ever-shrinking resource base and factors such as ecological degradation, episodic droughts and insecurity, pastoralism as a production system cannot any longer support the pastoral communities in the arid lands of Kenya" (RANTCO, 1999, p. 10). Livestock production is suffering from declines in soil productivity and lower land availability in Kenya. See Table 9 for an example of data for part of Meru District.

**Table 9. Per Capita Livestock Holdings (Tharaka, Meru District)**

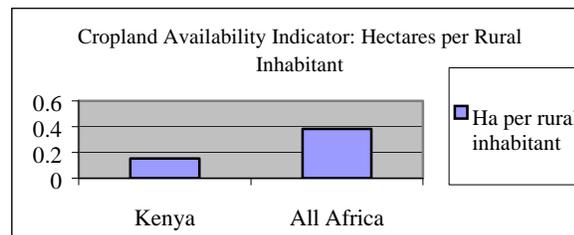
|                             | 1956    | 1980    | 1988    |
|-----------------------------|---------|---------|---------|
| <b>Total Livestock</b>      | 124,000 | 207,277 | 152,557 |
| <b>Total Population</b>     | 21,500  | 50,277  | 73,579  |
| <b>Livestock per capita</b> | 5.8     | 4.1     | 2.1     |

(Source: various, cited in GOK, 1992, p. 28).

The RANTCO report recommends ensuring that some choices and communal land ownership and land use options remain in place for management of pastoral areas, as policy decisions are made in future about land use and tenure regimes for Kenya (1999).

*5.4.3. Subdivision and conversion of vegetation/forest to agriculture.*

Globally, habitat loss and fragmentation is considered the primary threat to biodiversity and endangered species conservation. In Kenya, the deliberate policy of subdividing land traditionally held in common, and accessed for its different resources by pastoralists, wildlife, and smallholder farmers, is furthering the "expected" process of fragmentation and restricted access for each of these stakeholder groups even more rapidly. See Cropland Availability Indicator: compared with the average cropland available today for all Africans, Kenyans have less than half that amount due to the excessive subdivision of land. (Data from World Resources Institute, 1998). The government of Kenya has noted that small plots, i.e., 0.5 ha or less, cannot provide more than a part-time income for a family, even when adequately irrigated (GOK, 1992, p. 46).



The COBRA project began in 1991 with the assumption that the government "would remain committed to developing and operationalizing principles of land use management that are rational and sustainable." It appears in hindsight that the government was not so committed, even long before the 1990s (e.g., see Mwangi, 1996). The government actively encouraged a program of subdivision and individual titling on group ranches and other communal lands. Even in low potential areas, such as group ranches surrounding various national parks, subdivision is beginning to occur (Campbell, 1999; Githui, 2000).

The land use conversion documented in the Mbeere study mentioned in section 5.1.5. has caused clearing of almost all of the natural vegetation and wildlife habitat that existed in 1961. Bush cover, for example, went from 65 percent in 1961, to 46 percent in 1982, to 6 percent in 1995. Farmland increased at the same time from 24 percent to 39 percent to 84 percent (Olson/LUCID, 2000.)

The Campbell/LUCID study (1999a) comparing wildlife – people interactions over 20 years in the Amboseli Tsavo area also points to the strong possibility that, although group ranches have not been formally subdivided yet in this area, they may be soon. Tensions between elders and younger people, who seek more secure authority over land, are driving these changes. Maasai ranch members with knowledge of the land tenure changes occurring elsewhere have been seen

marking off choice areas for themselves. Researchers fear the results of such a process may lead to conversion of land use, and consequent loss of cover and wildlife habitat, similar to that noted in the Mbeere study.

#### 5.4.4. *Soil erosion.*

Erosion is increasing in those areas being converted rapidly from vegetative cover to agricultural land. National level statistics were not obtained for this paper, however several examples of Districts undergoing rapid conversion are presented. For example, the land being converted in Mbeere district is marginal, and therefore of low productivity, and when the rains are irregular or absent, as they often are, farming families don't produce enough to feed themselves. Land is not being left fallow for as long as it has been traditionally, leading to an increase in erosion. Additionally, more than half of all men in the area has left to find additional work, leaving women to manage the households. This rapid change has had negative social and economic impacts on the area. Whereas a poor household can often raise its economic standard over time, many farming households in Mbeere district are not able to increase their income levels. Poverty is therefore on the rise as the population grows (Olson/LUCID, 2000).

Erosion trends have been extensively studied for Machakos District, where soil conservation measures are widely practiced. Grazing areas in the district still suffer eroding soils on a serious level, however some terraced (cropped) areas do show less degradation than many agricultural areas in other parts of the district and of Kenya, according to researchers who have examined long-term trends in Machakos (Tiffen, Mortimore, and Gichuki 1994, p. 117). Erosion is a serious problem for Kenya's arid areas as a whole, however, as noted by increasing sedimentation and declining crop productivity mentioned in other sections of this report.

#### 5.4.5. *Irrigation of agricultural areas.*

Irrigation schemes extend over 40,700 ha in Kenya, encompassing 19 different projects in various parts of the country (FAO, 1993). Approximately 11,500 ha of these lands are under small-scale schemes, largely in ASALs (GOK, 1992). As noted in the section on threats to freshwater systems, large-scale dams developed for this purpose have caused a variety of environmental and social problems already in Kenya. The government's most recent policy for irrigation development in arid and semi arid lands notes that "there has been a long history of successful, low-cost, small-scale irrigation schemes in ASALs extending back to the pre-colonial era. However, in recent years, pre-occupation with the development of large-scale irrigation schemes in the country has caused these past achievements to be ignored. When new schemes are proposed for the ASAL areas, the basic approach will be to adapt accessible irrigation technology to the needs of smaller units." (GOK, 1992, p. 10). Environmentally sustainable approaches are favored in this policy.

The policy document notes that a number of irrigation experiences have been negative for reasons ranging from high costs to overestimation of impact to social costs of removing people from impacted areas. "Even small irrigation schemes on low-lying and seasonally damp land...can take away land that is necessary for the survival of pastoralists in dry years" (GOK, 1992, p. 46).

#### 5.4.6. *Relative severity of threat to land and soil resources.*

The issue of land use change and threat to soil and land resources in Kenya merits an "extremely severe" ranking, due to the nature of its long-term impacts on all sectors of society, in economic development, ecosystem health, and human health. This is an area requiring drastic attention and action.

### 5.5. Energy resources

5.5.1. *General statistics and trends.*

Energy is not always perceived as a "natural resource," although most of the raw materials used to create it are; by the same token, energy is not always seen as directly related to environmental concerns. In Sub-Saharan Africa in particular, this is true, as the region's per capita consumption of "modern" energy resources is lower than any other part of the globe (Karekezi and Mackenzie 1992).

Kenya's energy comes from a range of sources, including hydroelectric dams and geothermal plants. Fossil fuels, and woodfuels, especially fuelwood and charcoal, comprise a significant percentage of domestic use, even in cities and towns. Urban populations, which are growing rapidly, use mainly charcoal, a refined energy which can be sourced from distant areas. Considering the low conversion rates of raw wood into charcoal ( about 10%), considerable environmental degradation is caused by the energy consumption pattern in urban areas.

Electrical energy makes up approximately 12 percent of the national energy supply; 603.5 megawatts (MW) coming from Kenya's hydro plants, 156.3 MW from thermal sources, 45 MW from geothermal, and another 240 MW are imported from Uganda (MENR 1994, p. 15). Other sources, both domestically produced and imported, include ethanol for the transportation sector, coal for the cement industry, and petroleum products for transport and some domestic and industrial use. The household sector uses the highest percentage of energy use, 59 percent; industrial sector is a major user of *commercial* energy, using between 13-15 percent, or 4 percent of *total* energy use (Nyoike 1992, p. 129).

See Table 10. for recent data from the United Nations Development Program *Human Development Report*.

**Table 10. Energy statistics: Kenya, other "low human development" African countries**

| Country                                      | Tradition fuel use as % of total fuel use |           | Electricity use per capita (avg. kwh per annum) |            | Commercial energy use (oil equiv.) kg per capita |            |
|--|---|-----------|---|------------|--|------------|
|  | 1980                                      | 1995      | 1980  | 1995       | 1980   | 1995       |
| Kenya  | 75  | 78        | 109   | 144        | 120  | 110        |
| Tanzania                                     | 84  | 91        | 41  | 58         | 55   | 34         |
| Malawi                                       | 89  | 90        | 66  | 83         | 54   | 39         |
| <b>All "low human development" countries</b> | <b>51</b>                                 | <b>40</b> | <b>143</b>                                      | <b>307</b> | <b>112</b>                                       | <b>177</b> |

(Source: UNDP 1998, p. 179)

In the 1970s, Kenya began to examine energy efficiency and conservation as strategies to reduce dependence on external oil resources. At the same time, the country invested in its own hydroelectric and geothermal sources. Over the decades, an estimated 500,000 efficient stoves have been distributed through local NGO networks and have had various degrees of positive impact (Karekezi 1989). The Ministry of Energy did put in place two conservation initiatives: the Kenya Industrial Energy Management Programme (KIEMP) and the Kenya Energy Auditing Programme (KEAP). KIEMP is responsible for information sharing on voluntary efficiency-building measures and receives funds only at the discretion of donors or the industry itself. KEAP has been effective in its task of providing technical assistance for industry energy audits, etc. The World Bank and UNDP have also supported effective projects, including the Energy Sector Assistance Program (ESMAP). Energy sources are generally inadequate to meet the demand and/or are unevenly distributed; residents of Nairobi, for example, have experienced frequent power outages and rationing in recent months. Energy conservation, however, is a low priority in

Kenyan industry, and the regulatory climate adds barriers in the form of distorted pricing, policy, and import regimes (Nyoike 1993).

This overall energy situation has implications for the rural environment in terms of threats to forests and agricultural ecosystems. These threats are very severe. See Section 5.3.2 for an overview of forest degradation due to fuelwood collection and charcoal uses. Kenya's quest to dam rivers for hydroelectric power is also seen as problematic, particularly to those in Kenya working on wetlands conservation; whole river courses and floodplains have changed in recent years. See Section 5.2.3 for a discussion of some problems being created by hydroelectric dams in Kenya.

#### *5.5.2. Relative severity of threat to energy resources.*

Other regions have experienced the problems caused by inadequate planning in the energy sector in terms of rural resource exploitation, painfully visible energy shortages – such as those Nairobi has experienced in recent months, and urban and indoor air pollution. Kenya and other African nations have an advantage in that they can learn to circumvent some of these problems by addressing the issues in advance.

One issue that Kenya will need to consider is the lack of data on greenhouse gases and other emissions and urban pollutants. But as noted by Mackenzie and Christensen (1993, p. 156), “in the African context very limited information is available at present on emissions from any of the energy sources and devices. Although smoke emitted from domestic burning of woodfuels has been recognized as one of the main health hazards for women and children especially, very few activities have been initiated to analyze the complex problems.”

Despite these fears, energy overall does not seem to be the most critical environmental problem facing Kenya today. For example, there was an increase of 7.6 percent in total installed electricity generating capacity in 1998 (Deloitte & Touche 1999). The impact of deforestation for fuelwood needs and charcoal production is of the gravest concerns, however, as is the long-term damage caused to watersheds from hydroelectric dams.

### **5.6. Urban environmental resources**

#### *5.6.1. General statistics and trends.*

Urban environmental issues are increasingly recognized in Africa for the importance they bear in quality of life and economic development for major portions of the population. In addition, the linkages between urban and rural water supply and quality, human and industrial waste disposal and treatment, transportation, roads, housing, energy, chemical pollution, and habitat loss are beginning to be identified as important concerns in environmental planning. These links are often unseen in considering rural environmental and natural resource management planning, however they impact those sectors heavily.

Urbanization tends to concentrate both environmental problems and solutions, according to Anderson and Erbach (2000). While the difficulties arise faster and in a denser form due to the close quarters in which many people live, the solutions, such as piped water supplies, solid waste collection, and grid-based energy supplies, are also more efficient. Population growth rates in urban centers are higher than in rural areas, due to immigration from rural areas and other factors (WRI 1996). Consumption rates also tend to be higher, particularly in wealthy areas of cities and towns (McGranahan and Songsore 1994). Issues related to forest and agricultural resources, which are not often considered in the context of "urban environmental management," also arise in the African milieu. Africa's cities usually have developed in a more "rural" way than urban areas in most other geographic regions, and even today the lines between 'what is urban' and 'what is rural' are extremely vague; for example, Richard Stren (2000) estimates that approximately 27 percent of Nairobi's population is involved in some form of urban agriculture. Goats are

commonly seen grazing the medians in major thoroughfares downtown. Rural sensibilities – including the rural province or district an individual identifies as his/her home, the social connections associated with ethnic group, and the access to common resources – all continue to be strongly evident among urban dwellers in Kenya. When a vast Nairobi city park called Karua Forest – known as the "lungs of Nairobi" – was degazetted with little notice and parts distributed to private interests in early 1999, the action touched off a violent conflict which made international headlines.

Kenya is estimated by the World Bank to have 33 percent of its population living in urban areas at the current time – a number projected to surge to 48 percent by the year 2020 (Urban snapshot 2000). See Table 11. for an overview of Kenya and neighboring countries' urban statistics. Nairobi is estimated to have grown more than 600 percent since the 1950s, to a population of 4.5 million. It was originally designed to house a maximum of 1 million (Hinrichsen 1998). The country is part of an urbanization trend throughout the continent, which excels chiefly in that its cities are growing faster with lower economic growth than any other region of the world. Two-thirds of the residents of these areas live in slums and peri-urban green area ringing the city; residents here have little access to municipal services, a particular concern being lack of water supply, sanitation, and health services. However, 78 percent of Nairobi's households are estimated to be connected to a water supply and 35 percent to sewerage systems (WRI 1998).

**Table 11. Urban - rural environmental statistics for Kenya and neighboring countries**

| Country  | Urban population growth (annual %) | Access to sanitation (% of total population) | Access to sanitation (% of urban population only) | Access to safe water (% of total population) | Access to safe water (% of urban population only) |
|----------|------------------------------------|--|---|--|---|
| Kenya    | 6.3 (1993) - 5.3 (1998)            | 43 (1993)                                    | 69 (1993)   | 49 (1993)                                    | 74 (1993)   |
| Tanzania | 6.1 (1993) - 5.3 (1998)            | 86.2 (1993)                                  | 97 (1993)   | 49 (1993)                                    | 65 (1993)   |
| Uganda   | 5.5 (1993) - 5.4 (1998)            | 66.8 (1993)                                  | 60 (1995)   | 41.8 (1993)                                  | 60 (1995)   |

(Source: World Bank Urban Data Tables 1999).

Coastal areas and inland waterways are the first place to look for the impacts of urban environmental resource use in Kenya. The vast majority of municipal and industrial wastes created in Kenya are untreated when they eventually find their way into the Indian Ocean. Nairobi's systems are completely overwhelmed. In Mombasa, industries are known to dump untreated wastes directly into waterways and the ocean. Tudor Creek and Kilindini Creek, for example, are badly polluted.

#### 5.6.2. *Relative severity of threat to urban environmental resources.*

Urban environmental issues and their linkages with health, natural resource use in rural areas, and economic development potential are not well understood for Africa generally and this includes Kenya. These linkages are there in the movement of raw materials and other forms of trade back and forth, however, and they therefore have greater importance than may typically be granted by most "environmental" planners. Currently these trends strongly threaten economic development potential in Kenya, and increasingly they will affect ecosystem health in cities and surrounding areas, and also human health.

### 5.7. Summary: relative severity of environmental threats in Kenya

Following is a simplified "ranking" of the relative severity of environmental threats in Kenya. This section is accompanied by an index presented in Annex 3. It is a judgement – and by no means the final one possible – of the "sum" of information and expert opinion assembled for this report, a comparison of each sector with the *frequency of occurrence* of degradation in that sector

and the *potential consequences* to the achievement of USAID's three objectives in environment (USAID Guidelines for Strategic Plans 1995). These include:

1. Ameliorating and preventing environmental threats to human health
2. Protecting critical ecosystems
3. Safeguarding the environmental and social underpinnings of economic growth

Quantitative measures for these objectives are notably difficult to come by, particularly where linkages between health or economic development and environment are not well understood and therefore assessed. This was the case in this assessment as well. The Guidelines note that in this case, recent studies and expert opinions may need to be relied on. This ranking was done by considering key informant views and recent quantitative assessments of the status of each environmental sector.

Annex 3 is therefore an index – adapted from the Guidelines – that presents a visual comparison and ranking of each environmental sector in relation to the general frequency of "degrading events" occurring in recent years, and the potential consequences to the achievement of USAID's objectives.

**Ranking.** All sectors are estimated to have potentially negative health, ecosystem, and economic/social impacts. Among the environmental sectors covered in this assessment, there are none experiencing "negligible" threats; all are facing more severe dangers. For health – land, water, urban, and to some extent forests are likely to have the most severe consequences and/or to pose the gravest threat to the Kenyan people. For ecosystems – land, forests, and aquatic systems face potentially "catastrophic" threats if swift remedial action is not implemented; wildlife and biodiversity faces critical consequences if changes are not enacted. For economic/social issues – wildlife, land, and forests pose the most severe problems for Kenya and its people.

## 6. Key opportunities

Although opportunities for USAID/Kenya to consider in its planning and implementation were not the primary focus of this report, suggestions from key informants and recent studies were collected as a normal part of the interviews and research. The ideas are more broad than what the Mission or any one donor or government agency can accomplish; however, the Mission may use them in identifying possibilities for new efforts when needed.

Some of these approaches are already being planned or implemented on a limited scale by various government agencies, donors, NGOs, or local groups. The Mission supported a study in 1999 to identify areas where other donors already operate; this document should inform the Mission's choices as to the opportunities presented below. Many approaches were identified in the 1994 Kenya National Environmental Action Plan. Nevertheless they stood out as issues that need further examination and action. These ideas are closely linked to the trends, threats and constraints identified in the above sections, but presented together in this section for ease of reference.

### 6.1. Cross-cutting opportunities

1. Changing attitudes about the roles and benefits of natural resources, including wildlife. A key issue is the need to build on KWS' increased visibility at the community level and the acceptance the agency has gained in certain communities where wildlife management is a concern. Similarly, there is an excellent opportunity to build on increased media and public attention on NRM issues and governance, through social marketing research and environmental education campaign in support of program goals: adoption of available technologies, advocacy on environmental issues, etc. From the other side of the coin, KWS has also gained its own new perspective on the validity of community resources management and there is now a useful "window" of opportunity to build on. In the past, their support was limited to supplying funds.

David Western pointed out that Kenyans as a nation know and appreciate their wildlife heritage much more than the people of many other nations, due to the educational role played over the decades by their wildlife clubs. This knowledge and awareness may make forward movement with adequate additional education much easier, if done properly.

2. Integrated land use planning.

Key informants raised the concept and tool of integrated land use planning frequently. Environmental programs can have a greater impact when awareness of wildlife habitat and corridors, intensive and extensive agricultural use, forests, watershed protection, etc. are assessed in a holistic manner by stakeholders. Additionally, this approach can facilitate integration of work between Ministries for each sector, including environment, agriculture, economic development, and social issues, which can have a positive impact on program results.

3. Documenting linkages between sectors, particularly economic development and natural resource degradation.

USAID guidance notes that where factors such as rapid environmental degradation (1 percent/year or more), severe economic loss (5 percent of GDP), or severe environmental health risk are present, USAID "will give serious consideration to programmatic interventions that seek to address their root causes." (ADS 201, Technical Annex B, 1995.) Where these factors are not measured and "data is limited, missions, with support from G/ENV, should seek to work with host country counterparts and other donors to strengthen empirical understanding of these factors through strategically targeted research." Kamweti (2000) notes that "it should be highlighted that case studies on economic importance of catchment of natural vegetation, by economists, sociologists, foresters and wildlife specialists have not been undertaken and it may be necessary to avoid prodding in [the] dark when discussing conservation issues with politicians and policy makers."

Efforts were made to find studies that would help to illuminate these links, but the consensus was that few exist and therefore more such research needs to be done. Links between environmental degradation and human health are also not clear for the Kenyan context.

4. Supporting systemic change in Kenya.

No one agency can usually accomplish major shifts in policy or societal attitudes. However the "enabling conditions" required to allow more specific interventions to occur are well documented as a necessity for turning the tide. In Kenya, population pressures, poverty, political logjams, mismanaged public sector resources, and inadequately documented degradation trends or other research are the most commonly referenced constraints.

## 6.2. Wildlife and terrestrial biodiversity resources

1. Building on community-based wildlife and other natural resource management.

Building on COBRA and other community-based programs, through strategies that allow communities to see the benefits of wildlife and other non-farm land uses, is vital. For example, ecotourism, wildlife cropping, small-scale NR-based enterprise development, and other "alternative" strategies that directly link protection and income have been important to changing attitudes of communities near protected areas.

This sector is where USAID/Kenya's recent experience and thus also, to a great extent, its comparative advantage lie.

2. Linking biodiversity to other sectors.

Biodiversity conservation is documented to be more successful when practiced in the context of other factors. USAID and other donors are addressing economic need through CBWM programs, but few programs link health, education, culture, and other human elements into their work. In a recent study done by USAID's Biodiversity Support Program, which examined 20 *integrated conservation and development projects*, and the conservation impact their implementing

organizations made, development organizations tended to have a more positive impact than conservation organizations, when leading project alliances. Perhaps this was due to development organizations' greater focus on solving the needs of humans, whence come threats to biodiversity and other resources.

### **6.3. Freshwater and coastal resources.**

#### **1. Developing incentives for protection.**

A range of options for protection is needed in this sector, as many freshwater wetlands are privately owned and no one approach will work for them. Incentives are needed for landowners, but also for communities, industry, agricultural interests, etc.

#### **2. Supporting policy improvements and research on wetland ecosystem health.**

Much support needs to be given for the draft wetlands policy, and for increased research and monitoring of wetlands and watershed health. KWS has a solid base of knowledge now and needs external support and legal authority for extending that beyond protected areas and to pulling together integrated planning processes for watersheds, etc. that involve more than one ministry or donor agency. It and other research bodies also need much more support for monitoring ecosystem health and doing studies on impacts and their sources.

#### **3. Replanting and establishing nurseries for mangrove afforestation.**

Coastal areas are vulnerable to erosion and fisheries depend in many areas on mangrove ecosystems as nurseries for fry. Kenya's loss of mangroves is high and there is urgent need to increase replanting and establishing local nurseries; this could be an income-generating activity for communities in coastal zones.

#### **4. Considering inland aquatic tourism.**

In 1990, Ksh 20 million was gained from tourism to Lake Nakuru, from some 152,000 tourists (Visser, 1991). Developing this type of venue for ecotourism through community – managed projects is an opportunity that has yet to be fully exploited.

#### **5. Supporting integrated water resource management.**

USAID and other donors have supported and plan to support IWRM activities in the southern coastal region, in and around several key protected areas. Community-based projects in *inland* biodiverse areas can also integrate water and wetland management into community NRM and land use planning processes as part of the local agroecosystem.

#### **6. Supporting enhanced regional capacity to address CRM issues.**

USAID/REDSO-ESA plans to support activities such as targeted studies of capacity building needs for coastal resource management within Kenya, Tanzania, Madagascar, Mozambique, and Somalia. This kind of activity can elevate the discussion of local constraints to a higher level and bring support to influence local decision-making.

#### **7. Supporting water use efficiency.**

USAID, OFDA and others have supported PVO programs in water use efficiency in drought- and famine-prone areas; more can be done to build on the lessons from such experiences.

### **6.4. Forest resources**

#### **1. Replicating community-based successes.**

This sector, closely linked to the biodiversity sector, produced concrete suggestions for improvements, including the need to replicate community-based successes. In Turkana district, local communities established management committees to monitor vegetation cover in the district, to ensure that sustainable use levels are maintained and prevent harvesting of live trees. A complicated system of tree tenure has also evolved; trees are “claimed” by individuals, circumventing the common taboo on tree planting. Strengthening such conservation committees

could lead to greater successes (Kamweti, 1999, p. 27). They should also help in preventing fires, overgrazing, etc.

2. Providing strong support for agroforestry, NTFP development, and community woodlots. To relieve the heavy pressure on Kenya's tiny percentage of forested lands, focus on developing alternative sources of wood products and energy sources for domestic use is key. Few donor projects are actively implementing agroforestry or plantation improvements. Some are conducting research, but as noted above, that is insufficient to make a change in terms of forest protection and maintenance. Also needed are alternative species for use as fuelwood – Mwangi (2000) notes that there is a newly developed eucalyptus variety that requires little water and nutrients; stoves that fulfill all perceived needs of local people as well as cook more efficiently; food and medicinal species; etc.

3. Reducing poverty.

Researchers in the forest sector in Kenya point repeatedly to poverty alleviation as a key to reducing pressure on forests. Alternative fuel, food, and other resources and income-generation activities are needed, such as: beekeeping, butterflies, mulberries for silk, and the use of alternative woods for carving (instead of traditional olive and mahugu, using mango, jacaranda, and Australian blackwood, which are more sustainable).

#### **6.5. Agricultural resources and land use**

1. Establishing clear policies and educating people about appropriate land tenure and land use. Opportunities in this field require widespread coordination within and among Kenyan institutions and the donor community. The causes of trends in land subdivision and rural-rural migration, and the impacts of those trends on agricultural productivity and environmental degradation, are not well understood. Studies such as those conducted by the LUCID group and other research organizations may help if widely disseminated and discussed.

2. Working locally to promote sustainable land use and tenure regimes.

Community-based NRM and land use planning is a key component of providing examples and promoting more systemic change. USAID and other organizations have supported such approaches with success in that they helped build local awareness of biodiversity and how the regions surrounding protected areas are important to conservation. Planning for enterprise development activities based on NRM will also provide an alternative for group ranches involved in considering the subdivision/conversion cycle.

3. Working on dryland issues.

A range of opportunities for work in Kenya's ASALs were put forward. Transboundary conflict over cattle and other resources, capacity-building for NGOs and local governments in arid districts, strengthening levels of food security and reducing vulnerability to drought were mentioned as the most important issues.

#### **6.6. Energy and Urban environmental resources.**

1. Reducing pressure on forests as source of domestic energy.

As noted above under forest resource opportunities, community woodlots and on-farm agroforestry are desperately needed. Other alternatives to domestic energy use, particularly in urban areas whence comes the demand for woodfuels, are also urgently needed.

2. Revisiting plans for additional hydropower facilities.

Kenya and her investors may be able to take advantage of less – damaging, more efficient hydro systems now on the market if they revisit their plans for additional hydropower facilities before putting them into practice. This would help them in future to avoid the significant flooding, water course changes, sedimentation, and other problems associated with large dam projects in Kenya's past and present.

3. Recognizing the integrated nature of urban – rural landscapes and society in Kenya. Most African cities – and Kenya is included – have a more integrated rural-urban landscape than many other regions due to historical patterns of growth and movement. Rural environmental protection efforts would be aided by examining linkages to urban demand for raw materials and urban production of wastes.

#### **6.7. Summary.**

Each donor agency or NGO or government unit identifies an opportunity and decides to implement a program to address it based on their own experience. They also consider experience of their partners, amount of funding available, amount of time available, and other criteria. As noted, these opportunities are presented not to any institution in particular but as ideas that were captured during interviews and research for this broad assessment.

Using the "relative severity of threat" ranking presented in section 5.7 above for ecosystem degradation, it is clear that in the planned strategic objective for environment in USAID/Kenya, an "extremely severe" and "critical" threat to wildlife and biodiversity loss is being addressed directly. Significant threats to land/soils, forests, and aquatic systems are not as directly or as deeply addressed, however they are considered in the planned community/land use NRM planning processes. But as noted, these threats are constrained more severely by systemic problems, such as inadequate national legal frameworks and/or economic mismanagement. Thus with its limited budget and wildlife-focused experience in the past, these areas do not entirely represent the "best opportunities" USAID/Kenya should consider. Mission programs need only to expand on their current ability to "touch on" these issues, through field-level dissemination of best practices, use of lessons learned at the national level to illustrate the power of these practices and to influence decision-making, and making use of synergies between existing programs. More specific ideas are presented in Annex 6 of this assessment. Whether those types of suitable opportunities are found in the current strategy or incorporated from this list into *activity-level* mission planning during the five year strategy period, is not to be determined in this assessment.

## **Annex 1. List of People Contacted**

### USA

|                |  |
|----------------|--|
| Mark Amaral    | University of Rhode Island Coastal Resources Center Associate                |
| Russell Backus | G/ENV Africa Regional Coordinator  |
| Alan Bornbusch | Africa Program Director, American Association for the Advancement of Science |
| John Borrazzo  | G/PHN Environmental Health Project Officer                                   |
| Jeff Bowyer    | PADCO EIC Urban Liaison to G/ENV   |
| Dirk Bryant    | Program Director, Global Forest Watch, World Resources Institute             |
| Lauretta Burke | Senior Associate, World Resources Institute                                  |
| David Campbell | Michigan State University Geography Department/LUCID                         |
| Chris Elias    | Senior Associate, World Resources Institute                                  |
| Marcia Glenn   | Operations Specialist, G/ENV/UP  |
| Bill Lane      | World Bank Kenya Environment Office  |
| Robin Martino  | PADCO EIC Africa Specialist  |
| Jennifer Olson | Land Use Change Impacts and Dynamics – East Africa (LUCID)                   |
| Mark Phillips  | G/ENV Policy AAAS Fellow   |
| Tim Resch      | AFR-SD Tropical Forests and Biodiversity Advisor/G/ENV EAPEI Coordinator     |
| Mary Rowen     | PADCO/G/ENV Consultant   |

### Kenya

|                      |   |
|----------------------|---|
| Lynette Anyonge      | KWS Partnership Department Officer  |
| Meg Brown            | Chief, USAID/Kenya Agriculture, Business, and Environment Office                |
| Daniel Evans         | USAID/REDSO-ESA Natural Resources Management Officer                            |
| Irene Gathinji       | Pact Organizational Development Facilitator                                     |
| Nicholas Georgiadis  | Director, Mpala Research Centre   |
| Francis Gichuki      | Professor, University of Nairobi Agricultural Engineering Department            |
| James Githui         | KWS Amboseli National Park Warden II (Tourism)                                  |
| Greg Gottlieb        | Director, USAID/Kenya Office of Foreign Disaster Assistance                     |
| Richard Kaguamba     | World Bank/Kenya Natural Resources Management Policy Advisor                    |
| Walter Knausenberger | USAID/REDSO-ESA Environment Advisor   |
| Anderson Koyo        | Kenya Wildlife Service (KWS) Wetlands Programme Coordinator                     |
| Louise Labuschagne   | Homegrown, Inc. IPM Manager   |
| Vincent Lelei        | Arid Lands Management Programme Coordinator, Kenya Office of the President      |
| Victor Masbayi       | Health Officer, USAID/Kenya Office of Population and Health                     |
| George Mbate         | Economist, USAID/Kenya Program Office   |
| Daniel Moore         | USAID/G/ENV Natural Resources Management Specialist                             |
| George Mugo          | USAID/Kenya PL-480 Program Manager  |
| Maria Mullei         | USAID/Kenya Agriculture Specialist  |
| Nawira Muthiga       | KWS Coastal Programme Specialist  |
| Joseph Mwangi        | Forest Health Research Centre, Kenya Ministry of Agriculture                    |
| James Ndirangu       | USAID/Kenya Environment SO Team Leader  |
| Bill Polidoro        | Private Agencies Collaborating Together (Pact) Country Director                 |
| Robin Reid           | International Livestock Research Institute                                      |
| Michael Strong       | Sr. Reproductive Health Specialist, USAID/Kenya Office of Population and Health |
| David Western        | Wildlife Conservation Society and Chairman, African Conservation Centre         |
| Richard Young        | Africa Wildlife Society Community Tourism and Enterprise Specialist             |
| Ben Zech             | KWS Wetlands Programme Advisor  |

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## *Annex 5. Constraints in Potential USAID NRM Program Focal Areas*

### **1. Laikipia-Samburu**

Located just north of the equator in the rain-shadow of Mt. Kenya, the Laikipia – Samburu complex is one of the very few areas in Kenya where wildlife numbers – certain species – are increasing. One factor in this is the expectation and partial realization of a stream of benefits from wildlife accruing to private and community landholders. However, the stream of benefits has been well below potential, and there is an urgent need for concerted action to ensure a viable future for the area’s wildlife.

Despite creeping agriculture, about 70 percent of the Laikipia plateau is large-scale ranchland, the rest being occupied by Mukogodo Maasai and, to the north, the Samburu pastoralists.

#### **6.8. Key Conservation values of Laikipia –Samburu**

- Rare Northern Savanna Species including Grevy’s Zebra, Wild Dog, and Black Rhino.
- Wet Montane Forests, (Kenya, Aberdares) and Dry Woodland forests (Ngare Ndare)
- Elephant migration routes
- Ewaso Nyiro Riverine System
- Woodland Acacia Mosaic

#### **Threats:**

We identify the following as the key threats to wildlife conservation in this focal area:

**Security:** the area suffers from intermittent serious security issues caused by banditry and cattle rustling (particularly in Samburu), politically instigated conflict (particularly over trust lands), and the widely available arsenal of firearms from the conflicts in Somalia, Sudan and Ethiopia.

**Land tenure:** insecure land tenure in some units, sub-division of group ranches and growth of smallholder agriculture are a major threat to wildlife conservation in this area. In parts of Laikipia smallholder agriculture is proving non-viable in economic terms, and there is an opportunity to reverse some sub-division back into cooperatively managed larger land units, e.g. the Sipili and Ol Morani units in western Laikipia.

**Perceptions of wildlife:** While wildlife is tolerated for economic reasons on some individual ranches, which are making significant sums out of eco-tourism, other landholders, particularly smallholders are usually highly intolerant of wildlife, which are seen as presenting a serious threat to their lives and livelihoods. The threat to wildlife conservation lies in the fact that large land areas are needed to support thriving wildlife communities – small land areas that are wildlife intolerant can be a serious threat.

**Competition for resource use between land units, particularly for water:** at present the most fought-over limited resource in this area is water. Excessive upstream take-off and inefficient use is threatening downstream cattle, agriculture and wildlife. Water availability varies from year to year and no charges are made for its use.

**Lack of economic value realized from wildlife resources:** local people currently make very little from their wildlife resources in this area, and have few incentives to care for wildlife. The restrictive regulatory environment means that landowners have few rights over wildlife resources and eco-tourism is the primary wildlife business opportunity. Some cropping is allowed under Kenya Wildlife Service (KWS) quotas, but the markets for cropping products are tightly restricted and prices are low. Hunting is banned, except for game birds. Where wildlife businesses are successful, it is estimated that less than 5% of the revenue generated flows into the local economy.

**Weak infrastructure:** the poor quality of the road network across the area and the lack of telephones, even in towns, create a poor environment for tourism and business development across the area.

**Weak institutions and poor cooperation between institutions:** this area has not been a priority area for public spending and public institutions are under-funded and poorly equipped.

6.8.1.

### **Opportunities to Address Threats by Enterprise and CBO development under CORE project:**

The challenge in this region will be to combine the interests of very diverse groups of landowners and managers, from the southern ranchlands and the northern pastoral areas. The Laikipia Wildlife Forum has made great strides towards building a common vision for wildlife conservation and wise use of natural resources. Mobilization of community groups for wildlife management has successfully occurred in many areas and Laikipia is a model for community enterprise, especially when supported by neighbouring ranches (e.g. Il Ngwesi and Lewa Downs).

There is still, however, a lot of work remaining in finding ways for Group Ranches to benefit sufficiently from wildlife to justify putting aside land for conservation purposes and for reversing the trend towards land fragmentation. A key goal, therefore, of CORE will be to increase the value realized from wildlife business opportunities, particularly for local people, and to develop the advocacy capacity of the Laikipia Wildlife Forum. Despite technical and policy constraints it has been shown that Wildlife utilization is a competitive land use across much of the focal area.

Other opportunities include:

- Secure private sector investment in existing Community wildlife Areas (E.g. Il Polei, Nagum, Lerogi Kirisia)
- Develop tourism circuits and ecosystem enterprise planning
- Strengthen organizational capacity of LWF
- Work with LWF to develop community enterprise marketing strategy
- Promote innovative private sector-community partnerships including equity stakes
- Identify and develop appropriate community enterprises such as beekeeping, crafts, dead-wood furniture, plant and herb businesses
- Develop community monitoring capacity
- Assess potential for application of easements
- Build governance and accountability of community institutions
- Develop advocacy with existing organization with sectoral linkages. E.g. water, forestry, environmental law
- Harness regional opinion leaders for advocacy

### 6.8.2. 2. *The Greater Amboseli focal area*

This focal area encompasses the Amboseli National Park and surrounding Group Ranches, stretching west to Chyulu Mountains, east to Magadi and north to Kitengela.

The exceptional conservation values of the Amboseli focal area include:

- Elephant migration corridors in Amboseli-Kilimanjaro and Amboseli-Chyulu
- The best-known and most studied population of African elephants in the world; the associated wealth of information and baseline data including individual life histories.
- Other endangered species including cheetah and wild dogs;
- An important system of wetlands and swamps welling up from Kilimanjaro (almost all wetlands outside the park have now been drained for agriculture). Associated wildlife and aquatic birds.
- An important tourist destination with the highest earnings of any national park in Kenya.

### **Threats**

CORE and its partners have identified the following as major threats to the landscape and its management for conservation:

**Land fragmentation:** The fragmentation of land in this area is being brought about by a number of inter-related factors. Government policy in many cases favors the subdivision of group ranches into individual

holdings where people can settle and against which mortgages can be taken out for 'improvement'. However given the ecology, rainfall and soils of the area, it has been shown that subdivision can have serious and destructive ecological, economic and social consequences.

**Impacts of unplanned tourism developments:** There is an inherent danger that Amboseli could become the victim of its own success, with the impact of unplanned tourism potentially destroying the resource on which tourism depends. The Amboseli-Kilimanjaro area does not yet benefit from regional and rational planning of various types of visitor use and accommodation, and to allow for the cultivation of market niches. As a result, too many people are rushing after too few ideas and dollars with detrimental effects:

**Destruction of wildlife as a political statement:** The local communities are highly aware that not all wildlife species attract the same attention, or have the same political implications in the international arena. As various promises have been broken and expectations disappointed, Maasai warriors have developed a local habit of destroying highly visible wildlife species or individuals when they feel that wildlife needs are being put before human needs. The most relevant examples are the spearing of elephants and the poisoning of the park's lions.

### **6.9. Water management**

In most parts of savannah Africa, water is a key resource and often the one around which a conservation area has been formed. In Amboseli as well, water continues to be a crucial issue for the park and pastoralists. From the time the park was formed, promises were made to the local community about schemes for providing for the alternative supply of water outside of the park. The operation of these schemes has suffered for both managerial and technological reasons.

Finding more lasting and appropriate alternatives to the water supply issue is therefore a key threat to the long term management of the heartland.

### **6.10. Weak institutional structure and political conflicts**

The group ranch system throughout Kenya has been criticized for problems with accountability and for the fair distribution of benefits. Around Amboseli, sharp divisions have emerged between cliques on some of the group ranches making unified action or negotiation difficult.

### **Opportunities to Address Threats by Enterprise and CBO development under CORE project:**

The Greater Amboseli has a high potential for a high return on conservation investment for reasons including:

- The high economic potential of the park and surrounding areas
- The relative peace and stability of the area.
- The convergence of interests between maintaining range for wildlife and for livestock
- Opportunities to use the scientific and economic value of the elephant population

Although specific site and project selection still needs to be finalized, the following opportunities which exist under the CORE project:

- Strengthen the capacity of existing NRM and wildlife institutions (e.g. Amboseli Tsavo Group Ranches, Machakos Wildlife Forum)
- Provide training in governance and accountability to Group Ranch Committees
- Develop systems for revenue/benefit distribution that are fair
- Assist local CBOs (particularly pastoralist groups) in networking, information sharing, common vision, resource leveraging.
- Undertake community enterprise development activities – ecolodges, campsites, cultural bomas, interpretive centers, walking safaris, beekeeping, plant utilization etc. either as new ventures or with existing conservation areas (e.g. Eselengei)
- Conduct ecosystem-level enterprise planning

- Facilitate fair private sector-community partnerships
- Community monitoring of natural resources
- Assess scope for implementation of easements

### **3. Taita-Taveta**

#### *Taita and the Tsavo National Park*

Taita-Taveta in Coast Province is an unique district which forms an integral part of the Tsavo ecosystem. Sixty two percent of the land is protected as Tsavo National Park which is an important park for large fauna such as the elephant, giraffe, zebra and has a wide range of antelopes, birds and monkeys. Tsavo National Park has the largest population of elephants and the potential to hold even a larger population. Ngulia in Tsavo West has become an important rhino sanctuary after Nakuru National Park and the Ngulia escarpment and hills are an important area for migratory birds from the Northern Hemisphere. Lake Jipe in the boarder of Kenya and Tanzania is an important wetland teeming with bird life such as pygmy geese and black heron and other wetland wildlife.

#### *Taita Hills Forests*

Taita Hills is a heritage of montane cloud forest which is part of the Eastern Arc mountains found in both Kenya and Tanzania. Due to isolation, the Taita Hills forests harbor over 2000 species of flora and fauna, at least 13 taxa are endemic. There are 67 known indigenous plants including the wild coffee (*coffea fadenii*). The Eastern Arc mountains are known for their birds diversity and Taita Hills is classified as Important Bird Area (IBA) with three birds endemic to Taita Hills Forests; the Taita Thrush, the Taita White-eye and the Taita Apalis. The forests are also rich in other life such as reptiles, amphibians and insects including butterflies. According to the National Museum Taita Hills Biodiversity Project, new discoveries of not previously recorded flora and fauna are being found within the forests calling for an urgent need to stop further fragmentation of these unique habitats.

#### *Taita Lowlands*

Approximately 24% of land in the district forms key dispersal area for wildlife from Tsavo National Parks. The range land has the similar vegetation to the parks. Due to low rainfall, the lowlands are relatively sparsely populated and communal land has been put into group ranches. However, livestock keeping is not widely practiced unlike in Masailand leaving most of the group ranches lying idle. The recently observed trend is the families are migrating from high lands to the lowlands where they are clearing land for agriculture.

### **Threats To Biodiversity**

#### *Encroachment*

The unique biodiversity of Taita-Taveta is under pressure from competing/changing land use. Due to increase in population, the migration to the lowlands has put the group ranches in the area are under pressure to subdivide into individual holdings and subsequently utilized for agricultural production. There is a proposal to get water from lake Challa to coastal towns via Maktau-Mwateta-Voi increasing chances for ranches to be converted for irrigated crop production.

In the Taita Hills, increasing population in and around the hills has put pressure on the forest land for agricultural land. There subsistence crops growing such as maize, beans and bananas. Forests are overexploited for their timber, fuelwood and medicinal plants. Uncontrolled forest fires are reported caused by traditional honey gatherers.

#### *Human/Wildlife Conflict*

Settlement within wildlife corridors has over the years increased human/wildlife conflict. Destruction of crops and endangering human life occurs frequently with a KWS erected fence incomplete, which is compounding the problem.

Elephant and game meat poaching are recorded in this area while slash and burn agriculture causes uncontrolled fires that pose a threat to Tsavo National Park. In areas bordering lake Jipe where

communities are allowed by KWS to graze during the dry season, livestock competes with wildlife for grazing and there is evidence of overgrazing and soil erosion. This has caused problems within the lake due to siltation.

#### **4. South Coast**

The South Coast of Kenya represents the rich coastal and marine ecosystem with a coral reef running parallel to the coastline and terrestrial and marine inter-tidal forests harboring large variety of flora and fauna.

##### *Terrestrial Forests*

The terrestrial forests are sparsely distributed with the major bloc being in Shimba Hills Game Reserve and Mwaluganje Community Elephant Sanctuary. These two are home for elephants and endemic bird species and Shimba Hills reserve harbors the endangered sable antelope. Shimba Hills forest has indigenous trees species such as Mbambakofi (*Afzelia Quanzensis*), Mgurure (*Milicea Execelsa*) and Mvule (*Combretum Schumanii*). It is also a catchment area for Mwachema river which drains into Diani Marine National Reserve. This makes Shimba Hills Game reserve and Mwaluganje Community Elephant Sanctuary an important game sanctuary and tourist destination in the coast province. Around Diani, remnant patches of forests are home for the black and white colobus monkey

##### *The Kaya Forests*

These are forests of significant importance to the Miji Kenda people as centers of their spiritual and cultural identity. The Kayas are used for social functions such as relaxation and rest and clan gathering (Moro). Various areas of the Kayas were set aside for burial and grave posts marked by wood (Muhingo) or plant.

##### *The Mangrove Forests*

Mangrove forests are found along the coastline from Mombasa to Vanga with the exception where the land-use (urban development, agriculture, mining and quarrying) has completely wiped out the forests such as between Likoni and Tiwi. The largest bloc of mangroves is found between Msambweni and Vanga near the Tanzanian boarder.

Mangrove forests have unique biodiversity and are breeding ground for fish and dispersal areas for the Marine National Parks and Reserves of which in the South Coast, there are Mombasa and Kisite/Mpunguti and Diani. These marine parks and reserves have a large variety of fish life, marine algae, and sea grasses. Kisite/Mpunguti, which is a complex of four islands, is an important nesting place for marine sea turtles and a breeding site for dugongs and dolphin, all of which are endangered marine animals.

#### **Threats To biodiversity**

##### *Human/Wildlife Conflict*

This is particularly experienced within Golini-Mwaluganje elephant corridor between Shimba Hills Forest Reserve to Mwaluganje forest. Despite the establishment of the Mwaluganje elephant sanctuary, some families are still producing crops within the sanctuary due to dissatisfaction arising from inequitable distribution of benefits accrued from the community sanctuary. The elephant over-population is also increasing the conflict through elephants raiding crops outside the sanctuary.

##### *Encroachment of the Kaya Forests*

Threats to Kaya forest encompass, timber trade in *Afzelia quanzensis*, *Combretum schumanii* and *Milicia excelsa*, settlement encroachment, forest excision, extensive farming on the periphery of Kaya forests.

##### *Degradation of coastal and marine biodiversity*

This is mainly through over-exploitation of resources such as fish through use of inappropriate fishing gear, clearing of mangroves for poles and fuelwood, coral collection and trampling of coral reef during tourists

recreation. The proposed titanium mining and the associated developments of a port facility at Shimoni will compound the degradation.

## Annex 6. Environmental Regulations 117/118/119 Assessment

**1. Background<sup>4</sup>.** USAID/Kenya is developing a new five-year Integrated Strategic Plan for 2001 - 2006. The ADS 201.5.10g provides USAID's guidance concerning how USAID missions need to incorporate environmental requirements into their ISPs. This guidance is derived from provisions of the Foreign Assistance Act (FAA).

*1.1 Environmental Sustainability.* USAID recognizes that concern for the environment and wise management of the natural resources base are absolute requirements of any successful development program. Section 117 of the FAA "*Environment and Natural Resources*," dictates that efforts be made to maintain (and restore) natural resources upon which economic growth depends, and to consider the impact of USAID's activities on the environment. The legal requirements of the FAA are reflected in USAID's *ADS Chapter 204 "Environmental Procedures*," which guides users on the application of *22 CFR Part 216*. Regulation 216 codifies the Agency's procedures "to ensure that environmental factors and values are integrated into the A.I.D. decision making process." Accordingly, USAID conducts assessments to ensure that its environmental priorities are incorporated into results planning, achieving, and monitoring. *22 CFR Reg 216.9* allows for (a) bi- or multilateral environmental studies regarding the proposed action(s) or (b) concise reviews of the environmental issues involved including summary environmental analyses or other appropriate documents, in lieu of environmental assessments otherwise required by USAID environmental procedures. This assessment follows option (b).

*1.2 Tropical Forestry and Biological Diversity.* Sections 118 "*Tropical Forests*" and 119 "*Endangered Species*" of the FAA codify the more specific U.S interests in forests and biological diversity. These two provisions require that all country plans include: 1) an analysis of the actions necessary in that country to conserve biological diversity and tropical forests; and 2) the extent to which current or proposed USAID actions meet those needs. Section 118/119 analyses are specific legal requirements of all USAID operating unit strategic plans. It should be noted that *22 CFR 216.5* requires USAID to conduct their assistance programs in a manner that is sensitive to the protection of endangered or threatened species and their critical habitats.

Translating the intent of the above legal requirements into a broad strategic planning approach, the ADS provides a general priority-setting framework for missions to use in determining which environmental threats and opportunities they should address (See 201.5.8; and Supplementary References, Joint Planning and Guidelines for Strategic Plans, and Technical Annex B Environment, dated February 1995). The priority-setting process is intended to guide the setting of environmental strategic objectives, as well as to inform strategic objectives in other sectors. It has been noted that most missions fulfill these requirements in varied ways and to various degrees, largely due to the vague nature of the guidance mentioned above. In late 1994 the Africa Bureau disseminated a document called *Consideration of Biological Diversity and Tropical Forestry in the Context of Country Program Strategy Planning in the Bureau for Africa: Review and Guidelines*, by Sandra Russo. This document provided more focus to the interpretation of the law, and is used as a starting point for the assessments below, especially for 118/119. New guidelines are being developed by the Global Environment Center this year, and are expected to be available on the USAID Intranet when they are complete.

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<sup>4</sup> Adapted from *USAID/REDSO Strategy Environmental Threats and Opportunities Assessment with Special Focus on Biological Diversity and Tropical Forestry: Scope of Work*, January 2000.

## **2. Environmental Sustainability Assessment: USAID/Kenya 2000-2005 Integrated Strategic Plan.**

In December 1999, the Mission submitted to USAID/Washington a concept for their new strategic plan, in brief. At the time of this writing (March 2000), new strategic objective (SO) documents were still in draft. Therefore, this sustainability assessment of the plans for each SO is based on the concept paper and on discussions within each SO team.

In this sustainability assessment, we focus on the following questions: 1) what is needed to ensure environmental sustainability during implementation of each SO program; 2) what each SO team is planning to do or *not* do to address those needs; and 3) where the team has elected not to incorporate an environmental activity or approach, what is their rationale for that decision.

*SO 1: Sustainable reforms and accountable governance strengthened to improve the balance of power among the institutions of governance.*

SO 1 has been developed to address USAID Global goals in Democracy and Governance, and has no explicit environmentally-focused activities or approaches included. Overall improvements in governance and civil society participation in Kenya can only impact positively upon the country's environmental resources base, both in relation to USAID/Kenya programs and more broadly. However, significant reforms in public sector environmental management are needed, as is shown repeatedly in the Environmental Threats and Opportunities Assessment: USAID/Kenya Strategy, of which this Annex is part. The natural resources results that the Mission is pursuing have evolved to emphasize community involvement as key to decision-making about resource use. Communities are learning to devise win-win strategies that is, compromises which have been a thorny problem for political forces at a national level. Pursuit of these results will continue to engage local citizens groups in hands-on training in democratic decision-making.

The NRM sector is one of the most highly politicized in Kenya. Large-scale depredations of forest resources have been permitted, even facilitated, by the regime as a form of preferentialism and local patronage. Since ownership and regulation of many natural resources in Kenya is under the control of the local authorities e.g., forests, fisheries, and minerals of low value (such as sand) the results the Mission will pursue in SO 4 could be jeopardized by unresponsive local governments, providing them with information, lobbying constructively for relevant by-laws.

Therefore SO 1 and SO 4 plan to build linkages to environmental sustainability in Kenya and possible synergies with the proposed environment programs as noted below:

IR 1.1: CSOs effectively demand reforms and monitor government activities. This result is very pertinent to an IR 4.4 in the new natural resources management program, SO 4: Environmental advocacy strengthened, which aims to strengthen the ability of concerned stakeholders to affect change in their access and rights to manage natural resources. SO Team leaders plan to assess whether and to what extent the respective target stakeholders and organizations they aim to support in this effort are similar or complementary to those in SO 4, IR 4, and how both might achieve synergistic and mutually-valued results for both D/G and NRM objectives, with more focused and efficient use of USAID Mission resources.

IR 1.1 may also be important in the aim to mitigate conflict; many conflicts in Kenya today are over competition for primary natural resources and the benefits there from. The Mission will seek out examples of these to address through the D/G program, such as community-based organizations working to resolve conflicts over access to water, pastoral land, and/or high potential agricultural zones.

IR 4.2 Encroachment and subdivision reduced and a host of sub-IRs regarding environmental management, land-use and forest policy and the national biodiversity strategy, all will benefit by enhanced accountability of public institutions, especially the Parliament, which SO 1 IR 1.2 (Increased independence of selected government institutions) and 1.4 (better informed public and political actors) intends to promote. The new SO 1 will develop new implementation mechanisms, into which environmental review and compliance elements will be incorporated.

The SO 1 team has decided, at least at the outset, not to address explicit needs in environmental sustainability in this strategy, because (a) the host-country political and bureaucratic context is not highly conducive to productive investment in strong cross-sectoral programming involving NRM; (b) the need for basic democratic reforms is extremely pressing, (c) an environmental focus is not in SO 1 comparative advantage, and (d) funds are limited. However, opportunities will be sought to identify and foster cross-sectoral synergies which would bolster the sustainability of the program overall.

#### **SO 2: Increased rural household incomes.**

As has been proven time and again, poverty is a major “driver” of environmental degradation. SO 2 aims to address that cause of degradation by helping raise agricultural household incomes. The program will work through targeted sub-sector technology improvements, for example in dairy and horticultural production, in high potential agroecosystem areas.

Population pressures and inappropriate land tenure policies have led to rapid subdivision of these areas into plots too small to support most livestock and even much agriculture. These areas are increasingly an originating point for migration of farming households to lower productivity lands, including rangelands which are better suited to wildlife needs. These areas are also subject to rapid deforestation, both in degazetted and protected areas. A major threat to forests in Kenya is conversion to agricultural use. Thus agricultural households in high productivity areas need assistance in intensifying land use and raising incomes where they are, rather than moving farther into forested areas or into lowlands where wildlife roam and productivity is less.

SO 2 addresses these issues at the core through its income-generation objectives. In addition, SO 2 implementers will site their activities based on the appropriateness of existing ecosystems, and will plan activities to minimize negative impacts on land, water, and soil resources. Plans are also in place to establish a linkage with the Mission’s biodiversity and natural resources management-oriented SO 4 to share information about natural resources management issues in geographic and thematic areas of interest to both SO Teams. Most importantly, they plan to provide guidelines on protecting the natural resources upon which agriculture depends, through farmers’ groups and associations, export extension workers, and other means, at the same time that guidelines for agricultural technologies are being delivered. This information-sharing process will be carefully integrated into the program and systematically conducted by SO 2 partners to prevent environmental problems. As social status in rural communities is often directly linked to income levels as well as other factors, and as social status can influence people to adopt sustainable behaviors, these discussions will be extended, as appropriate, to involve other stakeholders in target agroecosystems, such as pastoralists, women’s groups, and others dependent on the natural resource base.

In some locations, particularly those near to or overlapping with SO 4 target areas, SO 2 plans to implement a more thorough option – providing input to SO 4 land use/community resource management plans (IR 4.1.2). This approach ensures that a broad perspective on environmental, social, and economic sustainability is captured, and that programs are harmonized with the Agency’s sustainable development goals. These land use plans may also be utilized to illustrate the need for a range of policy improvements to support sustainable enterprise, including agriculture, in Kenya. From the agricultural perspective, such plans could help highlight systemic problems, such as extensification and subdivision of land, an increased need for market access, more environment-friendly technologies, and better support for smallholder producers. As noted, they can also help SO 2 implementing partners to avoid environmental and social problems that have encumbered some agricultural programs in the past; e.g., abusing toxic insecticides that pollute sensitive downstream waterways; addressing the wrong “farmers” – i.e., husbands instead of wives, where women are the primary growers; creating pockets of wealth and thereby also social divisions in formerly close-knit communities; etc. Where land use planning is not practicable, SO 2 will conduct a planning process on a smaller scale to help its customers understand the context in which their growing decisions are made; for example, they may conduct stakeholder analyses, participatory income surveys, or

farming systems assessments in conjunction with agricultural training for growers' associations to launch discussion and collect information.

**SO 3: Reduce fertility and the risk of HIV/AIDS transmission through sustainable, integrated family planning and health services.**

As a strategic objective developed to address USAID Global goals in health, population and nutrition, this SO is relatively self-standing, i.e., without strong cross-sectoral linkages. SO 3 will include only limited explicit environmentally-focussed activities or approaches. Nevertheless, it can be considered to be an environmentally-sustainable plan in that it is cognizant of and seeks to be responsive to the environmental components of health risks and trends.

There has been an increase in prevalence of malaria in traditionally malaria-prone areas such as the Coast and Western Kenya, but also a new trend towards increases in malaria in highland areas, especially after heavy rains, where it has rarely or never been seen before. The latter trend is particularly troubling because limited natural resistance exists in that area. The causes for this increase are not well understood, but likely are partly due to increased trends of agricultural conversion from woodland and forest.

Whereas the under-five mortality rate for children in Kenya was in a steady decline for the last 50 years, it has recently swung upwards again to 112 per 1000 live births an increase of 24 percent from the last decade according to the 1998 Demographic Health Survey for Kenya. This is probably related to a number of factors, and again it is not clear what links there are to environmental degradation or related environmental health parameters (e.g., deficiencies in water, sanitation, drainage, leading to diarrheal disease, malaria transmission, etc.)

With a continuing upward trend in the prevalence of HIV/AIDS in Kenya, comes the need to develop programs of HIV/AIDS and STI prevention and treatment services at the community level throughout the country. This brings with it health-care waste management issues and related if relatively modest risk of disease transmission and environmental contamination

Improvements in women and children health and reductions in fertility overall in Kenya can only reflect positively on the country environmental future, both in relation to USAID/Kenya programs, and more broadly. Likewise, programs intended to stem the tide of HIV/AIDS in Kenya will have a salutary effect on the country health and economy. However, several explicit steps will be taken to enhance the contributions of this SO to environmental sustainability in Kenya, while also enhancing health outcomes.

First, the SO team will ensure that a Pesticide Evaluation Report and Safe Use Action Plan (PERSUAP) is developed in connection with its promotion of insecticide treated netting (ITN) for malaria control. This will be done in conjunction with the Kenya Medical Research Institute and related programs supported by USAID, WHO and other donors, and the Programmatic Environmental Assessment of ITN being organized by AFR/SD. In this way, unintended negative health risks associated with inappropriate insecticide use will be avoided or minimized.

Second, the SO team will seek to understand better the environmental components of health problems in Kenya, as part of the child survival program. Pertinent analyses being produced by Macro International, the Ministry of Health, the World Bank and others will be taken into account. If during the implementation of SO3, linkages to environmental changes are established, the SO team will work to enhance the sustainability and impact of its program in appropriate ways, such as including education about these linkages in its outreach efforts in child survival/reproductive health/family planning and HIV/AIDS services.

Third, the SO team will encourage the Ministry of Health and other appropriate actors to ensure that WHO guidelines and standards are applied to the management of healthcare wastes, esp. those associated with testing and treatment of HIV/AIDS-affected persons.

All these approaches are addressed and encouraged through the environmental review process to which all the SO programs are subjected, and all new implementation mechanisms will be likewise.

Explicit linkages to environmental sustainability in Kenya and possible synergies with the proposed environment program will be sought at this time. Any activity related to environmental health, such as in SO 4 influenced interventions by CBOs in environmental sanitation and health services, would benefit by including components of the SO 3 child survival, malaria, maternal health and HIV/AIDS services, and the like. SO 3: Reduce fertility and the risk of HIV/AIDS transmission through sustainable, integrated family planning and health services.

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**SO 4: Improved natural resources management in targeted biodiverse areas by and for the stakeholders.**

SO 4 is directly focused on improving sustainability and the team will be very thorough in that regard. However, although policy and institutional constraints are highly problematic for the environment sector in Kenya, the SO team does not plan to support direct work on the broader policy level to address fundamental causes of environmental degradation, such as inappropriate land tenure policy, due to limited resources and to the fact that this is not the Mission's comparative advantage. These causes will be addressed on a local basis within the program's five focal areas, which we hope will provide successful examples of this approach for national replication over the long-term. Nevertheless in the short term, these national trends will continue to degrade surrounding areas and will therefore inevitably continue to impact them negatively.

In addition, on the local level, SO 4 plans to develop land use/community resource management plans (IR 4.1.2) to support a broad perspective on environmental, social, and economic sustainability, and to ensure harmonization with the Agency's sustainable development goals. SO 2 partners will be involved to some extent in supporting these analyses to address agroecological issues. These land use plans will also be utilized to illustrate the need for a range of policy improvements to support sustainable natural resources management and community-based enterprise, including agriculture, in Kenya. Other USAID-supported programs around the world have used land use planning processes or community mapping processes to document their concerns spatially, and have found it a powerful tool for improving their negotiating position. (See for example, BSP-Indonesia; BOLFOR; etc.). From the natural resources management perspective, such plans will help highlight, for example, an increased need for strengthened wildlife protection, a more visible role for communities in resource decision-making processes, and stronger incentives for sustainable approaches to economic development in fragile lands. SO 4 will expand the vision for these planning processes to encompass related, outlying communities, if their livelihoods have the potential to impact focal area ecosystem functions.

