

~~Copy of Abstract~~

103 lib

Food Production vs. Wildlife Protection in Kenya:  
A Case for Preserving Tsavo National Park

by

Christian K. Howlett

Environmental Studies

302

Prof. Roger Bolton

May 2, 1984

## INTRODUCTION

The idea of preserving certain special land areas and wild species for the future originated in the United States, which, unlike Europe, had large wilderness areas. The world's first national park was Yellowstone, set up in 1872. In 1916 Congress established the National Park Service and the federal government became responsible for managing several large land tracts.<sup>1</sup>

These parks were set up to protect certain types of flora and fauna, and in the cases of El Capitan and Old Faithful, certain geologic features. In addition, they were designed to provide people with the opportunity of seeing natural spectacles firsthand. Although human interference was to be kept to a minimum, the parks were definitely viewed as having recreational value, as well as ecological value.

In Africa, European colonial governments began to be concerned about the state of indigenous wildlife as early as the turn of the century. The first African effort at conservation was the Sabie Game Reserve, established in 1898 in the Transvaal. Unlike parks in the United States, African parks tended to be set up in rather isolated areas where tse-tse fly infestation and lack of rainfall made pastoralism and agriculture difficult. There was a minimum of management and the protected species were allowed to fend for them-

---

<sup>1</sup> The first three paragraphs of the Introduction rely upon N.C. Pollock, Animals, Environment and Man in Africa (Westmead, England: Saxon House, 1974), p. 91, and Roland Oliver and Michael Crowder, editors, The Cambridge Encyclopedia of Africa (Cambridge: Cambridge University Press, 1981), p. 312.

selves within park boundries. Because its animals tended to be larger and more spectacular , and its ecosystems less well-defined, there was correspondingly greater emphasis in Africa on protecting certain species, usually mammals and birds, than on protecting ecosystems or geologic features.

In Kenya, located in East Africa on the shore of the Indian Ocean, ten national parks currently exist, as well as five major game reserves. The largest park, Tsavo National Park, is almost  $2\frac{1}{2}$  times the size of Yellowstone. In all, the parks in Kenya, Tanzania, Uganda, and Zambia total 38,000 square miles, an area the size of New England.<sup>2</sup> These East African parks attract hundreds of thousands of visitors annually, but in recent years they have come under increasing pressure due to human population explosions and overcrowding nearby. In Kenya, in particular, the growth rate is nearing four percent a year, causing the population to double every 18 years. About half the present population of 16 million is under 16 years of age<sup>g</sup>, so the present growth is expected to continue well into the next century.<sup>3</sup>

As Kenya's swelling population, 80-90 percent subsistence famers, looks about for enough land to scratch out a living, increasing pressure is placed upon the national parks, whose land presently supports only wildlife and tourists. The government has

---

<sup>2</sup> Norman Myers, "National Parks in Savannah Africa," Science, Dec. 22, 1972, p. 1255.

<sup>3</sup> Barry Munslow, et. al., "Energy and Development on the African East Coast: Somalia, Kenya, Tanzania and Mozambique," Ambio, vol. XII, no. 6, 1983, p. 332, and Norman Myers, "The People Crunch Comes to East Africa," Natural History, Jan. 1973, p. 10.

often been urged to turn over parts of national parks to landless peasants or to allow some wildlife to be consumed by hungry natives. The differing interests of preservation and exploitation raise many issues for the national parks, including population dynamics, proper land uses, the value of species preservation, the role and worth of national parks, the environmental problems associated with national parks and with agriculture, and the problems of poaching, tourism, and government and local attitudes.

In Tsavo National Park, the subject of the present study, all of these issues will play an important role in determining the future of the park. However, since Tsavo produces many sizeable and unique benefits to Kenya, both monetary and non-monetary, I feel that it should be preserved with whatever modifications are necessary to ensure its smooth operation, rather than be given up to food production.

### ACTIVITIES

There are two basic, separate activities which are operating here: the park itself and its internal activities - tourism and wildlife patterns - and the food production and human settlement which infringe on them.

Tsavô's characteristics. Tsavo National Park is one of the biggest and most spectacular game parks in Africa. Located in the southeastern corner of Kenya, on the Tanzanian border, it covers more than 8,000 square miles. (Figures 1,2,3) The main highway and railway from Nairobi to coastal Mombasa runs through the park,

NATIONAL PARKS APPROVED BY THE IUCN (1978)

Figure 1

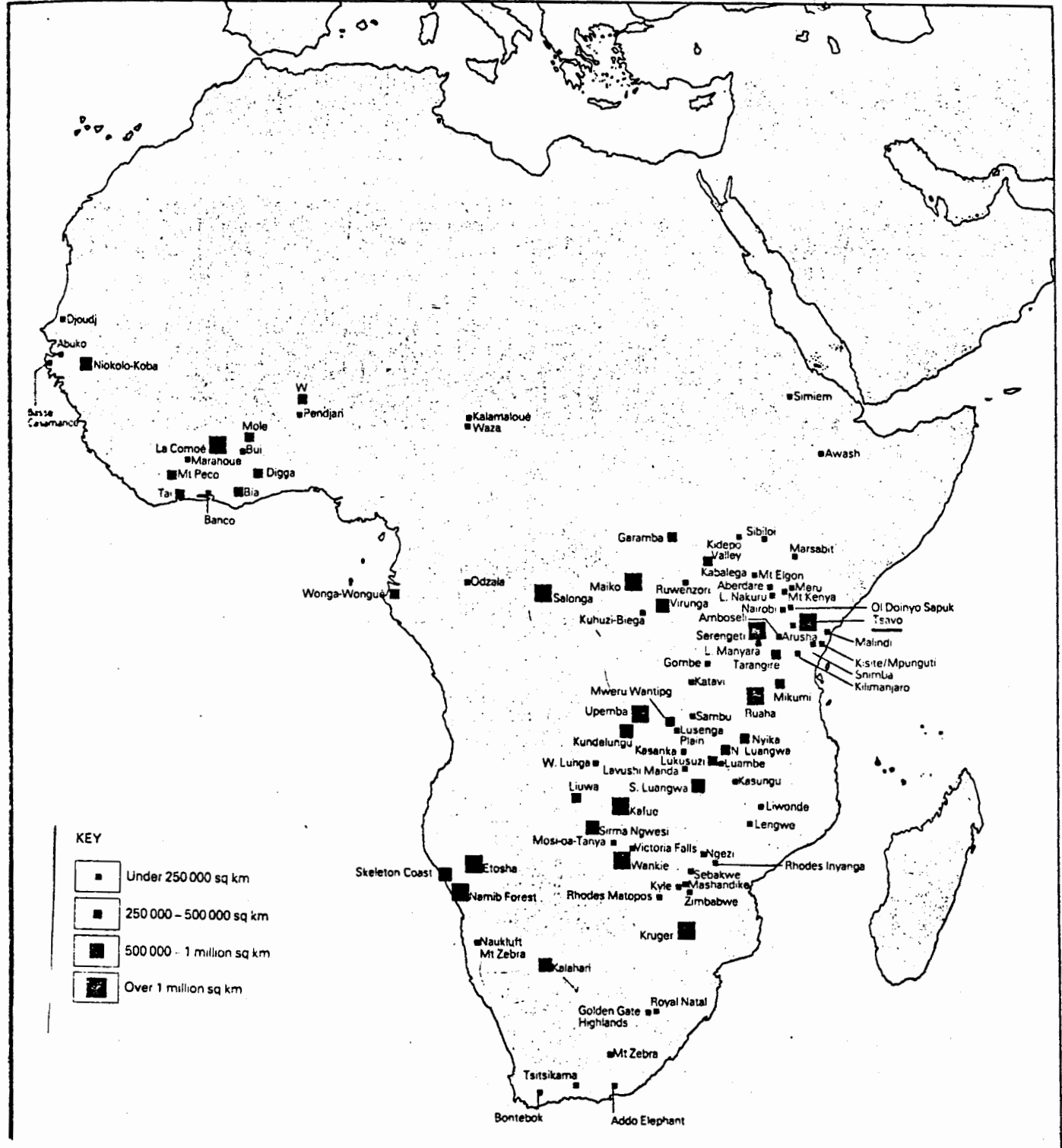
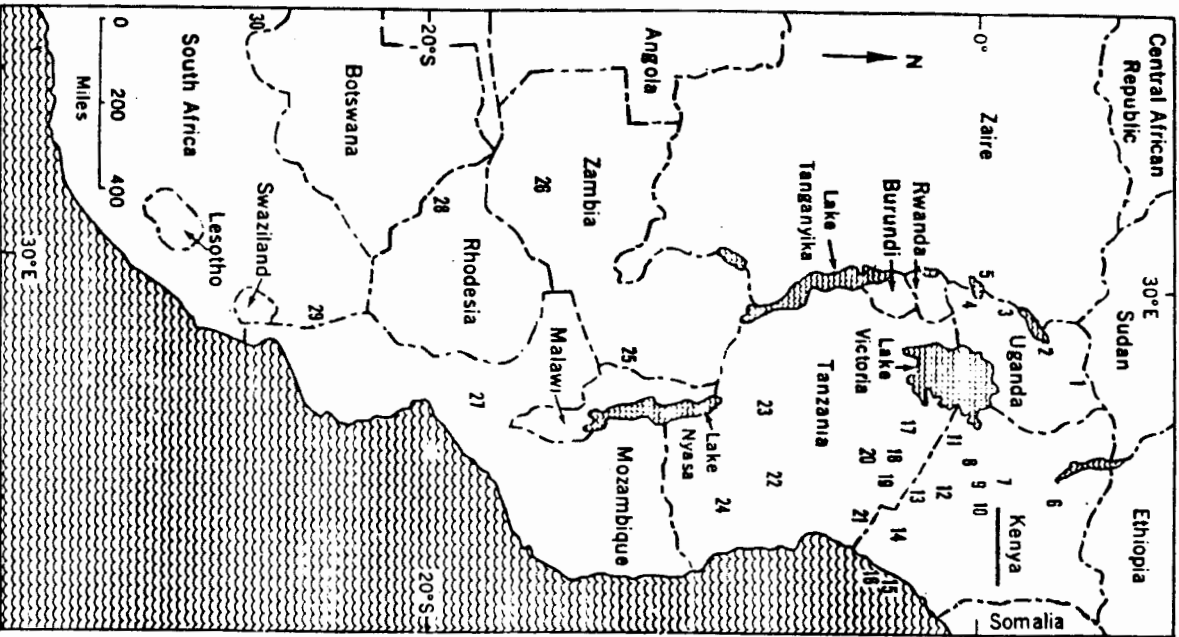


Figure 2

1972



- Uganda
- 1. Kidepo
- 2. Murchison Falls
- 3. Semliki Reserve
- 4. Queen Elizabeth
- Zaire
- 5. Albert
- Kenya
- 6. Marsabit
- 7. Samburu Reserve
- 8. Lake Nakuru
- 9. Aberdare
- 10. Mount Kenya
- 11. Mara Reserve
- 12. Nairobi
- 13. Amboseli Reserve
- 14. Tsavo
- 15. Malindi Marine
- 16. Watamu Marine
- Tanzania
- 17. Serengeti
- 18. Lake Manyara
- 19. Arusha
- 20. Tarangire
- 21. Mkomazi Reserve
- 22. Mikumi
- 23. Ruaha
- 24. Selous Reserve
- Zambia
- 25. Luangwa
- 26. Kafue
- Mozambique
- 27. Gorongosa
- Rhodesia
- 28. Wankie
- South Africa
- 29. Kruger
- 30. Kalahari-Gemstok

Fig. 1. National parks and game reserves in eastern Africa.

Figure 3

1974

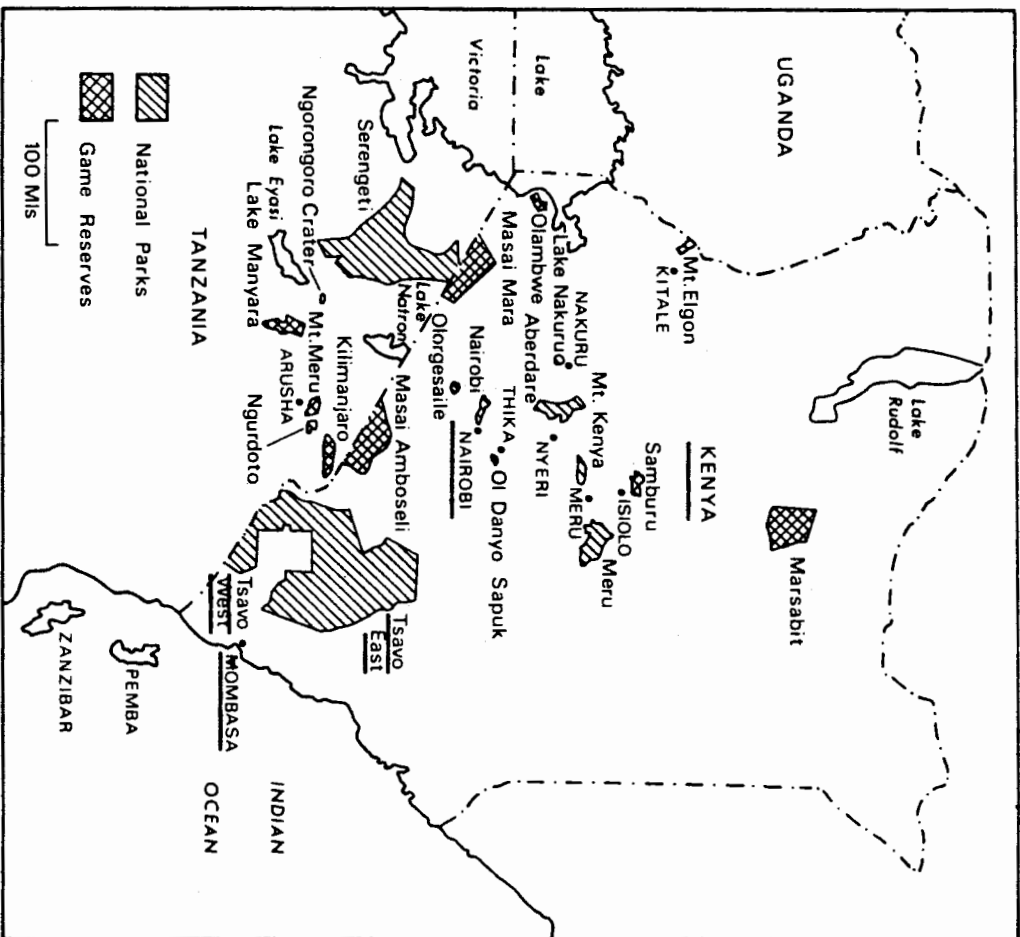


Fig. 9 National parks and game reserves, Kenya and north Tanzania

dividing it into Tsavo Park East and Tsavo Park West. The park is the main stronghold and reservoir of Kenya's wildlife. "Tsavo affords a refuge for one of the last great aggregations of elephants on Earth and for the only great aggregation of black rhinoceros."<sup>4</sup> Other species which inhabit the park include giraffe, hippo, lion, leopard, zebra, monkeys, gerenuk, oryx, and many other species of antelopes, as well as more than 250 bird species.<sup>5</sup>

National Park definition and tourism. According to the International Union for the Conservation of Nature, a national park is defined as an area preserved by government control, which is not occupied or exploited, and where ecosystems are not materially altered by human intervention. Visitors are allowed to enter under restriction for educational, cultural, and recreational purposes.<sup>6</sup> Under the last provision, Tsavo National Park has become a tourist haven, and now includes within its boundaries five luxury lodges, a hotel, and numerous campsites. Guides can be hired, hippos viewed from an underwater, glass-walled tank, or wildlife seen at night from the lodges with floodlights which simulate moonlight.<sup>7</sup>

In 1971, more than 118,000 visitors came to Tsavo.<sup>8</sup> That number was expected to double by the end of the 1970s. More than 1,000 miles of roads, mostly all-weather dirt tracks, have been constructed

---

<sup>4</sup> Myers, 1972, p. 1258.

<sup>5</sup> Malcolm Ross-Macdonald, editor, The World Wildlife Guide, (New York: The Viking Press, 1971), p. 34.

<sup>6</sup> Pollock, pp. 90-91.

<sup>7</sup> Ross-Macdonald, p. 34.

<sup>8</sup> Republic of Kenya, Central Bureau of Statistics, Ministry of Finance and Planning, Statistical Abstract, 1972, p. 34.

within the park to accomodate tourists.<sup>9</sup> In total, 1,534,000 people visited Kenya's national parks in 1975.<sup>10</sup>

Replacement, site boundaries, point of view. Like most African parks, "Tsavo was chosen as a national park not so much because it was particularly suitable as a park but because it was unsuitable for anything else," due to erratic rainfall and tse-tse flies.<sup>11</sup> "It was largely no-man's land, claimed by no tribe as their tribal territory. It was useless for farming or ranching. It had therefore been donated to the wild animals."<sup>12</sup> Because Kenya's ballooning population is continually grabbing every available bit of land, arable or otherwise, it would be impossible to relocate a game preserve anywhere near the size of Tsavo without great upset to many farmers and herders. Thus, since Tsavo could not really be replaced by anything comparable, if it is not protected Kenya will suffer a permanent loss of park land.

Unfortunately, even large parks such as Tsavo do not seem large enough. "Their boundaries were often fixed in response to political expediency rather than ecological expertise....There has been scant regard for the year-round needs of the herds of herbivores,.... When Tsavo was established, equally little account was taken of elephants in the entire ecounit (the geographical range needed to support the ecosystem during its seasonal fluctuations), an area at least twice

---

<sup>9</sup> Ross-Macdonald, p. 35.

<sup>10</sup> Oliver and Crowder, p. 311.

<sup>11</sup> John Reader, "Ndovu ni salama? (Is the elephant at peace?)" Audubon, vol. 76, no. 2 (March 1974), p. 39.

<sup>12</sup> Dennis Holman, The Elephant People (London: John Murray, 1967), p. 5.



as large as the park.<sup>13</sup> As a result elephants and other animals sometimes wander outside the park on seasonal migrations and are shot by defensive farmers or profit-seeking hunters. In addition, illegal poaching within the parks has reached huge proportions.<sup>14</sup>

Although to the Western mind e killing an elephant or gazelle or lion may seem a reasonless tragedy, to the farmer trying to defend his crop or the hunter trying to get meat for his family or money from ivory sales, it would seem a natural and rational act. Indeed, one of the problems in determining the fate of Tsavo National Park is that so many different points of view are involved. My own in this paper will be that of an outsider interested in preserving Kenya's wildlife if at all possible.

Land hunger and agricultural activities. The majority of Kenyans live in rural areas and depend on some type of agricultural activity for their livelihood.<sup>15</sup> Small farmers primarily grow maize, millet, sorghum, wheat, beans, peas, cassava, and potatoes. Coffee, tea, bananas, coconuts, cashews, cotton, and sugar cane are also grown, generally for cash sales. Cattle are the most common type of livestock, with a total of 9.8 million head in Kenya, although sheep, goats, pigs, and poultry are also raised.

It is difficult to comprehend how land-hungry Kenyans really are. Depending on estimates, anywhere from 80-96 percent of Kenya's

---

<sup>13</sup> Myers, 1972, p. 1255.

<sup>14</sup> The reader is referred to Reader, 1974, and to Esmond Bradley Martin, "They're Killing Off the Rhino," National Geographic, vol. 165, no. 3 (March 1984), pp. 404-422.

<sup>15</sup> Munslow, et. al., p. 333.

land is unsuitable for agriculture because it receives less than 30 inches of rainfall a year.<sup>16</sup> Nevertheless, "in the last few years a spillover of land-hungry Africans into the drier, game-supporting savannah lands has begun. Such is the mounting land pressure that some farmers are trying to grow maize in areas where they are lucky to get 20 inches of rain."<sup>17</sup> The high cost of irrigating land, about US\$7,000 per hectare,<sup>18</sup> prevents any sizeable increase in the amount of arable land. "Twenty-five years ago, when Kenya's first national parks were being set up, there were 4.6 cultivable acres for each Kenyan. Now there are two, far less than the worldwide average. Without any drop in the birthrate, there will be only 0.8 acre by the turn of the century."<sup>19</sup> (Figure 4)

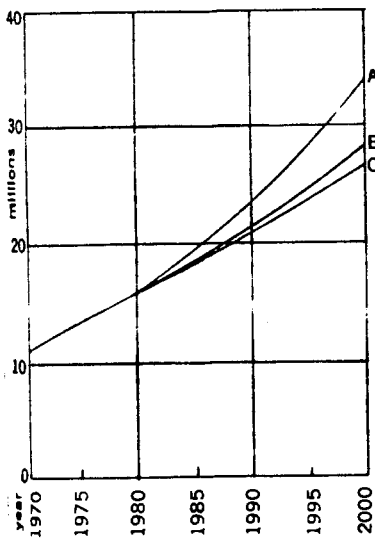
<sup>16</sup> For estimates, see *ibid.*, p. 333; Myers, 1973, p. 10; and International Bank for Reconstruction and Development, Kenya: Into the Second Decade (Baltimore: Johns Hopkins Univ., 1975), p. 466.

<sup>17</sup> Myers, 1973, p. 10.

<sup>18</sup> Munslow, *et. al.*, p. 333.

<sup>19</sup> Myers, 1973, p. 10. Figure 4:

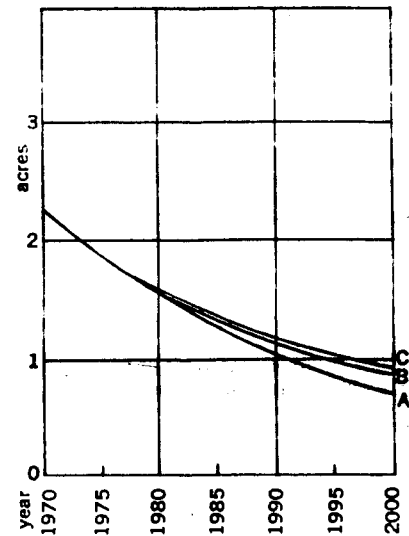
Projected Population Growth for Kenya



Notes: A—no change in present number of children per family (7.6)  
B—fertility rate of four children per family  
C—fertility rate of three children per family

Notes: based on a present arable land total of 24,855,000 acres, and corresponding to population projections.

Arable Land Per Capita



## RESIDUALS AND OTHER EFFECTS

### AGRICULTURAL RESIDUALS:

Erosion. However, while agriculture serves to keep the majority of Kenyans alive, it also produces residuals which have serious repercussions on the environment. As former president Jomo Kenyatta stated: "Land is Kenya's most important natural resource."<sup>20</sup> Despite this, hundreds of millions of tons of soil are destroyed yearly, the equivalent of one truckload per acre per year, because of erosion.<sup>21</sup> Much of this erosion results from having land under cultivation, particularly on slopes; wooded or grassy areas tend to hold water and resist erosion much better than agricultural lands. The most common preventive measure - terracing hillside fields - requires too much cost and man-power for the average Kenyan farmer. However, in recent years, experts from the Swedish International Development Authority, in conjunction with the Kenyan Ministry of Agriculture, have overseen large-scale soil conservation projects.<sup>22</sup>

Grazing by livestock also serves to clear the land of water-holding vegetation, substantially accelerating erosion. As a result of overgrazing, "in semi-arid areas there is desertification on

---

<sup>20</sup> Republic of Kenya, Development Plan, 1974-1978 (Nairobi: Kenyan Government Printer, 1974), p. 192.

<sup>21</sup> Phil O'Keefe, "The Causes, Consequences and Remedies of Soil Erosion in Kenya," Ambio, vol. XII, no. 6, 1983, p. 302.

<sup>22</sup> Carl-Gosta Wenner, "Soil Conservation in Kenya," Ambio, vol. XII, no. 6, 1983, p. 305.

almost every farm."<sup>23</sup> In all, about 75 percent of the land surface is continually threatened by advancing deserts. In addition, erosion is aggravated by land-clearing and deforestation. Trees are cut to create more farmland, or more often, felled to be made into charcoal, a major fuel source in Kenya.<sup>24</sup> With 74 percent of the country's energy consumption coming from biomass (i.e. wood),<sup>25</sup> only about 2.5 percent of the country is still completely forested.<sup>26</sup>

Pesticides. Another residual associated with agriculture is pesticide run-off. "Chemicals, when used heavily in agriculture, are carried to the ocean by surface run-off during the rainy season, and more so where there is soil erosion. In East Africa for example, DDT and similar compounds are sprayed on cotton and sugar cane fields to control disease vectors and to disinfect."<sup>27</sup> In all, about 50,000 metric tons of nitrogen and phosphate fertilizer are used annually in Kenya. Also, about 25,000 metric tons of mercury are used each year for seed dressing, leading to increasing fears of mercury pollution.<sup>28</sup>

---

<sup>23</sup> ibid., p. 307.

<sup>24</sup> O'Keefe, p. 303.

<sup>25</sup> Munslow, et. al., p. 335.

<sup>26</sup> Daniel Finn, "Land Use and Abuse in the East African Region," Ambio, vol. XII, no. 6, 1983, p. 296.

<sup>27</sup> Patricia Bliss-Guest, "Environmental Stress in the East African Region," Ambio, vol. XII, no. 6, 1983, p. 293.

<sup>28</sup> ibid., pp. 294-95. Also see Harry Osore, "Pollution and Public Health in East Africa," Ambio, vol. XII, no. 6, 1983, p. 321.

PARK RESIDUALS:

Erosion. Residuals associated with national park activities are much more difficult to quantify. Erosion and sediment run-off certainly occur from natural processes, although at a rate about 2.5 times lower than with human interference.<sup>29</sup> Grazing by Tsavo's herbivores - zebras, gazelles, wildebeest, elephants - clears land and leads to erosion. However, human interference may be at work here. Many scientists claim that park-imposed concentrations of populations, particularly elephants, have led to overgrazing beyond natural levels. In the past twenty years, grazing elephants have changed much of Tsavo from bush to grassland,<sup>30</sup> which is much less resistant to erosion forces.

Others. In addition, tourist activities produce residuals. Hotels, lodges, and campsites produce ordinary garbage and raw sewage which must be disposed of, although it is difficult to say how much is produced. The cars, land rovers and minibuses of tourists, one for approximately every 4.5 visitors, or about 25,000 a year,<sup>31</sup> also produce the usual emissions - carbon and nitrogen oxides, hydrocarbons, and particulates. So too do the vehicles and few airplanes used by the park's wardens for patrolling and anti-poaching activities. All of these residuals effect the ambient environmental quality of the park, and ultimately perhaps, the amount of tourism and tourist-generated income there.

---

<sup>29</sup> O'Keefe, p. 302.

<sup>30</sup> See Reader, p. 39; also Allan C. Fisher Jr., "African Wildlife: Man's Threatened Legacy," National Geographic, vol. 141, no. 2 (Feb. 1972), p. 184.

<sup>31</sup> Republic of Kenya, Statistical Abstract, p. 34, Table 46.

EFFECTS ON NATURAL SYSTEMS AND RECEPTORS; RESULTING AMBIENT ENVIRONMENTAL QUALITY

The residuals described above have a variety of effects on natural systems and human populations. Kenya is by far the most industrially developed nation in East Africa, and its industry is a major factor determining its environmental quality. "Few serious studies have been undertaken to assess the degree of industrial pollution, but the major sources - such as the discharge of effluents from coffee and sugar factories into rivers and streams - have been identified."<sup>32</sup>

Water quality. One of the most pernicious types of residual affecting the environmental quality of the Tsavo region is industrial waste in the Athi River, which flows from Nairobi into Tsavo National Park and joins with the Tsavo River to form the Galana-Sabaki River. This in turn empties into the Indian Ocean just north of Malindi, and "carries effluents from slaughter houses, tanneries, and cement and coffee factories situated in the industrial sector in the Kiambu District (outside Nairobi)."<sup>33</sup>

"Tanneries discharge large amounts of chrome salts and solids which contribute to increased Biological Oxygen Demand (BOD)."<sup>34</sup> Coffee plants give off heavy loads of organic waste. These wastes all cause an increased BOD in the Athi River, with correspondingly increased damage to fish and other river life. In addition, these decaying wastes attract bacteria which could seriously harm the

---

<sup>32</sup> Osore, p. 319.

<sup>33</sup> Bliss-Guest, p. 294.

<sup>34</sup> ibid., p. 294.

Tsavo animal populations using the Athi to drink and bathe in. Such bacteria may potentially affect humans in and around the park, too, who could be exposed either directly or through the local food chain.<sup>35</sup> The disease cholera is caused by bacterially infected water <sup>or</sup> food; in 1980 Kenya recorded 2808 cases of the disease,<sup>36</sup> while the United Kingdom did not report any at all during the years 1977-1981.<sup>37</sup>

Erosion effects. Erosion, due to agricultural practices, deforestation, and overgrazing, seriously affects the environmental quality of Kenya. Soil erosion results in an increase in silt carried by major rivers to the ocean. Silt deposited in and around deltas can effectively ruin sandy beaches. "Sedimentation from the (Galana-)Sabaki River, for example, has seriously affected the beaches at Malindi, a major Kenyan tourist center. Sand and water quality has markedly declined and there has been considerable beach accretion - reportedly as much as 500 meters over the last 10-15 years, with a noticeable acceleration during the last decade. As a result, fewer tourists visit the area and hotel occupancy has dropped."<sup>38</sup>

In addition, erosion renders land much less suitable for agriculture. By removing the relatively fertile upper layers of the soil, it reveals nutrient-poor lower layers, which in semi-arid climates can oxidize and form a cement-like hardpan. Thus soil

---

<sup>35</sup> Bliss-Guest, pp. 293, 294.

<sup>36</sup> Osore, p. 317.

<sup>37</sup> Whitaker's Almanack <sup>1984</sup> (London: William Clowes Ltd., 1983), p. 617.

<sup>38</sup> Finn, p. 298; also Bliss-Guest, p. 292.

erosion increases the need for added fertilizers, and thus may indirectly increase the amount of fertilizer run-off pollution.

Potential problems. Although Kenya does not yet seem to be experiencing significant air pollution problems, the ever-increasing number of vehicles which accompanies modernization or growing tourism poses serious, though latent, environmental threats. The facts that between 40 and 70 percent of Kenya's petroleum supplies are used for transportation<sup>39</sup> and that gasoline in the country still contains lead may well lead to carbon monoxide<sup>40</sup> and other air pollution problems of the sort which were well-documented in this country during the 1970's. Also, Kenya's widespread dependence on fuel wood and charcoal for energy could lead to problems of hydrocarbon and particulate air pollution.

In addition, Kenya's environment suffers in other ways not directly related to either agriculture or national park activities. Oil spills and routine tanker discharge in the Indian Ocean damage coastal marine life, including fisheries and coral reefs, and coat lagoons and beaches with tarry residue. And "despite the fact that there are 150 sewage treatment plants in Kenya, more than half the population still lacks adequate sanitation."<sup>40</sup> Lack of potable water and sanitation facilities are the two most serious health-related problems in the more rural parts of Kenya.

#### VALUES

Although Kenya has recently taken steps to combat its envir-

---

<sup>39</sup> Munslow, et. al., p. 335.

<sup>40</sup> Osore, pp. 317, 319.



onmental problems, including implementing soil conservation programs, oil spill clean-up operations, and industrial waste treatment processes, any large conservation effort is hampered by the lack of a wide-ranging environmental ethic.

Commodity ethic and poaching. Concern for the fate of wild animals is not really a part of the ethic of the average African. "The traditional African outlook toward land and natural things is commodity oriented."<sup>41</sup> This is particularly true with respect to poaching. "In more remote areas, where many people still live at subsistence level, poaching and a little ivory dealing are considered not so much a crime as a gamble,...After all, they say, it isn't like stealing or murder - elephants have been roaming these forests and plans for centuries and people have always tried to turn them to profit."<sup>42</sup> Or as one Kenyan game warden put it: "Many poachers believe they have a God-given right to kill the game. There is a Swahili phrase, *nyama ya mungu*, which literally means 'meat of God.' That sums up their attitude toward the animals."<sup>43</sup>

Short-term view. Another warden summed it up this way: "We simply do not have an esthetic value here in relation to the animals. You can't sell wildlife to the ordinary man except by economic arguments. In (America) leisure is an important consideration. Not here - food and shelter are my countrymen's primary considerations."<sup>44</sup> When people must be concerned about providing their

---

<sup>41</sup> Walter J. Lusigi, "New Approaches to Wildlife Conservation in Kenya." Ambio, vol. X, no. 5-6, 1981, p. 90.

<sup>42</sup> Reader, p. 40.

<sup>43</sup> Fisher, p. 160.

<sup>44</sup> ibid., p. 160.

next meal and keeping their children alive, they will probably not be too concerned about preserving something for future generations which could be of use to them now. "Kenya is a developing country still in need of the basic facilities for its people - hospitals and the like. Kenyans have to pay for their children to attend school, and many of them understandably take the short-term view that money for elephants should be low on the list of priorities."<sup>45</sup>

Uneven distribution of benefits. Also, under the current park system, lodges, hotels, information booths and the like do not always employ local people. Gate fees from most parks go to the national exchequer, with small portions diverted to the district treasury, and not back into the local economy.<sup>46</sup> Thus, the people who are most directly affected by the parks and their tourism receive little or none of their benefits. "The man who knows only a subsistence level of existence may look askance at his government's spending money on luxury facilities for outsiders. He himself has little prospect of benefiting from much of this tourist infrastructure, let alone the parks."<sup>47</sup>

Often, what a single truckload of tourists pays at a park entrance gate is more than what a local man earns in a month. This being the case, he is hardly likely to feel sympathetic toward comparatively wealthy foreigners staying in luxury hotels and driving automobiles while he, perhaps short of land, in no

---

<sup>45</sup> Reader, p. 41.

<sup>46</sup> Myers, 1972, p. 1260.

<sup>47</sup> ibid., p. 1260.

way benefits from their visit to "Africa's splendors." He himself has neither the means nor the leisure to visit the parks.<sup>48</sup> The problem of such a potentially hostile dichotomy of visitors and local people can only spell trouble for the parks unless addressed. "As people in East Africa become more hungry for food and land, they will look askance at any further schemes for keeping chunks of the landscape locked up for the delight of foreigners."<sup>49</sup>

#### VALUATION OF EFFECTS AND COSTS

Tourism value. Nevertheless, Kenya is a rapidly expanding and rapidly developing nation and vitally needs financial resources to carry out its plans and improve the living standards of its people. Thus, the revenues from wildlife preservation (i.e. from tourism) are crucially important to Kenya. "Tourism is currently (1972) earning at least \$55 million of that prime commodity for an emergent economy, foreign exchange, thereby making tourism the nation's most efficient industry in that respect. It generates 3 percent of the gross national product, or around \$4 out of a per capita GNP of \$130."<sup>50</sup> For the most part, it is "the abundance of wildlife which in general attracts tourists to Kenya, so that virtually all tourist income in Kenya may be regarded as being indirectly derived from the ~~existence~~<sup>existence</sup> of its wildlife."<sup>51</sup> Most

---

<sup>48</sup> Lusigi, p. 89.

<sup>49</sup> Myers, 1973, p. 82.

<sup>50</sup> Myers, 1972, p. 1259.

<sup>51</sup> International Bank for Reconstruction and Development, "The Economic Development of Kenya: Report of an Economic Mission, December 1962". (Nairobi: Kenyan Government Printer, 1962), p. 122.

all of this tourist income is profit for the government, since it spends less than \$1.5 million a year on all the national parks. In 1975, the Kenyan government ran Tsavo on an annual budget of no more than \$300,000,<sup>52</sup> although the park generated to all parties involved at least ten times that amount.

Valuing park monetary benefits. Placing a monetary value upon Tsavo National Park is extremely difficult, particularly because of a lack of such basic statistics as the amount of income the park generates annually. This must be estimated from such known figures as the annual number of visitors, fees, and hotel prices. In addition, the most recent official statistics available at Williams College are from 1971, so amounts must be considered in exchange rates of that time. As far as a purely monetary value for Tsavo is concerned, this can best be determined as the amount of money generated by gate fees, hotel and lodge occupation, and wages to park officials, given the existing constraints on data. The following is an approximation of that value:

| (1971)     | Adult Residents | Child Residents | Adult Non-Residents | Child Non-Residents | Vehicles |
|------------|-----------------|-----------------|---------------------|---------------------|----------|
| *Tsavo E.  | 16441           | 392             | 24690               | 3793                | 10366    |
| *Tsavo W.  | 26387           | 1714            | 32004               | 7241                | 15329    |
| **Gate fee | KSh10           | Sh 5            | Sh 20               | Sh 5                | Sh 10    |
| ***Value   | US\$59959       | \$1474          | \$158743            | \$7724              | \$35973  |

Total value of gate fees at Tsavo during 1971 = \$263,873.

\*Statistical Abstract, p. 34, Table 46.

\*\*Ross-Macdonald, p. 26.

\*\*\*Using the 1971 rates: K\$=\$2.80, KSh20=K 1, KSh=\$.14.

In addition, Tsavo generates income through the occupancy of its hotels. Assuming, for safety's sake, that only non-resident visitors

---

<sup>52</sup> Reader, pp. 42-43.

would occupy the park's hotels, a total of 67,728 people stayed at Tsavo during 1971. The average cost of these hotels ~~is~~<sup>was</sup> KSh 113<sup>53</sup> or \$15.84 per night. However, since the average tourist stay in Tsavo lasted three to 14 days,<sup>54</sup> hotel costs equal<sup>ed</sup> about \$134.64 per visitor-stay, amounting to an annual hotel revenue of \$9,118,898. To these figures must be added the value in wages of Tsavo to its game warden employees, approximately \$43,000 in 1975.<sup>55</sup>

Thus, <sup>l</sup>adding these figures, the total monetary value of Tsavo National Park, <sup>per</sup> as recently as I can calculate was at least \$9.4 million a year.

Another economic valuation technique which would work well in this case, were sufficient data available, is the so-called travel cost approach. In this method, the park value would equal the sum of the travel costs of all its visitors, <sup>costs</sup> which presumably enter the Kenyan economy in some form or other. For a place with as much tourist appeal as Tsavo, some of the travel costs, particularly of its international visitors, could be quite high. However, this method does not take into account the amount tourists actually spend getting into or once inside the park. In addition, many international tourists do not come to Kenya solely to visit Tsavo, so the possibility of multiple-purpose trips must be considered, and the travel costs involved solely with Tsavo isolated.

Valuing park non-monetary benefits. Of course, many people

---

<sup>53</sup> Ross-Macdonald, p. 34.

<sup>54</sup> ibid., p. 35.

<sup>55</sup> Reader, p. 43; assuming for the entire park a labor force of about 250, paid \$172 each annually.

would argue, much of Tsavo's value is non-monetary. Preserving these species, "the last large-scale remnant of the tremendous variety of mammals of the Pleistocene (Era, two million years ago),"<sup>56</sup> provides people from all over the world with the invaluable opportunity of looking into the past and seeing unique creatures and ecosystems. In addition, preserving a portion of "pristine Africa" can provide for Kenyans and other East Africans, as well as for foreigners, an important sense of biotic heritage and cultural identity. Indeed, in recent years, Tsavo has become an important teaching tool for Kenyan school children. And, as the park now provides many people with recreation and aesthetic pleasure, so it can be expected to be of similar interest to future generations.

By preserving these species, they are also available for study to the scientific community, and may yield important scientific discoveries in the future. One scientist in Kenya has established an experimental ranch "where he is attempting to demonstrate that superior (food) yields can be obtained from using the native animals (such as gazelles) which are physiologically adapted to the semi-arid savannah."<sup>57</sup>

In addition, many people would argue that, as living creatures and important and long-time parts of both the human and biotic ecosystems of East Africa, these species have an inherent right to survival through preservation and protection. Given the intensities of population growth and land hunger in Kenya, the potential host-

---

56

<sup>57</sup> Paul and Anne Ehrlich, Extinction: The Causes and Consequences of the Disappearance of Species (New York: Random House, 1981), p. 69.

ilities between farmers and crop-eating animals, and the economic benefits of meat and ivory sales, it is unlikely that many of these animals would survive if not within a protected park. Making Tsavo smaller would also carry with it the problems of constricting migration routes, too heavily concentrating populations, or lowering population numbers altogether. To successfully preserve species, it is not sufficient simply to retain a few animals in a sort of constricted, <sup>outdoor</sup> zoo. Populations must be large enough to ensure proper genetic diversity, and must be given enough land area to suit their feeding, mating, and territorial habits.

Valuing food production benefits. Of course, such land could not also sustain year-round agriculture without almost insurmountable conflicts of interests between animals and farmers. Thus, in examining the use of some or all of Tsavo for agriculture or preservation, it is best to treat the two options as mutually exclusive. To make an informed decision between the two, it is necessary to compare the value of the park as it presently operates to its opportunity costs, i.e. the value of its next-best land use - food production.

The principal food crop in Kenya is maize, much of which is grown on small farms, defined by the government as being between .2 and 12 hectares in size. In 1971, 916,200 hectares were under maize in Kenya, with an output valued at K~~5~~<sup>5</sup>,206,000 or K~~5~~<sup>5</sup>.68 per hectare. At that value, Tsavo's 2,080,806 hectares, if completely cultivated with maize, would yield an output worth K~~11~~<sup>11</sup>,818,978 or \$33,093,138.<sup>58</sup>

---

<sup>58</sup> The entire paragraph depends on Statistical Abstract, section on Agriculture.

However, in the provinces surrounding Tsavo, the Eastern and Coast Provinces, only about 2 percent of the land area is suitable for maize cultivation. Assuming this to be true for Tsavo also, which has a similar climate and soils, the value of Tsavo's potential maize output falls to only K~~₦~~236,380 or \$661,863.

However, since the majority<sup>7</sup> of the Tsavo region receives only between 10 and 30 inches of rainfall a year, it is considered by the government <sup>u</sup>unsuitable for agriculture as a whole. Immediately, the idea of livestock production springs to mind, but the Kenyan Ministry of Agriculture and Animal Husbandry has also classified the Tsavo region as having low potential for grazing because of its rainfall situation and tse-tse fly infestation. The area is "regarded as doubtfully suited to organized ranching at present stock prices and with indigenous livestock. (The) best use is thought to be for nomadic wild animals or, less so, for strictly nomadic stock keeping."<sup>59</sup> It must be remembered that <sup>the</sup> Tsavo region was chosen for a national park because it was generally unsuited for anything else. Small pockets of the parkland may indeed be suitable for some agriculture and livestock production, but a detailed survey map of soils and microclimate would be necessary to determine this.

#### CONCLUSION

Given the above information, I feel that Tsavo should be preserved as a national park with certain modifications. One

---

<sup>59</sup> Economic Development of Kenya, p. 51.



approach often suggested by experts is game cropping, in which wild animals are killed periodically either for food or, more often, to relieve dangerously-large concentrations in parks. In Tsavo in 1971, 6,000 elephants died during a severe drought, leading some wardens to urge that the park determine an optimum supportable elephant population and use game cropping to maintain it. In addition, as elephants migrate into the park from outside, overcrowding increases,<sup>60</sup> with increased harm to the park's environment. At approximately \$250 per elephant,<sup>61</sup> 6,000 animals could have earned a market price of \$1.5 million for the park. As one expert noted, "a reduction campaign of 10 percent per year of the surplus elephants at Tsavo would double the present financial allocation for all of Kenya's parks, while a sustained-yield harvest of 5 percent per year would triple the total wildlife research budget. Even if the harvest should be only 2.5 percent per year, there would still be much potential."<sup>62</sup>

Given the commodity-oriented nature of most Africans' environmental views and the feeling of many local people that they are not benefiting from the park, Tsavo would do well periodically to distribute or sell at very low prices the meat it would obtain from game cropping to local subsistence farmers. There is a demonstrated desire for the meat of elephants, hippopotamus, giraffe, zebra, and other park species on the part of Kenyans.<sup>63</sup>

---

<sup>60</sup> Reader, pp. 39-40.

<sup>61</sup> Myers, 1972, p. 1260.

<sup>62</sup> ibid., p. 1260.

<sup>63</sup> ibid., p. 1260, and Reader, p. 43.

In addition, local people, many of whom possess traditional tribal hunting skills, could be hired to carry out the game cropping. If Tsavo wishes to operate with as few problems as possible, it must endeavor to make local residents feel they directly benefit from the park. Correspondingly, some local people could be allowed to practice game ranching in buffer zones on the edge of the park. "Game ranching is the scientific management of many species of wild animals in their natural habitat and without any effort to domesticate them."<sup>64</sup> This works best with wild ungulates such as oryx, eland, impala, and gerenuk, which have low water needs and can live off poor natural grazing land without destroying vegetation in the way domestic livestock do.

In addition, the Kenyan government should direct more park revenue to the districts so that the money can be used for such benefits as schools, medical centers, and cattle dips for those people most directly affected by the parks.

Education is, of course, an important complement to these efforts, and can have long-range benefits. Existing efforts to educate both schoolchildren and adults about the beauty and importance of Kenya's wildlife, efforts which include a Wildlife Education Centre at Nairobi National Park, public conservation films, and the country-wide Wildlife Clubs of Kenya, should be encouraged and increased in order to ensure that future generations of Kenyans grow up realizing that wildlife can be an asset, not merely an enemy or commodity. (Other programs which the government is under-

---

<sup>64</sup> Pollock, p.122.

taking, such as population control, family planning, and increased agricultural productivity schemes, are equally important but somewhat beyond the immediate scope of this paper.)

If these sorts of modifications can be made, I believe Tsavo National Park will be able to continue its mission of protecting and preserving Africa's unique wildlife for the benefit of Kenyans and foreigners alike for many years to come.

\* \* \*

## Annotated References

- Bliss-Guest, Patricia. "Environmental Stress in the East Africa Region." Ambio, vol. XII, no. 6 (1983), 290-95.  
(Environmental characteristics and pollution problems of the coastal East African region. Good in-brief discussion of the major environmental issues.)
- Crittendon, Ann. "Tourism's Terrible Toll." International Wildlife, vol. 5, no. 2 (March-April 1975), 4-12.
- Ehrlich, Paul and Anne. Extinction: The Causes and Consequences of the Disappearance of Species. New York: Random House, 1981.
- Fisher, Allan C, Jr. "African Wildlife: Man's Threatened Legacy." National Geographic, vol. 141, no. 2 (Feb. 1972), 147-85.
- Holman, Dennis. The Elephant People. London: John Murray, 1967.  
(Semi-fictional story of the elephant-hunting tribes in the Tsavo region. Useful account of the physical characteristics of the park.)
- International Bank for Reconstruction and Development. The Economic Development of Kenya: Report of an Economic Mission, December 1962. Printed by the Government of Kenya, 1962.
- Kenya: Into the Second Decade. Baltimore: Johns Hopkins University Press, 1975.
- Kenya, Republic of. Development Plan, 1974-1978. Nairobi, Kenyan Government Printer, 1974.  
(Kenya's third five-year plan. Does not say much about present conditions in Kenya but talks at length about future plans and goals.)
- Statistical Abstract, 1972. Nairobi: Kenyan Government Printer, 1972.  
(Printed annually by the Central Bureau of Statistics, Ministry of Finance and Planning. Tables of numbers about absolutely everything. However, some of the tables are set up in such a way as to be confusing to someone with only limited knowledge of Kenyan politics and society. Some gaps too in important statistics.)
- Lusigi, Walter J. "New Approaches to Wildlife Conservation in Kenya." Ambio, vol X, no. 5-6 (1981), 87-92.
- Martin, Esmond Bradley. "They're Killing Off the Rhino." National Geographic, vol. 165, no. 3 (March 1984), 404-422.
- Munslow, Barry et. al. "Energy and Development on the African East Coast: Somalia, Kenya, Tanzania and Mozambique." Ambio, vol XII, no. 6 (1983), 332-37.  
(Detailed study of energy consumption and accompanying prob-

lems in these four countries. Especially good discussions of fuelwood shortages and Kenyan land-hunger. A thorough study.)

Myers, Norman. "National Parks in Savannah Africa." Science, (Dec. 22, 1972), 1255-62.

(Very good study by one of the field's leading experts on the problems facing national parks in Africa and how their ecological requirements can be balanced against socioeconomic constraints.)

—— "The People Crunch Comes to East Africa." Natural History, (Jan. 1973), 10-16, 79-82.

(Good discussion of Kenyan population expansion and land-hunger, as well as their danger to national parks. Numbers are pretty accurate, though study offers few answers, only problems.)

Netboy, Anthony. "Tourism and Wildlife Conservation in East Africa." American Forests, vol. 81, no. 8 (Aug. 1975), 24-27.

O'Keefe, Phil. "The Causes, Consequences and Remedies of Soil Erosion in Kenya." Ambio, vol. XII, no. 6 (1983), 302-305.

(Not enough discussion of the technical aspects of erosion, though good tables, numbers, and discussion of technical solutions, by an expert on the topic.)

Oliver, Roland, and Michael Crowder, eds. The Cambridge Encyclopedia of Africa. Cambridge: Cambridge University Press, 1981.

(Just what the title implies, a few pages on every facet of life in Africa. A useful overview.)

Pollock, N.C. Animals, Environment and Man in Africa. Westmead, England: Saxon House, 1974.

(Two useful chapters on conservation and national parks, good background information and unsophisticated analysis.)

Reader, John. "Ndovu nisalama? (Is the elephant at peace?)" Audubon, vol. 76, no. 2 (March 1974), 34-45.

(In-depth account of the causes and logistics of elephant poaching in Kenya. Lots of useful price information.)

Ross-Macdonald, Malcolm, editor. The World Wildlife Guide. New York: The Viking Press, 1971.

(Published by the World Wildlife Fund. A guide for the potential tourist to the world's national parks. Includes prices, sizes, animals to be seen, accommodations, etc.)

Wenner, Carl-Gösta. "Soil Conservation in Kenya." Ambio, vol. XII, no. 6 (1983), 305-307.

(An interview with Wenner, a Swedish soil specialist who has been working in Kenya. A discussion of that country's erosion problems and recent large-scale conservation efforts.)

Annotated References - Addendum

Finn, Daniel. "Land Use and Abuse in the East Africa Region." Ambio, vol. XII, no. 6 (1983), 296-301.  
(Overview of the problems of eroision and deforestation in East Africa, focusing on their effects on coastal ecosystems.)

Osore, Harry. "Pollution and Public Health in East Africa." Ambio, vol. XII, no. 6 (1983), 316-321.  
(An examination of the major causes of disease in East Africa, in particular lack of potable water and proper sanitation. A good, detailed study.)

Whitaker's Almanack 1984. London: William Clowes Ltd., 1983..