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**DEBT-FOR-NATURE SWAPS AND
THE ENVIRONMENT IN AFRICA**

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This paper discusses the use of debt-for-nature swaps as a funding mechanism for environmental expenditures in Sub-Saharan Africa. The pros and cons of such transactions for creditor banks, environmental groups and debtor countries are discussed and evaluated in terms of their ability to address environmental problems prevalent in the region. It is concluded that the usefulness of debt swaps may be limited and that direct donations to developing countries for environmental purposes may often be superior to swap transaction.

DEBT-FOR-NATURE SWAPS AND THE ENVIRONMENT IN AFRICA

Steven C. Kyle*

Introduction

Debt-for-nature swaps (DNS) are transactions in which a country's foreign currency debt is exchanged for environmental expenditures within the country or for the creation of nature parks, preserves, or development limits in fragile areas. Swaps have received a great deal of attention since first being suggested as a funding mechanism in 1984. The reason for this popularity is the fact that DNS's appear to address two problems simultaneously: high and rising levels of foreign debt, and the environmental crisis afflicting many developing countries. This paper discusses the pros and cons of DNS's vis-a-vis other funding mechanisms for addressing the environmental problems of Sub-Saharan Africa. The most recent DNS took place in Madagascar in August 1990¹ and many environmentalists in the U.S. and elsewhere have promoted additional transactions in other parts of Africa, making it important to assess the extent to which this mechanism can be used effectively.

The existence of serious debt repayment problems for many African countries is clear. Though most of these countries are not

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responsible for the bulk of the overall international debt crisis - the amounts owed by most Sub-Saharan countries are small in comparison both to the world financial system and to the debts of Latin American and East European countries - the foreign indebtedness of many African countries has grown to the point where repayment is difficult or impossible. One important cause of this decline in ability to service debt is the decline in commodity prices that occurred through the 1980's. Countries dependent on exports of unprocessed agricultural or mineral products have suffered a sharp drop in foreign receipts as a result.

The existence of serious environmental problems is also clear. Table 1 shows a recent estimate of the loss of wildlife habitat in Africa over recent years. It is evident that the problem of widespread degradation of land is not confined to the more obvious examples such as desertification in the Sahel, but extends across various agro-climatic zones to affect virtually all countries to some degree.

Various reasons have been cited for the accelerated rate of degradation. One major problem is the reliance of a large percentage of the population on fuelwood for cooking and other household energy needs. This has resulted in large areas of completely denuded land in some countries, as rural inhabitants are forced ever farther from home in search of needed fuel. Logging is also responsible for much land clearing and is a major export

industry in some countries. Land clearing for agriculture and ranching is also a major contributor as increasing populations expand into more marginal lands.

At the root of many of these causes is the increasing population pressure resulting from growth rates as high as 4%. Table 2 shows current and projected population/land ratios for selected African countries. It should be noted that these figures are based on the area of arable land which is considerably less than the total. The trend in the figures indicates the potential for severe problems in the future, while at the same time it is clear that there is considerable local variation. In addition to limited availability in some areas, many African soils are of relatively poor quality, though African farmers use less fertilizer than their counterparts anywhere else in the world, as illustrated by Table 3.²

From an economic point of view, the most important result of environmental degradation is the loss of productive capacity. That is, the land loses its ability to provide a viable subsistence for the people who rely on it. Population pressure can have a direct effect on this productive capacity if excessive cultivation prevents regeneration of nutrients or causes direct damage through erosion or other means. For example, continued use of farming systems based on slash-and-burn methods can result in severe damage

if population densities rise to a point where the forest no longer remains fallow for a long enough period between cultivations.³ While new farming techniques could in theory help a great deal, the introduction of new technologies in traditional societies is a slow process, often much slower than the pace of land degradation.

These problems are likely to remain an obstacle for the foreseeable future. African economies are for the most part dependent on agriculture for a major portion of GNP and for the employment of the majority of the labor force. Thus, overall growth will almost inevitably involve agricultural growth, particularly in export crops, as a result of efforts to open economies and increase trade. Given the fact that two thirds of the increase in agricultural output over the past decade has been a result of increases in the area cultivated rather than in the yield obtained, it is likely that future growth will be based at least partly on continued expansion into previously uncultivated areas.⁴

The remainder of the paper will discuss the ability of DNS's to help ameliorate these problems. First, the details of the swap transactions themselves will be discussed together with a brief review of previous DNS's. This will be followed by a discussion of the advantages and disadvantages for each of the participants. The paper will end with an evaluation of the prospects for swaps in Africa and recommendations for the future.

Previous Debt-for-Nature Swaps

Debt-for-nature swaps are similar to debt-for-equity swaps, which have been conducted since 1982. There are three principal participants in any debt swap:

1. **Creditor banks** - In order for a debt swap to occur, a creditor must be willing to sell the debt instruments owed by the country of interest.
2. **Foreign investors** - In a debt-for-equity swap, these are foreign nationals who wish to invest directly or in the stock market of the country whose debt is purchased. In a debt-for-nature swap they are foreign environmental groups who wish to promote environmental expenditures or actions.
3. **Central Bank** - In order for the foreign investors to make investments domestically, they must be able to convert the "second-hand debt" into local currency at the Central Bank. Unless the government is willing to make such a conversion there is no reason to purchase outstanding debt obligations.

The first step in a swap transaction is for the foreign investors or environmental groups to purchase the foreign debt on the secondary market. The extent of the advantage that can be gained from this purchase is limited by the size of the discount at

which the debt can be purchased. This discount, typically reported as a percentage of face value, is the main reason for the existence of a secondary market in developing country debt.

This market arose in 1982 as a result of the LDC debt crisis which caused widespread uncertainty about the ability of debtor nations to pay foreign currency obligations. This doubt as to the quality of the debt meant that the instruments themselves - the "IOU's" - were not worth as much as their face-value. Banks who wished to rid their portfolios of bad debt, and who were willing to take the loss incurred by selling at a discount, provided the supply of debt to the secondary market.

So, the result of the first step is an exchange of hard currency for the discounted debt obligation of the developing country. The foreign investor must then take this debt instrument to the Central Bank of the country involved and exchange it for local currency. As a result of this second step, the foreign investor ends up with local means of payment while the debtor government can cancel the debt for which it was swapped.

It is important to note that at this step there are two additional factors which determine the extent of the gain from using the debt swap mechanism. First is the discount at which the debt is redeemed. If the central bank redeems the debt at face value, then the foreign investors benefit to the extent of the

discount they received upon original purchase of the debt. To the extent that the local authorities themselves redeem at a discount, they can limit the implicit subsidy to the foreign investors. An additional way to limit the subsidy is to exchange the proceeds of the swap for local currency at an official exchange rate less favorable to the foreign transactors than a market determined rate. Such overvaluation is quite common in developing countries and has been a factor in several debt-for-nature swaps.

Since the overall object of the transaction is to translate a given amount of hard currency into the greatest possible amount of local currency in the country of interest, the extent of the advantage gained by using the swap mechanism can be expressed in terms of the implicit exchange rate involved in the transaction. That is, the gain from a debt swap boils down to a preferential exchange rate which depends on the purchase value, the redemption value and the official exchange rate at which the swap is transacted. The following equation, where e represents the exchange rate and redemption and purchase values are expressed as a percent of face value, shows the relationships between these factors:

$$(1) \quad e_{\text{implicit}} = \frac{\text{redemption value} \times e_{\text{official}}}{\text{purchase value}}$$

This equation shows that the implicit exchange rate (expressed as local currency/\$) improves with increases in the purchase discount, but decreases with higher redemption discounts or more

overvalued official exchange rates. The extent to which this funding mechanism provides an advantage can be further limited by restrictions on the uses to which the proceeds can be applied. For example, some DNS's have been used to fund environmental bonds which have had interest rates fixed below the rate of inflation. This can result in a capital loss in terms of the initial investment, as in Costa Rica where swaps were used to fund bond issues with fixed interest rates of 15% and 25%.

Other uses of the proceeds have been the creation of national parks or reserves, as in Bolivia, Ecuador, Costa Rica, the Philippines and Madagascar. Funds for management of parks and for creation or financing of domestic environmental groups have also been provided via swaps. In the most recent transaction in Madagascar some of the proceeds were dedicated to research into the problems of deforestation afflicting large parts of the island.

Table 4 summarizes debt-for-nature transactions which have occurred to date, aggregating individual swaps into country totals. The table makes it clear that there has been considerable variation in the discounts and exchange rates involved, while at the same time it can be seen that the amounts of debt swapped have represented only a small fraction of total foreign debt outstanding. The World Wildlife Fund, the Nature Conservancy and Conservation International are three environmental groups which have played a key role in promoting and funding many of these

transactions. Both the Dutch and Swedish governments have been involved in Costa Rica.

All of these swaps have several aspects in common: all have resulted in the cancellation of some foreign debt; all have resulted in the creation or support of parks; most have resulted in additional funding for local environmental groups. Only the first case, in Bolivia, provided for limitations on ownership rights to land, when constraints were placed on logging and agricultural development in buffer areas surrounding the Beni biosphere. Both Costa Rica and Ecuador made use of environmental bonds while the most recent transaction swapped foreign currency trade credits rather than syndicated bank debt as in previous examples.⁵

In order to make an evaluation of the debt swap mechanism for Sub-Saharan Africa, the following sections will address the gains to each participant in the swap and the ability of these transactions to affect the debt and environmental problems of the region.

Pros and Cons of Debt Swaps

This section will consider the advantages and disadvantages of debt swaps for each of the three major participants, the creditor banks, foreign environmental groups, and the debtor countries.

Creditor Banks

Debt-for-nature swaps (or indeed any kind of swap) are clearly good for creditor banks - they would not participate in them at all if they thought otherwise. To sell debt instruments at a discount means that the banks value these obligations no higher (and perhaps lower) than the price at which they are sold. If the creditor banks had no fears about timely repayment, they would not be selling the debt at all. They are selling questionable paper in return for cash from environmental groups, transactions which when viewed ex-post have virtually always been beneficial in light of the downward trend in secondary market prices for debt through the 1980s.

It is important to note that the number of banks which can or will participate in the secondary market for LDC debt is limited. This is due to accounting regulations which require banks which have sold developing country debt at a discount to "mark to market" any similar debt remaining on their books. In other words, to sell at a discount is to admit to impaired value and once this is admitted, banks are required to subtract the implied loss from their profits. For banks which hold large amounts of developing country debt, the resulting writedown could impose huge losses and result in the elimination of a significant portion of bank capital, a situation in which most money center banks find themselves. Consequently, banks with too much exposure to take the loss stay

out of the market, which is supplied mainly by smaller regional banks seeking to exit the market for developing country debt entirely. It has been estimated that only eight banks account for approximately 85% of the volume in the secondary market for debt.⁶

It is also important to note that there are relatively few African countries with commercial bank debt available to be swapped since, without a supply of debt, the transaction cannot go forward. (See Table 5). While the use of trade credits in the Madagascar swap sets a precedent that could be applied much more widely, the fact that trade credits (which support the international trade in merchandise - the main revenue source for many governments) are considered to be questionable debts is evidence of a very unfavorable economic situation. Sale of these credits at a discount makes it more difficult and/or expensive to use this source subsequently. Difficulty in obtaining such credits could pose very real obstacles to every-day transactions whose interruption could cause major economic damage.

The fact that a large majority of African countries owe money to the World Bank and the IMF is no help in terms of supply for the secondary debt market. Obligations to these international organizations are not resalable - even if they were considered of dubious enough quality to sell at a discount. In fact, these two organizations have senior creditor status, meaning that they are the first in line to be repaid in the event that there are

insufficient funds to satisfy all creditors. This senior status means that this debt enjoys a far higher likelihood of being repaid than does other debt and so would be unlikely to sell at a discount. The World Bank in particular has been reluctant to admit to impaired value in its loan portfolio, and will go to great lengths to preserve the AAA credit rating which allows it to borrow on world capital markets at the best available rates. Bilateral creditors can participate as did the Dutch and Swedes in Costa Rica, but this has been limited to these examples so far.

Environmental Groups

The degree to which environmental groups can magnify available funds via a debt swap depends mainly on the factors discussed above in equation (1). To the extent that there is in fact a greater expenditure for environmental purposes than there would be otherwise, debt swaps provide an advantage. However, it is important to realize that this depends on the additionality of the funds; i.e. the extent to which the debt swap results in expenditures that would not otherwise have taken place.

While it is clear that environmental expenditures result, it is less clear that they are 100% additional. For example, a direct donation of hard currency would also result in environmental expenditures, if we take it as given that environmental groups have a certain amount of money that they can dedicate to this purpose.

How much additionality results from a swap depends a great deal on the extent to which donor priorities coincide with those of the debtor government. To the extent that donations or debt swaps merely replace expenditures that governments would have made anyway, the degree of additionality is diminished.

Perhaps the biggest plus for environmental groups is the extensive publicity and public awareness that can result from these transactions. While it is difficult to measure the value of this, it is clear that increased international attention to environmental problems can help prod governments into action.

Debtor Countries

It would seem obvious that one direct benefit of debt swaps is the reduction in the amount of foreign debt outstanding. However, before jumping to this conclusion it is important to bear two caveats in mind:

1. The amounts involved are small. Table 4 shows that debt swaps have resulted in the cancellation of a very small portion of outstanding debt, amounting to less than 2% even in the country with the largest program, Costa Rica.

2. Cancellation of outstanding debt is a benefit only if the debt would have been repaid. Put another way, tearing up an IOU is only a help if the IOU was worth something in the first place.

Clearly, the creditor banks have a low opinion of the value of the debt or, as noted above, they wouldn't sell it in the first place. It can still be argued that cancellation of the debt reduces the debt service owed in any given year, regardless of the ultimate disposition of the debt. However, a closer look at actual debt repayments shows that the amount repaid in any given year bears little relation to the amount contractually required. Rather, repayment levels in the years since 1982 have been determined by negotiation based on a country's ability to pay. This ability is conditioned by such factors as GNP growth and achievement of a positive trade balance - variations in prices of important export commodities have been far more important than the face value of outstanding debt.⁷

In sum, incremental reductions in total debt outstanding have little or no real effect on a country's current position. If one is of the opinion that attempts to repay the debt are likely to be unsuccessful anyway and that it will eventually be repudiated or forgiven, then canceling it now in exchange for cash is in fact a loss to the debtor governments.

It may seem somewhat paradoxical to argue that the debt swap results in no net addition to the resources available to the debtor country. However, this paradox is resolved if we consider the ultimate destination of the hard currency with which environmental groups initiated the transaction - This money goes to the creditors and not to the debtor government, to whom it would in fact represent an increase in the ability to command resources. The money that is spent on environmental projects is local currency whose issue does not represent additional resources to the debtor country.

Additional issue of local currency cannot result in additional wealth unless one is willing to argue that the money multiplier in Sub-Saharan African economies is positive; that is, that printing money will result in more output rather than more inflation. This is not a very sound argument in most cases, leaving reallocation of existing priorities as the only source of additionality to environmental expenditures. That is, such funding comes at the expense of other priorities in what amounts to a zero sum game. Whether or not those expenditures which are eliminated are more or less important than those which receive additional funds depends on one's point of view. As noted above, the desirability of the end result depends on the degree to which the priorities of the government coincide with those of the environmental groups.

When weighing the extent of these beneficial aspects for the debtor countries, it is also necessary to account for the costs that are incurred in subsidizing the swap. This subsidy is a mirror image of the advantage accruing to the environmental groups as a result of the favorable implicit exchange rate shown in equation (1). To the extent that the debtor government permits the parties to the swap to "leverage" their money via the swap mechanism, it is itself providing the additional value. Some countries have made an effort to limit the extent of the subsidy. For example, Costa Rica originally redeemed debt at 70% of face value but reduced this to 35% after secondary market prices for Costa Rican obligations declined.⁸

The value of any development rights foregone, as in the Bolivian swap, must also be counted as part of the cost of a swap. Though difficult to quantify, these costs can be substantial. Finally, the administrative and legal costs of arranging such complex transactions are not negligible and must be borne to some extent by all parties to the transaction.

Ultimately, no evaluation of debt-for-nature transactions is complete without an examination of the end uses of the funds and the ability of these uses to have a favorable impact on the environmental problems of the region. This is the subject of the next section.

Parks, Preserves and Local Environmental Groups

Every country which has had a debt-for-nature swap program has used a large share of the funds to create or support parks or nature preserves. Can creating parks address the widespread ecological problems afflicting Sub-Saharan Africa?

In cases where specific areas which provide important habitats or which contain significant biodiversity can be protected, it seems clear that parks can help, provided that there is adequate enforcement and management. This, however, is an important caveat. Table 6 shows that Sub-Saharan African countries already have 165 national parks, most of which are sited so as to preserve the most important habitats. The existence of these parks has not prevented various important species from becoming extinct in some countries (rhinos, for example), largely because of an inability to enforce regulations. Table 7 shows recurrent costs for several African parks. It is clear from the variation in the figures that many parks are underfunded; spreading available funds and resources over larger areas may hurt more than it can help.

It is at least worth considering whether creating additional parks on top of the 165 which already exist can make a significant contribution. It is likely that in some cases such as the recent swap in Madagascar, the answer is yes. This is particularly true in countries which derive significant income from eco-tourism, such

as Kenya. However, it is an open question whether widespread application of this principle across the remainder of the continent is worthwhile. In any case, creation of parks can do little to address the broader problems of poverty and overpopulation which underlie much of the pressure on fragile lands.

Addressing these problems will take time and money. The results will be incremental, and often much less pleasant to visit than nature preserves or natural parks.⁹ However, there is one major form of assistance which can be given: Cancel the foreign debt of African countries. Recognition that this debt cannot be repaid and that continued attempts to do so exacerbate the poverty which promotes environmental destruction is very important. Perhaps one of the biggest drawbacks of debt swaps is their implicit acceptance of the legitimacy of the need to repay.

Cancellation of the debt is, however, a political rather than economic decision. Until such time as it is achieved, either as a matter of policy or as a result of the inability of countries to repay, those with money to spend on the environment in developing countries should give this money to these countries directly rather than giving it to creditor banks.

NOTES

1. See New York Times August 28, 1990 p. c4.
2. This difference is becoming still more pronounced as the financial crises in which many countries find themselves prevent expenditure of scarce foreign exchange on imported fertilizer. In addition, both the World Bank and the International Monetary Fund promote elimination of subsidies on purchased inputs such as fertilizer as part of broader structural adjustment and stabilization packages.
3. This is precisely the problem underlying much of the deforestation in Madagascar.
4. This statement is based on information contained in the FAO Production Yearbook.
5. See Kyle & Hawkins (1989) and Occhiolini (1990) for additional details on each transaction.
6. See Blackwell & Nocera (1988).
7. See Lindert (1989) and Sachs (1989) for extensive documentation on this point.
8. See Occhiolini (1990).
9. The penchant of environmentalists in developed countries for such visible and tangible results as nature preserves is actually quite consistent with the historical tendency of rich countries to fund large "showcase" projects in developing countries. Donors in rich countries, whether environmentalist or interested in industrial development, may have more in common than they realize.

REFERENCES

- Blackwell, M. & S. Nocera, "Debt/Equity Swaps" IMF Working Paper WP/88/15, 1988.
- Food and Agriculture Organization, Fertilizer Yearbook, Rome 1986.
- Food and Agriculture Organization, Production Yearbook, Rome various issues.
- Kyle, S. & A. Hawkins, "Financing Environmental Expenditures in Africa" in Lassoie & Kyle eds. Policy Reform and Natural Resources Management in Sub-Saharan Africa, Cornell Natural Resources Research and Extension Series No. 34, September 1989.
- Lassoie, J. & W. Wischusen, "The Impact of Structural Adjustment Programs on Wildlife in Sub-Saharan Africa" in Lassoie & Kyle eds. Policy Reform and Natural Resources Management in Sub-Saharan Africa, Cornell Natural Resources Research and Extension Series No. 34, September 1989.
- Lele, U. & S. Stone, "Population Pressure, the Environment, and Agricultural Intensification: Variations on the Boserup Hypothesis" MADIA Discussion Paper No. 4, World Bank 1990.
- Lindert, P, "Response to Debt Crisis: What is Different About the 1980's?" Ch. 8 in Eichengreen & Lindert eds. The International Debt Crisis in Historical Perspective MIT Press 1989.
- Occhiolini, M "Debt-for-Nature Swaps" World Bank International Economics Department Working Paper #WPS 393, March 1990.
- New York Times, August 28,1990.
- Sachs, J, (ed) Developing Country Debt and the World Economy, University of Chicago Press 1989.

Table 1. Wildlife Habitat Loss in Sub-Saharan African Countries in 1986.

Country	Original Wildlife Habitat (km ²)	Amount Remaining (km ²)	Percent Change
Angola	1,246,700	760,847	39
Benin	115,800	46,320	60
Botswana	585,400	257,576	56
Burkina Faso	273,800	54,760	80
Burundi	25,700	3,598	86
Cameroon	469,400	192,454	59
C.A.R.	623,000	274,120	56
Chad	720,800	172,992	76
Congo	342,000	174,420	49
Cote d'Ivoire	318,000	66,780	79
Djibouti	21,800	11,118	49
Equatorial Guinea	26,000	12,740	51
Ethiopia	1,101,003	30,300	70
Gabon	267,000	173,550	35
Gambia	11,300	1,243	89
Ghana	230,000	46,000	80
Guinea	245,900	73,770	70
Guinea-Bissau	36,100	7,942	78
Kenya	569,500	296,140	48
Lesotho	30,400	9,728	68
Liberia	111,400	14,482	87
Madagascar	595,211	148,803	75
Malawi	94,100	40,463	57
Mali	754,100	158,361	79
Mauritania	388,600	73,834	81
Mozambique	783,203	367,760	57
Namibia	832,200	444,528	46
Niger	566,000	127,880	77
Nigeria	919,800	229,950	75
Rwanda	25,100	3,263	87
Senegal	196,200	35,316	82
Sierra Leone	71,700	10,755	85
Somalia	637,700	376,243	41
South Africa	1,236,500	531,695	57
Sudan	1,703,000	510,900	70
Swaziland	17,400	7,656	56
Tanzania	886,200	505,134	43
Togo	56,000	19,040	66
Uganda	193,700	42,614	78
Zaire	2,335,900	1,051,155	55
Zambia	752,600	534,346	29
Zimbabwe	390,200	171,688	46
TOTAL	20,797,441	8,340,920	65

Source: Lassoie and Wischusen, 1989.

Table 2. Actual and Projected Per Capita Arable Land in Selected Countries.

Country	Year	
	1985	2000
	—————hectare per person—————	
Kenya	0.73	0.42
Malawi	0.48	0.30
Tanzania	2.30	1.44
Cameroon	3.34	2.09
Nigeria	0.71	0.48
Senegal	0.70	0.45

Source: Lele and Stone, 1990.

Table 3. Fertilizer Use Per Hectare of Arable Land, 1975 and 1985.

<u>Region</u>	<u>Kg. of Nutrient/Ha</u>	
	1975	1985
Africa	13	20
Latin America	29	41
Oceanic	29	32
Developing Countries	27	58
Asia	37	85
North America	87	85
Western Europe	188	228
World	63	87

Source: FAO, Fertilizer Yearbook, 1986.

Table 4. Debt-For-Nature Transactions.

Country	Cost	Face-Value	Local Currency	Total Foreign Debt
Bolivia	\$ 100,000	\$650,000	\$250,000	\$ 4.5 billion
Ecuador	1,422,750	10,000,000	10,000,000	9.4 billion
Costa Rica	10,175,000	68,500,000	33,730,000	3.5 billion
Philippines	200,000	390,000	390,000	23.5 billion
Madagascar	n.a.	5,000,000	5,000,000	3.3 billion

Table 5. Sub-Saharan Countries with External Commercial Debt
Quoted on the Secondary Market.

Cote d'Ivoire

Kenya

Liberia

Madagascar

Malawi

Nigeria

Senegal

Sudan

Togo

Zaire

Zambia

Zimbabwe

Source: Blackwell and Nocera, 1988.

Table 6. Number and Area of National Parks in Sub-Saharan African Countries.

Country	Number of Parks	Park Area (km ²)	Total Area (km ²)	Percent
Angola	6	54,660	1,246,694	4.38
Benin	2	8,435	112,622	7.49
Botswana	3	37,370	574,978	6.50
Burkina Faso	2	3,905	274,200	1.42
Burundi	0	0	27,731	0.00
Cameroon	6	9,059	465,054	1.95
Car	3	29,800	622,996	4.78
Chad	2	4,140	1,270,994	0.33
Comoros	0	0	2,274	0.00
Congo	1	1,266	342,000	0.37
Cote d'Ivoire	7	17,570	322,462	5.45
Djibouti	1	?	21,699	—
Equatorial Guinea	0	0	28,051	0.00
Ethiopia	8	11,675	1,184,000	0.99
Gabon	1	3,580	267,667	1.34
Gambia	1	6	10,368	0.06
Ghana	5	11,303	238,538	4.74
Guinea	1	?	245,855	—
Guinea-Bissau	0	0	36,125	0.00
Kenya	16	25,844	582,600	4.44
Lesotho	1	69	30,344	0.22
Liberia	2	3,607	111,370	3.24
Madagascar	2	997	587,042	0.17
Malawi	6	7,073	94,276	7.50
Mali	1	3,500	1,204,022	0.29
Mauritania	1	11,730	1,118,604	1.05
Mauritius	0	0	1,843	0.00
Mozambique	4	15,900	784,961	2.03
Namibia	1	22,270	824,293	2.70
Niger	1	2,200	1,267,000	0.17
Nigeria	1	5,341	923,769	0.58
Reunion	0	0	2,510	0.00
Rwanda	2	2,620	26,338	9.95
Sao Tome	0	0	964	0.00
Senegal	6	10,095	197,160	5.12
Seychelles	2	37	444	8.38
Sierra Leone	1	980	72,326	1.35
Somalia	0	0	637,539	0.00
South Africa	9	29,718	1,225,100	2.43
St. Helena	0	0	122	0.00
Sudan	4	44,819	2,505,813	1.79
Swaziland	0	0	17,366	0.00
Tanzania	10	37,518	930,700	4.03
Togo	2	3,620	56,500	6.41
Uganda	4	7,698	236,036	3.26
Zaire	8	122,000	2,345,236	5.20
Zambia	19	63,590	752,617	8.45
Zimbabwe	13	33,759	389,361	8.67
TOTAL	165	647,754	24,220,564	2.77

Source: Lassele and Wischusen, 1987.

Table 7. Recurrent Cost Expenditures and Densities of Staff for Wildlife Management and Protection in Selected Sub-Saharan African Countries.

Country	<u>1984 Expenditures</u> U.S. \$/km ²	<u>km²/staff</u>		
		1984	1987	Percent Change
Botswana	10	577.5	—	—
C.A.R.	8	329.5	680	106
Ethiopia	57	77.2	—	—
Ghana	—	8.7	—	—
Kenya	188	20.0	—	—
Malawi	45	45.8	57	24
Mozambique	19	100.4	1133	1028
Niger	—	292.4	3400	1063
Rwanda	—	21.7	—	—
Somalia	50	14.7	—	—
South Africa	206	41.0	4	-90
Tanzania	20	273.2	109	-60
Uganda	357	7.2	—	—
Zambia	11	299.7	—	—
Zimbabwe	277	21.9	34	55

Source: Lassoie and Wischusen, 1989.

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