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WILDLIFE LOSSES IN KENYA: AN ANALYSIS OF CONSERVATION POLICY

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ABSTRACT

Despite massive conservation efforts backed by significant international support, Kenya has lost some 44% of its large mammal fauna over the last 17 years. This catastrophic example of resource degradation stems from a mixture of policy, institutional and market failures.

Policy failures include an over-reliance on Command and Control (prohibition on consumptive use of wildlife, prohibition on use of resources within Protected Areas) without the ability to enforce compliance; subsidies to agricultural and livestock production which, by reducing marginal production costs to below social opportunity costs, has caused the overconversion of rangelands to livestock and agricultural production at the expense of conservation objectives and values; and the establishment of tourism cartels which divert wildlife generated benefits away from landowners. The fundamental institutional failure is the lack of property rights and use rights of landowners over wildlife. Fundamental market failures reflect the absence of financial incentives to landowners to conserve their wildlife resource, thus setting marginal depletion costs to zero, and competing production incentives.

The Kenya Wildlife Service (KWS) is reintroducing financial incentives to landowners by permitting some consumptive use of wildlife, by making substantial direct grants to landowners and communities who support wildlife and by sidelining the tourism cartels and encouraging private sector tourism on private land. However, investment in conservation is still being hampered by the continuing prohibition of high value activities such as sport hunting, and by over regulation and vacillation.

Furthermore, positive net benefits to landowners from wildlife operations are not in themselves adequate to guarantee economic incentives to conserve the resource. First, significant negative externalities are associated with wildlife in that they add greatly to the production costs of livestock and agriculture; second, opportunity costs (in terms of foregone benefits of development) of leaving land undeveloped for conservation are gradually increasing in response to growing populations, expanding markets and new agricultural technology; and third, some policies are having the perverse impacts of creating poverty traps.

Wildlife conservation policy must accordingly be much wider in scope and use a much broader range of economic, financial and market instruments, possibly including differential land use taxes, conservation subsidies and easements, and lease back agreements. Simply creating positive net benefits from wildlife is not enough.

1. Introduction. Kenya epitomizes the dilemmas and contradictions facing wildlife conservation policy in modern day East Africa. Kenya maintains a network of protected areas (PAs), her National Parks and National Reserves, of breathtaking beauty and abundant and diverse wildlife which each year attract hundreds of thousands of tourists and generate hundreds of millions of dollars in hard currency.[1] The industry itself supports jobs and economic activity throughout the country, especially in the construction, travel, hotel and agricultural sectors. Kenya's protected areas are also the focus of much interest and goodwill from international agencies, scientific foundations and international conservation organizations, many of whom locate their global or regional headquarters in Nairobi. Support from these sources brings in perhaps a further $50-60m each year (Norton- Griffiths [1994a]). Yet, the wildlife resource on which much of this prosperity and economic activity is based is becoming rapidly depleted and degraded. Ecological monitoring data, gathered by the government itself, shows unambiguously that Kenya has lost 44% of all its wildlife over the last 17 years (Norton- Griffiths [1998], GOK [1995a,b]): locally, losses of species abundance, number and diversity are even higher (Norton-Griffiths [1996]).

A catastrophic loss of wildlife resources on this scale is evidence of a major failure in both the formulation and implementation of policy, and clearly more than corrupt officialdom and wily poachers are involved. Norton- Griffiths [1998] identified three important contributory factors.

First, the major conservation problem lies not so much within the formal network of protected areas but on land outside, land owned, managed and used by Kenyans for agricultural and livestock production. The great majority of wildlife in Kenya are found outside the protected areas (GOK [1995c]), either on a permanent basis or as part of their seasonal migrations: rates of loss outside the PAs are 55% compared with 30% from inside.

Second, conservation outside the PAs is closely related to secure tenure and property rights: loss rates are 30% where land is adjudicated[2] to individual or group ownership compared with 44% where land remains largely unadjudicated and under communal tenure.

Third, while tourism clearly provides flows of benefits to finance national conservation activities (loss rates are lower (32%) in the areas frequented by wildlife tourists compared with 53% in areas where tourists rarely venture) it is the distribution of these benefits which is critical. Only where benefits have flowed transparently to landowners and landusers,3 rather than to Central Government, County Councils or tourism cartels, has wildlife either held its own or even increased (see also Aylward and Freedman [1992], Goodwin [1996]).

2. Shifts and reversals in conservation policy. By the 1970's, conservation policy relied on both Command and Control (Milner-Gulland and Mace [1998], Helm [1991]) and on a wide array of economic incentives (Panayotou [1994]). Within the network of PAs, the state enforced its property rights by controlling access and the nature and pace of activities and development. On land outside the PAs, incentives to landowners to maintain the wildlife resource included sport hunting, trapping for export, cropping, and tourism; a vast secondary industry of arts and crafts, tanning, and trophy preparation; and an array of schemes to compensate landowners for the depredations of wildlife, including loss of grazing, crop damage and loss of life and

property (for example, see Croze et al. [1976], FAO [1978]). By the mid 1970's these incentives, industries and compensation schemes were worth some $90-100m a year (in 1997 $), a large proportion of which flowed directly to landowners.

In an abrupt policy reversal in 1977, all consumptive uses of wildlife and the associated trades in wildlife products were prohibited and all compensation schemes were abandoned as being ineffective and corrupted. Conservation policy now relied solely on command and control. However, with the gradual erosion of institutional capabilities and motivation to enforce property rights either inside or outside the PAs, the following years were characterized by outrageous poaching especially of high value species such as elephant and rhinoceros. Furthermore, the removal of all incentives for landowners to invest in and conserve wildlife led to the pernicious eradication of wildlife throughout the rangelands of Kenya.

Seeking to improve matters, the government created the Kenya Wildlife Service (KWS) in 1992 as an autonomous parastatal organization with the mandate to conserve and manage all wildlife. The initial priority of the KWS was to revive and rehabilitate the network of protected areas by attracting loans and donor support, by improving the salaries and morale of personnel, by purchasing new equipment, and by improving security and anti-poaching. The first steps were also taken to reinstate wildlife related benefits to landowners by permitting some consumptive utilization, reduction cropping, on ranches infested with wildlife and by diverting a proportion of gate receipts to communities living around the protected areas.

In the mid 1990's the KWS shifted its policy orientation more towards improving the benefit flows from wildlife to landowners (KWS [1995a], [1996]). The clear objective was to create incentives for landowners and landusers to invest in wildlife conservation and become partners with the KWS in achieving national conservation objectives rather than opponents (KWS [1995b], [1996]; Kock [1995]).

(a) KWS has now licensed over 60 wildlife cropping, ranching and farming operations and game meat products can be sold on the open market. However, many important value added activities such as tanning of skins and trophy preparation remained banned, and sport hunting, the most profitable use of wildlife, has yet to be reintroduced;

(b) KWS is encouraging neighboring landowners to form licensed Wildlife Associations and Wildlife Forums to jointly manage their wildlife, much as neighboring landowners do in Namibia, Zimbabwe and Europe.

(c) The new Community Wildlife Service (CWS) of the KWS is providing tangible benefits to landowners and users by disbursing Wildlife Development Funds for social investment (Berger [1993], KWS [1996]), funds which are themselves generated from tourism revenues; and

(d) KWS, with the CWS, is assisting landowners and landusers to negotiate more advantageous concession fees with tourism operators,
and set up their own privately financed tourist operations such as camp sites, tented camps and camel trekking. The objective here is to improve benefit flows by sidelining the influential tourism cartels.

Supporting these KWS activities is a growing interest among international conservation organizations and development agencies to promote community conservation and development programs (CCDPs), most inspired by the successful CAMPFIRE initiative in Zimbabwe (Kiss [1992]). CCDPs aim to promote

`development with conservation' by realizing community benefits from the utilization of wildlife and other natural resource based production systems.

It is too soon to see how effective these new policy initiatives are, not the least because Kenya's long term environmental monitoring program now lacks for funding. But what is absolutely clear is the impossibility of rebuilding the wildlife stocks to previous levels: land use patterns have changed in response to the reduction in wildlife stocks, rural populations have almost doubled over the last twenty years (GOK [1994]), and a recent review of landowner attitudes towards wildlife (KWS [1995c]) reveals an almost universal hostility. In two important respects, however, there remains a policy vacuum:

First, policy objectives are still formulated mainly in terms of operational activities, e.g., "strengthen anti-poaching activities," or "improve benefit flows to landowners," or "create wildlife forums," rather than in terms of results, e.g., "reduce the rates of wildlife loss," or "rebuild stocks of important species." Yet it is the results that are important-the activities are simply ephemeral.

Second, there is no agreed or accepted theoretical basis to assess why or how any proposed activity might actually achieve the desired result. Why should an increase in benefit flows to landowners reduce the rates of wildlife loss? Why should a CCDP change the rate of tree cutting? Why should the creation of wildlife management forums of neighboring landowners benefit wildlife positively? Why should building a primary school influence the way a landowner considers wildlife?

3. Simple economic models of conservation policy.

3.1 *Basic assumptions.* It is clear from the preceding sections that the major failure in conservation policy in Kenya lies outside the protected areas and that the rates of wildlife loss are closely related to the flows of wildlife related benefits to landowners and users. Accordingly, the models presented here provide a simple theoretical basis for evaluating, from the viewpoint of landowners and landusers, both existing and proposed conservation policy on land outside the formal protected areas.[4]

The most important and fundamental assumption in the models is that production (in its widest sense) and wildlife are mutually incompatible land uses. It is this incompatibility which lies at the heart of the conservation-development dynamic and the loss of the wildlife resource. This assumption is supported by empirical observations, namely the near total avoidance between pastoralists, their stock and wildlife[5]; the higher loss rates of wildlife in the ecologically more marginal areas of Kenya (where the marginal impacts of wildlife on production are higher);[6] the massive losses of wildlife in Kenya from pastoral areas even where returns from wildlife tourism appear to be vast;[7] and the complete elimination of all large wildlife from high potential agricultural areas once fully developed.

The basic concept is that of the marginal benefit curve[8] for "production" ($\mathbf{MB_P}$), either livestock or agriculture or a mixture of both, and for "wildlife" ($\mathbf{MB_W}$), and an initial equilibrium in which the marginal benefits of one are matched, more or less, by the marginal benefits of the other. The models explore first the extent to which actual or proposed conservation policies might displace the equilibrium in favor of wildlife; and second, identify factors which might also displace the equilibrium but which are not addressed by current conservation policy.

3.2 *The 1977-1992 policy environment.* Figure 1 represents the conservation policy environment in Kenya from the late 1970's to the early 1990's. Consider an area of **OH** hectares under private, group or communal tenure used for a single productive activity (**P**) consisting of livestock husbandry, agriculture or a mixture of both. The curve **PP-P** represents the marginal benefit curve for production, $\mathbf{MB_P}$. Wildlife may or may not be present, but no returns of any sort are obtained from them ($\mathbf{MB_W}$ <=0). Under these conditions, **OX** hectares will be devoted to production ($\mathbf{MB_P} > 0$) while **XH** hectares will lie idle because production on them is uneconomic ($\mathbf{MB_P}$ <= **0**).

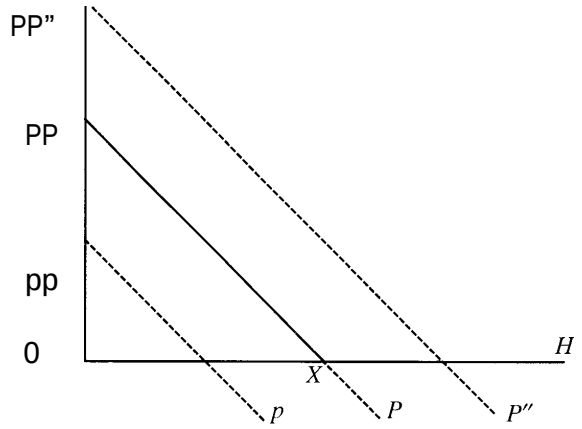

FIGURE 1. 1977-1992 policy environment: no benefits to landowners from wildlife. O-H number of hectares devoted to production/wildlife; PP"-P", PP-P, pp-p are MBproduction curves; X production - wildlife equilibrium.

The first policy implication is that under these conditions wildlife will not necessarily vanish for they might still survive on the land XH where production is uneconomic and which accordingly acts as a refuge. It also follows that on land of lower potential and with lower marginal benefits of production (such as **pp-p**) the potential size of such a refuge should be larger (in Figure 1, the equilibrium position of **X** shifts to the left towards **O**). There should be more room for wildlife in more marginal areas.

There is however an important scale effect for, irrespective of the slope of MB_P, the physical size of the refuge **XH** will depend upon the physical size of the landholding **OH**. *Ceterus paribus*, larger holdings will have larger refuges than will smaller holdings. Biogeography theory (e.g., Rosenzweig [1995]) predicts that larger refuges should have higher abundance and diversity of wildlife than smaller ones.[9] This has a further policy implication: when, and for whatever reason, a landholding is subdivided into smaller management units, the physical size of the refuge on any particular holding will become smaller, wildlife abundance and diversity will be reduced, and the refuge may even become too small for any (large) wildlife to survive.

The second policy implication is that the long term survival of the refuge and its wildlife will depend as much on economic as on ecologic factors. Factors tending reduce $\mathbf{MB_P}$ towards **pp-p**, such as shrinking markets, removal of agricultural subsidies, outbreaks of diseases, or persistent droughts (or floods) will shift the equilibrium towards O and release more land for wildlife. In contrast, rising demand, expanding markets, gains in producer prices, increased agricultural subsidies, improvements in infrastructure, improvements in production technology, new animal

and vegetable germplasms and better veterinary drugs will all act to increase $\mathbf{MB_P}$ towards **PP"-P"**. The equilibrium position of **X** will shift towards **H** and more land will be brought into production. Once **PP"-P"** reaches **H** then wildlife will become extinct, as has happened on all fully developed agricultural land in Kenya, including land surrounding protected areas.

The marginal benefits of production (Equation 1) are determined by, among others, the direct benefits of livestock and/or crop production (DBp), the costs of producing those benefits (Cp), the compliance costs of production (CCp) such as land and local taxes, the social benefits of production (SBp) and the direct costs of wildlife on production (DCw).

(1) $$MB_P = f\ (DB_P, C_P, CC_P, SB_P, DC_W \ldots)$$

There are two causes for concern here. First, the SB_P tend to inflate MB_P at the ultimate expense of wildlife, especially with livestock where herd size reflects aspects of social standing, insurance against droughts and requirements for dowry (Dahl and Hjort [1976], Ellis and Swift [1988]). It is possible that SB_P gradually may be eroded by more modern methods of production and more modern social attitudes.

Second, the DC_W increase substantially the costs of livestock and agricultural production and represents the negative externality imposed on landowners as a result of government conservation policy (Norton-Griffiths [1996], Skonhoft [1998], Schulz and Skonhoft [1996]). This lies at the heart of the conflict between conservation and development for wildlife compete for grazing,[10] they spread disease, they kill and maim people and livestock (Omonde [1994]), and they damage property and raid crops. In response owners and users of land must undertake all kinds of expensive defensive activities, such as building wildlife-proof fences and stockades, mounting night guards, and even moving away from areas seasonally infested by wildlife.

Producers looking to maximize net returns will be tempted to reduce their costs of production by eliminating wildlife. Compensation schemes (for loss of life, property and production) are meant to counteract this but may instead have perverse outcomes: by increasing marginal benefits of production they would displace the equilibrium towards **H**.

The key policy implication of this first model is that wildlife, can still survive outside protected areas even if they return no tangible benefits at all to landowners or landusers. However, under these conditions the survival of wildlife (i.e., the equilibrium position) will remain highly sensitive to socio-economic forces governing the physical size of landholdings, to macro-economic forces acting on the marginal benefits of production and to landowners lowering their production costs by reducing or eliminating wildlife. This represents a very difficult policy environment, in which there are few obvious positive opportunities and where the inevitable end point is protected areas surrounded by fully developed agricultural land devoid of wildlife.

3.3 *Introducing positive benefits from wildlife.* Figure 2 models the altogether more positive policy environment following KWS initiatives to provide tangible benefits to landowners from both production (**P**) and from wildlife (**W**). **PP-P** is as in Figure 1 while **WW-W** represents the marginal benefit curve for wildlife ($\mathbf{MB_W}$). In this

example, wildlife utilization now outcompetes production on some of the land (**MB_W** > **MB_P**) so a new equilibrium is established with a smaller area **OX"** devoted to production and a larger area **X"H** devoted to wildlife. Total returns from production (**a + b**) and from wildlife (**c + d**) are now greater than are those from production alone (**a + b -1- c**), a net gain from wildlife of **d**.

In general terms, therefore, policies which provide for positive marginal benefits from wildlife should lead to an increase in the area set aside for wildlife and potentially to more wildlife diversity and abundance. Clearly many of the KWS initiatives will have this positive effect on MB_W, especially their support for consumptive use of wildlife through cropping and game farming.

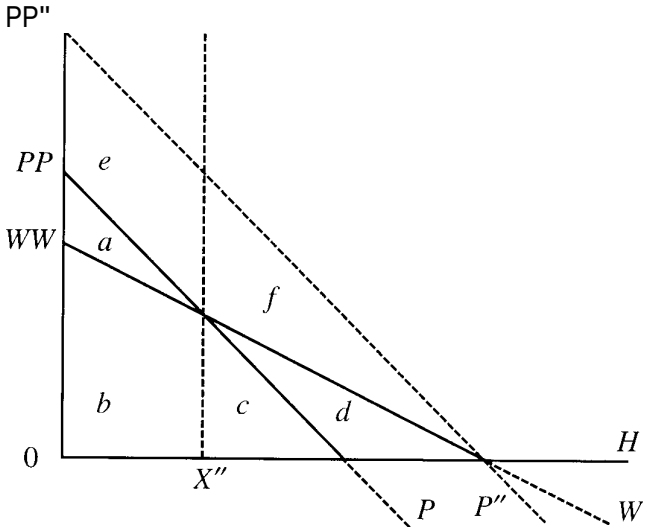

FIGURE 2. Post 1992 policy environment: positive benefits from wildlife to landowners. O-H, PP"-P", PP-P as for Figure 1. X" production - wildlife equilibrium; WW-W is $MB_{WILDLIFE}$ curve. a,b benefits from production; c,d benefits from wildlife; e,f, opportunity costs of conservation (potential rents from development) if policy fixes equilibrium at X".

However, the introduction of highly profitable activities such as sport hunting and trapping for sale and export would favor **W** even more over **P** and would shift the production:wildlife equilibrium even further towards **O**, making even more land available for wildlife. The continuing ban on such activities is not helping meet KWS objectives, neither are the continuing prohibitions on value added activities such as tanning and the preparation of trophies and trinkets.

Figure 2 also demonstrates unequivocally that wildlife benefits must flow to the landowners to be effective in promoting conservation, for diverting benefit flows off to central government, county councils, tourist cartels[11] and the like will, by reducing the **MB_W**, favor production at the expense of wildlife. KWS assistance to landowners to strike better deals with tour operators and especially to set up their own tourism activities will greatly assist this process.[12]

Figure 2 also lends support to the KWS policy of supporting Wildlife Associations and Forums. The scale effect linking the physical size of **X"H** to the size of the landholding **OH** still applies, so managing neighboring land together effectively increases the size of **X"H** and the potential benefit flows to landowners.

The marginal benefits of wildlife (**MB_W**) to the landowner are influenced by, among others, the direct benefits of wildlife (DBw) from access fees, lodge earnings, hunting fees, etc., the costs incurred (C_W) in capturing those benefits, the

compliance costs of wildlife (CC_W), and the intangible social benefits of wildlife (SBw).

(2) $$MBw = f (DB_W, C_W, CC_W, SB_W \ldots\ldots)$$

A new critical relationship is now apparent between the direct costs of wildlife on production (DC_W) and the marginal benefits of wildlife (**MBw**), for if $\mathbf{DC_W/MB_W} < 1$ then it will still be in the best interests of the landowner to remove wildlife even though positive net benefits are being obtained from it. However, unlike the situation represented by Figure 1, compensation payments may now be effective here in making landowners more tolerant to wildlife as they will be seen to influence this ratio rather than the MB_P.

The compliance costs of wildlife (CC_W) will act in the same way. KWS has a heavy bureaucratic hand with layers of regulations covering licensing, management plans, requirements for monitoring and assessment of stocks, and marketing and transport of products. If these CC_W become too onerous then landowners may simply give up in despair (as some ostrich farmers already have).

The social benefits of wildlife (SB_W) are important to consider, not the least because they comprise both internal and external components. The internal component is demonstrated by those landowners who tolerate wildlife on their land whatever the costs and, conversely, those who eradicate wildlife whatever the potential benefits. SB_W can be addressed through education and extension programs, one of the objectives of the Community Wildlife Programme of the KWS. Furthermore, perhaps the only means by which the disbursement of Wildlife Development Funds for social investment (schools, education grants, wildlife clubs, etc.) can act positively on MBw is by influencing the SB_W.

In contrast, the external component to SB_W is represented by the benefits of wildlife to Kenyan society and to the world at large. It remains highly problematical as to how KWS can internalize and capture these benefits for the landowner and landuser (for example through subsidies or international transfers).

Nonetheless, the production:wildlife equilibrium (**X"**) remains sensitive to policy and economic forces affecting the $\mathbf{MB_P}$. Anything which reduces these marginal benefits will favor wildlife by shifting the equilibrium towards **O** while policies and forces which increase $\mathbf{MB}_P$ (rising prices, developing markets, new technology) will shift the equilibrium towards **H**, resulting in more **P** at the expense of **W**. Once **PP-P** reaches **H** then, as shown previously, wildlife will become extinct even though positive net benefits can be obtained from them.

Similarly, policies and forces positively influencing $\mathbf{MB_W}$ will shift the equilibrium in favor of wildlife and should $\mathbf{MB_W}$ => **PP-P**, for example, with highly profitable activities such as sport hunting (especially on more marginal land), it becomes in the landowners interest to have a wildlife only operation (as is already the case on many ranches in Kenya, Zimbabwe, Botswana and Namibia). It is also clear that a policy shift akin to the 1977 ban on all consumptive utilization, engineered perhaps by groups championing animal rights, could so reduce $\mathbf{MB_W}$ that it would no longer be worthwhile for landowners to keep them, effectively changing the policy environment back to that modeled in Figure 1.

The key policy implication of this second model is unwelcome. Policies which simply provide positive benefits to landowners, landusers or communities are not in

themselves sufficient to guarantee their long term survival. They may well help in the short term. and on some (perhaps lower potential) land they may well be sufficient in the medium to long term. But wildlife will always remain at risk from macro-economic factors which influence positively the marginal benefits of production.

3.4 *Opportunity costs.*

Opportunity costs for landowners arid landusers. Let the curves **PP-P** and **WW-W** in Figure 2 represent as before the marginal benefits from production (**P**) and from wildlife (**W**) on a ranch (individual or group tenure) under more or less traditional land use. Suppose. however, that this land is in fact of high agricultural potential (or that new technology creates sudden new opportunities) and that the curve **PP"-P"** represents the marginal benefit curve of production on the same land if it were developed to its full potential. The area (**e+f**) now represents agricultural rents still to be captured from the land for the direct benefit of the landowner. This has profound implications for conservation policy makers.

First, if the value of these potential rents are larger than are the benefits of wildlife, e.g., if (**e+f**) > **d** then the landowner will continue to develop his land even though positive net benefits are being obtained from wildlife. It is this inequality that lies at the heart of the problems on the group ranches around the Maasai Mara National Reserve in Kenya (Norton-Griffiths [1996]). Potential earnings from development are so vastly larger than are rents from wildlife that the Maasai continue to develop their land despite all the efforts of policy makers to divert wildlife related benefits to them.

Second, these potential rents act as a magnet to developers to alienate land for development purposes which inevitably reduces conservation values. Government policy in Kenya is strongly in favor of adjudicating all group ranches into individual holdings and these smaller holdings. owned by a single family, are easier targets for the land developer than are the larger holdings owned by hundreds of families. In contrast. KWS policy is to support wildlife forums and encourage neighboring landowners to manage wildlife collectively. Unfortunately, the price offered by developers will reflect these potential agricultural rents so it is a moot point if such activities by KWS will be effective.

Third, if conservation policy is to conserve wildlife values on such land by freezing development at some certain stage, for example at the equilibrium **X"**; then the area (**e+f**) represents the opportunity costs to the landowner of not developing his land in order to maintain conservation values (for the state). Much now depends on how the policy is formulated.

If government allows no more development of any kind. for example by fixing **PP-P** through development taxes which offset any shift of **PP-P** towards **PP"-P"**, then the whole area (**e+f**) represents the opportunity costs to the landowner. In other words; if government policy denies to the landowner the right to develop his land, in order to preserve conservation values. then (**e+f**) represents the extent of the compensation due to him. A more relaxed policy might permit improvements on already developed land (on **OX"**), but no further land development. Now, the missing rents **e** may still be captured by the landowner, while **f** represents the opportunity costs from not developing **X"H**.

Policy should respond to the realities of these opportunity costs. Clearly, if policy can shift the $\mathbf{MB_W}$ towards **PP"-P"** the landowner will become indifferent to further development. Increasing net wildlife benefits is an obvious route, by allowing high value activities such as sport hunting, by reducing compliance costs, and by encouraging landowners to invest development capital in their own tourism activities. Alternatively, or in addition, direct subsidies could be made to landowners for maintaining wildlife stocks, or important species, funded from the central exchequer or from international transfers. KWS policy is not clearly active in this regard.

Sadly, the most usual response of conservation policy makers is simply to ignore the existence of these opportunity costs and expect the landowner to accept them for the benefit of society at large. This creates a de facto conservation poverty trap which leads to an inevitably confrontational policy environment in which conservationists and landowners are at loggerheads and in which landowners continually act to undermine and frustrate conservation policy (KWS [1995c]).

The Ngorongoro Conservation Area in Tanzania affords a different example of the way in which conservation policy can create poverty traps. Here, conservation policy has persistently eroded the resource base of the pastoralist Maasai by denying them access to grazing resources and prohibiting profitable activities such as agriculture. These policies have reduced $\mathbf{MB_P}$ from **PP"-P"** to **PP-P**, no mean achievement in development terms, while providing scanty returns from wildlife. The area (**e+f**) represents the extent of the poverty trap in which these unfortunate people now find themselves (Homewood and Rodgers [1991]).

Opportunity costs at the community level. Figure 3 models the currently widespread and modish initiatives known as community conservation and development programs (CCDPs). A typical CCDP aims to maintain conservation values by freezing the area under development at **X"**, first by enhancing existing traditional production strategies (raising the $\mathbf{MB_P}$ from **PP-P1** to **PP-P2**) and second, by creating tangible benefits (**WW-W**) from wildlife utilization or from other natural production systems.

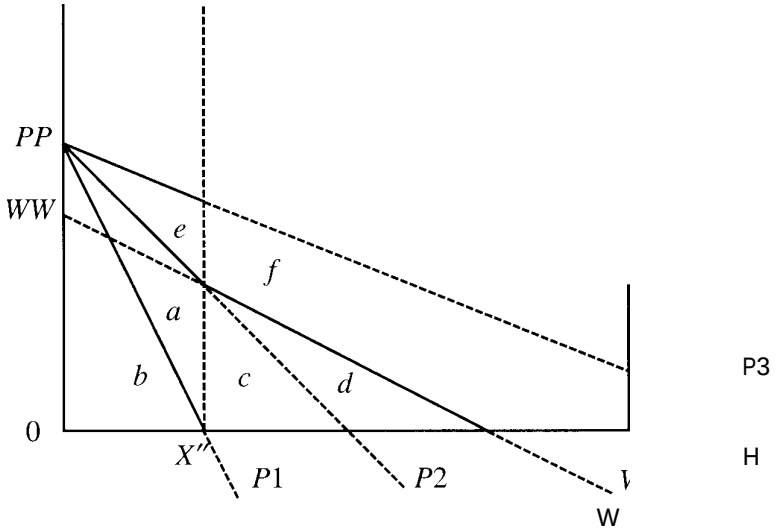

FIGURE 3. The conservation poverty trap. O-H, X", WW-W as in Figure 2; PP-P1, -P2, -P3 are MB_P curves; a,b,e benefits from production; c,d benefits from wildlife; f opportunity costs (poverty trap) by fixing equilibrium at X".

Such programs increase benefit flows to the community in two highly predictable ways. First, the area a represents the incremental gain on already developed land, while (**c+d**) represents gains from conservation activities, a net gain of **d**. Thus, the benefits of "development with conservation" (**a+b+c+d**) are greater than are those of "development alone" (**a+b+c**).

Inevitably, however, all the usual pressures of development force $\mathbf{MB_P}$ towards **PP-P3**. Benefit flows to the community increase in turn, by **e**, but the area **f** now represents benefits foregone because of the restraining activities represented by **WW-W**. The area **f** now represents the poverty trap created by the CCDP, and the power of the economic forces acting to undermine the sustainability of these well meaning, but deeply flawed, programs.

4. Discussion. These simple models focus attention on the pure dynamic between agricultural production (**P**) and wildlife (**W**), or on a larger scale between Conservation and Development, and provide a structure for assessing the impacts of conservation policy on landusers. An initial equilibrium is envisaged where the marginal benefits of one are matched, more or less, by the marginal benefits of the other. Following on from the intuitions of Figures 1 and 2, this equilibrium will be displaced by policies and events which change the values of these marginal benefits relative to each other. Should the $\mathbf{MB_P}$ increase and/or the $\mathbf{MB_W}$ decrease then the equilibrium will shift towards more development and less conservation.

Post 1977, when all consumptive use of wildlife and associated trades were banned; benefits from wildlife to landowners were effectively reduced to zero, thus creating disincentives to conserve wildlife. The equilibrium shifted sharply towards production over conservation and almost half the wildlife resource was eliminated in the following 17 years.

KWS activities since 1992 were initially focused on reestablishing state property rights to the protected areas and to wildlife and to reintroducing some wildlife related benefits, while more recently KWS has concentrated on improving further the benefit flows to landowners. While the models predict that these policies will all act in a general way to shift the equilibrium back towards the conservation of wildlife they also identify a number of important deficiencies.

First, investment in conservation by landowners and users is being hindered by the continuing prohibition of the highest value activities such as sport hunting, capture for sale and export, and all the associated value added trades of tanning and trophy preparation.

Second, KWS is prone to over-regulation and vacillation which raises compliance costs and reduces marginal benefits, to such an extent that some producers (ostrich farmers) have withdrawn from the market. Furthermore, the recent change in Director (September 1998) might herald a change in policy orientation back towards command and control (always popular with donors and conservationists) and away from landowner incentives (always difficult to design and implement). Such vacillation does not encourage investment by the private sector.

Third, the mechanism by which the now significant expenditures (c. $500,000 pa) on wildlife extension programs and wildlife development funds are meant to influence landowner's attitudes to wildlife it is not at all clear. It is argued that they may modify the $\mathbf{SB_W}$, but it is a moot point if this is so. While such programs sound

and look good, they may in fact be ineffective and even have perverse results (for example, CCDPs create poverty traps).

The models also identify clear gaps in conservation policy. For example, conditions still exist under which it remains in the best interests of a landowner to eliminate wildlife (i.e., when $\mathbf{DC_W/MB_W} < 1$) even though positive net benefits can be obtained. It is argued that so long as $\mathbf{MB_W} > 1$ then compensation schemes might be effective in reducing these DC_W.

Neither does policy address the problems of opportunity costs which can completely overwhelm all efforts to promote conservation. Much of Kenya's wildlife is found outside the PAs on land of high agricultural potential. Similar land has already become fully developed and all wildlife eliminated, for example the prime agricultural land around the Mount Kenya and Aberdares national parks; and most of the valuable peri-urban land around Nakuru and Nairobi national parks. These opportunity costs can be addressed only through economic incentives, by increasing vastly landowner's opportunities to benefit from wildlife.

A major conclusion from these models is that outside the PAs conservation objectives can be achieved only through economic incentives. This argues for a much more radical policy approach, one in which the State relinquishes all property rights to wildlife outside the PAs and removes all restrictions to wildlife utilization. Command and control must be replaced by a framework of economic incentives, implemented and monitored by the KWS and designed to achieve policy objectives. It should then be left to landowners to decide for themselves how best to maximize wildlife benefits and how much wildlife to keep, including the option of complete elimination.

But a major policy gap still remains with the factors influencing MB_P. In general terms, population growth, improvements to infrastructure, expanding markets, improving technology and real gains in producer prices will all act to increase the marginal benefits of development relative to those of conservation, and increase them at a faster rate. To counter this, conservation policy must focus on mitigating the seemingly inexorable upward trend in the marginal benefits of development. Policy must be much wider in scope and use a much broader range of economic, financial and market instruments, including the reduction in subsidies to production, differential land use taxes, conservation subsidies and easements, and lease back agreements (Norton-Griffiths [1998]). Sadly, conservation authorities usually consider such policy initiatives to be beyond their remit and to lie solely in the domain of the key planning ministries of central government. This is a fatal mistake in today's world. Environment policy, of which conservation is just one part, has to be integrated at a national level within economic development policy, and it is up to conservation policy makers to ensure that it is.

ENDNOTES

1. In 1996 (GOK [1997]) Kenya earned in excess of $650m from 800,000 tourist visitors, but see Norton-Griffiths and Southey [1995] for an assessment of the costs of these gross earnings.
2. Property rights (Bromley [1991], Norton-Griffiths [1996]) and land tenure are central to understanding the impacts of conservation policy in Kenya. With respect to land, the government has retained to itself all property rights to the protected areas, but has transferred operational control over the National Parks to the Kenya Wildlife Service (KWS) and over the National Reserves to the appropriate local County Councils (Bragdon [1990]). Land outside the PAs is either

adjudicated or unadjudicated. On adjudicated land, the government has assigned property rights either to individual landowners, who accordingly have individual tenure to a single landholding (farm or ranch), or to groups of landowners who accordingly share among themselves the property right and tenure to a group ranch (Galaty [1980], [1992]). These property rights are legally enforceable, so tenure is strong and landowners can, within reason, do what they like with their land. In contrast, the property rights on unadjudicated land remain held in trust by County Councils on behalf of the landusers, whether smallholder farmers on unadjudicated agricultural land or nomadic pastoralists on unadjudicated rangelands. They at best have usufruct rights, based on their traditional lifestyles, but tenure is weak. The situation is quite different with respect to wildlife, for the government retains to itself all property rights to wildlife whether inside or outside the protected areas. All wildlife belongs to the state, and it is this which creates a fundamental conflict between the interests of the state on the one hand and those of landowners and landusers on the other.

3. The term landuser refers to an individual who has traditional usufruct rights to land but no legally enforceable property right. In contrast, a landowner has a legally enforceable property right to his land.
4. In order to provide useful insights to policy makers, models must reflect to some extent the empirical relationships between their most important components. Most of these are simply not yet known in the conservation policy environment in East Africa: for example, there is no accepted function relating wildlife abundance to the costs of livestock production. Similarly, in the comparative dynamic models of Skonhoft and colleagues (Skonhoft [1998]; Schulz and Skonhoft [1996]; Skonhoft and Solstad [1996], [1998a], [1998b]) the interaction between pastoralists and wildlife is expressed in terms of predation, yet the reality is quite different. Hunting, the most primitive method of eliminating wildlife, is rarely used by pastoralists who instead adopt the more subtle approach of permanently lowering the carrying capacity of the range for wildlife by changing landuse patterns, e.g., settlement, fencing, protecting water sources, and habitat modification through the use of fire.
5. Data from 400,000 km^2 of aerial survey over east African rangelands show an almost complete temporal separation of pastoralists and wildlife: the 10% of area occupied by pastoral settlements hold 50% of livestock yet only 3% of wildlife (Norton-Griffiths [1994b]).
6. Peden [1987] derives an aridity index for each of the 18 pastoral Districts of Kenya. Relating % pa wildlife loss rates (%pa loss) to this index yields the following OLS equation (df 17, $r = 0.81$, $p < 0.001$, $r^2 = 0.64$): %pa loss = 9.273 (t = 1.091) - 2.163 * aridity (t = -2.542).
7. Narok District affords an excellent example. The District is the premier ecotourism destination in Kenya, it generates some $30m annually in gross tourism revenues, yet over 50% of wildlife there has vanished in the last 20 years (Broten and Said [1995], Norton-Griffiths [1990], [1996]). Of these gross tourism revenues, less than 1% actually go to landowners (Douglas Hamilton [1988], Norton-Griffiths [1995], Talbot and Olindo [1992]).
8. Marginal benefit curves show the benefit arising from "the next" unit as a function of the number of units already produced or in production. Thus, the benefit from one additional hectare devoted to production will be significantly greater if only ten hectares are in production than if ten thousand hectares are in production. Similarly, the marginal (additional) benefit of a single cow is greater if a herd numbers ten cows than if the herd numbers ten thousand cows.
9. This is supported by empirical data from the Laikipia ranches in Kenya (Norton-Griffiths [1998]): wildlife diversity and density decrease with ranch size, and wildlife are effectively eliminated on ranches of under 3000 ha.
10. The grazing consumed by wildlife on ranches surrounding the Maasai Mara National Reserve in Kenya is equivalent to 40% of net livestock revenues (Norton-Griffiths [1996]). Veterinary costs on ranches infested with wildlife can be 20-30% higher (Grootenhuis [1999]).
11. Possibly one of the greatest failures in conservation policy has been the adoption of mass tourism by east African governments. Starting from a position of strictly enforceable property rights, including right of access, governments have created de facto open access conditions with rents completely dissipated among too many lodges with too many beds chasing too few tourists (see also Lindberg [1991], Wells [1997]).
12. One of the fastest growing sectors in the wildlife tourism industry in Kenya is landowners investing in tourism facilities on their own land (Thouless [1993], KWS [1995b]). Elsewhere in Africa (Zimbabwe, Botswana, Namibia) such initiatives have given rise to "game conservancies."

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