Conservation of Biological Resources

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Chapter 11: The Economics of Wildlife Conservation Policy In Kenya

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11.1 The problem

Although Kenya is some 580,000 km^2 in area, only 15% supports continuous agricultural production (Fig. 11.1a). About 80% of the population of 21 million are concentrated in this area (GOK 1994) along with over 90% of all livestock (Norton-Griffiths & Southey 1993). The agricultural and livestock industries are well organised and highly profitable, contributing (in 1994) around 35% of GDP and generating some 56% of all foreign exchange earnings (GOK 1996).

The remaining 500,000 km^2 of the country consists of rangelands. While some of these rangelands are of high agricultural potential most are arid drylands or semi-deserts. These rangelands support some 4 million pastoralists with their livestock, the majority still following a traditional, nomadic lifestyle.
Conservation policy in Kenya is based primarily on the network of protected areas (PAs), the national parks and the national reserves, most of which lie within these rangelands (Fig. 11.1b). The PAs are of international scientific and conservation interest. Each year they attract literally hundreds of thousands of overseas visitors, they generate vast tourism revenues (US$400-500 million a year) and they attract significant international aid. Nonetheless, the continuing conservation of wildlife in Kenya is beset by many problems and uncertainties.

The scale of the problem is shown by data recently released by the Department of Resource Surveys and Remote Sensing (DRSRS) which has been monitoring the size and distribution of wildlife and livestock populations throughout the rangelands since 1977 (GOK 1995a,b). Kenya has lost 44% of its wildlife over the last 18 years (Table 11.1), while over the same period livestock populations have been relatively stable. It was never the avowed policy of the government to lose half its wildlife, so this clearly indicates a major policy failure.

Closer inspection of these DRSRS figures reveals insights as to what has gone wrong. First, other DRSRS data (GOK 1995c) show that the majority of wildlife, well over 70%, live either permanently or seasonally on the rangelands outside the PAs rather than inside. Second, the PAs are at least partially effective, for losses within them over the last 18 years are 31% Compared with 48% from outside (Table11.1). Clearly, the main conservation problem facing Kenya lies with wildlife on the rangelands outside the PAs, for 84% of the total wildlife lost during these 18 years was from outside and only 16% was from inside the PAs. This chapter therefore considers policy options for wildlife conservation on land outside the formal conservation areas of Kenya.

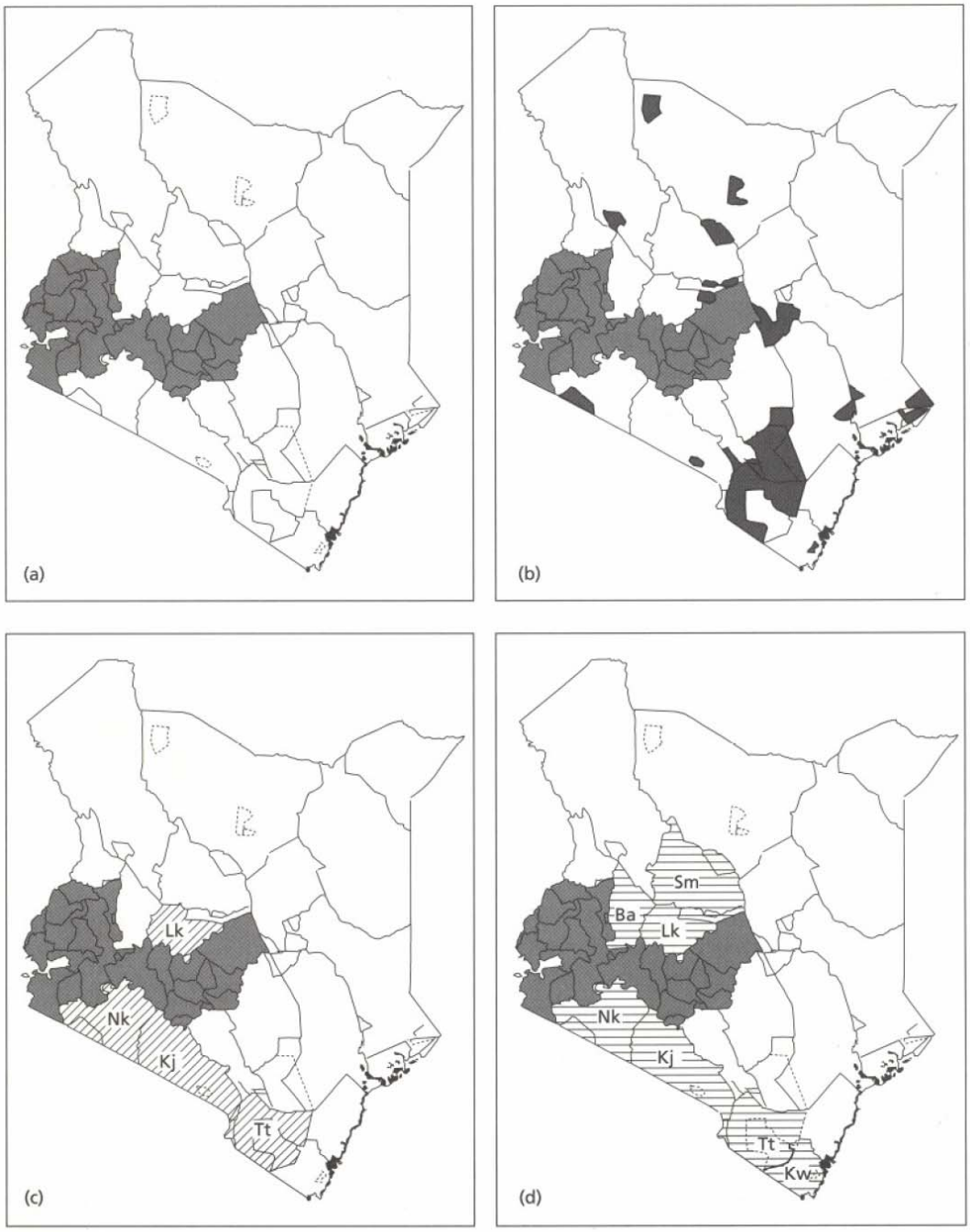

Fig. 11.1 Agricultural, protected, adjudicated and main tourism areas of Kenya. (a) Agricultural areas (shaded) occupy only 15% of the country, the remainder being semi-arid or arid rangelands. (b) Most of Kenya's protected areas (dark shading) lie in the rangelands. (c) Land has been adjudicated in only four rangeland districts: Kajiado (Kj), Laikipia (Lk), Narok (Nk), Taita Taveta (Tt). (d) The seven most important districts for wildlife-based tourism: Baringo (Ba), Kajiado (Kj), Kwale (Kw), Laikipia (Lk), Narok (Nk), Samburu (Sm), Taita Taveta (Tt).

Table 11.1 Population trends for livestock and wildlife on the 18 rangeland districts of Kenya, 1977-94

		Rate of change per annum (%)	Percentage change in 18 years	P value of population trend
Livestock	All	+0.60	+11.0	0.398 NS
Wildlife	All	-3.24	-44.0	< 0.001
Wildlife	Inside PAs		-31.0	
	Outside PAs		-48.0	
Wildlife	Adjudicated land	-2.04	-30.0	< 0.001
	Unadjudicated land	-3.36	-50.0	< 0.001
Wildlife	Tourism districts	-2.16	-32.0	< 0.002
	Non-tourism districts	-4.56	-55.0	< 0.001

Census data from GOK (1995a), trend analysis by OLS using logged data and dummy variables for each district and each wildlife species.

11.2 Property rights and land tenure

Property rights (Bromley 1991) and land tenure are central to the debate. Within the PAs, the government has retained all property rights 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). Outside the PAs, where 4 million pastoralists live, land is either adjudicated or unadjudicated (Fig. 11.1c). On adjudicated land, the government has assigned property rights either to individual landowners, who accordingly have individual tenure to a single ranch or landholding, 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 (Norton-Griffiths 1996). In contrast, the property rights on unadjudicated land remain held in trust by the county councils on behalf of the landusers. They at best have usufruct rights, based on their traditional lifestyles, but tenure is weak, and with no formal or legally enforceable property rights there are continuous problems over land alienation.

The DRSRS data show how important property rights and land tenure are to wildlife conservation. Wildlife losses have been 30% over the last 18 years in the four districts where most land apart from the PAs is adjudicated (Fig. 11.1c), compared with 50% in the districts where land remains unadjudicated (Table 11.1). Clearly, conservation of the wildlife resource is favoured by secure title to land and enforceable property rights.

Unfortunately there is a downside to both private and group title in that land holdings tend to become split up and sub-divided into smaller and smaller units. There are strong socio-economic forces driving this trend (Galaty 1992), including rising populations, fragmentation of landholdings following inheritance, the need to raise capital, and the fear of being marginalised by stronger groups of landowners.

The danger of this for wildlife conservation is shown clearly by data from 32 ranches in Laikipia District ranging in size from 1,500 to over 40,000 ha. Wildlife numbers and diversity are significantly lower on smaller than on larger holdings, and wildlife is effectively absent from ranches of under 2,000 ha (Fig. 11.2).

Land sub-division is politically highly sensitive in Kenya and deep policy conflicts are apparent. The government, for example, is encouraging the rapid adjudication of land in the rangelands and the transformation of the group ranches into (smaller) individually owned ranches. In contrast the KWS, which is also responsible for managing all wildlife outside the PAs, is trying to discourage land sub-division and instead encourage landowners and landusers to form wildlife associations to jointly manage their wildlife (KWS 1995a, 1996), much as neighbouring landowners in Namibia, Zimbabwe and Europe do for shooting and hunting.

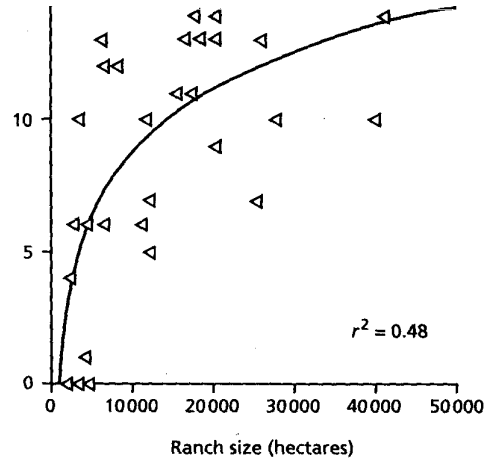

Fig. 11.2 Influence of ranch size on the number of wildlife species present on the ranch.

11.3 The influence of tourism

Tourism is a major bastion of conservation policy in Kenya, second in importance only to the network of PAs. Tourism is meant to provide the flow of benefits to support conservation activities and in general it has a beneficial influence. Wildlife losses in the seven districts, which between them account for over 95% of all wildlife visits (Fig. 11.1d) are 32% over the last 18 years compared with 53% in the districts where tourists barely venture (Table 11.1). Clearly, however, even these vast revenues generated by tourism (some US$500 million annually) are not adequate in themselves to ensure the conservation of the wildlife resource on which the industry depends.

The PAs generate revenues from entry, bednight and concession fees. Revenues from the national parks accrue to the KWS while those from the national reserves accrue to the county councils, in each case ostensibly to meet both the direct costs of conservation and for social investment at national or district levels. Most of the remainder of the vast tourism revenues are captured by the tourism industry (the travel, transport and hotel operators) and only a tiny amount (as little as 1%) accrues to the landowners and landusers on whose

land the majority of the wildlife resides (Douglas Hamilton 1988; Talbot & Olindo 1992; KWS 19956, c; Norton-Griffiths 1995, 1996).

Table 11.2 ranks five of the major wildlife tourism districts in the order of the severity of their wildlife losses. It is clear that these losses are not related in any simple way to visitor numbers, or therefore to total revenues. They are, however, related to the distribution of revenues between central government, the tourism industry and landowners.

In Narok and Samburu Districts (Nk and Sm in Fig. 11.1d), tourism revenues are captured mainly by the tourism industry and by the county councils, and more than 50% of all wildlife has gone. Taita Taveta (Tt) is much the same (39% losses) with revenues going mainly to the tourism industry and to the KWS. In contrast, in Kajiado (Kj), where there has been a continuous programme over the last 21 years to share wildlife revenues and benefits with group ranch owners (Berger 1993) and where substantial wildlife development funds have been disbursed to landowners over the last few years, there are roughly the same numbers of wildlife today as there were 18 years ago. Laikipia (Lk) is the most interesting, for conservation in the district is carried out solely on private land by private landowners developing their own privately financed wildlife-based activities (Thouless 1993). Landowners have reaped these benefits directly, and wildlife numbers have increased.

Table 11.2 Wildlife losses and tourism in five districts of Kenya

District	Narok	Samburu	Taita Taveta	Kajiado	Laikipia
Loss of Wildlife 1977-94	-65%	-33%	-29%	+2%	+12%
Main Conservation Area	National reserve	National Reserve	National park	National Park	Private Land
Tourist Numbers (1994)[1]	138,000	90,000	238,000	160,000	~50,000
Control of access and concession fees	Local county council	Local county council	Kenya wildlife service	Kenya wildlife service	Land owners and users
Years of community based, wildlife extension work[2]	5	2	4	21	3
Disbursement since 1992 from the KWS Wildlife Development Fund[3]	US $0.1m	US $0.2m	US $0.2m	US $1.2m	US $0.2m
Revenue distribution[4]					
To central GOK revenue	**	**	***	***	*
To county council	***	***	*	*	*
To tourism industry	***	***	***	***	*
To landowners and users	*	*	*	**	***

[1] GOK(1996); [2]Berger(1993); [3]KWS(1996); [4] Minor * through to major ***.

This is strong evidence that from the perspective of landowners and landusers that the contemporary distribution of wildlife benefits is inequitable, and is a major contributor to the problem of wildlife losses. Direct benefits are clearly more important than are any indirect benefits through social investments (WCMC 1992; Goodwin 1996).

11.4 Other costs and benefits of wildlife to landowners

The KWS and the county councils enforce their property rights to the PAs by granting access only to tourists and by excluding neighbouring landowners and landusers. Furthermore, the game laws (Bragdon 1990) allow the KWS to enforce property rights to all wildlife outside the PAs on both adjudicated and unadjudicated land.

The enforcement of these property rights imposes significant external costs on landowners and landusers. First, important natural resources are alienated from them, for there is relatively more high potential land inside PAs than outside, and relatively more low potential land outside than inside. Second, wildlife significantly raises the costs of livestock and agricultural production. Wild animals compete for grazing, they spread disease, they kill and maim people and livestock, they damage property, and they raid crops. In response, owners and users of land must undertake all kinds of defensive activities, such as building wildlife-proof fences and stockades and even moving away from areas seasonally infested by wildlife.

Conditions are accordingly ripe for major conflicts between the economic interests of landowners and landusers and the social and scientific interests of the government and conservationists. Indeed, a recent study by the KWS has shown that the vast majority of landowners and users in pastoral Kenya would like to see all wildlife eradicated and the PAs opened for development (KWS 1995c).

Many observers, including the KWS itself, point out quite correctly that one root cause of these conflicts under current conservation policy is that wildlife *benefits* to landowners have been effectively zero, especially since the ban in 1977 on hunting and all other consumptive forms of wildlife utilisation. At that time, consumptive use generated annual revenues of some US$24 million (nearer US$80 million in today's money) of which some 10-15% went to landowners and users. Furthermore, compensation schemes for death or injury to persons, and for losses to crops or livestock, were suspended long ago because of corruption.

11.5 Economic appraisal of new policy options

In response to all these problems there has been a significant change in policy thinking since the KWS was established in 1989 (KWS 1995a, 1996). Some consumptive utilisation of wildlife is now allowed under special KWS permit (over 60 wildlife cropping, ranching and farming operations are now licensed) and sport hunting might one day be reintroduced. Plans are well under way to license wildlife associations made up from neighbouring landowners and landusers to whom KWS will grant wildlife user rights, given certain conditions. The KWS has also introduced

variable entrance fees for parks to even up the distribution of tourist visits, and is trying to attract tourists to more districts.

Furthermore, the new Community Wildlife Service (CWS) programme of the KWS is providing tangible benefits to landowners and users in at least five districts through the disbursement of wildlife development funds which are themselves generated from tourism revenues (see Table 11.2). The CWS is also helping landowners and landusers to negotiate more advantageous concession fees, and set up their own privately financed tourist operations such as camp sites, tented camps and camel trekking.

The clear objectives of these new policy orientations is to ensure that the *benefits* of wildlife to *landowners* create *incentives* to invest in wildlife conservation so that landowners (and users) will become partners in conservation with the KWS rather than opponents. Policy objectives are to create an enabling environment within which the private sector (landowners and landusers) has incentives to support the public sector in achieving national conservation objectives (KWS 1995b, 1996; Kock 1995).

Nonetheless, the complexity of the linkages between wildlife conservation and development introduces seeds of doubt and uncertainty about the new KWS approach.

A wildlife production function

Let us start with a simple example of a landowner (everything from now on is about landowners and wildlife on people's land) who, following the new KWS policy initiatives, has decided to keep wildlife on his land. The net benefits of wildlife (NB_W)to him can be expressed very simply in terms of the direct benefits of wildlife ($DirB_W$), the management costs of wildlife ($MgmtC_W$), the compliance costs of wildlife ($CompC_W$) and the social benefits of wildlife (SB_N,). Let:

$$NB_w = DirB_W - MgmtC_W - CompC_W, + SB_W \quad (11.1)$$

where NB_W, is a function primarily of the difference between the direct benefits of wildlife (represented by the stream of benefits from a tented camp, access fees for game viewing, hunting or bird shooting, or from cropping) and the management costs of wildlife (represented by all the costs associated with creating and capturing those benefits). Clearly, net benefits will be positive so long as the direct benefits are larger than the management costs, under which conditions a landowner will look favourably on wildlife as a resource.

However, we must not overlook $CompC_W$, the costs of *compliance* with all the rules and regulations put in place by KWS or other agencies in order to use wildlife. If KWS insists on too many committees, utilisation plans, monitoring, regulations, complicated licensing arrangements and reports then costs will outweigh benefits. If:

$$DirB_W < MgmtC_W + CompC_W \quad (11.\ 2)$$

the landowner will give up in despair. KWS policy documents show serious signs of imposing crippling compliance costs onto landowners with too much unnecessary regulation. This may negate the very objectives of their new policies.

The final term SB_W represents all those intangible social benefits of having wildlife around. For some landowners these social benefits seem to outweigh all other costs and they gain great pleasure and satisfaction from conserving the resources on their land. For others, of course, these social benefits are strongly negative and they will never tolerate wildlife under any conditions.

If a landowner cannot capture benefits from wildlife, or if compliance costs are too high, then the decision whether or not to conserve wildlife depends solely on SB_W, which is risky to say the least (for most landowners and users this was indeed the situation following the ban on all consumptive use of wildlife in 1977). In principle, therefore, policy initiatives from KWS which allow landowners to both create and keep benefits from wildlife will in general be effective in creating incentives to conserve the resource.

A ranch production function

This would be as far as we had to go if it were not that wildlife also enters into the agricultural and livestock production function of the landowner. Let:

$$NB_P = DirB_P - MgmtC_P - CompC_P + SB_P - IDirC_W \qquad (11.3)$$

where the net benefits of production (NB_P), from either agriculture or livestock or both, is simply a function of the direct benefits of production $(DirB_P)$ less the management costs $(MgmtC_P)$. Compliance costs $(CompC_P)$ are represented here by local taxes, veterinary or other regulations, movement restrictions, etc., while the social benefits of production (SB_P) cater for the landowner who, for example, keeps 2 ha of maize among the coffee because he likes home grown maize, or the landowner who wants to keep a small herd of livestock because he always has and always will.

The indirect costs of wildlife to the producer $(IDirC_W)$, some of which were mentioned earlier, include competition for grazing and water resources and for space; and the costs of crop damage, predation and injury to livestock, death and injury to persons, disease, and damage to property. They also include the costs of defensive activities such as moving away from migratory herds, building strong bomas to keep lions out and children in, extra veterinary requirements, and electric fencing around fields.

Clearly, these $IDirC_W$ add to the *production costs* of a landowner and reduce both his profitability and his efficiency. One recent study (Norton-Griffiths 1996) showed that grazing competition alone reduced net benefits of livestock by some 35-40%, while another (Omondi 1994) highlighted the costs from predation and crop raiding. Equation 11.3 shows that, all things being equal, a ranch or farm with fewer wildlife around will be more efficient and profitable than will one with lots of wildlife.

Under the old conservation policy in Kenya, NB_W in Equation 11.1 was effectively zero $(SB_W$ apart) so it was not possible for a producer to offset any of the $IDirC_W$. The consumptive use of wildlife by landowners had been banned, all compensation schemes had been closed, and tourism benefits were in the grip of a powerful tourism cartel. Conservation policy in fact created *disincentives* for landowners to conserve wildlife, as getting rid of it reduced production costs.

However, Equation 11.3 also shows that policies which simply allow landowners to make profits from wildlife (Equation 11.1) are no guarantee at all that it will be in their economic or financial interests to do so. The key relationship is between the net benefits of wildlife *(NB_W)* and the indirect costs of wildlife on production *($IDirC_W$),* for if

$$NB_W < IDirC_W \qquad (11.4)$$

then wildlife will remain a net cost to a landowner even if individual wildlife utilisation activities themselves yield net benefits. It is Equation *11.4* which explains why the group ranches in Narok have lost more than 50% of their wildlife over the last 17 years (Broten & Said 1995; Norton-Griffiths 1996) despite the truly massive tourism income generated on their lands, and why the ranches in Laikipia have kept theirs.

Development pressures on land

There persists the romantic notion that pastoralists coexist with wildlife in an harmonious relationship. The truth is, of course, quite different and what one observes and interprets as coexistence is in fact a shortage of capital and technology on the part of the pastoralists, restricting their ability to change the status quo. Perhaps in the past, when population densities were low, pastoralists could indeed afford to ignore wildlife, but today, population growth across the country in cities, towns and villages, and on farms and ranches, leads to a demand for increased production, while expanding markets at home and abroad, real increases in prices, growing personal expectations, and advances in agricultural technology all create overwhelming pressures to raise the productivity per unit area of land.

Pastoralists simply can no longer afford the extra costs of production associated with wildlife. Indeed, Table 11.1 shows the success with which they have eradicated wildlife from the rangelands over the last 20 years or so, despite gains from land adjudication and from tourism, and despite all the well-meaning efforts of conservationists.

The growth in rangeland production over the last 18 years in response to these economic, social and market forces has been astonishing. The sales and slaughter of livestock in the pastoral districts of Kenya have each grown at over 4% per annum (Table 11.3), incidentally demonstrating a fundamental change in pastoral production strategy, for it was achieved without any increase in the actual numbers of livestock (see also Scoones 1994). Pastoralists have also shown themselves to be extremely price sensitive in that numbers sold and slaughtered increase by 0.7% for every 1% increase in prices. Pastoralists are also investing more in agriculture, for planted hectares in the rangelands have been growing on average by 7% per annum (but by up to 18% per annum in districts with high agricultural potential, such as Narok) with a 0.6% increase in area for every 1% increase in producer prices.

Table 11.3 demonstrates clearly that landowners and users can distinguish between the relative benefits of development (i.e. livestock and agricultural production on their land) and conservation (the benefits from keeping land undeveloped for wildlife).

Table 11.3 Trends in livestock slaughter and auctions, and cultivation, in 17 pastoral districts of Kenya, 1977-94. Annual district level data (1977-94) were obtained from district records and reports, and from internal records and reports in the Ministry of Health and in the Ministry of Agriculture and Livestock Development.

	Rate of change[1] (% per annum)	Price elasticity[2]
Livestock Slaughter	4.84***[3]	0.38% KShs kg^{-1} meat
Livestock auctions	4.12**	0.32% KShs per carcass
Cultivated hectares	8.64***	0.55%*** District producer price for maize

[1] Trend analysis by OLS of logged data with dummy variables for each district, for each livestock species and for drought years. [2] Price elasticity shows the percentage increase in slaughter, auctions or cultivated hectares for each 1% increase in price. [3] Significance of trends: P < 0.05*, < 0.01**, < 0.001***.

Figure 11.3 portrays this pure development-conservation dynamic in terms of the marginal benefits of *development* (curve D-DD) and the marginal benefits of *conservation* (curve C-CC) with an initial equilibrium (Q***) where the marginal benefits of one are matched more or less by the marginal benefits of the other (marginal benefit curves show the benefit arising from the `next' unit as a function of the number of units already produced or in production).

This equilibrium will be displaced by policies and events which change the relative values of these marginal benefits. For example, should the marginal benefits of development increase (to D'-DD') following, perhaps, further growth in demand, markets and prices, then the equilibrium will shift away from Q*** towards a new equilibrium at Q** characterised by more development and less conservation. Similarly, should the marginal benefits of conservation fall (to C'-CC') following, perhaps, increased competition from Tanzania and Southern Africa, or a downturn in the global market for tourism, then the equilibrium will shift even further away from Q*** towards a new equilibrium at Q*.

Of equal relevance to policy is the concept of the rate of change through time of these marginal benefit curves. If the marginal benefits of conservation are increasing (an upturn in tourism), but those of development are increasing even faster (new and expanding overseas markets), then the equilibrium position will still shift towards more development at the expense of conservation.

Figure 11.3 contains clear policy implications for conservation. In general terms, population growth, expanding markets, improving agricultural 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. In the Kenyan context, this makes it more difficult for wildlife to pay its way and it makes it more sensible for landowners to get rid of it.

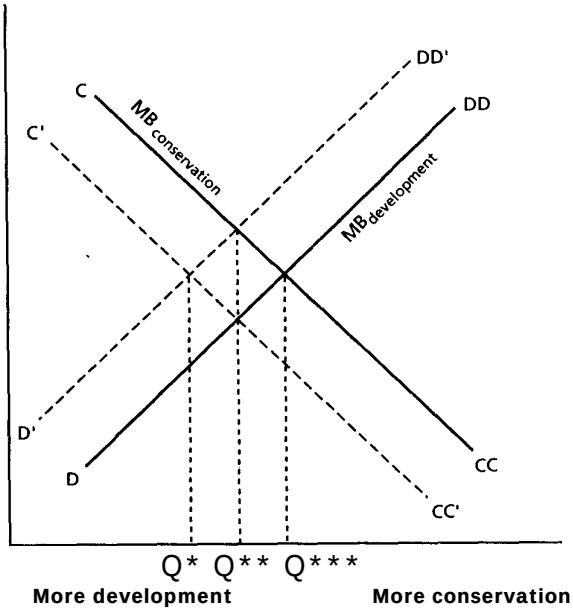

Fig. 11.3 The conservation-development dynamic.

The opportunity costs of conservation

The opportunity costs of conservation to a landowner are the forgone benefits from development, which can be quantified in terms of the expected net returns to land under contemporary levels of development and with contemporary technology and land uses (Norton-Griffiths & Southey 1995). Net returns to land are high in areas of high agricultural potential so the opportunity cost to a landowner of leaving such land undeveloped (for conservation) is also high. In contrast, net returns to land are much lower in arid areas, so the opportunity cost to a landowner of maintaining land for conservation will be less, and it will be easier for wildlife-generated benefits to meet these opportunity costs or even to surpass them.

In terms of wildlife conservation policy, it is the net opportunity cost to a landowner of keeping land relatively undeveloped *for the benefit of wildlife* which is important. This can be expressed in terms of the opportunity costs (given full development) and the current *net* returns from ranch production *(NB_P* from Equation 11.3) and wildlife conservation *(NB_P* from Equation 11.1).

$$\textit{Net OC} = \textit{Expected net returns (Full Development)} - NB_P - NB_W \qquad (11.5)$$

Quite simply, the greater these net opportunity costs are, the greater will be the economic incentives to the landowner to develop his land, and the harder it will be to protect conservation interests. A recent example is given by a study of the Maasai Group Ranches surrounding the Maasai Mara National Reserve in Kenya (Norton-Griffiths 1995, 1996) where there is much discussion of the impact on conservation values from the Maasai developing their land. If their land was fully developed (just like similar land elsewhere in Kenya but outside Maasailand), net revenues to the Maasai landowners would be some US$28.8 million each year, compared with

contemporary net earnings of US$2.4 million from ranch production *(NB_P)* and US$0.4 million from wildlife tourism *(NB_W)*. The net annual opportunity cost to these landowners is accordingly:

Net OC = $28.8m - $2.4m - $0.4m = $26m (11.6)

This equation has four important policy implications for conservation. First, these net opportunity costs (of US$26 million) represent an awesome financial incentive to develop the land. If net benefits from wildlife cannot match these opportunity costs then it is inevitable that the land will become developed (either by the Maasai or by outsiders alienating the land from them) and wildlife conservation values will suffer greatly. Second, Equation 11.5 is also linked to Fig. 11.3, for opportunity costs will increase as market forces push up the marginal value of production from D-DD to D'-DD'. Third, if the Maasai were to freeze development on their land at contemporary levels to maintain conservation values then they would forfeit some US$26 million annually. Clearly they should be compensated - but by whom? Finally, if conservation interests were to *deny* to them these benefits of development *without* compensation, then they would be condemning the Maasai to a poverty trap on behalf of conservation (Homewood & Rogers 1991).

11.6 A review of policy options

The main conservation problem facing Kenya is the loss of wildlife on land outside the PAs. The challenge is to devise and implement policies which create incentives for landowners and landusers to maintain the wildlife resource and to invest in conservation. To succeed, policy must be effective at both the micro-economic (individual) and macro-economic (whole economy) levels.

At the micro-economic level, three main policy prescriptions are being relied upon to create a partnership between the private and public sectors in achieving national conservation objectives: first, to encourage landowners and landusers to set up and manage their own tourism ventures so they receive a greater proportion of wildlife revenues; second, to permit some consumptive use of wildlife (ranching and culling) given very specific circumstances; third, to distribute social benefits to communities in the form of wildlife development funds.

Equation 11.1 shows that while these should all enhance the net benefits of wildlife and should provide appropriate incentives to landowners, there are two clear policy deficiencies. First, the rights to consumptive use are held at the discretion of the KWS and can be withdrawn at any time for any reason while the most profitable form of consumptive use, sport hunting, is still forbidden: this does not encourage investment. Second, the policy does not address at all the problem of the indirect costs of wildlife on ranch production ($IDirC_W$ in Equations 11.3 and 11.4). If the net benefits from wildlife are less than these indirect costs of production then wildlife will remain a net loss to the landowner and it will be in his best interests to eradicate it.

A subsidy scheme along the lines of the former grazing compensation scheme (Croze et al. 1978; FAO 1978) could be reconsidered, for it is practicable to calculate the indirect costs of each wildlife species on ranch production in terms of grazing

offtake, veterinary challenge and danger to life and property. Landowners could then be compensated depending upon the numbers and species mix of wildlife on their land and the time they spend there. However, subsidies often tend to become abused, and lead to uneconomic outcomes. For example, landowners might well over-invest in conservation just to get the subsidy, much like farmers over-invest in wheat production.

An economically preferable option would be to allow landowners to maximise the net benefits of wildlife through direct use, but to achieve this the KWS would almost certainly have to be much more radical in its approach. It might well have to relinquish all property rights to wildlife outside the PAs, even to species under protection through international treaty, and remove all restrictions on wildlife utilisation, including sport hunting and trade. It would be left to the landowners to decide how best to use their wildlife resource, including the option to eliminate it. This would open conservation to the full force of the market and lead to maximum economic efficiency.

However, macro-level policy deficiencies undermine this approach. Figure 11.3 and Table 11.3 show how macro-economic forces can compromise efforts to make wildlife profitable to the private sector, for in the face of expanding markets and real gains from production the marginal benefits of development overwhelm those of conservation. Current conservation policy does not address this important issue at all and policies based simply on allowing landowners to utilise wildlife will be continuously undermined by such powerful economic forces.

Policy initiatives are needed to redress this upward trend to the benefits of development. Fortunately the vast array of direct and indirect subsidies to agricultural production are gradually being scrapped as part of contemporary structural adjustment programmes in Kenya (IBRD 1992, 1995; KWS 1995b), so this may favour conservation in the long run by reducing the marginal benefits of production (Mugabe & Wandera 1993). This process would be enhanced by differential land use taxes, specifically taxes designed to reflect the marginal social costs of land development. Similar taxes have proved effective in Germany and Thailand (Panayotou 1994), but require quite sophisticated tenure, legal and enforcement systems.

Conservation policy in Kenya does not address the problem of opportunity costs, namely the benefits from development forgone by a landowner who keeps his land undeveloped to maintain conservation values. Net benefits from wildlife may more than match these opportunity costs on land of low potential, especially if landowners are left alone to maximise such net benefits in any way they want. It will be much more difficult, however, to match these opportunity costs on land of high potential, and here policy options might include lease backs or easements.

A lease-back policy would pay annual economic rents to landowners for not developing their land, the rent reflecting some proportion of the opportunity costs. This is quite similar to the current EU policy of `set aside' (Adger & Brown 1994) where farmers receive some 75% of net benefits for each hectare taken out of production (MAFF 1993). In contrast, a conservation easement would aim to purchase the development rights to land from the landowner, the price reflecting the net present value of the opportunity costs (Panayotou 1994). Neither policy is particularly easy to implement, and both are expensive as they recognise the true

costs of conservation to landowners. However, both can be effective, and undoubtedly both will be needed in Kenya.

These discussions demonstrate the complexity of the interactions between conservation and development. Conservation is indeed a matter of development, and sadly the complexities of the interlinkages are unfamiliar to most conservationists. Environment policy, of which conservation is just one part, needs to be an integral part of the economic development policy of the country, and the policy decisions about Kenya's wildlife and other conservation interests must be taken within the central planning environment. While it is absolutely correct to concentrate first on the fundamental problem of creating incentives for landowners to look after wildlife and other biodiversity, conservation policy needs a much greater flexibility and conceptual depth, and at each level it needs more sophisticated policy initiatives.

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