

THE CHANGING ECOLOGY OF EAST AFRICA

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Abstract: While the countries of East Africa have cause for credit in much of their wildlife policy since independence, they are now faced with a threat of growing human populations, together with growing expectations, that could severely limit the lands ultimately available for wildlife. The attempts to support these people on areas suited for arable agriculture are well above average for Africa, as for much of the developing world. But there is need for increased crop productivity to bridge the interval before such birth control programs as are in hand come into ultimate effect. Wildlife is largely to be found in the rangelands, mostly outside the parks on reserves; moreover these wildlife territories are invariably unviable as independent eco-units. Extensive development of the rangelands is scheduled for the near future. The needs of wildlife - seen here as an economic factor in land-use - should be urgently integrated with the needs of the pastoralist peoples, within the sociological as well as the agricultural perspectives of these emergent communities. For policy purposes, parks are generally loosely defined entities. Tourism is not always the support for conservation it is represented; wildlife could be exploited through game cropping, in association with, rather than in opposition to, livestock husbandry.

There has been a great deal said over the past few years about African wildlife. There has been very little said about East Africans. Apart from being doubtful public relations, this has ignored what will be the prime factor for wildlife, conservation, too in any proper sense, whether in the long term or a good deal shorter term. What applies in other parts of the world applies here: whatever your cause it is likely to be a lost one unless it faces up to the population problem.

In East Africa there has been massive restriction of habitat for elephant (Loxodonta africana) and hippo (Hippopotamus amphibius), to the stage where the surviving remnants of the once great populations have to be reduced by management to fit their remaining range (Laws, 1968). There has been even more critical reduction in habitat for crocodile (Crocodylus niloticus) -- like the hippo it needs gently sloping beaches, those which are also preferred by the dominant species of the

environment -- to the extent that it is almost entirely eliminated over huge areas where it was plentiful only a dozen years ago (Parker and Watson, 1969). This is a trend that will continue whatever is done about poaching. The same pressures apply to other species already; they will apply to many more before long unless man is able to subsist in more efficient manner off the areas he has already appropriated as his own -- a factor as important in the immediate future as reducing the birth-rates.

This threat applies to practically every wildlife area in East Africa, whether designated as a protected area or not. It can be illustrated by reference to two or three localities, though one could instance the danger for a score of places. One of the best known is Nairobi Park. Within twenty minutes of leaving your downtown hotel you can be im amongst the lions (Felis leo). Within twenty minutes of leaving the centre of Nairobi in the opposite direction you can be in amongst Kikuyu settlements. Here lives the man who has probably never seen a lion and probably never will. Yet in the long run he is likely to determine the future of Kenya's wildlife just by virtue of being father of six children. Some day he--or his descendants--might look beyond the boundaries of their present domain towards a spill-over into lands not really suitable for cultivation, the lands which make up 80% of Kenya, where rainfall is too low for arable agriculture at under 30" (the equivalent of 40" or more in temperate zones due to higher evaporation in tropical Africa). These are the lands of Kenya's wildlife. Already there are people trying to grow maize in the Rift Valley semi-savannah regions where maize has never been grown before but where maize must be grown now-- or attempted-- when Kikuyuland becomes overloaded. This is the man whose voice will be heard when the final dividing-up of the land takes place. He will only be ready to look twice at wildlife areas if they are already producing what means something to him in direct terms--food in his stomach and cash in his pocket.

On the other hand he might not need to look towards the rangelands if he can produce enough food from his own region. One-fifth of Kenya accommodates nine-tenths of the 11 million people. If these concentrations of population are making their impact beyond their borders already, it is nothing like what they could do in 20 years from now. Just outside Nairobi there are people living at over 1500 to a square mile, (Brown, 1968). This is as thick on the ground as in Japan's agricultural areas or Holland's. There are similar areas around Lake Victoria in Uganda and on the slopes of Kilimanjaro in Tanzania. Roughly speaking there are something over 30 million people living in a part of Africa the size of the eight most westerly states of the United States--the rough part being the actual size of the population. Tanzania recently found it had 12½ million people instead of 10 million-plus it had reckoned on (Tanzania Gov., 1969) and Uganda has just upgraded its estimate from 8½ million to nearly 10 million (Uganda Gov., 1969). These are populations which are expanding at a rate of 3% or more (Kenya Gov., 1970). They are also extremely poor and often malnourished; they are also intent on rapid advancement. This means not only more people but more people demanding more of lots of things, including space. It has been said that an increase in income of two dollars means an increase in grain of one pound, (Brown, 1967). In terms of what these small farm plots already support, the biomass of people together with their domestic stock frequently surpasses the figures so often proclaimed for the savannah game areas which are reckoned as some

of the most productive natural areas on earth at 100,000 lbs. a square mile (Talbot et al., 1965). Croplands like these produce an average of 20 bushels of maize an acre, though the one farmer in ten who is planting hybrid maize (and Kenya is the first country in black Africa to take this step) is now reaching nearly three times the yield, well on the way to matching what is achieved in the United States (Kenya Gov., 1970). Not that yields in one area should necessarily rival those in another; but Kenya's maize output has gone up two and a half times since independence, and it could go up another two and a half times at least if new methods proliferate as fast as new Kenyans--and provided a quarter of it is not lost in storing.

This would be an advance which is no more than is needed in a country where 90% of the people make their living from agriculture. Over the border in Tanzania the agricultural output is expanding by over 6% a year, twice that of Africa or the developing world as a whole (Tanzania Gov., 1969). Tanzania aims at raising its per capita income from \$55 in 1963 to \$130 by 1980, though even at a GDP growth-rate of 5%-- unusually good for the developing world-- it won't double its income in another thirty years unless it does something about its 3% population growth (Tanzania Gov., 1969). Tanzania also aims to extend its life expectation from 35 to 50: one wonders what the population expansion will be like when the ratio of doctors gets anywhere near the 15-times better rate of the United Kingdom--though Tanzania is already five times better off than Ethiopia (W.H.O., 1969). Birth-control is not going to counter immediate pressures for a long time with a population half in its teens or less. Nor is the population likely to become as productive as it might while children suffer from malnutrition to the extent that they get only a fifth the meat or fish or milk an American child gets and only one egg in thirty (F.A.O., 1969). But if these East African countries are pulling themselves up in a fashion to show what development can amount to, and doing it largely off agriculture, they are doing it in an equatorial environment as fragile as it is fertile. If parts of it are good for wheat--and the Masai highlands reach the 30 bushels an acre or more that the U. S. farmer averages (still only half what the best farmer in Europe achieves) (Brown, 1968)--that is a different thing from trying to grow wheat on the plains around Loita towards the borders of the Mara Game Reserve. Here you look for 20 bushels or less; the savannah wheatlands are more vulnerable to the Dioch weaver bird (Quelea quelea) which in the past few years has been destroyed in its hundreds of millions but still is more prolific than ever.

Some of these Kikuyu farmers are now earning five times what they were half a dozen years back. Their coffee and tea compete with the best in the world (Pearson, 1969). But coffee is susceptible to growth blights, and synthetic substitutes, too. It is also susceptible to quota cuts, worse still to falling commodity prices. For several years, these Kikuyu farmers have been growing more and receiving less for their trouble (Kenya Gov., 1970). Tanzania is producing only slightly less sisal than five years ago while earning only a third as much for it (Tanzania Gov., 1969). It is setbacks like these that can leave an emergent economy broken-backed overnight. Then the people must look to other means of subsistence, often enough in other parts of the national territory. Meanwhile there is one site near Mount Kenya which illustrates what can be achieved. A patch of semi-desert fifteen years ago is now irrigated until it supports 15,000 people on 5,000 acres, with rice yields that surpass Japan's: the area's overall biomass reaches well over 400,000 lbs. per square mile (Brown, 1968). It is development like this which also illustrates the role of overseas

aid. It only needs man's proper technological skills applied in the right places for present food problems to be solved--and few areas are achieving the revolution, social as much as agricultural, so well as Kenya. Not that there aren't backslidings; in the same Kikuyu highlands there is erosion as bad as for fifteen years, making itself apparent in Tsavo Park two hundred miles away and leading to silting of the rivers with consequences for the dry-season ecology of this elephant region. And if instant advance in agriculture calls for more fertilizer and better insecticides (here Kenya again leads black Africa), that can also mean huge increases of nitrogenous additives and DDT on every side. Lake Nakuru and Lake Naivasha with their unique bird populations are acting as sumps for surrounding farm lands: already there are tentative signs of disturbances in the ecology of these lakes.

If Kikuyuland on one side of Nairobi Park offers a threat which is gathering momentum but is being partially met already, there is another threat on the southern borders which is much more imminent and could be almost as troublesome. It is typical of what is immediately facing virtually every single wildlife area in East Africa. Not one is an independent viable eco-unit, most of them not by a long way. Serengeti is a third too small, Tsavo a half. All of them should be integrated with the surrounding countryside, since a park exists not within its borders but within its region. The map for the Nairobi Park says it is 44 square miles; the migrating populations say it is ten times as big. Even at that, the migration zone for the wildebeest (Connochaetes taurinus albojubatus) is only a quarter what it was in the recent past. Wildebeest are more dependent than zebra (Equus burchelli) or other plains herbivores on water and fresh grazing. When their range becomes restricted, the nutritional plane falls off and their fertility rates with it. The Nairobi Park wildebeest often do not nearly maintain the reproduction rates of the Serengeti wildebeest, with their much greater scope for migration (Talbot and Talbot, 1963). Nairobi Park is sometimes instanced in support of tourism as an economic form of land-use. But it does not really earn the 10 dollars an acre so frequently claimed; that income is earned from a huge stretch of Masailand--though the Masai receive no benefit from it of any direct visible kind, no more than anyone else in Kenya. Partly because they want to develop their land, partly because they want title to their holdings in an age when even a nomadic Masai has to talk of "all that part and parcel of land" which is his own (if he is to be sure it stays his own), the Masai are growing keener to become up-to-date citizens. When the land becomes private property, so do the animals on it. The Masai have so far ignored wildlife, but they do not any more when zebras break down fences, especially if the animals are theirs to do with what they want. The position could be changed by legislation--or it need not arise if fences don't arise (Longhurst and Heady, 1968). Meanwhile there are notices going up on the southern borders of Nairobi Park saying 'Keep Out', addressed to whatever creature comes along. There are extensive developments scheduled--if not ranches, then grazing associations--for half of Kenya's rangelands, an area the size of California, during the next four years (Casebeer, 1969). So far they are just wildlands. Investment hardly reaches a dime an acre. Within this spread of country there is a total area the size of Vermont that is occupied by the parks and reserves. An area the size of Connecticut is given over to commercial ranches. These commercial ranches earn two dollars an acre, the parks earn four dollars an acre and the rest is lucky if it reaches fifty cents an acre, often enough a mere quarter of that. Of the 7 million cattle in the national herd, the commercial ranches

account for one beast in 14, though they do it on one acre in 50 (Casebeer, 1968). They also produce three-quarters of the marketed meat. The rest of the rangelands are the areas scheduled for a main effort in the next phase of Kenya's agricultural development. What happens to the wildlife depends upon what sort of development is judged best. If it means fences, it means problems. There might be scope for intensive ranching in limited areas (trials in Rhodesia and Uganda have indicated that very high-density stock grazing for very short periods allows far higher overall stocking rates (Savory, 1966; Thornton, 1968; Goodloe, 1969) which would allow space for more parks and reserves; though a leading agriculturalist recently remarked there were enough sanctuaries to prevent the animals going extinct--a somewhat limited view of the role available to wildlife, even if a reflection of the manner in which wildlife protagonists have represented their case: "an antelope is a thing of beauty to be exploited never."

The very small proportion of the rangelands at present taken up by parks and reserves earns the greater part of Kenya's 50 million dollars a year from its 150,000 visitors. When the tourist stream approaches one million, as is expected before the 1970's are out, tourism could supplant the main body of agriculture as the prime revenue-earner--it is currently overtaking coffee as the single most lucrative item. To this extent alone there should be little conflict permitted between livestock and wildlife. While a cow or a lion cost about the same quarter dollar of government funds to maintain, a lion is twenty times as powerful in earning foreign exchange (Brown, 1968). In fact a Masailand lion must represent one of the most valuable beasts in the world, to rank in potential with a race horse. Some people estimate the odd one could be just as valuable viewed down the sights of a rifle: parts of the rangelands outside the parks could earn more from hunting than from any other current land-use (Davis, 1968). Yet at Amboseli Reserve in the heart of Masailand the conflict between livestock and wildlife is reaching crisis stage. The central 30 square-mile sanctuary around the swamps at the foot of Kilimanjaro attracts only 40,000 visitors a year so far, but produces over half the total revenue for the entire district and half a million dollars in indirect revenues for the national exchequer. The land would not match that sort of income if it were completely given over to the best ranching methods known in Kenya; and the tourist flood is only starting (Western, 1969). Yet the livestock outnumber the wild animals by three or four to one; there are more cattle to the square mile than at any other point in East Africa--and this is supposed to be a protected area for wildlife! As the cattle increase the wild herds decline further; as the pressures mount on the 200 Masai immediately responsible so their suspicions mount too. Now that an economist and an anthropologist have joined the ecologist and the local warden to balance the needs of every part of the conservation spectrum, there is prospect of a way out.

These problems are similar to what is going to be met in other parts of Masailand. Many Masai still subsist largely off milk. With this way of life they may be not so much overstocking their land as overpopulating it with people, even at less than ten to a square mile. A family of five need eighty cattle, fifty of them cows in milk, to get through normal times let alone hard times (Jacobs, pers. com.), which is why the Kajiado District supports half a million or more cattle (far too many, at one hundred to a square mile), till over-grazing and drought decimate the herds. There will be not much in the way of a final solution till the Masai can be persuaded to change their diet, and that is like telling them to change their whole social

framework, to forget their Masai history and what it stands for. With improved stocking methods and greatly improved education--if not transformation--the Masai country might reach the two dollars an acre that the commercial ranchlands already achieve. A zebra skin sells for 50 dollars or more, let alone the meat off the carcass. The 35,000 zebra of Kajiado could outproduce the cattle with populations as they stand now. If populations were regulated to increase output from cropping, other species besides zebra, there would be more scope still beyond the present biomass split of 10,000 lbs. of wildlife per square mile and 45,000 lbs. of livestock. What counts is how far there is competition and whether it could be suitably reduced without reducing the cooperation of the Masai. Some people maintain that what makes for good wildlife country makes for good stock country; the one should act as little constraint on the other. Present findings suggest that cattle eat fewer species and are less selective the year round. Four major animals investigated on the Athi Plains, wildebeest, zebra, hartebeest (Alcelaphus buselaphus cokei) and cattle, all show a basic preference for the red-oat grass (Themeda triandra). Hartebeest are more persistent than others when supplies get limited (Casebeer and Koss, 1969). One could perhaps manipulate the populations to aim for steady number of cattle with a greater number of wildebeest and zebra, by eliminating some of the hartebeest? Or maybe one should manipulate the pastureland rather than the populations, by stimulating the spread of red-oat grass through a judicious use of fire, since Themeda triandra is considered part of a fire-climax grassland. Competition with the cattle is greatest at the end of the dry season, a short phase which is critical to the whole year-round sequence. One wonders how well cattle are adapted to the African environment having arrived only 2000 years ago; are they still ecological intruders or have they achieved some degree of separation? A census around Loliondo to the north-east of the Serengeti suggest that cattle largely replace the wildebeest of the adjacent spectrum in the Serengeti Park (Watson, et al., 1969).

Meanwhile the prospects for game cropping become more optimistic, as the need grows for trials on plains game in the face of human pressures. The claims for cropping the wild herbivores have often been advanced, as more material has emerged of their efficiency in protein production through ecological division of labour, or what amounts to a wild form of crop rotation (Longhurst and Heady, 1968). In brief summary, they use the vegetation mosaic in a refined and resourceful manner, there is a much wider exploitation of niches, they reach maturity sooner than does domestic stock, they breed more rapidly, they reach slaughter size more quickly, they reveal more carcass protein than does domestic stock, they are more resistant to drought and disease, etc. There is still much to be resolved, not only in getting the animals off the hoof and onto the slab, but in meeting hygiene requirements and surmounting marketing problems. There is no point in making euphoric claims for game cropping until the moment when the antelope becomes supper steak for the customer--and up to that moment it remains pie in the sky, as many a cattleman points out.

All manner of further factors remain to be investigated: what about the carnivores? Do they really make for healthier populations? Do they act as reservoirs for parasites? Would offal in the field stimulate hyena (Crocuta crocuta) populations, leading to increased natural predation during non-cropping periods? Could cheap game meat on the market lead to a decline in the sale of livestock products, a reduced off-take from the scrub cattle which are already far too numerous? (Longhurst and Heady, 1968). There have been pilot-schemes in various places using various species:

researchers have found how you can take 20% off the hartebeest and 30% off the gazelle (Hopcraft, per. com.)--some people suggest ultimately 50% or even 60% off the gazelle after due adjustments to the population parameters. But it is not the entire story to talk of wildlife biomass. There are calorific-intakes to establish and energy-flows. It is not the standing crop that matters so much as the productivity each year. Elephants with all their enormous biomass would not reveal such an increase in protoplasm by proportion as would meadow-mice (Petrides and Swank, 1965).

But cropping could provide a further cash crop in countries where the usual cash crops are unpredictable. It would do something especially for the man to whom the benefits of tourism scarcely penetrate, the man away from the big city, the man on the edge of the game reserve who may wake up in the morning and see his maize crop disappearing over the border inside an elephant. An animal to be cropped would become an animal to be protected. Many areas already practice cropping widely though not in any legal regulated fashion. The Murchison Falls Park in Uganda is subject to more poaching than virtually any other area despite a staff greater than for any other park, since it is ringed with human populations whose activities are hardly in harmony with the park's needs. Even more damage is done by poachers in terms of the park's ecological balances when they light fires and leave them to blaze. Not that fires can always be stopped when they originate outside the park as well as within: they take just as much notice of rigid park boundaries as do poachers or birds or freak weather. If the people who drew the park boundaries in years past had little knowledge of where the ecological boundaries ran (if indeed such borders can ever be said to be anything but as fluid as nature itself), they had little concept of regional integration as a basis for park planning. They aimed at a black-and-white situation with absolute 'protection' on one side away from the world and its hostile ways on the other. The more the two could be rigidly segregated, the better. The prime attempt in East Africa at multiple-resource planning was set up at Ngorongoro, where a range of activities--forestry, cultivation, stock-rearing, wildlife, tourism--were to be pursued in coordination (Dirschl, 1966). Now the scheme is on the point of coming to an end under the ostensible demands of Masai for more rational agriculture.

For a while the Murchison Falls Park benefited from an accidental buffer-zone around it. That has now disappeared on two-thirds of the perimeter and the rest is not likely to last long (Wheater, 1968). Apart from the prospect of the park becoming Murchison Hydro-Scheme Park (which is viewed as a straight engineering job--ecologists have nothing to do with the project despite their queries on water-levels below the site, crocodile hatching-grounds, etc.), there is the problem of what the park is intended for, and what it is meantime becoming whether anybody wants it that way or not. Many parks do not have any stated policy at all: the aim is to "just let them be". At Murchison Falls the intention is to "maintain and create by natural means as diverse a habitat as is possible and natural to the area". No indication of what you take as a base-line for "what is natural"; or whether "create" means "recreate" with regard to the vegetation, especially on the south bank of the Nile which was already losing its variety under elephant pressures before the park was ever set up. Twenty-five years ago there was still some mosaic of high forest and open woodlands. Now you see nothing but straight grassland. You don't see many of the forest birds and chimpanzees (Pan troglodytes), though you see a lot more

buffalo (*Syncerus caffer*) taking advantage of the grassland-spread (Laws, 1969a). If you can see buffalo in plenty of other places in East Africa, you can see chimpanzees in few enough places throughout the whole of Africa. Something the same is happening in Tsavo: the baobab trees, some of them a thousand years old, are being destroyed by the elephants at a rate of 2% a year, depriving the area of part of its distinctive avifauna as well (Laws, 1969b). The elephants are still plentiful in Murchison Falls Park, though only two-thirds what they were 25 years back. At the rate they are at present reducing their reproduction and the rate the calves are dying off in that shadeless savannah, there will only be one-fifth left by the year 2000 (Laws and Parker, 1968). To bring the herds within the carrying capacity of the land the original totals have been reduced by 2,000, to be followed by another 3,700 in accordance with the fresh parameters of the various populations. But now there is no researcher left at Murchison Falls Parks, just as there is nobody working directly on elephants in Queen Elizabeth Park or Tsavo, both areas with elephant problems. The elephants continue to reduce Murchison's carrying capacity at an accelerating rate. Far from having anywhere to migrate to, they are joined by other elephants from outside crowding into the park to escape harassment from human throngs right across the park's hinterland.

All of which raises a question which is being asked of every park and reserve in East Africa, and which hardly one of them is equipped to answer in the face of expanding human populations and expanding human expectations: what is a wildlife area for? Ostensibly it is to protect nature, even if it does not always do the job so well. Some people maintain that tourists will help in the protecting, since they supply revenues that give the parks a *raison d'être* in an impoverished region. At Murchison Falls with 40,000 visitors a year (as many as a crowded weekend at Yosemite) the park is close to breaking even, if in fact a park should aim at that. Tourism equated with conservation is another thing: tourists on the Nile launches with their demands to have crocodile flushed off the banks to provide better pictures, are contributing to the destruction of unguarded nests and abandoned young, hence to the endangering of one of Africa's last remaining crocodile populations--they can be just as deleterious as poachers. Treetops is geared to a year-round flood of visitors, animals and humans alike, although at present rates it might not feature either before the century is out. From all the revenues earned through tourism, only the merest fraction goes back into conservation. Murchison Falls Park already earns four dollars an acre, five times more than is gained from subsistence agriculture in surrounding areas. Yet if administrators wonder what the park is for, so do the people on the edges. There was a time when it supplied good cheap meat from elephant and hippo cropping. Now the warden watches the habitat deteriorating from overstocking, while locals watch their children's hair turning red from malnutrition. Just maintaining the elephant reduction program, for the primary sake of conservation alone, would produce one million dollars for park funds and the local coffers. The GDP of Uganda is only a little more than what is spent in California each year on hunting and fishing--and that is a mere part of the recreation industry, what people do when they have met the basic needs of life. In the U. S. it is obviously in order to question what happens if commercial considerations step over a park's borders: if they do, it is likely to stop being a park. In East Africa one might well say that unless they step over the border, it is likely to stop being a park. Far more than in the U. S. one must accept for wild country in East Africa that you

use it or you lose it. High-flown talk about national heritage is likely to be drowned out by the rumblings of a nearby stomach--unless you talk within the larger social and economic perspectives; and if you talk about tomorrow it must be a highly probable tomorrow, a very close tomorrow, and a tomorrow that means something in terms of the overriding daily factor--finding a fair ration of food (as much meat as is eaten by a domestic cat in the U. S.).

At Murchison Falls Park there is a plan for using the hinterland as a broad-based ranching-cropping area, integrated with the park itself as one unit. The livestock side would be mostly open-range, hence no fences; the cropping would view the entire populations of the region as a single base-line from which to draw cropping schedules. While elephants and buffaloes could be cropped in the overflow zone, the hippos would have to be taken along the Nile within the park. Three per cent of the 20,000 elephants, five per cent of the 15,000 hippos and fifteen per cent of the 30,000 buffaloes (the off-take could work out much higher) would yield at least half a million dollars a year, as well as a steady supply of meat for the locals. (Uganda Dev. Corp., 1967). Over a number of years the cropping-for-conservation work in the two main Uganda parks has yielded as much meat as would keep Kampala going. Now there is none, except such as is acquired by local moonlight operators who care nothing for parameters and their potential. There are strong interests in Uganda--as in all the East African countries--which see prospects for beef across all those rangelands, prospects which could be prejudiced from the start if a steady supply of economic wild meat on the market appeared through legitimate channels. A one thousand square mile ranching-scheme is underway in western Uganda, financed in part by AID. At enormous cost, tsetse fly has been cleared off the wild animals slaughtered by the scores of thousands (some people say a quarter of a million). If it turns out like many another such scheme since the war, the tsetse will not take much notice of the ranch signs, and the protein return will not remotely match what has already been achieved from limited cropping schemes in Uganda. The land squeeze in Uganda is much more acute than in Kenya or Tanzania; a quarter of the land is already under intensive use (three times as much as thirty years ago), against one-seventh in Tanzania and one-tenth in Kenya (though virtually all the more suitable land in Kenya and Tanzania has already passed under the hoe). One could consider exploiting natural Africa in the manner it has proved most productive, without leaving the biotic potential impoverished. The total standing crop of wild animals in East Africa has been estimated at half a billion dollars (Parker, 1968). People say the developing nations are short on natural resources. Here is a region rich beyond most others. It may lose its advantage though following conventional approaches for a highly unconventional asset. If it is an environment remarkably productive, it is remarkably vulnerable as well. The only viable prospect in the long term is the fitting of man's populations to their environment in the most efficient fashion.

These wildlife areas are dynamic communities: that is now apparent to administrators throughout East Africa. What is still not always recognized is that wildlife country is also part of a wider community, where what goes on in the Serengeti may have resonances for regions hundreds of miles away, especially when what is already the dominant species could expand till it starts to become exclusive. The parks cover between 5% and 10% of these countries, but they are facing fundamental threats--

unless they can show they have their place in the socio-economic fabric of newly emergent communities. At present they have an image as preserves for the white man from overseas, an affluent white man and a well-fed white man. The African can hardly be blamed if his thinking is coloured, so to speak. He largely sees wild animals as a resource to be exploited in a single direct manner. Not that he would use the land of the parks for anything much, since many of the wildlife areas are tsetse-infected--that was how they maintained themselves before they were declared protected areas. Swahili uses the same word for "animal" as for "meat", which tells something of how an African views wildlife in what might be called his gut-feelings.

Until conservation in East Africa is considered conservation of the entire environment and an African environment at that, these threats will gain ground. A zebra must be viewed not merely as something for people overseas to go and see next vacation (a sort of luxury entity beyond the purview of down-to-earth living after the vacation is over). There are hopeful signs of a trend in another direction. East Africa could even become a sounding-board for conservation in the Seventies among developing countries where the old story of "animals versus people" is at last left behind, where wildlife could be tolerated in something more than a barely-spared corner. East Africa has an advantage over more advanced parts of the world, in that it can take a long look at how to apply technology before it plunges right in. The refined techniques of the new conservation could give wildlife its best chance as well as its last chance.

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