

The Pastoral Road to Extinction: Competition Between Wildlife and Traditional Pastoralism in East Africa

by

HERBERT H.T. PRINS, MSc (Gron.), MA (Cantab.), PhD (Gron.)

*Professor of Tropical Nature Conservation,
Wageningen Agricultural University,
POB 8080,*

6700 DD Wageningen, The Netherlands;

*Formerly Research Fellow of the Royal Netherlands Academy of Sciences,
Senior Scientist at the Zoologisch Laboratorium, Rijksuniversiteit Groningen,
Haren (Gr.), The Netherlands.*

INTRODUCTION

Large parts of Africa are still dominated by a pastoral economy, and many observers have been impressed by the coexistence between nomads or semi-nomads and their livestock on one hand, and wild animals on the other. Often, this way of life is traced back to a (pre)historic past, although without evidence; for example, Parkipuny (1989) states that 'before European hunters and indigenous trophy hunters and meat poachers disturbed that once-natural balance in [Masai-land], domestic and wild animals coexisted in virtually all pastoral areas in this region', and Osemeobo (1988) wrote 'before the advent of modern methods of primary production and rapid growth in human population, the rural farmers were able to manage both the animal wildlife and their habitats'.

The impression has thus arisen that there can be harmony between wildlife and pastoral exploitation. This idea is fuelled by statements such as '... as a matter of fact the entire area which is still predominantly utilized by these [Masai] to raise their livestock is characterized by the abundance of wild animals grazing side by side with domestic stock. Confronted with this stark reality [of coexistence], in their lop-sided perception of the heritage at stake, preservationists have repeatedly sought either piecemeal eviction of the Maasai from literally the whole of their homeland, or definite subjugation of the interests of this indigenous community to those of wildlife protection and tourism throughout the land.' (Parkipuny, 1989). Partly as a reaction to the preservationists' type of criticism by local community leaders, and partly based on the idea that wildlife and livestock can indeed live in harmony together on the same land, some conservation authorities reacted by recommending a type of management of conservation areas, and even national parks, in which there is a place for pastoral people (*e.g.* Newby & Grettenberger, 1986) or for grass-cutting inside the park (Lehmkuhl *et al.*, 1988).

As a general statement about the future of protected areas, McNeely (1989) went so far as to write that 'far greater expanses are required for conservation than modern societies can afford to remove from direct production. The best answer to this dilemma is to select and manage protected areas to support the overall fabric of social and economic development, *not as islands of anti-development*' (p. 240, my italic), and continued by stating that 'improvement in conservation over the coming

decades will lie primarily in the establishment and improved management of categories of protected areas where some human use will be tolerated *or even encouraged*' (p. 241, my italic). The World Conservation Union (IUCN) has, in response, 'proposed changing the definition of a national park to exclude indigenous people from the prohibition on resource exploitation and occupation, provided that they continue to live *in harmony with their environment*' (Hough, 1988, again my italic).

But how harmonious is the relation between the pastoralist and large game? In his classic study of the pastoral Barabaig, another of the East African Nilotic tribes with a 'cattle complex', Klima (1970 p. 57) wrote that 'lifelong prestige is awarded to any man who has killed an 'enemy of the people'. The Lion [*Panthera leo*], Elephant [*Loxodonta africana*], Rhinoceros [*Diceros bicornis*], Cape Buffalo [*Syncerus caffer*], and alien tribesmen, are all considered 'enemies', and the killer of one of these status animals [sic] is rewarded with gifts of livestock ...'.

In Nigeria, 'nomadic Fulanis were found maintaining permanent routes in the Reserves. The concentration of cattle along these routes led to excessive trampling and erosion. The cattle-ranching Fulanis also effected changes in the movement of wildlife to areas where their [the Fulanis'] activities were minimal even when such movements were unfavourable to the wild animals. Moreover, the herdsmen hunt carnivores and ungulates for meat or in protecting their cattle, and indiscriminately burn the vegetation to produce new swards of grass and herbs for their cattle — usually at the expense of wildlife' (Osemeobo, 1988).

For a Nature Reserve in northern Niger, Newby & Grettenberger (1986) advocate the development of tourist hunting of Barbary Sheep (*Ammotragus lervia*) if there is scope for such an activity, and suggest that Dorcas Gazelle (*Gazella dorcas*) might provide a supplementary source of protein and a supply of trophies and hides for the tourist trade, although they indicate strong competition between wildlife and livestock and their owners in this area, stating that: 'In the past, large game animals [Addax (*Addax nasomaculatus*), Dorcas Gazelles, and Barbary Sheep] as a source of food or as a trade item constituted a resource for the people of the Air'.

'Over the past 60 years or so, such wildlife has not only become progressively scarcer but the absolute wealth of the Tuaregs, in terms of livestock owned, has seen periods

of marked increase'; the Wild Dog (*Lycaon pictus*) has been eradicated already, the Cheetah (*Acinonyx jubatus*) is severely threatened, yet Newby & Grettenberger (1986) suggest that concessions have to be made with regard to killing the Common Jackal (*Canis aureus*) and even, in exceptional cases, the rare Striped Hyaena (*Hyaena hyaena*), by the Tuareg in this Nature Reserve.

This, apparently, is not perceived as bartering but merely pragmatic management, with the greater goals of conservation in mind — conservation that is lasting and, hopefully, applicable with the maximum of understanding and a minimum of blind repression. Nature conservation is becoming alarmingly 'pragmatic', 'realistic', 'flexible', and 'seeking the involvement of a much wider constituency through making protected areas more useful to society' (see also McNeely, 1989).

The present paper questions the harmonious coexistence between wildlife and pastoral economy, and addresses the 'new' idea of letting local people use the resources in a National Park or Reserve. Evidence is presented from East Africa for the expectably negative effects of livestock densities on wildlife densities.

METHODS

From different sources (referred to in the headings or footnotes to the Tables), details of densities of game and livestock in selected areas in Kenya and Tanzania were collected. In order to add the weights of different categories of animals, biomass data were sometimes transferred to metabolic weights ($W^{0.75}$ in kg) or into estimated energy consumption rates ($1.8 \times 70W^{0.75}$ in calories per individual); $70W^{0.75}$ is a good estimator of basic metabolic rate, while $1.8 \times \text{BMR}$ is a good estimator of the metabolic rate under range conditions (Moen, 1973).

Typical pastoralists live mainly off the milk of their herd and not off their meat. According to Lamprey (1983) and Brown (1971), 75% of their caloric intake is derived from milk and 25% from meat; an average family of 8 people consumes 6,600 litres of milk and 700 kg of meat per year, to produce which this family needs 35 to 40 head of cattle. In order to provide for the possibility of drought or disease, an addition of 50% of cattle appears reasonable (Lamprey, 1983). Such a family, with a combined metabolic weight of $8 \times 40 \text{ kg}^{0.75}$ ($= 127 \text{ kg}$), needs livestock with a combined metabolic weight of $(37.5 + 0.5 \times 37.5) \times 180 \text{ kg}^{0.75}$ ($= 2,801 \text{ kg}$). These calculations are based on the assumption of an average family member weighing 40 kg, because of the large proportion of children and subadults in a family, while for livestock the basis is the tropical livestock unit (TLU) of 180 kg.

The ideal theoretical ratio between the metabolic weight of people over that of livestock amounts to 0.045 (a figure without a dimension), which represents Brown's (1971) 'minimum pastoral standard of living, allowing for adequate daily subsistence with a little surplus in good years'. If the actual ratio is higher, then the people involved have not enough livestock or rely partly on agriculture or horticulture. If the ratio is lower, then they will be keeping more livestock than are necessary (and can be considered wealthy).

RESULTS AND DISCUSSION

'Prestige' and 'Ordinary' Overstocking

Of a number of districts, enough data on livestock and human densities could be collated (Table I) to calculate whether people keep too many livestock in relation to their needs, or not — consequently whether they indulge in 'prestige overstocking' or not. As is clear from Table I, the

TABLE I

*In Pastoralist Economy, Herd Population consists of Small Stock ('shoats', namely Sheep and Goats: approximately 15% of the metabolic weight), Donkeys (for transport: approximately 4%), and Large Stock (approximately 80%; Camels are important in the arid areas of northern Kenya).**

Metabolic Weight Distribution (%)

District	Cattle	Shoats	Donkeys	Camels	Size of District (km ²)	Metabolic Weight (ton) per km ²	Ratio of Metabolic Weight of People over Livestock
KENYA							
Marsabit (IPAL)	38.5	19.8	0.5	41.2	23.000	0.4	0.05
TANZANIA							
Arumeru	75.0	24.1	0.9	0.0	2.927	4.7	0.37
Hanang	88.1	6.4	5.6	0.0	9.086	2.9	0.14
Mbulu	84.1	10.3	5.6	0.0	7.776	2.5	0.16
Monduli	76.0	19.3	4.7	0.0	15.171	1.5	0.05
Ngorongoro	69.0	23.5	7.5	0.0	14.882	1.2	0.04
Kiteto	92.0	5.8	2.3	0.0	33.601	1.0	0.03

*Metabolic weight is used, that is $W^{0.75}$ in kg, as this reflects the consumption by the different groups in a comparable way. Original data for Kenya from Field *et al.* (1983), for Tanzania from Ecosystems Ltd (1980). For the calculations, average weights are used for cattle (180 kg), shoats (16 kg), donkeys (100 kg), camels (300 kg), and humans (40 kg). The districts of Marsabit, Monduli, Ngorongoro, and Kiteto, are typically occupied by pastoralists (note the equal ratios of human:livestock metabolic weights), while the other three districts have a mixed economy. According to Ecosystems Ltd (1980), the Arumeru District shows signs of land degradation.

herd population in pastoral societies consists of small stock ('shoats', *i.e.* sheep and goats, comprising approximately 15% of the metabolic weight), donkeys for transport (approx. 4%), and large stock (approx. 80%, which are normally cattle except in the arid regions of northern Kenya where camels are important).

The districts of Marsabit (Kenya) and Monduli, Ngorongoro, and Kiteto (Tanzania), are typically occupied by pastoralists. These districts demonstrate a very close fit to the 'theoretical' ratio of 0.045 metabolic weight of humans over that of the livestock — Marsabit: 0.045, Monduli: 0.046, and Ngorongoro: 0.043. The exception is Kiteto, with a value of 0.029, which can be explained by a large influx of cattle at the time of census (Ecosystems Ltd, 1980). These values indicate that, on average, in these pastoral societies people do not keep too many head of cattle as a sign of wealth — the so-called 'prestige overstocking' (Brown, 1971, *pace* Semple, 1971). The districts of Hanang and Mbulu (both in Tanzania) are mainly occupied by pastoral people in transition to agriculture and horticulture. Here the ratios are higher already (Table I).

Fosbrooke (1989) provides data to calculate the number of cattle and 'shoats' in the Ngorongoro District over the last forty years (Table II). The number of people in relation to the number of livestock has increased quite dramatically, but it is doubtful whether the situation is as bad as is claimed by Parkipuny (1989), who states that 'the majority of families in a community of previously well-off pastoralists are falling destitute at the hands of conservation'. The data in Table II show that in 1954 the Masai in this district indulged in 'prestige overstocking' (with a ratio of 0.016 metabolic weight of humans over that of the livestock), and even in 1987, after the huge increase in the number of people, this ratio was still lower than the 'theoretical' one, being 0.038.

TABLE II

*In the 1950s, the Masai of the Ngorongoro District had High Livestock Numbers in Relation to the Number of Humans, and Apparently indulged in 'Prestige Overstocking'. At the End of the 1980s, the Metabolic Weight Ratio was Still Lower than Necessary for Subsistence Only.**

Year	N Humans	N Cattle	N Shoats	Metabolic Weight Ratio of Humans Over Livestock
1954	9,321	122,263	428,845	0.016
1974	1,178	123,613	157,505	0.029
1977	16,705	110,548	243,810	0.036
1987	22,637	137,398	343,445	0.038

* For method of calculation, *see* under Methods; data for numbers of people and cattle from Fosbrooke (1989); numbers of shoats, *i.e.* sheep and goats, calculated from the same Author's data on total stock units.

This situation is reminiscent of the one reported for the Kajiado Masai in Kenya, where, at the end of the 1950s, nearly three times more cattle were kept than necessary; when the severe drought of 1960–61 was followed by a flood, the livestock population was reduced by 65% but cattle numbers were still high enough for subsistence (Brown, 1971). Data presented by Brown (*op. cit.*) reveal

that, for the Marsabit District in Kenya, the ratio was about 0.013 in 1963, whereas at the end of the 1970s it was 0.045 (Table II) — again pointing at 'prestige overstocking' in the past. Note that the calculations presented do not throw light on the distribution of wealth within the community, but I am sure that this is not an issue to be solved by conservationists alone.

Whether the Nature reserves or national parks have to alleviate the pressing needs of pastoral people for more grazing space for their livestock, as was suggested by Myers (1972, 1973) and Parkipuny (1989) and echoed by McNeely (1989), can be tested by comparing the actual stocking rate in a district with the potential one. This results in testing whether there is 'ordinary' overstocking (in contrast to 'prestige' overstocking). Table III shows that in all the investigated cases but one, the actual stocking rate of livestock and wildlife combined was lower than the possible stocking rate (defined by Lamprey, 1983, as 50% of the vegetative production being consumed and yielding an annual live-weight gain of 100 kg/ha or 1000 kg milk/yr). Only the Arumeru district in northern Tanzania shows overstocking according to this calculation (Table III), which district shows signs of overutilization by Man and livestock in the form of bare land and erosion (Ecosystems Ltd, 1980).

This information, combined with the finding of the increasing ratio between humans and livestock (*see* above), strongly suggests that the real problem is an increase of the human population which outgrows the livestock population.

Harmonious Coexistence Between Wildlife and Pastoralists?

What remains to be investigated is whether livestock and their owners can live harmoniously together with wildlife in the same area. From a cultural point of view, all pastoralist tribes and their satellites or dependent tribes traditionally hunted game by various means. The following account is based on Huntingford (1953a, 1953b).

Nandi: hunted big game with spears, small game with bow-and-arrow.

Kipsikis: hunted Buffalo with bow-and-arrow, and caught Elephants in pit-traps.

Dorobo: never used spears, but caught Elephants and Buffalo in pit-falls, and other game with poisoned arrows and snares.

Suk: Elephants were speared from platforms; other game was killed with spears and poisoned arrows.

Barabaig: used spears and clubs to kill game (Klima [1970] writes about them using poisoned arrows).

Masai: 'though the Masai do not hunt habitually, and despise those who do, they used occasionally to kill animals — Elephant for their tusks, Buffalo and Eland [*Taurotragus oryx*] for their meat and hides, Ostriches [*Struthio camelus*] for their feathers, and Leopard [*Panthera pardus*] and Lion to protect their cattle'.

Iraqw: do not hunt (although they kill Leopard to protect their livestock [pers. obs.] and hunted Rhinoceros [*Diceros bicornis*] in the 1950s and 1960s — pers. comm. S. Swalleh 1991).

Hadzapi: hunt by using bow-and-arrow and poisoned arrows; strings made of Rhinoceros sinew.

TABLE III

*The Actual Stocking Rate (Livestock plus Wildlife) is Nearly Always Lower than the Calculated Stocking Rate.**

Area	Annual Rainfall (mm)	Observed Stocking Rates			Calculated Possible Stocking Rate (kg/km ²)	Ratio of Observed Stocking Rate over Calculated Stocking Rate (%)
		Wildlife (kg/km ²)	Livestock (kg/km ²)	Total (kg/km ²)		
KENYA						
Marsabit	250	50	1.150	1.200	4.000	30
Wajir	250	?	1.150	± 1.200	4.000	30
Kaputei	650	?	7.900	± 8.000	9.000	89
TANZANIA						
Kitete	700	850	3.700	4.550	9.500	48
Monduli	800	850	5.100	5.850	11.000	53
Mbulu	800	600	8.800	9.400	11.000	85
Arumeru	800	300	15.500	15.800	11.000	144
Hanang	900	600	10.150	10.750	13.000	83
Ngorongoro	1000	10.300	3.750	14.050	15.500	91
AVERAGE						73 ± 36

* Based on 50% of the production being consumed, and yielding live-weight gains of 100 kg/ha or 1,000 kg milk/ha each year, the so-called carrying capacity. Only the Arumeru District shows overstocking according to these calculations. The possible stocking rate follows Lamprey (1983) and all Kenya data come from the same source. Tanzanian data are calculated from Ecosystems Ltd (1980), and rainfall figures from Prins & Loth (1988).

Sandawe: hunt by using bow-and-arrow and poisoned arrows.

Bari: killed Elephants by climbing trees under which the animals were driven and speared.

Mondari: hunting not recorded.

Lotuko: 'were excellent hunters and extraordinarily courageous; they attack the Elephant and the Rhinoceros [possibly *Ceratotherium simum*] with a spear, and also the Buffalo — a still greater feat, as the hunted often hunts the hunter'.

This overview could be expanded by using other literature (*see*, for example, Hay [1975] about hunting techniques of the *Luo*). The evidence makes it abundantly clear that pastoral people of East Africa have a marked tradition of hunting large wild animals (*see* also Stone, 1972), though it is unclear whether they would abandon these traditions if they were allowed into Nature reserves or national parks to pursue their traditional way of life.

Actual competition between wildlife and livestock can also be demonstrated. In Table IV the estimated energy consumption by wildlife and livestock in a number of areas in Kenya and Tanzania is shown. Because the data in Table III demonstrated the fact that the combined stocking rate of livestock and wildlife is reasonably close to the calculated 'optimal' stocking rate, it is clear that the total energy consumption figures in Table IV are close to the possible 'optimal' energy consumption. The energy consumption by wild herbivores is far removed from the total optimal energy consumption figures, because domestic animals take nearly all available energy in most areas. In other words, domestic animals compete with wild herbivores for food in almost all areas.

This scenario of the 'pastoral road to extinction' is elaborated upon in Fig. 1. At first, livestock partly supplants wildlife. Then, when the ratio between humans and livestock increases, and wildlife is outcompeted by livestock, people ultimately switch to agriculture or horti-

TABLE IV

*Estimates of Assimilated Energy Per Day in Different Areas of Kenya and Tanzania.**

District (or Park)	Energy Consumption in kcal/km ² /day × 1,000			
	Livestock	Wild Herbivores	All Herbivores Combined	Wild Herbivores as Percentage of All Herbivores
Marsabit	44	3	47	6
Kiteto	130	29	159	18
Monduli	195	31	226	14
Mbulu	319	22	341	4
Hanang	363	24	387	4
Ngorongoro	146	415	561	78
Arumeru	598	16	614	2
Manyara N.P.	0	425	425	100

* Calculated from the same sources as Table I, except for Manyara which is based on Drent & Prins (1987).

culture, and there is less and less space for wild animals. Ultimately, agriculture has to give space to urbanization, and no space or food will be left for wildlife.

CONCLUSIONS

At the beginning of the 1970s, the late Leslie H. Brown already pointed out that 'if conservationists wish to preserve habitats more or less intact, with a good population of wildlife and an adequate living for some picturesque and independent pastoralists, they must urge the removal not only of excess domestic stock but of excess humans as well' — by settling surplus populations on irrigation (or water-spreading) schemes in semi-arid areas, or by increasing the dependence on the sale of meat for cash with which to purchase grain, or by the sale of

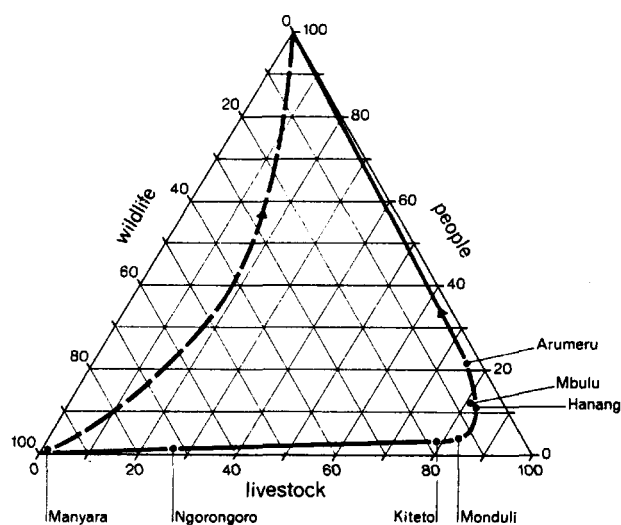


FIG. 1. The 'pastoral road to extinction' is indicated by the black continuous line in the graph. It connects points representing the combinations of wildlife, livestock, and people, as observed in different districts of East Africa based on aerial counts. The line also indicates the observed course of wildlife demise in a development from pure Nature, via pastoralism, to urbanization. The broken line indicates the possible course of wildlife demise in a development from pure Nature, via mixed agriculture, to urbanization. The three axes represent the metabolic weights per square kilometre (see text for explanation) of wildlife, livestock, and people, respectively, as percentages of the total combined metabolic weights of these three categories.

weaned immatures to fattening areas (Brown, 1971), because 'remedial measures can only be effective if they strike at the root cause of the matter, which is the ecological undesirability of subsisting on milk in a habitat which is ecologically unsuited for milk production'. Brown did *not* suggest that National Parks or other protected areas should be opened-up for pastoral people, nor did Semple (1971) who concluded that a remedy has to be found through increasing the productivity of the land rather than increasing the area under use. Semple (*op. cit.*) gave a 15-points programme for improved use of grassland and savanna in Africa, most or all of which still waits to be done.* Here lies, to my mind, an important task for IUCN and/or WWF when the new 'Caring for the Earth'† strategy is implemented.

Nature preserves are places where naturally-occurring features and processes are protected within the context of their natural environment. They are *not* places to be saved to be used at a later stage when an ever-growing human population claims more land because of lack of economic development. If, as a number of recent Authors have suggested, conservation is an alien concept in Third World countries (e.g. Hough, 1988), then IUCN and WWF and other conservation bodies have to work hard to

*In editing Semple's paper following that of Brown in the 1971 volume of our old Journal, we recall having doubts, following our own experiences elsewhere in Africa, about the practicability of some of Semple's proposals, despite their seeming wisdom. — Ed.

† See the Review Article by Dr Michael B. Usher on pp. 59–60 and 72 of our preceding issue. — Ed.

change this attitude; conservation was once an alien concept in the West, too, and that was exactly why a number of enlightened people founded the pioneering IUCN.

It should be noted also that allowing 'indigenous people' into protected areas opens new avenues for endless lawsuits (*vide* the North American situation over land-rights of the Amerindians). In case of the Ngorongoro and Serengeti, for example, which group of people is indigenous and which is not? The Masai arrived in northern Tanzania only at the end of the 18th century AD, and after a series of wars supplanted the Iraqw, Barabaig, and other groups (Gray, 1975; Flint, 1976; Waller, 1976; Fosbrooke, 1989). Would this mean that the Iraqw would get rights in the parks and the Masai not? It is utterly unlikely that the authorities of the United Republic of Tanzania would encourage this discussion, and, by the same token, it is extremely likely that they would consider this standpoint as promotion of disharmony between population groups in their country!

Nature reserves have little to do with 'wise use of natural resources': we are closing our eyes when we think that allowing people to invade protected areas can result in a harmonious relation between them, their livestock, and wildlife. When, for example, Newby & Grettenberger (1986) wrote that 'there is a pressing need for deliberation on the contentious subject of natural resources and to what degree it can be reasonably permitted to satisfy local needs', then, as the present analysis shows, the answer is that this satisfaction will certainly reduce the possibilities for wildlife, if not at present then when the local human population expands.

This type of discussion, ultimately, will only lead to the possible dissolution of, for example, the African Convention for the Conservation of Nature and Natural Resources (Burhenne, 1970); indeed, that Convention prohibits human use of natural resources in strict Nature reserves and national parks, and subordinates human interests to those of plants or animals in partial reserves or sanctuaries. A sad recent example of the interaction between the local population and a protected area is Amboseli National Park in Kenya, where the surrounding local community of mainly Masai eradicated the Amboseli Lion population to protect their livestock (pers. comm. D. Lovatt-Smith 1991).

'In general, protected area managers need to ask some hard questions of themselves about their role in sustaining society, and seek the involvement of a much wider constituency through making protected areas more useful to society' (McNeely, 1989). I totally agree that some hard questions have to be asked, but it is especially those who develop the new policies who have to ask questions of themselves. It is not easy to find a solution to the problems of underdevelopment, but what has the possible development of protected areas into overstocked and degraded pasture-lands to do with economic development or with Nature conservation? Why should conservationists advocate the opening-up of protected areas for which two generations of conservationists and politicians have fought so hard?

African countries, such as Tanzania and Kenya with their splendid parks, will not be developed by having rural poor in those parks! Even if the whole of the Serengeti

were to be handed over to the Masai, how many years of population growth of pastoral people of northern Tanzania (now close to 4% *p.a.* — Johnston [1983], and still so at present [pers. comm. Monduli District Office 1991]) could be alleviated before even this last of the great migratory systems of Africa would be completely taken over by people? Only a few extra years can be bought before the real problems have to be solved. In 1987 there were 22,637 Masai in the Ngorongoro District. Given the conditions in the Serengeti, approximately 80,000 pastoralists could find a reasonable living there. Thus by the year 2027 the whole of the Serengeti would be filled to the brim by the growth of only the Ngorongoro District population (*i.e.* $101,852 - 22,637 = 79,215$, given a population growth of 4% *p.a.*).

Even if more pastoralists could find a living in the Serengeti, and even if the population growth-rate were to become lower, the Serengeti would be totally occupied in a few scores of years. Moreover, not only these Masai are hankering after new grazing-grounds; the Sukuma and other groups to the west and south-west of the Serengeti are doing the same. So, opening-up an area such as the Serengeti would result in its total conversion in a few years, because people cannot be *forced* to live in harmony with their environment, and the human population will continue to grow and to demand more and more resources and space (Hough, 1988). Conservation or preservation of protected areas is not aimed at preserving them only for the coming decades but as a matter of hope for eternity, so protected areas cannot be viewed as a sort of buffer for present or future human population growth.

This is not to deny the plight of poor people in developing countries, and I agree with Cloudsley-Thompson (1988) that 'what needs to be worked out is a method by which money and aid can reach those nomads and peasants — who include among their numbers the poorest of the poor — fast enough to alleviate their misery', but not at the cost of the protected areas that are needed for the well-being of the present and future generations because 'nature has to be protected so that our grandchildren could enjoy it and learn from it' (Dr Julius Nyerere, President of Tanzania, in the Arusha Declaration).

What is needed especially is investment in schools, in women's programmes, etc., to curb illiteracy and population growth, and create jobs in modern industry and horticulture outside the protected areas, so that the density of people can be higher there. The rich countries have to show their willingness to pay for all the *in absentia* benefits (*see* Pearsall, 1984). That is what conservationists have to address, and not how to dissolve the world's national parks and other protected areas in the tropics under the guise of 'development'.

ACKNOWLEDGEMENTS

This paper benefited from the comments of Drs J.H. Beekman and Professor Dr A.H.J. Prins. It was able to be written because of work supported by grants received from the Netherlands Foundation for the Advancement of Tropical Research (WOTRO) and the Royal Netherlands Academy of Sciences (KNAW). I thank an anonymous referee for constructive criticism of an earlier version of

this paper and another for comments on the case of the Air and Ténére National Reserve in Niger.

SUMMARY

In some developing countries there is a call to open-up protected areas and even National Parks for low-intensity use by the local population to alleviate the pressure of the rapidly increasing human population, or because conservationists have been able to 'take' too much land according to others. This conflict in land-use has been noted by conservation authorities, and proposals have been formulated to give way to such pressure. Moreover, it has been suggested that there can be a harmonious coexistence between wildlife and livestock, so that opening-up of protected areas would not necessarily be to the detriment of wildlife, and also that the indigenous populations were able to manage wildlife and their habitats in the past (so why not again in the future). The last point in the concerted attack on the status of the protected areas is that 'conservation is an alien concept in Third World countries'.

In this paper is reviewed the question as to whether there ever has been such a harmonious coexistence between wildlife and pastoral Man in East Africa, and aerial census data from a number of districts in Tanzania and Kenya have been used to demonstrate that livestock outcompetes wildlife. At present 'prestige overstocking' is not the case any more, due to the fact that the human population outgrows the livestock population. Apparently, a very high rate of population growth is at the root of the call for more land, and even if, for example, the whole of the Serengeti were to be handed over to the local Masai, this enormous, relatively undisturbed eco-complex could absorb the growth of the Masai population for only some forty years.

Finding the key to increased development should not be sought in an opening-up of protected areas but in payment of *in absentia* benefits by the rich western countries. This money should be used for developing programmes aimed at population limitation, increased income for the rural poor, and increased sustainable human densities in areas outside the protected areas.

REFERENCES

- BROWN, L.H. (1971). The biology of pastoral man as a factor in conservation. *Biological Conservation*, 3(2), pp. 93–100.
- BURHENNE, W.E. (1970). The African Convention for the Conservation of Nature and Natural Resources. *Biological Conservation*, 2(2), pp. 105–14.
- CLOUDSLEY-THOMPSON, J.L. (1988). Desertification and sustainable yields from arid environments. *Environmental Conservation*, 15(3), pp. 197–204, illustr.
- DRENT, R.H. & PRINS, H.H.T. (1987). The herbivore as prisoner of its food supply. Pp. 131–47 in J. van ANDEL, J.P. BAKKER & R.W. SNAYDON (Eds), *Disturbance in Grasslands: Species and Population Responses*. Dr W. Junk Publishing Company, Dordrecht, The Netherlands: xii + 316 pp., illustr.
- ECOSYSTEMS LTD (1980). *Livestock, Wildlife and Landuse Survey in the Arusha Region, Tanzania*. Final Report (3 volumes). Ecosystems Ltd, Nairobi, Kenya: 82 + 103 + 187 pp., illustr.

- FIELD, C.R., LAMPREY, H.F., MASHETI, S.M. & NORTON-GRIFFITHS, M. (1983). Household, livestock and wildlife numbers and distribution in Marsabit District. Pp. 101–25 in *Proceedings of the IPAL Scientific Seminar, Nairobi* (Ed. W.J. LUSIGI). UNESCO/FRG/MAB Integrated Project in Arid Lands Technical Report A-5. UNESCO, Nairobi, Kenya: i + 355 pp., illustr.
- FLINT, J.E. (Ed.) (1976). *From c. 1790 to c. 1870*. Vol. 5 in J.D. FAGE & R. OLIVER (General Eds) *The Cambridge History of Africa*. Cambridge University Press, Cambridge, England, UK: xv + 617 pp., illustr.
- FOSBROOKE, H.A. (1989). Case study: Ngorongoro Crater and Serengeti National Park. Pp. 246–55, illustr., in W.D. VERWEY, *q.v.*
- GRAY, R. (Ed.) (1975). *From c. 1600 to c. 1790*. Vol. 4 in J.D. FAGE & R. OLIVER (General Eds) *The Cambridge History of Africa*. Cambridge University Press, Cambridge, England, UK: xiv + 738 pp., illustr.
- HAY, M.J. (1975). Economic change in late nineteenth century Kowe, western Kenya. *Hadith*, **5**, pp. 90–107.
- HOUGH, J.L. (1988). Obstacles to effective management of conflicts between National Parks and surrounding human communities in developing countries. *Environmental Conservation*, **15**(2), pp. 129–36.
- HUNTINGFORD, G.W.B. (1953a). *The Northern Nilo-Hamites: Ethnographic Survey of Africa; East Central Africa, Part VI*. International African Institute, London, England, UK: 108 pp., illustr.
- HUNTINGFORD, G.W.B. (1953b). *The Southern Nilo-Hamites: Ethnographic Survey of Africa; East Central Africa, Part VIII*. International African Institute, London, England, UK: 152 pp., illustr.
- JOHNSTON, A. (1983). *Population and Development in Monduli District*. Regional Commissioner's Office, Arusha Region, Arusha, Tanzania: 83 pp. (mimeographed), illustr.
- KLIMA, G.J. (1970). *The Barabaig: East African Cattle Herders*. Holt, Rinehart & Winston, New York, NY, USA: xii + 112 pp., illustr.
- LAMPREY, H.F. (1983). Pastoralism yesterday and today: the overgrazing problem. Pp. 643–66 in *Tropical Savannas* (Ed. F. BOURLIERE). Elsevier, Amsterdam, The Netherlands: xii + 730 pp., illustr.
- LEHMKUHL, J.F., UPRETI, R.K. & SHARMA, U.R. (1988). National parks and local development: grasses and people in Royal Chitwan National Park, Nepal. *Environmental Conservation*, **15**(2), pp. 143–48, illustr.
- MCNEELY, J.A. (1989). Management of protected areas for sustaining society. Pp. 235–45 in W.D. VERWEY, *q.v.*
- MOEN, A.N. (1973). *Wildlife Ecology: An Analytical Approach*. W.H. Freeman & Co, San Francisco, California, USA: xvii + 458 pp., illustr.
- MYERS, N. (1972). National parks in savannah Africa. *Science*, **172**, pp. 1255–61, illustr.
- MYERS, N. (1973). Tsavo National Park and its elephants: an interim appraisal. *Biological Conservation*, **5**, pp. 123–32, illustr.
- NEWBY, J.E. & GRETTEBERGER, J.F. (1986). The human dimension in natural resource conservation: a Sahelian example from Niger. *Environmental Conservation*, **13**(3), pp. 249–56, 15 figs.
- OSEMEOBO, G.J. (1988). Animal wildlife conservation under multiple land-use systems in Nigeria. *Environmental Conservation*, **15**(3), pp. 239–49, 6 figs and 7 tables.
- PARKIPUNY, M.S. (1989). So that the Serengeti shall never die. Pp. 256–64 in W.D. VERWEY, *q.v.*
- PEARSALL, S.H., III (1984). *In absentia* benefits of Nature preserves: a review. *Environmental Conservation*, **11**(1), pp. 3–10.
- PRINS, H.H.T. & P.E. LOTH (1988). Rainfall patterns as background to plant phenology in northern Tanzania. *Journal of Biogeography*, **15**, pp. 451–63, illustr.
- SEMPLE, A.T. (1971). Grassland improvement in Africa. *Biological Conservation*, **3**, pp. 173–80, 5 figs.
- STONE, M.L. (1972). Organized poaching in Kitui District: a failure in district authority, 1900–1960. *International Journal for African Historical Studies*, **5**, pp. 436–52.
- VERWEY, W.D. (Ed.) (1989). *Nature Management and Sustainable development*. IOS, Amsterdam/Springfield VA/Tokyo: xx + 531 pp., illustr.
- WALLER, R. (1976). The Maasai and the British 1895–1905: the origins of an alliance. *Journal of African History*, **27**, pp. 529–53, illustr.