6.1.3 ANTI-POACHING, LESSONS FROM UGANDA

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The theme of this paper is that catastrophe and sudden change are normal circumstances of nature that need to be taken into account in conservation planning. Catastrophes associated with the turbulence of human affairs are a probability in the long term for most large mammal populations in whatever continent they inhabit. Africa has become increasingly turbulent since the 1960's, but it is only 35 years since the whole world was at war, and in the long perspective of history turmoil is as normal a condition as stability.

The catastrophe which has happened to the wildlife in Uganda is the result both of lawlessness during the Amin era and in the aftermath of war, and the easy availability of automatic rifles to people living around the National Parks and Game Reserves. These factors are dominant in terms of large mammal population dynamics, although totally unexpected in terms of planning of the 1960's and early 1970's. Elephants and rhinos have been particular targets because of the high value of their ivory and horn.

I will use the example of Uganda to suggest that in conditions of disaster conservation bodies should react quickly and flexibly as opposed to the deliberate long-term planning more appropriate for times of stability. Independent conservation bodies should possess singular advantages in speed and adaptability relative to larger funding agencies, advantages which have yet to be fully realised.

In Uganda eighteen months ago, elephants had decreased to approximately one fifteenth of their former numbers in the National Parks - shot out by poachers - rhinos were nearly extinct, and the killing was still continuing at a high level. The Park's administration was struggling in severely adverse conditions, with a chronic shortage of foreign exchange. Uniforms were ragged, food was scarce to the point that two children died of starvation in the Kidepo National Park ranger lines. Transport in Kabalega National Park was down to three unreliable vehicles. Fuel was often unavailable and could only be brought to the Parks a drum at a time since the headquarters could not afford to order a tanker to fill the tanks in each park. In May the rangers had not been paid for six months, and were unable to live without finding supplementary earnings. The result was that many of them became involved in poaching, and anti-poaching patrols decreased. Finally there were no communications, no air support, and travel around the country outside the parks was insecure. In many respects Uganda looked the worst possible case of survival of elephants and other wildlife, and arguments were advanced at the last elephant group meeting in April that, until the Uganda Government could guarantee law and order, aid should be withheld lest it should be wasted or go astray.

However, the view prevailed that limited emergency funds to the sum of $50 000 should be made available for assistance to anti-poaching.

The WWF aerial survey also proved to be catalytic in other ways. Firstly, three members of the counting crew elected to devote their time to immediate assistance. One, who was soon to be appointed as WWF/IUCN representative in Uganda, loaded up a vehicle with urgently needed supplies and drove through the road blocks to Kabalega National Park, the premier location, and two others, at the invitation of the Government, began anti-poaching operations with the WWF "Elephant" Toyota landcruiser and a privately-owned Cessna 185.

At the same time the Minister of Tourism and Wildlife approached UNDP for emergency assistance armed with the figures from the survey. A representative of the EEC participated in the anti-poaching operations in Kabalega and, after viewing for himself from the air a group of 13 recently machine-gunned elephants, became convinced that emergency aid should be provided.

One of the WWF counting crew was requested to help draft both proposals, and after several redraftings both were successful and were formally endorsed by the Ministry of Planning. In each case the proposals were justified in terms of economics, that is, of safe-guarding an economic resource from destruction against the day when it could once more start making money again. Under these programmes UNDP was to create an anti-poaching force, support the existing forces, and engage the services of a Chief Technical Advisor who would advise on Parks planning and administration and, together with the anti-poaching specialist, assist in the formation, equipping, training and operations of the anti-poaching unit. The EEC complemented UNDP by providing 10 landrovers, three lorries, two pick-ups and spares. Once both programmes were under way and operating successfully, both agencies increased their support, UNDP by providing extra funds, and EEC by recruiting the services of an engineer and equipment to rehabilitate the mechanical workshops, restore broken equipment and properly maintain the new vehicles.

It is interesting to note that both programmes were funded from emergency budgets largely at the discretion of the UNDP Resident Representative, and the EEC Delegate. There was a great deal of cutting of red tape, which, although crucial to the success of both projects, I will not enlarge upon, but much was owed to the personal interest of the Government Minister concerned and the representatives of the two aid agencies.

The fact that in Uganda both aid agencies were geared to major disaster relief with respect to the famine in Karamoja meant that they were capable of acting swiftly and flexibly in the relatively miniscule anti-poaching project, which totalled a sum of US$ 1.2 million.

It may seem strange that a wildlife programme should be considered by the Government at all in a country suffering from acute problems of security and famine, but one of the most encouraging factors in Uganda is that a basic non-partisan political interest exists in conservation due in part to the immense contribution that game-viewing tourism had formerly made to the foreign exchange of the country.

In 1972, 85,000 tourists came to Uganda spending an average of 9.7 bed nights. In total, they spent 160 million shillings which was approximately US$20 million. Given that the surface area of the Parks is 7,148 km^2 and that the tourists came exclusively to see wildlife it is possible to calculate that the National Parks earned approximately $3,000/$km^2$. This exceeds the $1,342/$km^2$ predicated by Laws <u>et al</u> (1975) for the year 1970, which compared favourably to any other form of land use at that time.

By 1978 the visitors had fallen to 6,000 and following the liberation war numbers decreased to virtually zero at which level they have remained.

A further factor which made the prospect for Uganda's wildlife less desperate than it appeared was the survival of the basic infrastructure of the National Parks. This parastatal body was formerly a strong institution, with high standards of discipline, training, equipment and research, which the wardens and rangers had worked under.

The basic discipline and chain of command still existed, but before anti-poaching activities could succeed some general reconstruction had to be undertaken, in particular to guarantee food for the rangers and fuel for the vehicles. Luckily the arrival of two Tipper Trucks from the West German Commodities Aid Programme, and the landrovers from FZS, AWLF and EEC helped with the supply of essential commodities.

In the Parks efforts were first concentrated on Kabalega, which possessed the largest remaining population of elephants of about 1,200 at the time of the April survey. It was hoped that by mounting an immediate operation in the south of the Park, that it might be possible to prevent the last 160 elephants from extermination. The first patrols met with an exceptionally heavy concentration of poachers, with contacts nearly every day. Long grass hampered patrolling, but did not seem to hamper the poachers. Despite the fact that four rifles were recovered in the south in the first month, the elephants were never seen again in the numbers we encountered during the survey. It would appear that they have either been exterminated or have left the southern portion of the Park. It is possible that they have crossed north by swimming the Nile.

The Park area to be patrolled was 3,859 km^2 with a ranger force of approximately 100 men active at any one time, giving a density of one ranger to every 38 km^2. If patrols were to be organised to cover the area randomly, it would be unlikely that they would meet more than a fraction of the poachers.

Furthermore, the nature of poaching gangs had changed greatly since the first days of the Park. Formerly, they were almost entirely spearmen, and ranger patrols were equipped with one or two Greener Shotguns at the most. Now each poaching gang might number between five and 30 men and up to four would be armed with automatic rifles.

The nature of anti-poaching tactics had to change. Rangers were now armed with automatic rifles, G3s and 303s, and the number of rifles steadily built up as more were captured from the poachers. Anti-poaching in Kabalenga has now been re-organised on the principle of centrally-controlled forces reacting to information from the peripheries. Mobile units are based in Paraa in the West and Chobe in the east, with other patrols in the field operating under the directions of the Chief Park Warden and the anti-poaching specialist. The success of these operations depends on the quality and flow of information coming in, on good communications and mobility.

There are three main sources of information on poachers whereabouts and activities. Firstly, outposts are located throughout the Park. Some of these are not occupied all the time but all are convenient both for gathering information and as staging posts for patrols. Each post when manned contains three to four men who make reconnaissance patrols. Any gunshots heard, vultures seen, or tracks of poachers are communicated to headquarters at the first opportunity. In the open country of Kabalega gunshots, under the right conditions, can be heard a distance of 15 km or more.

Secondly, a Cessna 185 aircraft is stationed in the Park, which makes frequent patrols looking for vultures, dead animals, vehicle tracks, smoke and poachers' camps. An effective method is to fly at night when meat-drying fires can be located. Frequently aerial patrolling is combined with administrative visits to outposts.

Finally, some of the most valuable information comes from informers in the surrounding villages, who detail the intentions of poachers and often comment on the success or failure of poaching expeditions. Information on exact dates, times, places and names of poachers, together with numbers, types and hiding places of illegal guns, have proved invaluable. A long list of illegal gun-holders has been prepared by the Chief Park Warden and joint operations with the police are held from time to time to round up such loose guns.

Successful operations are dependent on first class communications. Fortunately, after reporting directly to fund-raisers in the USA last November, it was possible through WWF/US and SAVE Foundation, to raise over $18,500 which has been used to purchase a VHF network that links ranger patrols, anti-poaching vehicles, and the aeroplane. This is now installed and highly effective. From the aircraft, it is possible to communicate with every other unit in the Park.

A long-range HF system has also been installed under the UNDP project, which links all the Parks with Kampala headquarters, and which has greatly speeded up supplies and economised on unnecessary trips to town.

Whilst all patrolling by rangers is done on foot, patrols are usually dropped off by vehicle near the area to be covered. A new series of airstrips has also been built, some in remote areas and five rangers at a time can be carried by air and deposited with their equipment. Rangers have also been supplied with food, ammunition, medicines and other equipment by air drops.

The results of this activity can be measured in terms of elephants reported killed and in numbers of guns recovered:-

		Elephants killed	Guns recovered
1980	Jan-Mar	30	3
	Apr-Jun	82	11
	Jul-Sep	5	0
	Oct-Dec	3	0
1981	Jan-Mar	2	2
	Apr-Jun	10	8
	Jul-	1	3
	TOTAL	133	27

In the first half of 1980 112 elephants were reported killed, with the heaviest mortality occurring between April and June. It was also during this period that the first intensified anti-poaching operations were initiated and 15 automatic rifles were recovered in the first six months. Poaching activity tailed off in the latter half of the year with eight elephants reported killed and no more guns recovered. During this period the number of army and militia road blocks on access roads to the Parks also increased which made it more difficult to transport illegal ivory. In the first half of 1981 reported elephant mortality increased to 12 and the number of captured rifles to 10. This increase is associated with a new influx of loose guns available around the Park, although the type recovered now tends to be the Kalashnikov rather than the G3 of former times.

The reported elephant mortality is an unknown fraction of the real mortality and no census has yet been repeated since last year. One is planned early next year when the grass is short and carcasses can be counted. For the meanwhile it is not known how many of the 1,200 elephants estimated at the last census remain, but on the basis of these figures it is thought that mortality has greatly decreased.

One of the key factors in regaining control of the situation is to supervise the rangers closely, and to supply them with basic commodities. In this respect the Chief Park Warden has had to adapt to the unusual conditons prevailing. A ranger currently earns 600 shillings per month, which at the floating rate of exchange is equivalent to US $7.50. Maize meal adequate to support his family, i.e. 5 kg per week costs 30 shillings per kilo, which consumes his entire monthly wage. There is nothing left to buy protein, clothes, soap, sugar or any other essential commodities. In consequence the Chief Park Warden has authorised limited fishing within the formerly protected waters of the Park, and certain fishermen supply the Parks and are recompensed with half the catch. The rangers are given fish which they are free to eat or to sell externally. Nevertheless, there is always a strong incentive for rangers in outposts to poach on the side and sell hippo or buffalo meat at 150 shillings per kilo. This can only be countered by strong supervision on the part of the wardens.

It is also relevant to note that the size of the sentence handed out to poachers is less important than the likelihood of detection. Idi Amin decreed the death sentence for poachers convicted of killing an elephant, yet the poaching continued.

In the Kidepo National Park a different situation exists. The elephant population is still relatively intact, with approximately 400 animals within the Park and occasionally increased by others from outside. The final WWF aerial survey took place in April, 1981. The age structure of the population appeared much healthier than that of Kabalega, with a high proportion of young animals. However a ratio of 27 dead to 73 live elephants was also recorded, which indicates a high recent mortality. This is supported by the record of elephant mortality assembled by the Chief Park Warden as follows :

1978	3
1979	10
1980	25
1981 Jan-March	29

The cause is increased poaching by armed men from across the border with Sudan. On numerous occasions these have been identified as elements of the Sudanese army stationed at a camp known as Bira, on the border of the Park. The poaching is done both for meat and ivory. The poachers are aggressive and open fire immediately on ranger patrols and any Parks' aircraft that come within range.

Despite intensive diplomatic protests from IUCN, FZS, NYZS and FZS, together with representations from the Uganda Government and the British High Commission, the shooting still continues.

Finally, the Ruwenzori, which is the worst-depleted Park, where only 150 elephants were counted in 1980 out of a former population of nearly 3,000, anti-poaching efforts are only just beginning. The Park has chronic problems with fishing villages within the Park boundaries which have grown out of control. Human populations within the boundaries pose far greater problems in the long term than are found either in Kabalega or Kidepo.

In general, the Uganda National Parks are in a better condition than a year ago. The aid programmes have so far concentrated on activating the existing ranger forces. Now new recruiting and training is beginning with the object of bringing fresh blood into the ranger force.

In future there may be difficulties in the transition from emergency relief to sustained development. The reliance on aid for the recurrent expenditure is to be avoided, but aid must continue until in the long-term the National Parks regain their economic basis in the resurrection of tourism.

However, external aid has resulted in substantial Government support. The foreign aid has had a catalytic effect, not only in terms of support form Government ministries, but in a substantial increase in the Government subvention to National Parks.

Having become involved in supporting a project with the objective of securing the situation and restoring the Parks, Government is committed and is likely to continue to support conservation aimed at increasing their foreign exchange earnings.

The chief lessons learnt have been the need for flexibility and speed in response to a catastrophic situation, and the advisability of concentrating resources on strong institutions such as the National Parks and some Game Departments which have retained their basic infrastructure so they can build up discipline and effectiveness. To quote the Chief Technical Advisor to the UNDP project - "Had we waited for the establishment of law and order in Uganda, it would have been too late. It was a question of now or never".

The other side of the coin is that, had conservation aid got going somewhat earlier, some of the worst slaughter might have been stopped.

The Uganda conditions, although better documented, are by no means unique in Africa, and some of the major elephant areas such as those of Sudan, Chad, Zaire and Central African Republic could benefit from a rapid response of conservation organisations to reports of excessive poaching, which could in each case begin with a survey.

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6.2.4 NOTES ON ELEPHANT-WOODLAND INTERACTIONS

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INTRODUCTION

This is a large subject to present in 20 minutes, and would probably be better presented by others who are attending this meeting. My approach, therefore, will be to give a brief outline of the nature of the elephant - woodland interaction as I see it, and then to invite participants to modify the outline, and/or to fill in concrete data to the various parts of the system from the areas with which they are familiar.

In putting forward this brief outline, I want to make two main points, as follows :

(i) In order to predict the outcome of the elephant-woodland interaction a full ecosystem model is required, including physical components, (i.e. soils and climate) vegetation dynamics (tree and grass layers), herbivore dynamics (including other browsers, grazers and fire) and human influences (including compression and hunting);

(ii) In such a model, (human influences apart), soil factors, particularly soil nutrient availability and soil water dynamics, are of dominant importance in determining the outcome of the elephant-woodland interaction.

In this paper I have said nothing about the effects of humans on the elephant-woodland interaction, i.e. through hunting and compression. This is not because I do not think these are important, quite the opposite, but because covering these points would double the length of the paper. Also, I feel that other speakers will have adequately covered these topics.

THE PHYSICAL ENVIRONMENT

The work of Walter (1971), de Wit (1978), Jager (1980), Tinley (1982), Walker, Ludwig, Holling and Peterman (1981) and Bell (1981, 1982), among others, has emphasised the importance of the balance between soil water availability and soil nutrient availability at different levels of the soil as a determinant of the dynamics of community structure.

In summarising its influence, I will for the sake of brevity ignore the effects of climate (total and seasonal distribution of rainfall) and topographic situation (i.e. waterlogging) and consider single rainseason climates of about 600 mm - 800 mm a^{-1} and midslope situations.

Within these limits sites can be classified according to two main trends of soil properties, soil nutrient availability and water infiltration rate, as indicated in Fig. 1:

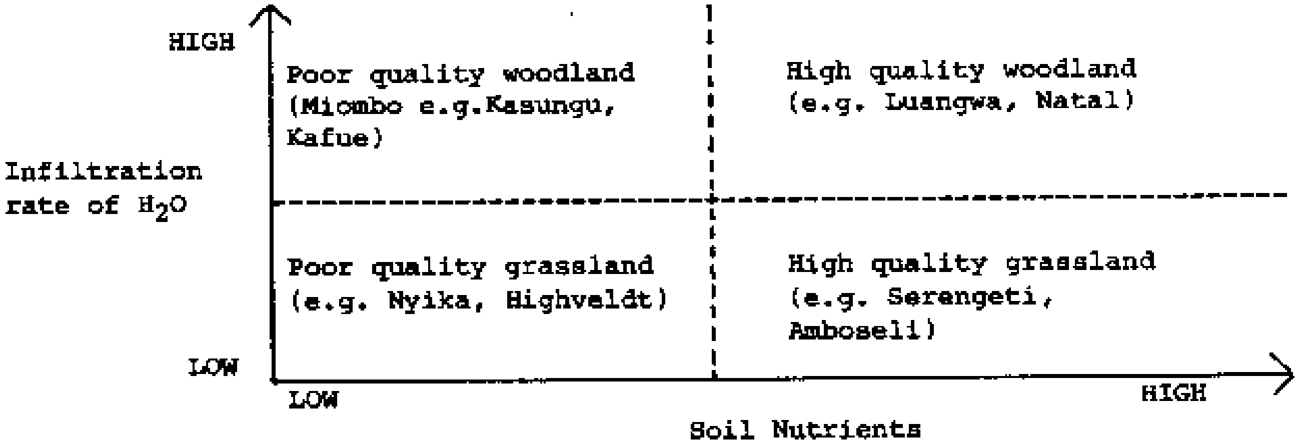

Fig. 1 Relationship between soil nutrients, infiltration rate and plant community

The point I wish to emphasise is that these physical parameters are of the highest importance in determining the points of stability and instability in the ecosystem model, and therefore of the community structure under different conditions. In short, the physical parameters largely determine the outcome of the elephant-woodland interaction.

VEGETATION DYNAMICS

The points to emphasise here are :

(a) The balance between grass and tree production is influenced by the relative availability of water in different levels of the soil, (Walter 1971, Tinley 1982, Walker, et al 1981). Tree production is favoured in high infiltration rate soil levels. Very low infiltration rate soils, however, give rise to treeless short grasslands, as in the Serengeti (Jager 1980) or Transvaal highveld (Tinley 1982).

(b) The balance between usuable components of plant production (proteins, soluble carbohydrates) and unusable/inhibitory components (i.e. fibre, secondary chemicals) is related (in both grass and tree layers) to the balance between soil water and soil nutrient availability (Bell, 1981 - 1982). Briefly, high water availability favours both protein and fibre production, but preferentially, fibre. High soil nutrient availability favours both types of production, but preferentially, protein. The effects on plant biomass and quality may be summarised as in Fig. 2.

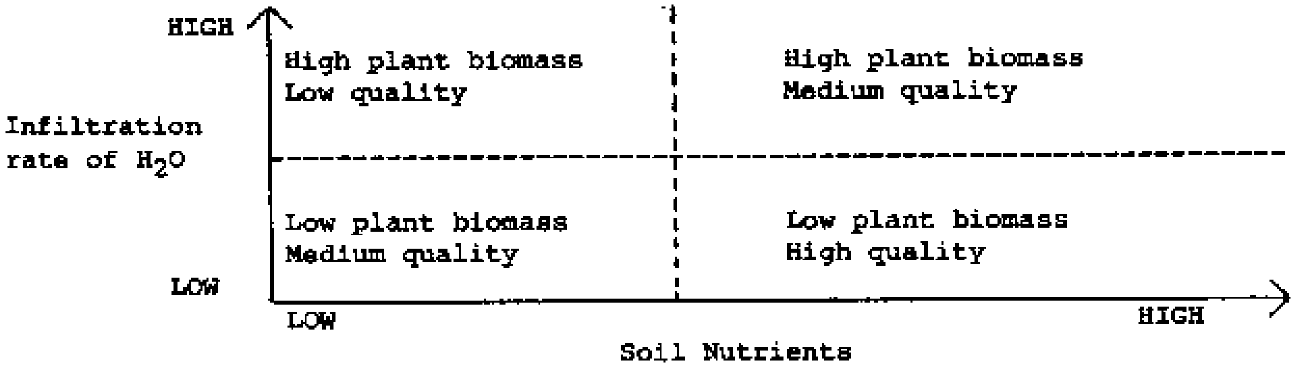

Fig. 2 Relationship between soil nutrients, infiltration rate and plant production and forage quality.

HERBIVORE BIOMASS AND TYPE

Vegetation communities support characteristic herbivore communities in terms of biomass and type. These may be summarised as in Fig. 3.

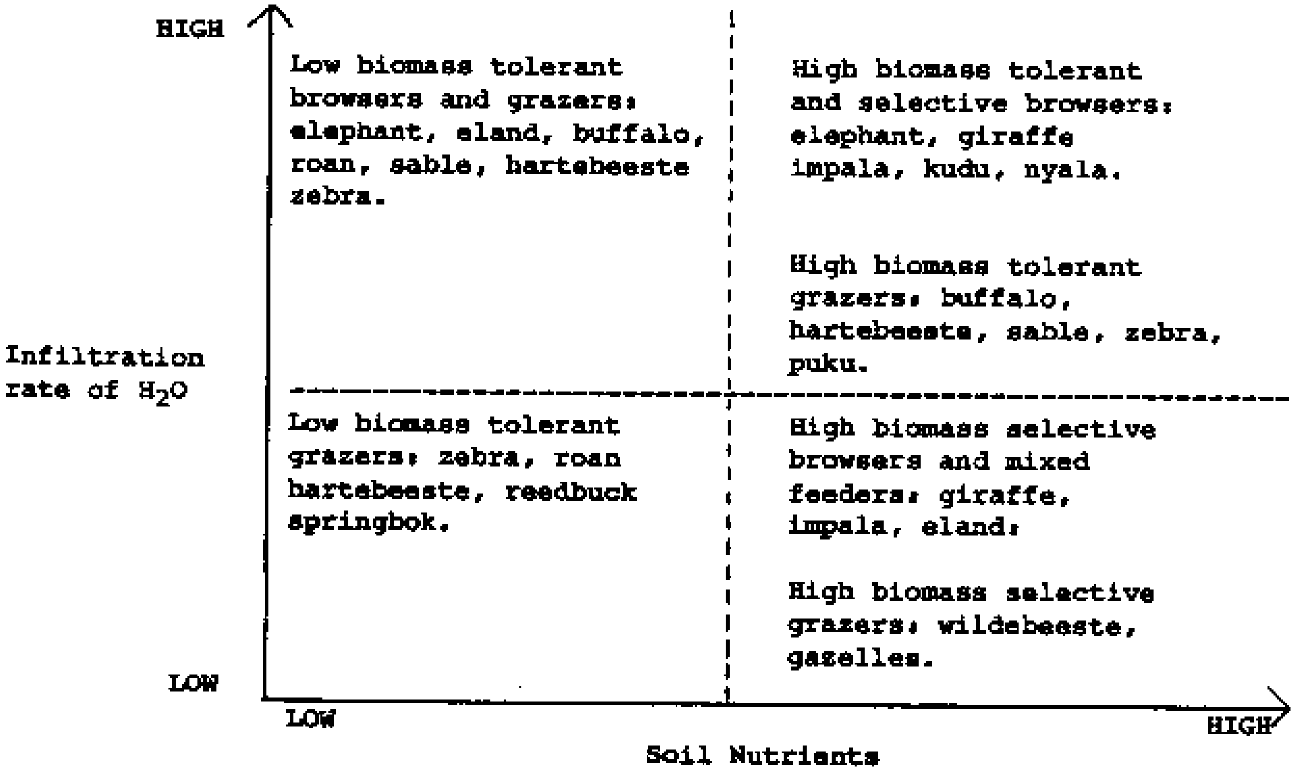

Fig. 3 Relationship between soil nutrients, infiltration rate and large herbivore community

ELEPHANT-WOODLAND INTERACTIONS

One can simplify this picture to get an idea of the conditions under which elephant are likely to have a substantial impact on the vegetation (in the absence of hunting and compression by human), as in Fig. 4.

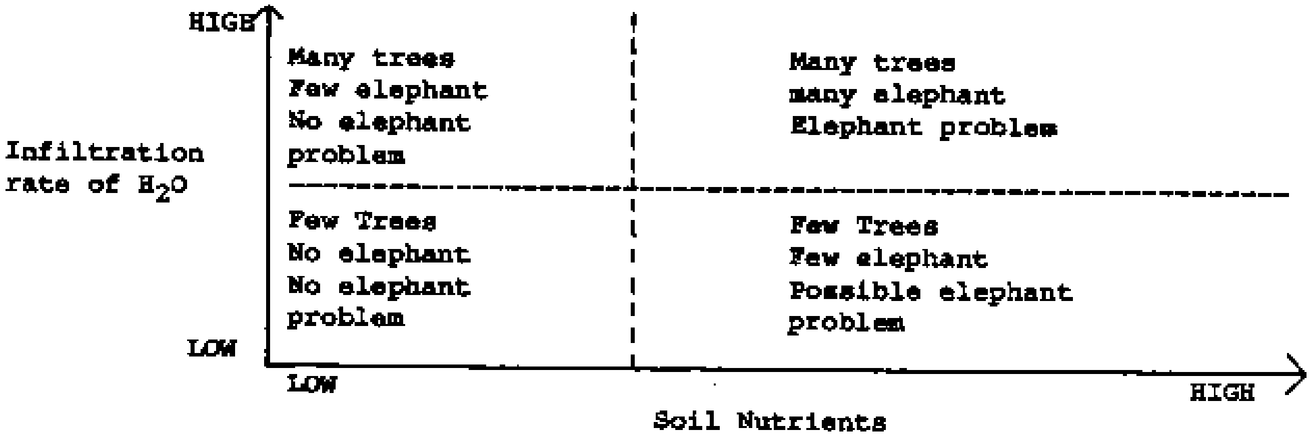

Fig. 4 Relationship between soil nutrients, infiltration rate and elephant-woodland interactions

This diagram makes the point that elephant problems, i.e. radical vegetation changes due to elephant, are most likely in conditions that favour both tree and elephant production, that is, in conditions of medium to high nutrient status and soil water dynamics favouring plant biomass production. It should be noted that these correspond to the conditions that lead to instability of the trophic level interaction model of Caughley (1976), i.e. high values of maximum usable plant biomass (K), high levels of feeding efficiency (d1) (because plant quality is high), high rates of elephant increase in conditions of high tree density (C2), and relatively low rates of decline of elephant when tree density is low (d2 is high) because trees are replaced by tall grass, (see below).

In other cells of the diagram, sour grassland (low nutrient low infiltrition) does not support elephant so there is not a problem. Brachystegia woodland (low nutrient/high infiltration) generally supports low elephant densities and in its high quality soil areas appears to take up an equilibrium in a state of coppiced woodland, (Bell, 1981). The Acacia/short grass cell, (high nutrient/low infiltration) supports low densities of elephant but also low densitites of palatable trees, so that noticeable elephant damage to mature trees can take place.

EFFECTS OF GRAZERS AND FIRE

The last section considered the elephant-woodland interaction in isolation according to the straight-forward Caughley (1976) interactive model. This paragraph considers additional elements of the community which may modify the outcome of the interaction.

The first question to ask is, what happens to the vegetation if the mature tree canopy is removed? In most cases, the immediate effect is an increase in grass biomass, mainly through fibre production, so that the grass gets taller and is reduced in quality. This in turn has three types of effect,

(a) Increased grass biomass may suppress tree regeneration by intercepting water near the soil surface, (Walter, 1971, Walker, et al 1981). This situation may be called a 'grass trap'.

(b) It will affect the biomass and type of grazers in a way dependent on the extent of quality shift in relation to the quality tolerance of the grazers present, i.e.:

(i) it may produce an increase in good - medium quality grass which will allow an increase in the smaller grazers (i.e. wildebeeste, zebra, gazelles etc.). This will in turn reduce dry season grass biomass and hence fire risk, as in the Serengeti (Norton-Griffiths 1979, Pellew, 1980). This situation may be called a 'grazer trap'. However, in soil conditions, that favour tree growth, this situation may break the 'grass trap' and lead to woody regeneration, i.e. bush encroachment, (Walker, et al 1981).

(ii) it may produce an increase in medium - poor quality grass, leading to a decrease in small grazers and an increase in large grazers (i.e. buffalo), though probably not to a sufficient extent to reduce grass biomass significantly. This situation, then, produces both the 'grass trap', (see above) and the likelihood of intense fires, which may also suppress woody regeneration. This situation may be called a 'fire trap'.

(c) It will affect the extent and temperature of fires. This effect has been indicated above. To recap briefly: a 'fire trap' is likely except in conditions particularly favourable to grazers which reduce the fuel biomass (i.e. Serengeti c.f. Norton-Griffiths, 1979) or in conditions particularly favourable to tree growth (i.e. miombo, Bell, 1981).

These effects may be summarised as in Fig. 5.

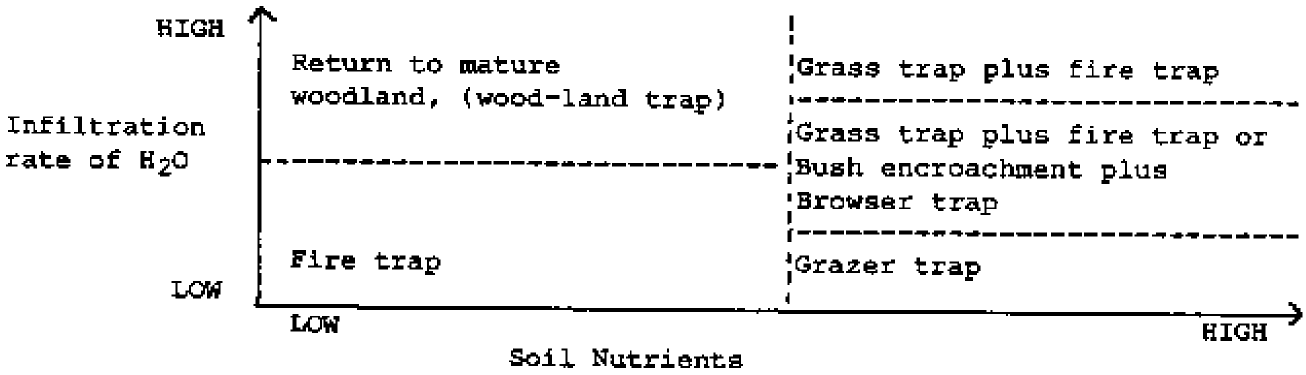

Fig. 5 Relationship between soil nutrients, infiltration rate and browsers, grazers and fire.

EFFECT OF SMALLER BROWSERS

A further complication has been introduced by the work of Pellew (1980) in the Serengeti. Pellew has shown that in these conditions of high production of palatable trees (Acacias) smaller browsers (i.e. smaller than elephant), in his case giraffee, can reach densities sufficient to reduce or halt height growth in regenerating trees, introducing what may be called a 'browser trap' which is enhanced by fire but reduced by grazers. Goats may play a similar role, c.f. Trollope (1982). This type of browser trap is particularly characteristic of the high nutrient status areas whose soil water dynamics are intermediate i.e. not especially favourable to tree growth, (see Fig. 5).

SOME GENERALISATIONS

The above hasty summary outlines some of the ecological factors that have to be considered in trying to predict the outcome of an elephant-woodland interaction. I have accepted as a basis Caughley's (1976) interactive model, but have tried to emphasise two points. Firstly, that, taking the basic interactive model, the key parameter values that determine the outcome vary between sites in a way strongly affected by physical soil properties in addition to climate; and secondly, that the basic interactive model is only one part of a considerably more complex system involving other trophic levels and other components on each level (i.e. the effects of grass, grazers, fire and other browsers). This complexity leads to the possibility of a variety of points of relative stability and instability in the system.

I would like to put forward as a tentative proposition that, in African wildlife ecosytems at least, ecosystem instability is more prevalent in conditions favouring both plant and animal production, that is, in conditions of medium to high nutrient status and soil water dynamics that favour tree growth. These seem to be the conditions in which dramatic ecological changes (i.e. bush encroachment, elephant damage) seem prone to occur, and which require comprehensive management to maintain ecological stability - if stability is what is wanted.

Finally, I am of course aware that human influence can determine the outcome of elephant-woodland interactions. However, I suggest that the distribution of such decisive human - elephant conflicts agrees with the proposition in the last paragraph in that human densities and hence ecological impacts are greatest in high nutrient/high infiltration conditions. Such human influences are themselves a major source of ecological instability.

ACKNOWLEDGEMENTS

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