The Common Property Problem and Pastoralist Economic Behaviour

by Ian Livingstone*

This article deals with a central issue in rangeland management in tropical semi-arid areas, the 'common property problem', which is said to arise in a situation where livestock are kept under individual ownership on communally-owned land: a situation which is the most usual one among pastoralist livestock keepers.¹ With communal land ownership each individual can maximise his 'share' of pasture by increasing his own livestock holding as far as he can, leading in aggregate to collective overstocking, producing degradation of the pasture, something which, conversely, the individual cannot avoid by unilaterally limiting his herd.

The conclusions drawn by policy-makers from this hypothesised behaviour are major: degradation of rangeland is man-made, with its origins in the institutional arrangement described, rather than the result of natural and climatic factors; correction of the situation requires an institutional change, that is, land reform in the direction of privatisation; and, pending such institutional changes, 'natural' methods of correcting disequilibrium through natural calamity need not be strenuously avoided. This has been referred to as 'the mainstream view' of the degradation process.²

Among the prominent supporters of privatisation as a solution have been Ruthenberg and Davis. The former argued that 'What needs to be changed is the concept of "private cattle on common land" which leads to over-grazing and the consequent destruction of the environment'.³ Davis states that 'By assigning definite property rights to specific individuals or groups the consequences of misuse and the returns to investment in future productivity are both made specific to the holders of those property rights'.⁴ Other, just as fundamental aspects of policy have been affected, even determined by the notion that pastoralists have an irrational propensity to accumulate livestock. Frequently new investments which would have favoured livestock-keepers, particularly water provision, but even veterinary health services, have been made conditional upon prior adoption of rotational grazing and de-stocking, the programme not proceeding when these requirements were not complied with.

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This article examines the logic of and some of the empirical basis for the foregoing arguments. It is argued that there are gaps in this logic which also has not been combined in an adequate way with the technical and empirical evidence available. Much more detailed elaboration of the relevant relationships is required, as attempted here, before firm conclusions can be drawn regarding development in the pastoral economy.

I

In assessing the ‘economic rationality’ of pastoralists, we need to distinguish between the rationality of individual households and the ‘collective rationality’ of a community of pastoralists. The common property problem indeed assumes utility maximisation by individuals, in line with economic theory. But even if individual rationality is granted, the question may still be asked, do pastoral societies have the institutions and organisation necessary to ensure good management of the natural environment, by achieving the socially optimal level of stocking?

‘Economic rationality’ may be used to refer to different aspects of behaviour, including adherence to the profit motive or exhibition in the market of ‘normal’ supply responses. What is in question here is rationality with respect to cattle numbers. Livestock holdings in excess of range carrying capacity would reduce forage availability in the long run and in the absence of alternative avenues for economic activity must reduce correspondingly livestock wealth and income. Since there are well-known practical difficulties in making precise technical/agronomic estimates of range carrying capacity, we can define this capacity here conceptually as the maximum rate of stocking which can be sustained as an equilibrium without degradation of the range (which would reduce the sustainable stocking rate). It follows that a group maintaining livestock numbers in excess of this rate would be reducing its future productive capacity or social capital stock and realising present income only at the expense of eventual future income. Collective irrationality, defined to refer to a situation where group behaviour and organisation is not such as to secure the group’s long run economic interest, is thus synonymous with ‘economic shortsightedness’. The term ‘overstocking’ can be defined simply with reference to the sustainable or equilibrium rate above, and becomes irrational by definition.

II

As a basis for some of the discussion to come, it is worth examining first individual rationality. A wide variety of economic and non-economic reasons for individual owners to attempt to expand their cattle holdings, such as prestige or bride-price, either appear unimportant or do not offer sensible explanations of why the numbers of livestock owned by the group would expand. The two motives which appear fundamental are insurance against risk and investment for economic return.
Given the risks faced by the pastoral producer in the environment in which he finds himself, the rational first objective must be survival. The 'survival algorithm' has been applied in explaining non-maximising behaviour on the part of the peasant farmer and clearly applies here with greater force. The scale of the risk in this case is not often appreciated, however. In four Sahelian countries, Chad, Niger, Mali and Mauretan, the size of cattle herds was estimated to have fallen in aggregate by about 35 per cent, from some 16.2 million to 10.6 million between 1972 and 1973, implying losses by individual stock-owners of anything between ten and 100 per cent. Similarly, official government censuses taken in Kaputiei, Masailand, suggest an increase from 9.4 livestock units per adult-equivalent in 1967 to 13.9 in 1972-73, and a subsequent decrease to 5.3 in 1977, an overall decrease of 44 per cent over the decade and 62 per cent from 1972-73. If the post-drought figure of 5.3 in 1977 represents a 'survival level' of stock per adult-equivalent (in fact one would not expect the pastoral population to be in equilibrium at this time, but that some would be 'leaving the industry'), then in order to be left with a residual adequate for subsistence in 1977 of 30 livestock units per family, say, over 75 livestock units would be required pre-drought, two-and-a-half times as much. Other estimates, this time excluding small stock, by Theuri, suggest that an average family in Central Kaputiei lost approximately 3.5 times the 1977 average herd size of 22.6 cattle units, while that in South Kaputiei lost 4.5 times the 1977 level of 36.9 cattle.

Thus if such families were guided by mean or expected value of losses, rather than a focus-loss which might be still higher, they would need about four times the post-drought subsistence level as an insurance component in order to leave sufficient for subsistence in poor years, thus maintaining a herd size of five times the post-drought level to cover subsistence plus the insurance component. Orders of magnitude will vary in different pastoral areas, but such figures are not incompatible with experience in other, very different parts of the world, such as Afghanistan and Mongolia.

Inevitably the pastoralist's first concerns have been to preserve a viable herd - a minimum size is necessary if regeneration is to be possible, in the absence of which the household/herding unit will disintegrate - and in post-drought situations to rebuild his holding. An indication of the lack of understanding of this motive is the fact that government policies are rarely, if ever, designed to assist the livestock-keeper in these efforts, and indeed periodic major losses through drought have been seen by many observers as a natural means of maintaining ecological equilibrium.

Turning to the investment motive, some light can be shed on this also by closer consideration of the basis of pastoralism. First, we may distinguish it from saving: pastoralists may 'save', for example, towards bride-price, by holding cattle or other stock as capital assets (rather than consuming). 'Investment' is associated with the fact that livestock can, in favourable circumstances, multiply, bringing a positive rate of return. The possibility of high return has been commented on from time to time by different observers without attracting much attention. Thus in Kenya
Henriksen\textsuperscript{11} refers to the fact that through livestock ‘the pastoralist can increase his capital without the presence of any market institutions’ and that ‘even today (animals) represent the best investment object for practically all Turkana, giving the greatest increase on a man’s capital’. Barth\textsuperscript{12} makes a similar observation in his classic work on the Iranian Basseri.

This high rate of return has been difficult to reconcile with the periodically quite serious economic situation of many pastoral groups and it is perhaps for this reason, as well as the perceived commercial rate of offtake, which has led governments to think of investment in pastoral systems primarily in social terms, and to look for economic returns in non-pastoral projects such as ranches.

To make this reconciliation it is necessary to make a distinction between a run of ‘good years’ and the periodic drought event. Given the rapid rate at which herds can multiply, particularly in the case of sheep and goats, it is likely that the rate of return on investment in livestock units during good-year sequences is exceptionally high: although it will also carry a high risk. With perfect foresight one would sell livestock just in advance of a drought, and buy stock at the beginning of a good-year sequence.

It follows that holding cattle as an asset is not merely a reflection of lack of investment opportunities outside the pastoral sector, as is so often suggested, although this can be an additional factor. Not all pastoralists have the same opportunity to make this investment. of course, and it is inability to reinvest in livestock post-drought which leads some to drop out of the activity altogether.

The high rate of return suggested is associated with another fact: the use of low opportunity-cost natural forage. In a normal year the rains produce extensive wet-season grazing areas from which pastoralists can profit. In a good-year sequence these areas will be progressively extended.\textsuperscript{13}

In relation to the above, Sandford\textsuperscript{14} makes a useful distinction between ‘conservative’ and ‘opportunist’ strategies for utilisation of forage, taking into account year-to-year variations in rainfall and thus forage availability. A ‘mildly conservative’ strategy would be based on a level of stocking for which sufficient pasture without overgrazing would be available for all but 20 years out of 100. Rainfall distributions are positively skewed, however, with a long tail, and by implication the forage availability would exceed that required in the remaining 80 years, with a corresponding amount of unused or wasted forage. An ‘opportunist’ strategy would be one which attempts to make use of the grazing available in these ‘good-years’.

As Sandford demonstrates, the conservative strategy may have a high opportunity cost. Fixed-location modes of production such as ranches, favoured by the technical experts, generally must follow such. The higher-risk strategy adopted by nomadic pastoralists, on the other hand, has two advantages: the pastoralist at least has the benefit of high output and consumption during the good years, an obvious consideration invariably left out of accounts by commentators, rather than simply maintaining those of the worst years,’ while he is able, secondly, to build up the livestock he requires as insurance. As we shall see, the investment process just described
is essential to understanding how range degradation might occur, whether via the common property effect or otherwise.

Since rationality was defined above with respect to livestock numbers, it is worth considering how the risk motive for expanding such numbers would relate to collective as well as individual rationality. On the face of it, the risk motive would not appear to apply to the group. In the first place, the law of large numbers will apply, reducing the collective risk compared with that faced by individual livestock holders. Second, for the group as a whole, the available grass represents its ‘bank’ rather than cattle: expansion beyond carrying capacity as defined, by reducing grass cover, would appear to reduce the livestock numbers the group could expect to have in the long run. Thus only if the group behaved as a single family – or if gainers within the group could bribe losers – would the optimum herd size be selected. Non-achievement of this optimum would reflect a common property problem with private/social benefit divergence.

We can see two ways at least, however, in which the risk factor would still apply to the group. Much may depend on the size of the group, since even a fairly large aggregate herd may be wiped out in a drought, given the mortality figures indicated earlier, and the long period required to regenerate a herd to an adequate level. Thus the risk argument has some validity even for the group, although the required safety margin will be much smaller, in proportionate terms, than for the individual household.

The second way is suggested by responses given in interview with the author by Pokot pastoralists in Western Kenya some years ago. Holdings of livestock were fairly unequal within the group and it appeared that large owners were obtaining disproportionate use of the available pasture, which was being overgrazed, with private and social costs of grazing diverging. The very poor pastoralists with limited holdings of their own, however, were quite hostile to the notion of ceilings on individual holdings to limit the very largest individual herds as a means of controlling over-use of pasture. Experience elsewhere suggests that both the situation and the responses would occur more generally.

The explanation is probably that the poorer households see the large owners as the only available animal ‘banks’ to which they might turn as ‘lenders of last resort’ either for assistance in rebuilding their own cattle numbers or for subsistence animals or even merely for employment as herdsmen. This appears to go beyond the informal social security system known variously as tilia in Kenya, mafisa in Botswana, and other names elsewhere, as actual transfers under these systems are usually not sufficient quantitatively to provide an explanation on their own. It is likely that, the larger the aggregate herd size, the more people there will remain in a drought or other emergency, from which any individual household may seek help. It is in this sense, perhaps, that some validity may exist in the argument of those anthropologists who state that wealth inequality among pastoralists is illusory since ‘the herd belongs to everybody’.
III

Putting these risk considerations to one side, let us examine the applicability of the common property explanation in pastoralism. The explanation appears thoroughly convincing, given the extent of observed degradation and that it requires only the assumption of individual maximisation of benefits. It should be appreciated, however, that the individualist behaviour involved in the common property model is assumed or hypothesised in most discussions or – in preference to alternative possible explanations – deduced from the existence of degradation. However, alternative models of behaviour involving co-operation and predicting different results can be constructed, as Runge has pointed out:¹⁹ choice must depend, therefore, on observation and empirical evidence.

One way in which the group may deal with excess numbers, for instance, is by squeezing out marginal members. One description, referring to the Sudan, runs as follows:

Management units are autonomous and are individually responsible for the welfare of their members. Some times householding viability may be restored through sharing and the subsidisation of others. In most cases, and certainly in the case of drought and other natural calamities, however, it seems that householders are selectively and individually squeezed out of the pastoral sector so that pressure on the resource base is relieved . . . . The important point is that these processes seem to intervene before the viability of the whole group is threatened, thus permitting the stable pastoral adaptation of the group. The viability threshold also seems to be such that the sloughing-off processes intervene and relieve grazing pressure before the pasture is destroyed beyond recovery.²⁰

Among the Borana in Ethiopia co-operation rather than conflict of interest between individuals is said to prevail:

Imagine for example, the degree of organisation and cooperation that is required to work say, the wells at Bor Bor. There, in 1982 over three days, some 47,000 head of cattle, 27,000 sheep and goats, and 2,000 other stock were watered in groups of 50 to 100 at nearly 300 groups per day, in the same or nearly the same sequence every third day, and some 780 people were organised to work in one of 17 wells also every third day. This was no mean feat under any circumstances. Thus a society which stresses community over the individual, and which stresses common but organised rights to resources is more likely to succeed in a pastoral context than one which stresses individual rights.²¹

A second empirical question is the converse one, does individual ownership under private property yield superior results in preserving the range? Sandford offers examples to the contrary.²² Since rationality in our context relates to economic foresightedness, we might note that even in industrialised
countries investments made by large companies are widely based on a rather short pay-back period criterion, suggesting that private commercial and financial considerations do not themselves guarantee a long-term view.

The third empirical question is whether long-term degradation is actually taking place, something which Sandford, in particular, contests. It is possible to cite specific evidence of quite remarkable range recovery from apparent degradation following one or two seasons of adequate rain, such as the following example from Ethiopia:

While some range areas, particularly those below the foothills from the Mille river to the south, show signs of long abuse and depletion, there are large areas where rapid recovery has been made in one season and the foundations laid for return to a state of range vigour and production not seen in the 'Afar lands for many decades.  

A particular difficulty of ecological measurement here is of distinguishing secular from cyclical change. Sandford refers to a number of studies which show the direction of trends to be uncertain. Sandford points out that oral evidence from pastoral groups themselves is conflicting. The third kind of evidence is of livestock numbers themselves, which have often increased over time suggesting, given our definition, that carrying capacity has not decreased. Sandford states that 'official estimates of long-term increases in livestock numbers tend to lie in the range between 50 and 250 per cent over 20–60 years', although stressing their unreliability.

IV

Apart from the above, however, there are certain logical difficulties associated with conventional discussions of the process of range degradation which need to be explored. First, as already indicated, herds multiply steadily during a run of good years, during which available forage can be presumed to be expanding also, for botanical reasons as well as by deduction from increasing livestock numbers. As suggested in Figure 1, which gives estimated cattle numbers in the Kajiado District of Kenya, forage availability falls sharply within a minimal space of time in a drought crisis, with heavy losses of livestock: in this case estimated at 60 per cent during the year 1961–62. Thus carrying capacity varies cyclically, and degradation would appear equally to be a cyclical phenomenon, concentrated here in 1961–62 and 1975–77, when carrying capacity, having fallen by 60 per cent, left initially balanced cattle numbers in excess of capacity by some 150 per cent.

It should be noticed here that, to be consistent with our earlier definition of carrying capacity, the latter has to be seen as a variable. If, instead, it were defined as that rate of stocking which would avoid losses throughout the cycle, this would be 300,000 cattle. Limiting the stocking level to this figure would imply a substantial opportunity cost in terms of production foregone, for instance, over the period 1944–61. This is the output secured by the ‘opportunistic’ strategy described by Sandford.
An implication of the above is that degradation might be reduced if measures were introduced to permit orderly – if rapid – reduction in excess numbers during periods of drought. Livestock-keepers will be understandably reluctant to abandon their animals at this time partly because of their own subsistence needs – with milk output per animal also falling – and partly because this is the very moment for which they have been ‘insuring’ themselves and when it remains to be seen whether the numbers they own at the beginning will be sufficient to leave them with the means to reconstitute their herd at the end. This is the point, therefore, where the ‘common property problem’ would operate. Discussions of the problem which treat carrying capacity as a constant are therefore inadequate, just as are the discussions of why livestock are accumulated during the process, which should take account of the good-year rates of return and risks run in the course of the climatic cycle.

A second logical problem is this. In pastoral systems, where pasture is produced in direct response to the rains, wet-season grazing greatly exceeds dry-season pasture, and livestock are herded extensively during this period in order to conserve dry-season requirements. In addition grasses germinate during the wet period, not in the dry season, and it might appear that it is during this period that excessive livestock numbers could affect the production of grass. Thus Granier states
un pâturage Sahélien ne peut se dégrader que s’il est exploité pendant la période de végétation, donc en saison des pluies, et les forages doivent être fermés à ce moment là ... l’exploitation du pâturage en saison sèche ne peut avoir une action dépressive que sur les espèces vivaces, et on sait que celles-ci ne représentent qu’une faible proportion du pâturage constitué essentiellement d’annuelles ....

Since wet-season pasture exceeds dry-season pasture by a high factor, it would seem therefore that dry-season pasture is the critical constraint on livestock numbers. But it would be the amount of dry-season fodder which determines livestock numbers rather than vice versa, since germination of grasses does not occur in this period. If this is viewed in linear programming terms, with binding constraints, there would appear to be a natural constraint on livestock numbers and environmental degradation. This should, of course, be combined with the cyclical variation described above spanning periods of years.

The impact of intensive grazing on the production of grass is somewhat more complicated than this, however, involving also less direct effects. Reduction of grass cover is likely to encourage bush encroachment, increasing loss of soil moisture and thus grass growth. Second, it will increase soil erosion and under pressure of grazing produce changes in soil structure, again affecting the growth of grass, even while dry-season areas are in seasonal rest. These effects have yet to be accurately quantified, and may differ according to the area, range and underlying soils, but are likely to be significant as long-run factors. It remains true that it is the size of these effects in the dry-season grazing areas, which will always be subject to very much more intensive use, which is relevant. The extent to which dry-season grazing areas are subject to pressure will vary according to the circumstances, and will change as these circumstances change, as discussed presently.

V

It follows from the above that there is a great deal of uncertainty about the process of degradation as well as about the applicability of the common property model. There are reasons for thinking, however, that the model has and will become increasingly appropriate in the light of evolving circumstances in many pastoral areas.

There are, first, reasons to think that the scope for traditional organisation of the control over range usage has been reduced. Technological changes such as the introduction of trucks to transport people and animals, as in Saudi Arabia, Syria, and parts of Africa, and government interventions in several countries to declare grazing land public (as opposed to communal) property have added to the tendency. In many cases the likelihood of a co-operative resolution of the common property problem has decreased where different ethnic groups, some perhaps dislodged from their traditional grazing areas, are in competition with each other. An example of this is in
Tanzania where the Wasukuma from the north-west of the country have moved southwards from overgrazed pastures and areas taken over for cotton cultivation and graze their animals alongside those of Maasai and Baraguyu who have come down from the north-east, usually those with larger herds who can no longer be accommodated in home areas.

Increasing stratification of income and wealth and erosion of social cohesiveness and reciprocal caring arrangements, of which there are clear signs in some areas, may also produce a conflict of interests between large and small livestock-owners, traditionally moderated by customary ties.

In particular, the controlling measures which might have been feasible earlier have become more and more difficult to retain in the face of increasing scarcity of pasture following on two key factors, population growth and alienation of traditional lands. To take an example, referring to rotational grazing in Upper Volta (Burkina Fasso). it was reported that

Some elderly Fulani said that at one time they employed such practices. Now, however, with increasing population pressure and more intensive crop cultivation, such a system is impossible. Any good grazing land, if left to regenerate for a period of time, will merely serve to feed other people’s herds ... many livestock producers laughed at the suggestion.13

It is argued by some, in fact, that factors affecting human and animal population growth, particularly in the field of health and veterinary services, have changed the entire framework within which pastoralist communities are operating. Thus:

A problem common to all (pure pastoral societies) is the exponential natural growth of human and animal populations against a finite and low resource base. These growth rates were traditionally slowed down by natural calamities of various sorts ... A number of self-regulatory mechanisms, and in earlier times, territorial expansions, have enabled these societies to maintain themselves through time, by periodically re-adjusting the balances between people, animals and land on which they rest .... Under the present circumstances, these adaptations are no longer adequate, as is amply evidenced by the ‘boom and bust’ syndrome affecting these pastoral societies.14

In many areas the traditional migratory pattern which is an essential component of pastoralism has become progressively circumscribed as people and animals have become ‘boxed into’ restricted areas. With this reduced movement dry-season grazing areas have been subjected to heavier pressure than in the past, with a likely reduction in grass cover. Often these areas were formerly in grassier highlands which are no longer accessible for transhumance, and have been replaced by hot plains with much lower carrying capacity.14
VI

As indicated at the outset, acceptance of the common property model as applied to pastoralism has affected investment and development policy towards pastoralists in a major way. Water investments, in particular, have been the subject of widespread criticism. The basic criticism made is that water investment helps to keep a larger number of animals alive than are warranted by the carrying capacity of the range, so that these do not constitute a genuine increase in output in the long term and will produce general degradation reducing the value of the range as social capital. An alternative form of criticism is that the investments produce localised but damaging degradation specifically in the area of the boreholes or other constructions. As in the previous discussions the logic again is in need of clarification if only, given the huge expenditure involved in water provision, to permit cost-benefit calculation, since benefits will depend directly on the returns from additional livestock.

A specific variant of the first criticism is the Malthusian argument that improvements of this kind must inevitably initiate an increase which will continue until the initial low-level equilibrium position is restored, simply reproducing degradation in new areas. This criticism is often extended with consistent logic to vaccination and other animal health programmes. Thus it is suggested that:

Even if there is no room for further increases in the total number of animals in the province, the individual nomad will see his situation in another way. For him, there is always an opportunity to increase his herd. This factor is probably the most important factor behind the deterioration of the grazing land. The reason why it is more severe now than previously is the improvement of the water supplies and annual health care services. A drought period when animals die will subsequently be followed by a growth period for the whole livestock sector.35

We may note, first of all, that, in line with the common property model, it assumes competitive behaviour rather than co-operation, which is also observable in pastoral water management. More suspect, on a priori grounds, is the argument that the introduction of water to open up new areas will reproduce degradation. For pasture to be usable, there must be a combination of grass and access to water for drinking: introduction of water can thus increase the amount of ‘effective’ grazing. Prior to investment, the new areas would have produced nothing.36 If after investment the new water sources support a similar number of animals – whether more than the maximum desirable number or not – to those previously existing, this clearly implies an increase in the total number supported.

To illustrate from the eastern range areas of Botswana, it is possible to identify very clearly as four white spots on an aerial photograph of the area the four isolated settlements of Hukuntsi, Lehutu, Tshane and Lokgwabe where water has been introduced. While this has been mentioned
as evidence of water investment inducing degradation, it is noteworthy that the spots of question indicate the only part of the zone which is contributing significantly to the support of livestock.

The argument that water investments produce localised areas of severe degradation— the Sahelian tubewells are the most commonly cited example— has validity, as explained presently, but neglects this generally more important effect of bringing into operation new grazing areas. Such new water points which complement those already existing should produce a better distribution of water sources, not only avoiding the alleged effect of producing a concentration of animals but positively reducing such concentration and the consequent pressure on pasture. It is therefore necessary to distinguish between water investments which increase concentration and those which decrease it, a distinction which the literature does not consistently make.

A case where new investments did produce a concentration of water availability was the scheme for grazing blocks in Kenya's North-East Province in the 1970s. The first blocks developed immediately attracted Somali pastoralists from a wide area, with the obvious consequences. The problem here, a general one, particularly when the total capital funds are limited and the boreholes employed expensive, was that the scheme was initiated not on a broad front but in just one section of the pastoral zone, without the possibility of broadening this effort at all quickly.

There are three reasons why water investments along the lines of the Sahelian tubewells might produce a concentration of animals and/or increased degradation. Apart, obviously, from adding to the geographical concentration of water sources, the new sources may offer significantly easier means of obtaining water than prior sources. While labour can be an important constraint on pastoral activity as a whole, watering of animals has been found to impose particularly heavy labour demands. Consequently even if it is merely additional to water sources elsewhere in the area, a new high-capacity borehole may be attractive enough to produce concentration. This was a major error in the earlier Sahelian programmes and more recent programmes in Ethiopia and Mali, for instance, are sensibly designing sources with manual rather than mechanical delivery of water.

Labour costs, secondly, are also involved in migration itself, together with social and 'inconvenience' costs. The provision of additional water in base areas therefore could increase pastoralists' reluctance to undertake quite as extensive seasonal migration as in the past, increasing the time spent in base areas and the eventual degradation there. Equally, pastoralists may decide to stay permanently in areas previously usable only on a seasonal basis. As in the previous case, this assumes that the change in labour cost is sufficient to induce pastoralists now to pursue their private interests ahead of their collective interest, where previously this was strong enough for them to maintain migration as required for the preservation of communal pastures.

A third case where new water installations may indirectly increase the likelihood of degradation is by leading to a breakdown of traditional water controls. This arises because the new installations are mostly public water
points. This reduces the control of local communities not only over the water-drawing operations themselves, but also over the range area which it services, public water implying public grazing.

Thus in relation to the Borana in Ethiopia, who have always had a social organisation very effectively adapted to communal management of pastures, an observer concluded that:

If water is made freely available it means that the existing social organisation which regulates access to water, labour inputs and stocking rates of the pastures is stripped of a major function. Such a loss of function will eventually weaken the social controls (sanctions) in the existing system. 39

The potential importance of this factor is evidenced by instances in the Sahel of local communities resisting major water installations for fear that this would provoke invasion of their traditional pastures by other pastoral groups, or requesting their closure. 40 The occurrence of this phenomenon in the Sahel, where the extensiveness and homogeneity of the major ecological zones facilitate wide movement and make it more difficult to protect 'home' areas, is no coincidence.

What the above points to is not non-investment but investment in a larger number of smaller, distributed water sources; proportioned to grazing availability and where appropriate facilitating migratory movement aimed at maximising pasture use; based on manual delivery; and under communal control rather than operated by public agency.

Conclusion

'Economic rationality' in the context of our problem was defined as synonymous with 'economic foresightedness', and a distinction was made between 'individual' and 'collective' rationality. Rationality in respect of accumulating livestock needs to be seen in relation to a process of investment in which high rates of return are obtainable during good-year sequences but subject to risks of calamitous drought, in a situation where carrying capacity is a variable rather than fixed quantity. The common property model assumes the absence of co-operative behaviour and takes for granted what is in fact uncertain evidence regarding long-term degradation of ranges. Second, it is based on very simple assumptions regarding the process of degradation, which requires much closer specification. Nevertheless it may be increasingly relevant in particular parts of the pastoral world where the conditions favourable to the effective functioning of the traditional system had been progressively reduced. A similar lack of specification has affected the evaluation of the benefits of investment in pastoral economies, leading to unjustified blanket condemnation of its value.

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NOTES

1. Pastoralists are defined here as people deriving the main part of their livelihood from keeping livestock, using natural forage. Dependence on natural forage will generally require a significant degree of seasonal or other mobility and thus an element of ‘nomadism’.
2. Sandford [1983].
3. Ruthenberg et al. [1974: 3].
4. Davis [1971: 2–3].
5. See the review in Livingstone [1977].
6. Lipton [1968].
8. See Livingstone [1981].
9. Theuri [1979].
10. Dahl and Hjort [1979].
13. The extent of wind-blown grass seed will depend on the area and quality of grass in the preceding year.
14. Sandford [1983: Ch. 2].
15. This provides a case where despite the suggestions of the ‘survival algorithm’ the traditional producer is more willing to bear risk than the technical expert or large-scale producer. A very similar case has been identified elsewhere in irrigation by peasant producers [Hazlewood and Livingstone, 1982].
16. See Livingstone [1977].
17. A variation of the argument that the herd is essentially communal is that individual ownership of animals and thus wealthy inequality cannot be specified, each animal being the subject of a variety of indirect claims to title. Note that if the herd was effectively communal, with wealth inequality undefinable, a common property problem could not exist.
22. Sandford [1983].
27. Granier [1977: 60].
28. In temperate region pastoralism winter grazing supplemented by stored fodder provides the equivalent constraint on livestock numbers. See Livingstone [1984].
29. Verbal communication from Nick Abel.
30. See Livingstone [1984].
31. For a brief review of alienation of pastoral lands in different parts of the world, see Livingstone [1984].
32. IBRD [1974: 365].
33. Helland [1980b: 19].
34. This would apply to most Kenyan pastoralists, including the Pokot, Samburu and Maasai.
35. Haraldsson [1982].
36. They may have provided wet season grazing because of seasonally available surface waters, but since such grazing is not a binding constraint the point stands.
37. Helland [1980c: 42].
38. FAO [1972: 21].
REFERENCES

Helland, J., 1980c, 'Social Organisation and Water Control Among the Borana', in Helland [1980a].