The Common Property Problem and Pastoral Economic Behaviour

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Abstract: Widely accepted views among technical personnel and particularly development programme administrators are that the explanation of widespread range degradation in pastoral areas lies in the problem of common property (whereby private benefits from putting additional livestock on the range exceed social benefits), and that, more generally, pastoralists have an "irrational" propensity to accumulate stock. The policy conclusions drawn in this paper relate to the appropriate level of water investment and veterinary programmes. The paper exposes major deficiencies of logic in the standard arguments and explores the rationale of pastoral economic behaviour in a more systematic way.

Introduction

This paper deals with a central issue in rangeland management in tropical semiarid areas—the "common property problem," which is said to arise in a situation where livestock are kept under individual ownership on communally-owned land (the most usual situation among pastoralist livestock keepers).[2] With communal landownership, individuals can maximize their "share" of pasture by increasing their own livestock holding as far as they can, leading in the aggregate to collective overstocking that produces degradation of the pasture (something which, conversely, individuals cannot avoid by unilaterally limiting their herds).

The conclusions drawn by policy makers from this hypothesized behaviour are major: degradation of rangeland is caused by people (with its origins in the institutional arrangement described) rather than by natural and climatic factors; correction of the situation requires an institutional change (i.e., land reform in the direction of privatization); and, pending such institutional change, "natural" methods of correcting disequilibrium through natural calamity need not be strenuously avoided—"the mainstream view" of the degradation process (Sandford, 1983).

This paper examines the logic of and some of the empirical bases for the foregoing arguments.

Economic Rationality

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.

"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 well-known practical difficulties exist in making precise technical/agronomic estimates of range carrying capacity, we can define this capacity here conceptually as *the maximum rate of stocking that can be sustained as an equilibrium without degradation of the range (which would reduce the sustainable stocking rate)*. A group maintaining livestock numbers in excess of this rate would be thus reducing its future productive capacity or social capital stock and realizing present income only at the expense of eventual future income. Collective irrationality, defined to refer to a situation where group behaviour and organization 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.

Individual Versus Collective Rationality

A wide variety of economic and noneconomic 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.[3] The two motives that appear fundamental are insurance against risk and investment for economic return.

Given the risks faced by pastoral producers in the environment in which they find themselves, the rational first objective must be survival. The "survival algorithm" has been applied in explaining nonmaximizing behaviour on the part of the peasant farmer (Lipton, 1968) 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 Mauritania—the size of cattle herds was estimated to have fallen in aggregate by about 35 percent from some 16.2 million to 10.6 million between 1972 and 1973 (Berg, 1975, Annex A), implying losses by individual stock owners of anything between 10 and 100 percent. 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 percent over the decade and 62 percent from 1972/73. If the post-drought figure of 5.3 percent 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 that 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—2½ times as much (Livingstone, 1981). Other estimates (this time excluding small stock) by Theuri (1979), 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.

If such families were thus guided by mean or expected value of losses rather than a focus-loss that 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 pastoralists' 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 would disintegrate (Dahl and Hjort, 1979)—and (in post-drought situations) to rebuild their holdings. 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 (1974, p. 24) 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 (1966) 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, perhaps for this reason as well as the perceived commercial rate of offtake, governments have been led to think of investment in pastoral systems primarily in social terms and to look for economic returns in nonpastoral projects such as ranches.

To make this reconciliation, one must 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, the rate of return on investment in livestock units during good-year sequences are likely to be 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.

Holding cattle as an asset is thus 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 inability to reinvest in livestock post-drought 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.[4]

In relation to the above, Sandford (1983) makes a useful distinction between "conservative" and "opportunistic" strategies for utilization 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 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 "opportunistic" 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 (e.g., fixed-location modes of production, such as ranches, favoured by the technical experts). The higher-risk strategy adopted by nomadic pastoralists, on the other hand, has two advantages: pastoralists at least have 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,[5] while they are able; and they can build up the livestock they require 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, one might want to consider 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. Secondly, 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. Nonachievement 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 (Livingstone, 1977).

Holdings of livestock were fairly unequal within the group and large owners were apparently 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 overuse of pasture. Experience elsewhere suggests that both the situation and the responses would occur more generally.

The explanation is no doubt 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, for subsistence animals, or even merely for employment as herders. 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. The larger the aggregate herd size, the more people will likely remain in a drought or other emergency, from which any individual household may seek help. In this sense, perhaps, 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."[6]

The Common Property Model

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 given that the explanation requires only the assumption of individual maximization of benefits. However, the individualist behaviour involved in the common property model is *assumed* or hypothesized in most discussions or (in preference to alternative possible

explanations) deduced from the existence of degradation. Alternative models of behaviour involving cooperation that predict different results can be constructed, as Runge (1981) has pointed out; choice must depend, therefore, on observation and empirical evidence.

A second empirical question is the converse one: Does individual ownership under private property yield superior results in preserving the range? Sandford (1983) offers examples to the contrary. Since rationality in our context relates to economic foresightedness, we might note that, even in industrialized countries, investments made by large companies are widely based on a rather short payback 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. One can cite specific evidence of quite remarkable range recovery from apparent degradation following one or two seasons of adequate rain. A particular difficulty of ecological measurement here is of distinguishing secular from cyclical change. Sandford refers to a number of studies that show the direction of trends to be uncertain (Horowitz, 1979; Breman *et al.*, 1979/80; Peyre de Fabregues, 1971; and UNCOD, 1977). Sandford points out that oral evidence from pastoral groups themselves is conflicting (Dahl, 1979; and Government of Botswana, 1977). 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 percent over 20-60 years...," though stressing their unreliability (Sandford, 1983, p. 14).

Changes in Pastoral Areas

A great deal of uncertainty exists about the process of degradation as well as about the applicability of the common property model. However, the model has and will become increasingly appropriate in the light of evolving circumstances in many pastoral areas.

The scope for traditional organization 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 (Livingstone, 1984). In many cases, the likelihood of a cooperative 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 northwest have moved southwards from overgrazed pastures and areas taken over for cotton cultivation, and who now graze their animals alongside those of the Maasai and Baraguyu, who have come down from the northeast because their large herds 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 that 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.[7]

Some argue 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.

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.[8]

Investment and Development Policies

As indicated at the outset, acceptance of the common property model as applied to pastoralism has affected investment and development policies 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 animals 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. Or, others agrue that the investments produce localized but damaging degradation specifically in the area of the boreholes or other constructions. The logic is in need of clarification if only, given the huge expenditure involved in water provision, to permit cost-benefit calculations, 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 that 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.

We may note first of all that, in line with the common property model, the Malthusian argument assumes competitive behaviour rather than cooperation, 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, a combination of grass *and* access to water for drinking must be present; introduction of water can thus increase the amount of "effective" grazing. Prior to investment, the new areas would have produced nothing.[9] 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, one can 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. The spots in question, however, indicate the only parts of the zone that is contributing significantly to the support of livestock.

The argument that water investments produce localized areas of severe degradation (the Sahelian tubewells are the most commonly cited example) has validity, but neglects this generally more important effect of bringing into operation new grazing areas. Such new water points, which complement those already in existence, 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. Therefore, one must distinguish between water investments that increase concentration and those that decrease it—a distinction that the literature does not consistently make.

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 to 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 risk of calamitous drought—a situation where carrying capacity is a variable rather than fixed quantity. The common property model assumes the absence of cooperative behaviour and takes for granted what is in fact uncertain evidence regarding long-term degradation of ranges. Secondly, the model is based on very simple assumptions regarding the process of degradation, a process which requires much closer specification. Nevertheless, the model may be increasingly relevant in particular parts of the pastoral world where the conditions favourable to the effective functioning of the traditional system have 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.

Notes

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[2]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."

[3]See the review in Livingstone, 1977.

[4]The extent of wind-blown grass seed will depend on the area and quality of grass in the preceding year.

[5]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).

[6]A variation of the argument that the herd is essentially communal is that individual ownership of animals and thus wealth inequality cannot be specified, each animal being the subject of a variety of indirect claims to title. Note that if the herd were effectively communal, with wealth inequality undefinable, a common property problem could not exist.

[7]For a brief review of alienation of pastoral lands in different parts of the world, see Livingstone (1984).

[8]This would apply to most Kenyan pastoralists, including the Pokot, Samburu, and Maasai.

[9]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.

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