SOCIO-ECOLOGY OF GRAZING LAND MANAGEMENT

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HIGHLIGHT
Often the technological solutions to problems arising out of low productivity of grazing lands in arid and semi-arid regions are searched in a very narrow framework. Different classes of users ranging from landless livestockmen to landed livestockmen are considered equally vulnerable in the event of a fodder crisis. The result is that either the stakes are assumed equal for each user class in conservation strategies, or policies like privatization or closure of common grazing land are suggested which affect the landless most adversely in the short as well as long term, without simultaneously organizing a water and fodder distribution network or alternative employment opportunities for these classes. Frequent droughts in these regions have impaired the ability of small farmers and agricultural labourers to adjust to the lean seasons through livestock management. Often the poor are considered responsible for environmental degradation. Government policies for wasteland development have tended to worsen the dynamics of the access differential that exists as regards pasture lands. Technicians have not viewed the multiple roles of livestockmen-cum-cultivators-cum-craftsmen and labourers. This paper makes a plea for adopting a socio-ecological approach to the problems of grazing land management in semi-arid and arid regions, if the prospects of large-scale social tensions are to be avoided.

INTRODUCTION
The ecological conditions define the mix of economic enterprises sustainable in any given region. The scale at which different classes of farmers operate, however, is a function of the access farmers have to different institutions, resources, and the technology necessary to use them. Due to frequent droughts, the household budget of most marginal farmers and labourers is in deficit, leading to indebtedness. The prevailing credit, product and labour markets make it imperative that decision making options of farmers in any one resource market are not worked out independent of constraints and opportunities obtaining in other markets (Gupta 1981a). Technological interventions bearing on improved income opportunity for different classes of farmers thus have to be appraised in the above framework to be socio-ecologically consistent. 'Access differential' is not a concept to be used only at the implementation or technology transfer stage. The way a technology is conceptualized determines in what ecological conditions, who will benefit, and how.

CONCEPTUAL FRAMEWORK
A few issues which arise while exploring technological options for rangeland management are listed below;

(1) With whom do we want to explore technological options? How do we characterize the resource-use constraints of various classes of different users of rangelands?

(2) In what time-frame do we want to appraise the results of our interventions? If the tangible results are delayed, and in the absence of alternatives the poor users do not agree to restricted access, how do we resolve this dilemma? In what time frame do different classes of users appraise their own investment options in land, labour, credit and product markets? Are the 'timeframes' the same in different markets and for various classes of farmers?

(3) At whose cost, is the improvement planned? How much stake, financial and otherwise do central, state, and district administrations have in the programs? Are local governments participating in the program merely because central assistance was available, or are they genuinely committed to the project?

(4) Whose skills in what proportion would be required for the development of the rangeland economy? Can we concentrate only on the productivity of land? If so, how do we measure productivity in terms of various outputs and their end uses? What weights do we assign to the utility of rangelands as the provider of fodder, fuel, raw material for crafts (e.g., some grasses are used for making rope, trinkets, etc.), tanning material for leather-based crafts, fibre (e.g., Agave is a very useful source of fibre), etc. Since different classes of users have different skills evolved historically in a given eco-context, this dimension could be neglected only at a great cost to the poor.

(5) Finally what level of risk was anticipated by the technicians for different classes of users? The role of risk has to be taken into account at several stages. What was the risk inherent in the traditional risk-adjustment devices of pastoralists; is this level of risk reduced or increased by the new intervention; is there a mismatch between multi-market simultaneous operations of poor households and a single market technological intervention? For instance, seasonal peaks and troughs in labour use, income profile and resource use might be managed by various household members by shifting economic enterprises. Modern technological interventions, by emphasizing only one or a few dimensions of resource use, often impair the resource shuffling ability of a household, thereby increasing the risk.

The concept of 'access differential' which operates in any technological transition can thus be understood as illustrated in Figure 1, which shows how various conditions of a household enterprise mix influence the access of the pastoralist to various markets and institutions, as well as the perception of the risk in their environment. The poor could visualize the same events as more risky if they had accumulated deficits in their cashflows in the past. The consequent stability or instability in cashflows would influence future outcomes, which in turn would generate different stakes in environmental protection among surplus- and deficit-budget households.

DIMENSION OF THE PROBLEM
The issues of access to grazing land has recently been causing a lot of stress to poor pastoralists. Some of the dimensions of these tensions are presented below to show how the socio-ecological framework will help us look for different types of technological options than conventionally explored. In the late sixties, a confidential report of the Ministry of Home Affairs, Govt. of India, traced the roots of widespread violence to the widening of disparities due to the introduction of new technologies ('green revolution') in the already better-endowed irrigated regions. Subsequently, various special area and target group programs were introduced to blunt the edges of emerging contradictions. Drought-prone area programs were introduced in the mid-seventies to restore ecological balance, provide employment opportunities to the poor and attempt to drought-proof the chronically affected regions apportioned the majority of the budget for minor irrigation (more than 50%) and

infrastructural development like chilling plants for milk. Pasture development or soil conservation received extremely meagre support. Recent evidence of violence by dominant high caste landlords against landless livestock owners in Haryana, Bihar, and Tamil Nadu has somehow not received much public attention. Closure of forest land for wildlife protection in Bharatpur (Rajasthan) and Mehboobnagar (Andhra Pradesh) has led to friction between herdsmen and forest officials. Increased vulnerability of shepherds due to reduced grazing facilities in some areas has led to long-distance migration. Such migrants, being politically weak, have been subjected to exploitation by forest officials (e.g., Dahinala, M.P., where sheep worth Rs.1.0 lakh were killed by rangers during some disputes). However, these instances of violence have some deeper structural features of the fodder crisis, which are enumerated below.

Prices of dry fodder

The introduction of dwarf varieties of cereal crops has localized the fodder reserves; in some cases the total fodder supply has gone down. Dry fodder prices in a drought year (1979-80) in the prewheat harvest period were as high as Rs.90-120 (US $ 10-13, approx.) per quintal. Inter-village differences in prices were very high, pointing to high market imperfections.

Livestock disposal due to drought

Data on livestock disposal from Haryana* reveals the following features:

a) In 1978, 1979 and 1980, the maximum disposal of livestock took place in the drought year 1979. In 1979, 40% of the animals disposed of were buffaloes, followed by bullocks, goats, camels and cows. Sheep disposal was maximum in the better rainfall year of 1982.

b) Among different reasons reported for disposal of buffaloes, the most important were fodder stress, followed by domestic consumption deficit, repayment of informal loans, sickness of animals, etc.; fodder shortage and infirmity in the case of bullocks; consumption deficit and reduced income in the case of goats; and fodder stress, among other reasons, in cases of camel disposal.

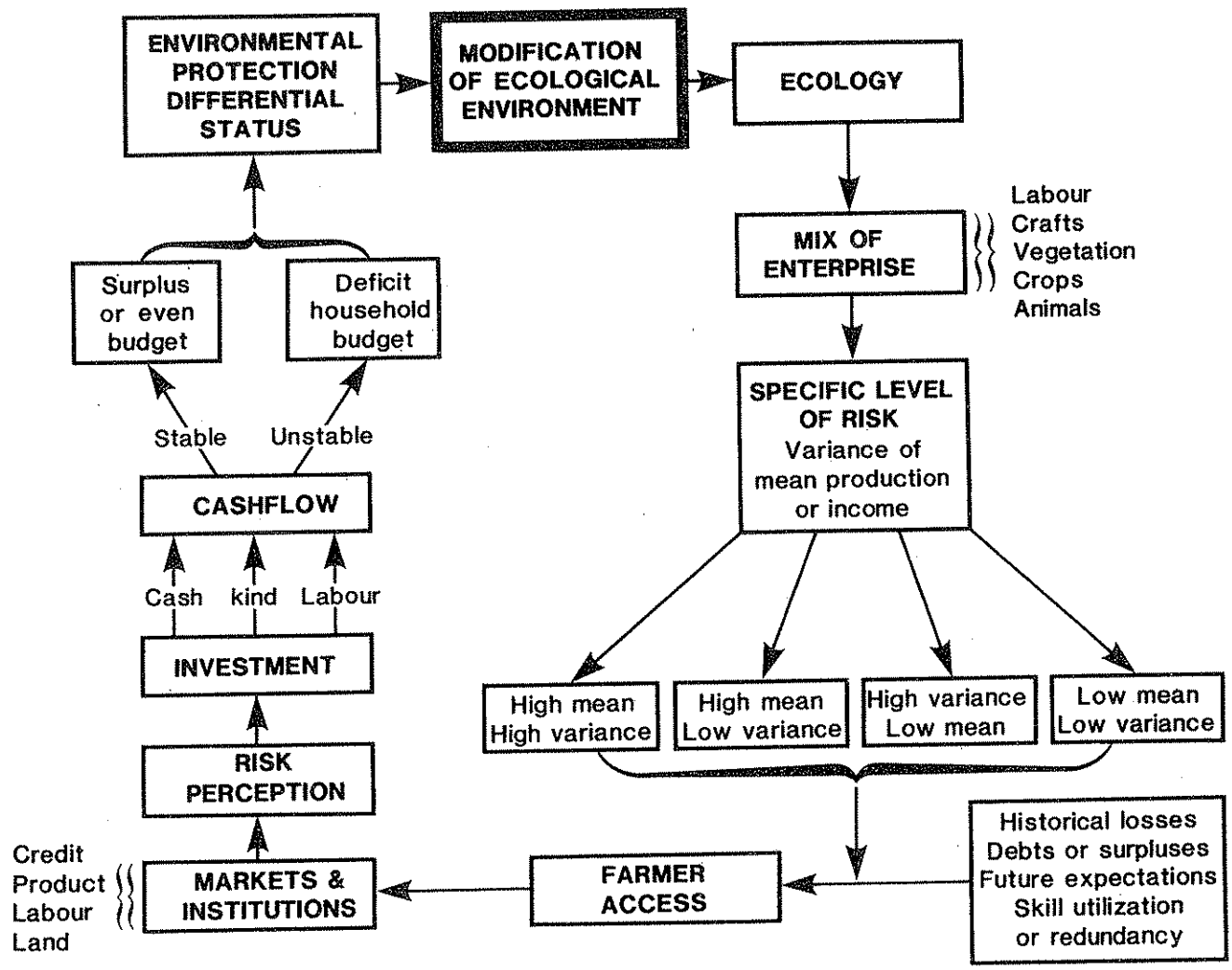
c) Most of the disposal (80%) was by small, marginal farmers and landless labourers.

d) Sheep and goats were predominantly owned by poorer marginal farmers (owning land less than 1 hectare) and small farmers (1-2 hectare landholding) owned the majority of the other animals.

e) Implications of the disposal pattern are that fodder stress, apart from domestic consumption requirements, aggravated in a drought year, forced the majority of marginal farmers and labourers to dispose of heavy grazers (buffaloes, camels, and cows) leading to greater reliance placed on close grazers (goats, sheep) as the source of livelihood. Already poor grass cover had to be grazed more closely in drought years by poorer farmers, unless the cover was so little that they migrated out of the area.

f) Generally, the close grazers were also owned by lower

Figure 1. Socio-economic framework for grazing land management.



caste farmers and labourers situated in more marginal areas.

A very strong tendency has been noted that credit resources flow to places which already have some. Credit neither climbs up hills, nor traverses sand dunes; arid and marginal regions have the majority of sheep, camels and goats (Gupta 1981b, 1984).

THE POLITICS OF ACCESS DIFFERENTIAL

1. Village common lands traditionally available to landless and other poor herdsmen were auctioned by Panchayats dominated by high caste big landlords to the highest bidders for cultivation. The poor livestock owners were excluded despite statutory reservation of some proportion for harijans. However, bigger farmers always found proxy harijans willing to be used as pawns.
2. Lessors of land insisted on sharing with tenants even the grass collected during weeding, besides grain and fodder.
3. 'Auran' lands traditionally left unexploited in the name of a village deity were being encroached upon by the farmers who remained behind when the poorer ones migrated away. Earlier, wood from such lands was never cut and twigs of dead trees were used for the funeral pyres of those whose kin could not afford to buy wood. These lands acted as an ecological buffer.
4. Even the grazing of fallow lands was restricted by landlords who used the priviledge of grazing as a means of patronage in return for a vote in the elections.
5. Generally depressions on both the sides of the road in desert regions are low lying and thus have better grass cover. Long stretches of fencing along the roads without even providing frequent crossways makes grazing difficult.
6. Large-scale plantation of Hawaiian Giant (which required water in the initial stages and thus could be grown only where some water was available) had created a false hope for the pastoralists. The leaves of these trees not only have to be cut but also mixed with some other fodder so as to make it palatable for cattle. Such a technology increased the dependence of marginal farmers and labourers on irrigated, landed farmers.
7. Several wild grasses (e.g., moonj) and plants like agave have been used for rope making by the old and women members of migrant families left behind. Agave processing almost without exception was done by low caste people. However, technologies which could improve cultivation of agave and its processing has not attracted national research resources in India.
8. In some places, as a part of a drought-prone areas development program, 100 hectare sheep and pasture development plots were established on a cooperative basis on village common lands.

As an intervention for restoration of the ecological balances, this effort was quite effective. However, the consequent social tensions somehow have not been given adequate attention (Gupta 1981c).

The problems were:

a) The lands which were allocated for closure and pasture development were not type VI or VII, i.e., the most degraded ones. To show results faster, better lands were chosen.
b) These plots were situated close to the village, obstructing the traditional passage of grazers to far off lands.
c) While before closure everybody grazed their animals on this land, after closure the income from grass seed and disposal of sheep (reared as a part of share capital contribution) was distributed only among the members of cooperatives led by high caste big landlords.
d) There was no system by which cattle required to graze the plot to help regenerate the grass could be distinguished on the basis of ownership, i.e., there were lesser charges for landless, higher charges for landed farmers.

Technological options

An overview of the various dimensions outlined above illustrates the complexity of the problem of grazing land management in semi-arid regions. While several policies aimed at different aspects of sisal economy trigger direct or indirect effects on the pastoral household, often the answers for most of these problems was assumed to be closing the common lands or encouraging cultivation of fast growing exotic fodder plants which required some water in the early stages. Future options In a separate study (Gupta 1984), it was shown that the tree density of *Prosopis cevararia* in dry regions on the land holdings of marginal farmers were highest, whereas with increase in land holding size the density decreased. In an irrigated region, the pattern reverted.

Based on a survey of more than 650 households, this finding revealed that poor farmers knew well the importance of resource preservation, particularly regarding certain tree species of which almost every part was useful. The implication is that we must shed some of our biases which imply the poor are the culprits before looking for future options. Also, since the condition of private wasteland was no better than common waste lands, the case for privatization was weak.

Some tentative recommendations derived from this analysis can be mentioned:

1. Wherever pastoral development projects requiring closure of common grazing lands are implemented, institutional arrangements for sharing revenue from those lands which were a major source of income for the poor, should be worked out.
2. A public distribution system of dry fodder should be an urgent priority in drought-prone regions. Ironically, most of the public distribution systems, even for essential items for human consumption, are concentrated in metropolitan towns or two to three states of this country. It is , therefore, extremely important that drought-prone regions are given higher attention for public distribution of fodder.
3. Many of the problems of grazing land management emerge in a drought year, when most poor households are under serious stress and when bigger farmers increase their livestock holdings by operating as buyers. It will be worthwhile, therefore, to ensure that productive animals are not sold off by poor farmers by exercising public policies that provide sustenance in such periods of stress. Alternatively, the poor will have no recourse but to keep a large number of less productive animals to meet the survival requirements as well as deal with the risks inherent in such regions.
4. There is a large number of dual-purpose livestock breeds in the dry regions of Asia which are adapted to extreme environmental fluctuations. Proper management of these breeds could often exceed the productivity levels of exotic breeds crossed with local breeds in their native environment (Jain 1984). The extensive grazing system therefore, together with upgrading of traditional breeds through proper selection, should form the core of new technological arrangements.
5. Stall feeding and extensive closures were not the answers in these regions. Often the technicians ignored the problem of mobility, which is the major means of survival for marginal populations owning livestock. On the contrary, it would be better to organize regular water and fodder points along the traditional migratory routes.
6. It is also important to legislate proper rights for interstate

migration so that undue harrassment of poor pastoralists can be checked. India has recently taken a positive step in this direction.

7. It is tragic that watershed projects implemented by soil conservationists include predominantly the activities of land shaping, bunding, etc., by foresters include tree planting, and by agriculturists include intensive cultivation. Despite the ecological terminology used by experts of various disciplines, there is seldom a systematic socio-ecological framework used by watershed planners in which proper land use policy is worked out in consonance with the interests of the poor.
8. Is it not ironic that one of the major programs for dairy development in India has not attached much importance to the problem of dry fodder? It will be useful to put the issues mentioned above in proper focus so that social scientists and technicians can work together to identify the key breeding objectives for grasses, trees, livestock and crops for dry regions.

The land use policies and institutional arrangements covering the access to provide common lands in these regions call for an extremely innovative approach in which poor pastoralists should have a significant say.

It is difficult to summarize a paper which has tried to focus attention on numerous dimensions of grazing land management in dry regions. What is important is that by using a socio-ecological framework, one can appreciate the historical differences in the way access to grazing land by different classes of farmers/pastoralists has emerged vis-a-vis various types of land markets and institutions.

This access differential should not be worsened by providing technological alternatives that on one hand substitute the irrigated crop lands with tree farming for paper and textile industries, and on the other hand intensify cultivation in dry regions by financing tractors and irrigation with the help of cheap credit.

We can conclude by suggesting that victims of the violence and tensions around the grazing land should not be made the culprits in the debate on environmental degradation. It is tragic that the problem of grazing land and supply of dry fodder have been neglected so much by all concerned. The socio-ecological approach presented in this paper provides an alternative way of according urgency to a problem that affects some of the most vulnerable sections of rural society.

We should act before their patience runs out and tensions overtake us. * These findings are based on a CMA project on Small Farmer Household Economy in Semi-arid Regions.

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