

THE IMPACT ON LIVESTOCK OF SILVIPASTURE DEVELOPMENT ON COMMON LANDS IN SEMI-ARID RAJASTHAN

C. CONROY*

* Principal Scientist, Social and Economic Development Department, Natural Resources Institute, University of Greenwich, Central Avenue, Chatham Maritime, Kent, ME4 4TB, UK

Introduction

Use of common lands in Rajasthan has been primarily unregulated and open access during the last few decades, and a large proportion of them has become degraded. During the last 15 years or so there have been many initiatives to rehabilitate them, including the World Bank-supported Integrated Watershed Development Programme, and the state government's watershed development programme and joint forest management programme.

When silvi-pasture rehabilitation and development (SPRAD) has been undertaken by development agencies in India (both state agencies and NGOs) the approach taken has normally involved enclosure of the area and long-term exclusion of all ruminants (Bhise, Vardhan and Suess, 2000; Conroy, 2000). The standard technological package has been to construct a boundary wall, and to plant trees and sow grasses within the protected area.

This approach tends to be implemented in a blanket fashion, with only slight variations and without reference to community needs and preferences or the specifics of forage resources and livestock feeding systems in the locality. Forage is only obtained from the enclosed areas through cut-and-carry, and has to be stall-fed. In joint forest management (JFM) programmes - and sometimes in other rehabilitation programmes, such as Maharashtra's watershed development programme (Bhise, Vardhan and Suess, 2000) - lopping of trees tends to be prohibited. Thus, the principal (sometimes only) kind of forage harvested from the protected sites is grass.

A goat research project¹ managed by BAIF Development Research Foundation and the Natural Resources Institute (NRI) was interested in the potential of this kind of intervention for relieving seasonal feed scarcity for goats and other livestock. However, a review of the literature on silvi-pasture development in Rajasthan (Conroy, 2000) found that there was very little information in the existing literature on the effect of these initiatives on livestock, including their feeding systems and numbers. Thus, in late 1999 the project commissioned 15 case studies of silvi-pasture development interventions that had been initiated in the 1980s or the early 1990s, with a view to filling in these and other knowledge gaps. Analysis of data from the case studies is still being done, but the general nature of the findings is already clear.

The case studies were undertaken by BAIF, and four NGOs based in Rajasthan's Udaipur district, namely: Hanuman Van Vikas Samiti, Prayatna Samiti, Seva Mandir, and Ubeshwar Vikas Mandal. So far, eight of the case studies have been published, those by Seva Mandir (Jain *et al.*, 2000) and Ubeshwar Vikas Mandal (Saint, 2000). The Society for the Promotion of Wastelands Development also provided inputs, through its western region programme office in Udaipur.

Materials and Methods

Selection of cases

The 15 cases were selected to represent a wide range of types of SPRAD and of experiences, including:

- SPRAD on pasture lands, initiated by NGOs;
- SPRAD on pasture lands, initiated by the forest department (FD);
- SPRAD on forest lands, initiated by the FD; and
- community-initiated forest management.

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All of the cases were ones with which the NGO undertaking the case study had some familiarity, and in most cases the NGO had had some involvement in SPRAD with the community concerned.

Data collection

A 12-page checklist of topics and information to be covered in the case studies was developed by the author and the NGOs, and a copy of the final version was given to all of the researchers undertaking the case studies. Preparation of the case studies was based on a combination of secondary and primary data collection. Where the researchers had access to project records or other secondary data, they were encouraged to make full use of these sources, and only to collect primary data where necessary.

The general approach used to collect primary data was semi-structured, group discussions, using the checklist. Researchers were given a lot of flexibility as to the sequence in which topics were covered and the precise methods they used. However, particular methods were specified for two topics. To assemble information about how forage from protected silvi-pasture areas (PSPAs) had been utilised and incorporated into livestock feeding systems, researchers were asked to use seasonal feed calendars (see Figures 1 and 2 for examples). A specific methodology was also developed for estimating the stock of woody biomass on each site.

Results and Discussion

Results

The case studies found that when the SPD interventions were planned their likely impact on livestock was unknown (at least to the development agencies involved), and hence was not taken into account in the design of the intervention.

Pattern of livestock ownership In socially heterogeneous communities the pattern of livestock ownership can vary considerably between sub-groups (see Table 1 for an example): hence this kind of intervention can affect different sub-groups in different ways. Poorer groups tend to own less large ruminants, particularly buffaloes, and more goats. Members of one particular caste, *Gayris*, tend to own large number of sheep.

Utilisation of forage from PSPAs In all but two of the cases the grass from the PSPA was harvested, usually in November or December, and then stored for a period of time, which varied considerably. In several villages people stored the grass for a few months, feeding it in the dry season or even in the early rainy season. The harvested grass was fed almost entirely to large ruminants, as can be seen from the example given in Figures 1 and 2.

Impact on livestock numbers The researchers collected data on the current populations of each kind of livestock in the village, and attempted to get similar data for the year in which work on the PSPA was initiated. The historic data can only be obtained via people's recall or from census data, neither of which is particularly reliable. Nevertheless, the best possible data were obtained, so that some sort of comparison could be made. Interpretation of changes in livestock populations is the next challenge, as the PSPA may be only one of several factors that have contributed to changes. Other factors include: shifts from draught power to tractors; the introduction of irrigation facilities, which may increase the demand for draught power; reduction in farm sizes; and the establishment of a dairy milk cooperative in the village. Nevertheless, since the case studies also contain information about these other factors, it is possible to make some allowance for them when assessing the impact of the PSPA.

The numbers of **large ruminants**, particularly cows, tended to decrease. This was associated with an intensification of the production system, increased productivity of the remaining animals and a shift to stall-feeding. However, in some villages there have been marked increases in the buffalo populations, among relatively better-off farmers, which is also associated with the commercialisation of milk production and improved marketing infrastructure.

The research found that livestock-keepers who primarily own **small ruminants** are adversely affected by enclosure of common lands when the enclosed site constitutes a large proportion of the common grazing land in the vicinity of their village. This was more common under government programmes,

such as JFM, but sometimes occurred under NGO programmes as well. The size of the goat herds owned by these households was found to decline by as much as two-thirds (Jindal, 2000; Kashwan, 2000), for example from 15 to five. The *Gayri* caste, who own large flocks of sheep and are more dependent on livestock than the other castes, were perhaps the worst affected. They were obliged either to sell-off their sheep or migrate for several months to grazing areas distant from their village (Vardhan, 2000).

Discussion

Utilisation of forage Some previous studies of PSPAs have been disappointed to find that they only provide a small proportion (e.g. 5-10%) of the total forage needs of the livestock in the community concerned. However, the findings of these case studies show that the significance of forage from PSPAs should not only be judged on the basis of quantity, but also on the timing of the use of that forage. Where the forage is being stored for use in times of scarcity it may mean that the owner no longer needs to purchase forage at those times, or that the animals can be maintained in a better condition nutritionally.

The year 1999/2000 was a drought year in Rajasthan, and the case studies contain information about the use of PSPAs under drought conditions. In several cases, the local people said that the grass from the PSPA had enabled them to avoid purchasing grass from outside; and some people who had been obliged to sell animals during the 1987 drought said that the PSPA had saved them from doing that in the recent drought.

In the case of large PSPAs poorer people, especially tribal women, tend to sell some of their share of the grass: this can constitute a useful source of income for them.

Differential impact on livestock There is a major problem with the equity and social sustainability of the conventional approach to SPRAD in a large proportion of the situations in which it has been applied. There are often sub-groups within the villages that the development agencies work with, who are dissatisfied as they want to continue to graze their animals on at least part of the site that has been enclosed. This is particularly the case for people with sheep or goats, as small ruminants are less well-suited to stall-feeding. (In addition, goats prefer to browse the leaves (and pods) of trees and shrubs, rather than to graze ground vegetation, so grass normally forms a smaller proportion of their diet than that of other ruminants.) People whose livestock are primarily small ruminants, particularly goat-keepers, tend to belong to the poorer groups. In Rajasthan they are usually marginal or small farmers, and in other states they also include the landless.

The social and economic consequences of reductions in small ruminant numbers can be serious. As goats are a liquid asset and a valuable source of income, such reductions may have serious ramifications for the welfare of the household members. They may be forced to try and find other sources of income, such as wage labour (Kashwan, 2000), but there is no guarantee that wage labour will be available when needed. Migration of the *Gayri* men with their flocks of sheep imposed extra burdens on women, who had to take over responsibility for supervising agricultural operations (Vardhan, 2000).

Such impacts on small ruminant owners have also been observed in other states. In Maharashtra it has been noted that sheep-owners "as a result of the ban on grazing, are compelled to shift their livelihood strategy ... by way of selling off their herds or by migrating to neighbouring villages to graze their herds" (Bhise, Vardhan and Suess, 2000). In Andhra Pradesh, it has also been observed that poor goat-keepers have been adversely affected by enclosure of common lands (Ramdas, 2000).

When the development agency withdraws the dissatisfaction can result in breakdown of the protection system, resumption of uncontrolled grazing and a reversion to degradation of the resource (Bhise, Vardhan and Suess, 2000). Thus, there is a clear need, on both equity and sustainability grounds, for Indian development agencies to take a more sophisticated and flexible approach when rehabilitating common lands. At present, only two situations are normally found, neither of which is satisfactory for the reasons mentioned above, namely: **regulated use of the resource without grazing, or unregulated use of the resource with grazing.**

Summary and Conclusions

The case studies found that when the SPD interventions were planned their likely impact on livestock was unknown (at least to the development agencies involved), and hence was not taken into account in the design of the intervention. In socially heterogeneous communities the pattern of livestock ownership can vary considerably between sub-groups: hence this kind of intervention can affect different sub-groups in different ways. The ban on grazing tends to be disadvantageous to owners of goats and sheep, and buffalo-keepers tend to benefit most from the grass that is used in stall-feeding.

The case study findings highlight the need for a more participatory and flexible approach to SPD on common lands. Local communities should be encouraged to take part in planning and designing interventions to meet specific livestock development objectives that are set by the communities themselves. The objectives chosen would influence the selection of tree and/or shrub species, the tree planting density, whether or not grazing was permitted at certain times of the year and other aspects of the technology.

There is a need to investigate other options for silvi-pasture rehabilitation and management, including a range of options involving **regulated grazing**. Such options include:

- grazing of large ruminants at the end of the rainy season, without cut-and-carry;
- closure of site from July to December, followed by grazing from January to June;
- closure of site during the rainy season (July-September);
- hybrid management systems, in which part of the common lands is closed, but regulated grazing is allowed on another part;
- regulated lopping of trees.

The author – in collaboration with BAIF, Seva Mandir and other organisations – has developed plans for a three-year research project to explore these issues and develop more participatory approaches to SPRAD. If funding is forthcoming, this project will start at some point in 2001.

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Tables and Illustrations

Figure 1 Feed Calendar for Large Ruminants in Jogyon Ka Guda

Source	Siyala (Winter)		Hunala (Summer)		Chaumasa (Rains)	
	Nov.-Dec.	Jan-Feb.	Mar.-Apr.	May-Jun	Jul-Aug	Sept-Oct
Loppings				1	2	
Stored Crop Fodder	6	8	5	3		
Grass from protected area	6	5	9	10	8	
Concentrate/Grains	1	1	1	1	1	
Cultivated green fodder – Barseem						
Open Grazing	3	2	1	1	1	4
Green Grass cut					4	12

(Source: Saint, 2000)

Figure 2 Feed Calendar: Small Ruminants in Jogyon Ka Guda

Source	Siyala (Winter)		Hunala (Summer)		Chaumasa (Rains)	
	Nov.-Dec.	Jan-Feb.	Mar.-Apr.	May-Jun	Jul-Aug	Sept-Oct
Loppings	6	5	3			
Stored Crop Fodder						
Grass from protected area				2		
Concentrate/Grains	1	2	2	1	1	
Cultivated green fodder – Barseem	1	1	1	1		
Open Grazing	8	8	10	12	14	14
Green Grass cut					1	2

(Source: Saint, 2000)

Table 1: Caste-wise livestock ownership profile at present (1999 – 2000)

	<i>Bhils</i>		<i>Rebaris</i>		<i>Rajputs</i>		Total
	<i>Total</i>	<i>Avg.</i>	<i>Total</i>	<i>Avg.</i>	<i>Total</i>	<i>Avg.</i>	
Households	32	-	63	-	7	-	102
<i>Beeds</i> (in bigha)	40.5	1.3	445	7.1	35	5	520.5
Agricultural land (bigha)	45.5	1.4	153.5	2.4	22	3.2	221
Buffaloes	2	0	61	0.97	11	1.6	74
Cows	22	0.7	60	0.95	3	0.4	85
Camels	0	-	102	1.6	0	-	102
Bullocks	40	1.3	29	0.5	8	1.2	77
Goats	117	3.7	213	3.4	11	1.6	341

(Source: Jindal, 2000)