

## Institutional and technological options for sustainable intensification of community based Silvi-pasture systems in arid ecoregions

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*Paper presented at the 23<sup>rd</sup> International Grassland Congress: 20-24 November 2015, New Delhi, India*

[DOI: 10.13140/RG.2.1.1990.2808](https://doi.org/10.13140/RG.2.1.1990.2808)

**Introduction:** In arid ecoregion of Rajasthan, India, common pool resources (CPRs) like common pastures and village water bodies provide ecosystem services such as fodder, fuel, timber, water and medicinal plants which are crucial for the livelihoods in particular of the poor. In western Rajasthan livestock keeping is the most important and resilient component of the agricultural systems which strongly depends on common pastures. However, the grazing areas have become severely degraded making the rural poor more vulnerable. A number of efforts have been made to improve the management of and rehabilitate the community pastures (Conroy and Lobo, 2002; Agrawal, 2003). The success of such initiatives was unreliable and even the strong involvement of elected village councils (Panchayats) has not helped. Post-project sustainability of new management practices remains uncertain due to cumbersome social dynamics, neglect of institutional arrangements as well as an overemphasis on technical and externally controlled interventions (Jodha, 2001; Chaudhry et al., 2011; Mishra and Kumar, 2007). Previous empirical research using the social-ecological systems thinking and framework (Ostrom, 1990, 2007; Wade, 1998; Baland and Plateau, 1996) has helped to better understand CPR governance challenges. Nevertheless, there is still no clear answer to the question why common pasture management works out in some Rajasthan communities and fails in others.

**Objectives:** As part of the CGIAR research program on Dryland Systems, a study was conducted in arid western Rajasthan on the people's perceptions on the causes leading to degradation of common pastures and the factors hindering sustainable management and rehabilitation efforts. Another objective of the study was to facilitate the participatory assessment of natural resource management and institutional options for sustainable intensification of community silvi-pasture systems.

**Approach, process and method:** The study was undertaken in three villages in western Rajasthan, India: Govindpura/Jodhpur, Dhok/Barmer, and Damodara/Jaisalmer. The selection of sites was based on community and experts' consultation, secondary data and geo-spatial analysis. On the basis of multiple indicators communities have been identified which are representative for the arid and vulnerable ecoregions along a rainfall gradient (annual rainfall rises from 170 mm in Jaisalmer to 280 mm in Jodhpur). Adverse weather conditions result in negative water balance for 9 to 11 months in a year and frequent droughts (every year to 2.5 years). Approximately 4 years ago in Dhok and Govindpura a new management regime was introduced for part of the community pastures as part of development projects. Nevertheless, the projects did not prevent the pastures to severely degrade. In Damodara no project was implemented and the pastures are in a severely degraded state.

The study has been structured on the basis of the IAD framework. Information on the attributes of the community, biophysical conditions, and rules in use are collected. In a first step a literature review was undertaken on institutional mechanism, drivers and processes of success and failure of CPR management. In a second step, empirical socio-economic data have been collected using multiple methods such as a field-survey (n = 70), transect walks, and key-informants interview at all three study sites. Especially in focus group-discussions people’s perceptions on factors and drivers of success and failure of CPRs management systems have been revealed.

In a third step, the outcomes of the case study analyses and the group discussions were used as a starting point for facilitated community elaborations on how to adopt institutional arrangements and especially by-laws. The opportunities and challenges of sustainable intensification of community based pasture systems were included in this discussion. As an outcome of these discussions an action site of 10 ha degraded common pastures were identified in each of the three communities to test silvi-pasture rehabilitation options. The plant species for the silvi-pastures were selected by using the participatory Mozer-framework matrix.

Table 1: Some characteristics of CPRs in the selected villages

Particulars	Dhok	Govindpura	Damodara
Long term average annual rainfall, mm	235	280	170
Number of households	355	150	157
Total livestock number	19,633	3,153	20,663
Total area of common pasture, ha	250	32	45
Part of the pasture treated in recent past	Yes	Yes	No
Livestock dependence on CPRs and fallow lands*	Very high	High	Very high
Current status of common pasture- biomass*	Degraded	Highly degraded	Severely degraded

\* Based on ratings given by the community

**Results and Discussion:** The livestock in all the three selected villages was heavily dependent on common pastures (Table 1). Most pastures were moderate to severely degraded. According to stakeholders’ perceptions the major factors for poor management were the lack of effective boundaries, the lack of accountability for resource management and regeneration, inequities, and the lack of involvement of key stakeholders (smallholder livestock keepers and women). Farmers do hardly participate in the pasture governance. As a consequence there have been hardly any effective management institutions and the situation is close to open-access. This results in overgrazing and over-extraction of CPRs. The analysis of stakeholders’ perceptions and review of previous studies suggests that a critical constraint in the rehabilitation efforts is heterogeneity of group interests. Within each village, different groups like small-ruminant keepers, cattle keepers, landless, smallholders and large farmers had different perceptions, engagements and response to CPRs management interventions. In many cases influential people who focus on productivity-enhancement dominated the management. Groups of higher socio-economic status favour complete protection of common-pastures, while resource poor small ruminant-keepers demand open grazing. Women livestock keepers practicing the cut and carry system significantly contributed to better management of common-pastures. Another aspect is the low economic viability of livestock keeping. Farmers do not want to invest time in pasture rehabilitation because expected individual benefits are low and cooperation of fellow farmers is uncertain. In peoples’ perception there was a vicious cycle of poor governance leading to CPR degradation, low productivity and loss of interest of community resulting again in poor governance.

The study indicates that the Panchayats, who are currently responsible for managing CPRs, were not capable of managing the pastures alone, but the communities (hamlet level) were the key players and should have equitable benefits and property rights. Lesson we learned is that all stakeholders should be given equal opportunity to participate in the governance structure. It should not only be dominated by the voluntary participants ready to join it in early phase of CPRs development.

Based on above described analyses, the project created awareness amongst key stakeholders for the different elements and links within their pasture management system. They have been encouraged to review their governance system and propose changes. Interestingly, across three sites different by laws emerged. We believe that this is linked to different local situations for example social norms, livestock composition, feed and fodder supplies. Our research facilitated participation of all sections of users in formulating bylaws and governance structure, enhancing economic viability via introducing horticulture and agroforestry trees and highly productive and adapted grasses, as well as soil and water conservation measures to increase moisture availability and reduce soil loss. Active participation of all sections of the village ensured that the burden and benefits of new institutional arrangements are shared equitably.

## References

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