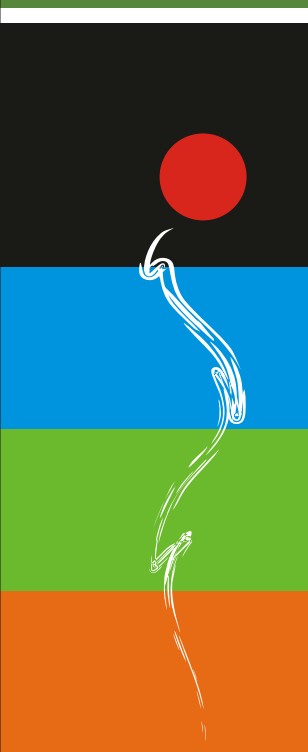


Climate Change

Vulnerability & Adaptation
Experiences from Rajasthan &
Andhra Pradesh

PLD Pasture Land Development

Case Study
INDIA



The 'Vulnerability Assessment and Enhancing Adaptive Capacity to Climate Change in Semi Arid Regions in India' (V&A) programme in brief

The Swiss Agency for Development and Cooperation (SDC), recognising the risks that climate variability and change pose to livelihoods of rural communities in semi-arid regions of India, supported a process-oriented pilot programme on 'Vulnerability Assessment and Enhancing Adaptive Capacity to Climate Change in Semi Arid Regions in India' (V&A). The programme was implemented in the period from 2005 to 2009 in two semi-arid regions in India, namely Udaipur district in Rajasthan, and Mahbubnagar district in Andhra Pradesh. The overall goal of the V&A Programme was to secure the livelihoods of rural poor and vulnerable communities by promoting adaptation measures that enhance their capacity to better cope with adverse impacts of climate change and by improving their disaster preparedness.

The programme had **three specific inter-linked objectives**:


- **Objective 1:** To build community level capacities with regard to best practices and technologies in the agriculture, water and energy sectors.
- **Objective 2:** To optimise the service delivery system and services at selected sites in semi-arid areas in India.
- **Objective 3:** To promote policy dialogue and advocacy at different levels.

A range of field activities, some of them building on and aligned to traditional local adaptation practices, were tested in the particularly climate sensitive sectors of water, agriculture, rural energy and livestock. The field interventions helped identify measures and mechanisms for reducing the vulnerability to climate hazards of the poorest social groups in these regions. The emerging lessons were analysed with a view to informing policy processes at state, national and international levels by demonstrating a way forward for integrating development strategies with climate change adaptation.

The programme built on the collaboration between various actors with complementary strengths. A National Consortium, for overall management of the programme, comprised three partners, namely **M.S. Swaminathan Research Foundation (MSSRF)**, **Action For Food Production (AFPRO)**, and the **National Institute of Agriculture Extension Management (MANAGE)**. An International Consortium for backstopping, quality assurance and facilitation of continuous exchange with ongoing international policy processes was constituted by **INFRAS** and **Intercooperation (IC)**.

Mahabubnagar district in Andhra Pradesh and Udaipur district in Rajasthan were selected for implementation of the programme, as rural communities in these districts are among those most vulnerable to climate variability and are likely to be highly impacted by climate change. A multi-stakeholder process and a set of pre-defined criteria, including manifestation of climate hazards and evidence of social organization at village level, helped identify two villages for programme implementation in each district, namely **Kothur** and **Srirangapur** in Mahbubnagar district of Andhra Pradesh and **Amda** and **Kundai** in Udaipur district of Rajasthan.

For further details on the V&A pilot programme and a detailed analysis of the vulnerability of the communities selected for implementation of the programme, see the 'Introduction' or visit the V&A programme website www.climateadapt.net.



Climate Change

**Vulnerability & Adaptation
Experiences from Rajasthan &
Andhra Pradesh**

PLD Pasture Land Development

Case Study
INDIA 



Climate Change

Vulnerability reduction and adaptation to climate change in semi-arid India - Pasture Land Development

The use and sharing of information contained in this document is encouraged, with due acknowledgment of the source.

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This is a publication from the SDC supported Vulnerability Assessment and Enhancing Adaptive Capacity to Climate Change in semi - arid India (V&A) Programme

Citation:

V&A Programme (2009) Vulnerability and Adaptation experiences from Rajasthan and Andhra Pradesh: Pasture Land Development SDC V&A Programme, India.

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Acronyms

LULUCF	Land Use, Land Use Change and Forestry
NAPCC	National Action Plan on Climate Change
WDR	World Development Report

Acknowledgements

This case study could not have been prepared without the committed collaboration of all partners in the *Vulnerability Assessment and Enhancing Adaptive Capacity to Climate Change in Semi Arid Regions in India (V&A)* programme. In particular, we gratefully acknowledge the time and efforts invested by the local communities of Amda and Kundai villages, Udaipur district, Rajasthan, to share their views and provide valuable feedback on the programme throughout the preparation of this documentation. We owe special thanks to the AFPRO field unit of Udaipur, as well as to the local NGO partners Sahyog Sansthan and Vikas Sansthan (Udaipur district, Rajasthan), for all their support in data collection, for facilitating numerous field visits and ensuring that field realities are well understood by all partners and reflected in the documentation.

We are also grateful to Mr. Vishnu Sharma, who has helped to make field visits in Rajasthan extremely fruitful and who has supported the preparation of this documentation through his extensive knowledge and decades of committed work in rural areas of Rajasthan.

In addition, this study has benefitted hugely from valuable comments that were provided by Dr. K.R. Viswanathan, SDC, Mrs. Annet Witteveen, Intercooperation, Dr. C.K. Rao, Intercooperation, and Prof. Dr. T.N. Balasubramanian, MSSRF.

Executive Summary

Diversified livelihood systems with a livestock component have a high capacity to deal with multiple stresses and are well adapted to the harsh climatic conditions of semi-arid areas in India, characterized by erratic rainfall patterns and recurrent deviations of annual rainfall. However, climate variability and emerging climate change will have adverse effects on the natural resources that sustain fodder production for livestock and thereby pose a considerable threat to the mixed crop-livestock systems of rural communities in these areas. Pasture lands, which are already highly degraded in many semi-arid parts of India due to the absence of appropriate management practices, are at risk of further degradation through the expected climate change impacts, particularly more concentrated rainfalls and longer dry spells.

The villages selected for implementation of the SDC supported *Vulnerability Assessment and Enhancing Adaptive Capacities to Climate Change (V&A)* pilot programme in Udaipur district, Rajasthan, are characterized by high dependence of people's livelihoods on livestock, with small ruminants playing a particularly important role for poorer households; low productivity of livestock activities resulting, amongst other factors, from lack of fodder availability; and high vulnerability to impacts of climate variability and climate change of the natural resource base needed to sustain livestock activities. Therefore, addressing the increased risk of land degradation through the expected future climatic conditions was one of the priority issues under the programme. In order to enhance climate resilience of the rural livelihoods, communities were encouraged to take up activities to protect pasture lands and develop them through the adoption of a range of soil and water conservation measures. A central element of the activities was to enhance the capacities of the communities to jointly manage and maintain these pastures and set up buffer stocks of fodder for periods of stress.

The V&A experience has shown that protecting pooled private and common land, in combination with soil and water conservation measures, has been effective for raising the productivity of the land to a level that sustains the communities' fodder needs throughout the year even if rainfall was below average and highly erratic. The piloted measures thus have a potential to help secure people's livelihoods under a climate change scenario. In particular, the V&A experience has shown that community-based approaches to managing commons in a sustainable way are viable, and that the problem of land degradation due to neglect of maintenance can be overcome through clear stakes. Therefore, by supporting joint management and maintenance systems, communities can be better equipped to effectively respond to the challenges posed by climate change.

1. Introduction

Mixed crop-livestock systems¹ are a traditional livelihood strategy of many communities in semi-arid rural areas all over the world. They are well adapted to climatic conditions characterized by erratic rainfall patterns and recurrent deviations of annual rainfall of 50 per cent and more below average. Diversified livelihood systems with a livestock component are flexible and have a higher capacity to deal with multiple stresses in general, and with a dry and drought-prone climate in particular (Morton 2007).

However, climate variability and emerging climate change in semi-arid areas in India pose considerable threat to the natural resources that sustain fodder production for livestock. Pasture lands, in absence of appropriate management practices, are at risk of further degradation with precipitation expected to occur in future, in more concentrated rainfall events interrupted by longer dry spells. Loss of grazing lands may result in more intensive management practices, increasing competition between land for food grain cultivation and livestock activities, or decreasing livestock populations, undermining the security function that livestock rearing provides.

Many traditional systems for collective management of pasture lands have existed in Rajasthan, where livestock rearing and transhumance have been

an important part of people's livelihood strategies in the face of a harsh environment and highly variable climate.

Contributing to the regeneration of common and private pastures was identified as one of the key entry points for enhancing climate resilience of the rural livelihoods in Udaipur district in Rajasthan under the Vulnerability Assessment and Enhancing Adaptive Capacities to Climate Change (V&A) pilot programme. Communities were encouraged to take up activities to protect pasture lands and develop them through the adoption of a range of soil and water conservation measures. A central element of the V&A approach was to enhance the capacities of the communities to maintain and manage these pastures and set up buffer stocks of fodder for periods of stress. The underlying hypothesis was that building management systems for common and collective private lands and fodder banks in the communities can enhance their adaptive capacity to deal with climate stresses and emerging climate change.

The V&A experience has shown that improving the productivity of common and private pasture lands has helped communities to be better equipped to effectively respond to the challenges posed by climate change. It has also shown that community-based approaches to managing commons in a sustainable way are viable, and that the 'tragedy of commons' can be overcome through clear stakes.

This case study will first provide some background about the traditional pasture management systems and the importance of livestock as a livelihood asset in Rajasthan. The linkages between livestock, pastures and climate risks will be illustrated. Subsequently, the study will go into the details of the interventions on common and private pastures initiated under the V&A pilot programme. The outcomes will be analysed against the background of vulnerability to climate risks. Finally, some key lessons will be drawn from the experience with regard to planning and implementing pasture land development, and options for upscaling such interventions will be laid out.

¹Also referred to as 'mixed farming' or 'integrated farming systems'.

2. Livestock, pasture and climate risks in Udaipur district, Rajasthan

2.1 History of common land resources in Rajasthan

Rajasthan is the largest state in India with a geographical area of 34 million ha and a population of 56 million. Two thirds of the total geographical area is desert. Average rainfall varies significantly between the western part which receives an annual rainfall of 100 mm, and the south eastern part, which receives 650 mm. The period of monsoon is short compared to other parts of India, ranging around 2 to 2.5 months (July to September), and dry spells are a common phenomenon. About 90 per cent of the total rainfall is received during monsoon season. There is also great spatial and temporal variation in rainfall. Two thirds of its population is dependent on agriculture, with 70 per cent of the area being primarily rain fed.

Common property resources, including pastures, constitute an important component of livelihood assets of communities in semi-arid areas of India and offer vital income and sustenance opportunities in the harsh agro-climatic conditions (Jodha, 1995). Accordingly, Rajasthan has a long history of well-designed management systems for pasture lands. These management systems have emerged in light of the key role that livestock plays in people's livelihoods and for the local economy.

Before independence, community pasture land management in Rajasthan was entrusted to '*thikandedars*' or 'caretakers' who were appointed by the Princely States. These caretakers were responsible for ensuring the productivity of the pastures. To this end, they adopted soil and water conservation measures, facilitated the growth of vegetation, and controlled livestock rearing. The caretakers were also responsible for preventing misuse and encroachment by the individual villagers (Hedge et al., 2003).

After independence, with the transfer of power from the Princely States to the State Government of Rajasthan, the management of common properties was handed over to government authorities at different levels. Today, common lands in Rajasthan fall under 3 categories: Village community pastures (*Charagah* or *Charnot*), which have been entrusted to the Gram Panchayats, revenue wastelands, which fall under the authority of the Revenue Department; and forests, which are under the authority of the Forest Department.

The first of these categories, village community pastures, should in theory be accessible to all groups and classes of the rural communities. Sadly, lack of resources and accountability on the part of the Gram Panchayats has resulted in large-scale mismanagement of common lands in many places. Only very few communities have taken autonomous initiatives to develop common properties. Overgrazing and excessive cutting of bushes and trees for fodder and fuel are wide spread, which in turn causes soil erosion, leaving large areas of common pastures in poor conditions². This process of erosion of common property resources in rural areas in Rajasthan despite their significance as components of the agricultural resource base has been highlighted by scientists for several decades (e.g. Jodha, 1983).

The common pasture lands in Rajasthan also tend to be situated in ecologically highly sensitive contexts. Specific topographic and climatic characteristics of the region add to the risk of degradation of the vegetation cover and soil erosion. Recurrent droughts over few years have often led to significant losses

²The challenges that occur in the context of consumption of common property resources in absence of appropriate common property regimes have been the subject of extensive research and scientific debates ever since Garret Hardin published his influential article on 'The Tragedy of Commons' in 1968. The basic argumentation was that individuals who consume shares of an open-access resource do not bear the full cost of resource degradation, which tends to result in over-exploitation of such resources, or 'free-riding' in economic terms. It is argued that rational individuals who maximize their private utility cannot agree on collective outcomes (formalized in game theory as the 'prisoners' dilemma'). Refined analyses of such dilemma situations in relation to common property resources have concluded that the 'tragedy of commons' can be overcome through assignment and effective enforcement of property rights, including to groups of individuals (Ciriacy-Wantrup and Bishop, 1975, Runge, 1981, Bromley and Cernea, 1989). Typical reasons why commons suffer unsustainable levels of exploitation have been found to be institutional failures to control access to the resources, and to make and enforce internal decisions for collective use (Cox, 1985).

of tree cover on common lands, which led to a decline of important buffer stocks of fodder. In addition, when heavy monsoon rainfalls hit the undulating terrain after long dry periods, large amounts of silt and sand are washed away by the runoff. The soil cover is very thin and a few cycles of such erosion can render the land unproductive.

Of the 1.194 million ha common pasture lands in Rajasthan, over 40 per cent are marked by extremely low productivity and considered 'wastelands'. Over the decades, many of these lands have lost their capacity to regenerate as the occurrence of native grasses and wood species has continuously declined and passed below a critical threshold.

As the village pastures in Rajasthan are traditionally used for open grazing and are left without fencing, encroachments by individual families have emerged as a great problem that further restricts the community benefits from these lands. Typically, encroachments on common lands are made by the more powerful and influential members of the village communities. In some cases, rich landlords facilitate encroachments on common land by the weaker sections, as a method of buying their cooperation or silence (Conroy and Lobo, 2002; Patel and Kashwan, 2008). Dealing with encroachments has been a major hurdle for communities to take joint action towards improving the productivity of their commons. Many communities have not overcome the inherent challenges in removal of encroachments, namely protesting against influential and powerful community members, deferring individual stakes and interests to public benefits and dealing with rekindling old animosities between different groups, which indeed bear a risk of undermining the social cohesion of the community. Government programmes such as land allotment for housing plots or to landless households have been other factors alienating such lands from public use.

2.2 Importance of pasture lands as a livelihood resource for the poor



Figure 1: Goats are important livelihood resources of poor people

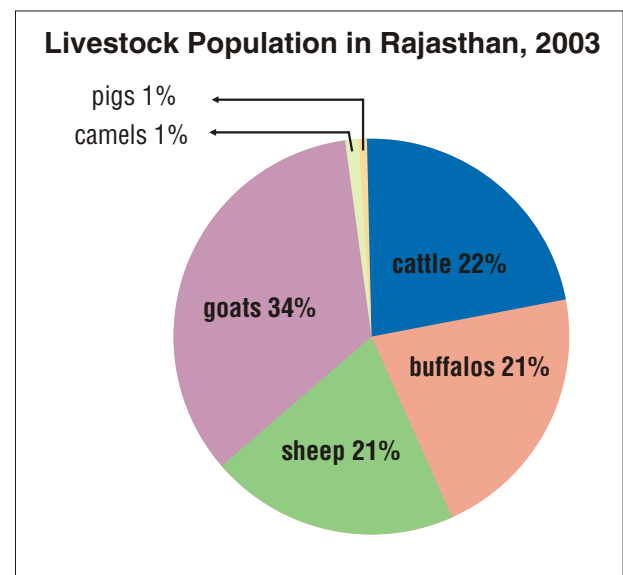


Figure 2: Total Livestock population in Rajasthan, 2003.
 Source: 17th Livestock Census of Rajasthan,
http://animalhusbandry.rajasthan.gov.in/livestock_census.asp.

Village commons in Rajasthan constitute an indispensable part of the livelihood basis of rural communities. They are the primary source of fodder for grazing animals, but also a source of fuel wood and many important non-timber forest products. The poorer segments of the rural society depend disproportionately on the common pastures, as they derive a larger share of their income and sustenance from livestock rearing, particularly of small ruminants. As goats are generally non-migratory in Rajasthan and maintained through browsing on natural vegetation and tree lopping, village pastures play a particularly important role in the sustenance of the goat population in the villages. Of the total livestock population in Rajasthan, small ruminants constitute 54 per cent (34 per cent goats, 21 per cent sheep).

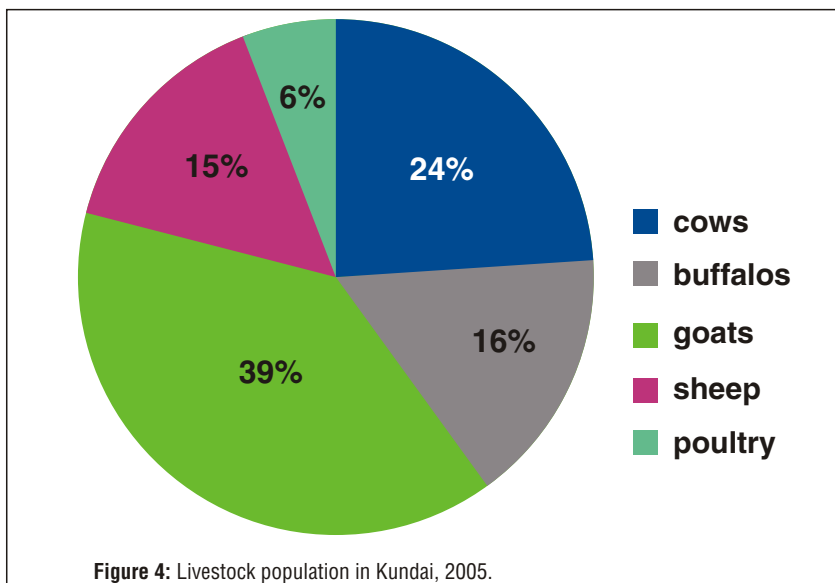
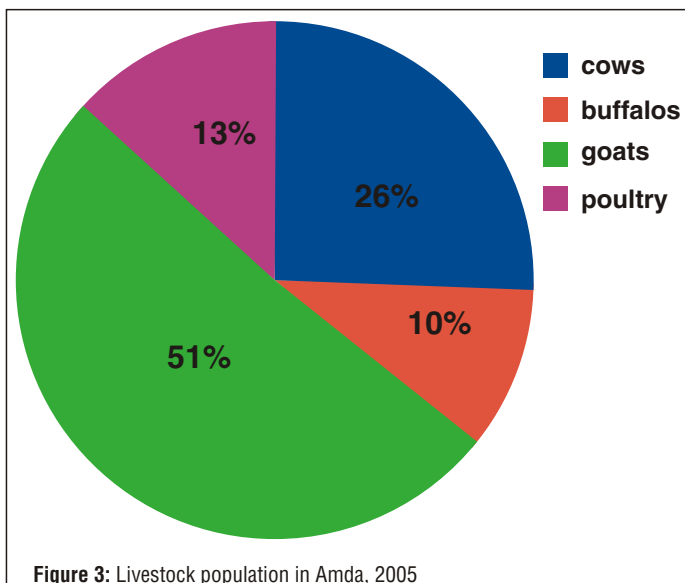
For small and marginal farmers and landless agricultural labourers, goats and sheep are valuable assets for various reasons: First, with low initial investment, they provide regular income through sale of milk or wool as well as meat, and also contribute to the families' balanced nutrition. Second, small ruminants play an important role in buffering or smoothing expenditures of poor households as they can be sold flexibly at low transaction costs (World Bank 2001), which is also important for families who migrate seasonally to cities for labour. Third, small ruminants can live on low quality feed resources, like the shrubs and trees they find on open grazing pasturelands (Intercooperation 2008). In the villages selected for implementation of the V&A pilot programme in Udaipur district, a situation analysis undertaken in the first phase of the programme indicated that particularly for the poorer households belonging to scheduled tribes, scheduled castes and backward classes, goat rearing is an important source of income. It is a preferred livelihood activity for these groups because of the short gestation period, the low cost of maintenance, and because it constitutes a low risk capital investment. It is an important asset for women who are primarily responsible for management of the small animals within the household.

As a result, the poorest people tend to be most affected by degradation of common land resources, in general in Rajasthan and in the villages selected for implementation of the V&A pilot programme in particular.

Common pasturelands, in addition to their role as direct livelihood resources, also contribute indirectly to sustaining livelihoods as they provide essential ecosystem services on which all segments of the rural society depend. The condition of soil and vegetation on these lands, particularly of those located in upper ranges of catchments, determine water availability, soil moisture and productivity of agricultural lands in downstream areas. Another important ecosystem service provided by intact pasturelands is the sequestration of carbon dioxide (CO₂), which is relevant in a climate change mitigation context. With a loss of vegetation and soil, CO₂ held in plants and in soil organic matter is released and contributes to the concentration of greenhouse gases (GHGs) in the atmosphere, and ultimately to global warming. In its 4th Assessment Report, the Intergovernmental Panel on Climate Change (IPCC) estimates that globally, there has been an increase in direct GHG emissions from land use, land use change, and forestry (LULUCF) of 40 per cent between 1970 and 2004 (IPCC, 2007). The IPCC explicitly recognizes the huge potential for climate change mitigation in land use change and agro-forestry (Smith et al., 2007), and highlights that including land-use and forestry mitigation options provides relatively high flexibility and cost-effectiveness compared to other mitigation options.

2.3 Livestock and pastures situation in villages selected for implementation of the V&A pilot programme in Rajasthan

The livestock situation in the two villages selected for implementation of the V&A pilot programme in Udaipur district is marked by a prevalence of mixed crop-livestock systems, i.e. almost all land owners keep at least a few animals. Small ruminants are most widely spread among landless community members. In the baseline year of 2005, before the V&A pilot activities were initiated, small ruminants constituted 51 per cent of the total livestock population in Amda, and in Kundai village 56 per cent. As



mentioned above, small ruminants are mainly kept by scheduled tribes, scheduled castes and backward classes. Other animals reared by communities in the villages are cows, ox, buffalos, poultry and camels.

In Amda village, in the baseline year of 2005, the total number of animals was 7545 (1925 cows, 770 buffalos, 3850 goats, and 1000 poultry) (figure 3). In Kundai, the total number of animals was 1470 (352 cows, 237 buffalos, 573 goats, 223 sheep and 85 poultry) (figure 4). Milk productivity in the villages was very low at only 1 to 1.5 liters of milk per cow and 1-2 liter from buffalos per day.

2.4 Livestock and pastures in the context of climate risks

The climatic conditions in Rajasthan, with droughts occurring on average every three years over the last century, render livestock rearing as a particularly well-adapted subsistence strategy for the rural population. First of all, livestock keeping is more tolerant to heat stresses and dry spells than other agricultural livelihood activities. The results of a study by Intercooperation on livestock-environment-livelihood interactions show that aridity is not a limiting factor in livestock rearing and that communities in more arid regions are more dependent on livestock production (Intercooperation 2006). Accordingly, increasing livestock production relative to crops has been observed as a common autonomous response to drought conditions (Morton 2007). Goat farming in particular appears to be

less at risk from drought than cattle rearing (Akter et al. 2008).

In addition, as mentioned above, livestock assets provide security against external shocks, including climatic stresses and shocks like drought, as animals can be sold quite easily in times of stress for immediate income.

In general, diversified livelihoods make households less vulnerable to climatic stresses, and mixed crop-livestock systems have a higher capacity to deal with climate variability.

Even though livestock is relatively robust to multiple stresses as compared to other sources of livelihood, climate variability and emerging climate change in semi-arid areas in India pose considerable risks to livestock systems in the absence of appropriate management practices. In fact, natural and environmental factors such as drought and loss of grazing lands have been identified as the most important causes of a decrease in number of livestock (Akter et al, 2008).

A situation analysis of the villages in Udaipur district under the V&A pilot programme in 2005 revealed that lack of fodder availability is among the key factors that limit the income contribution and security function of livestock kept by the communities. Recurrent droughts have added to the stresses for the vegetation on the pasture lands over the last decades. As per reports by the villagers, the severe drought conditions from 1984 to 1987 led to over 50 per cent reduction in the livestock population of Amda village due to shortage of fodder and water. Many villagers had to sell their large ruminants at very low prices, as they could not support them during the droughts. The major loss was in the population of cows.

Climate change projections for the region indicate that droughts will occur more frequently and with higher intensity in the future (Kumar et al., 2006). As indicated above, the already degraded pastures are at high risk from further loss of productivity through the specific characteristics of the terrain in combination with the adverse climate conditions. Increased variability in precipitation and heavier rainfalls after longer drought spells will enhance the exposure of the already degraded lands to soil erosion through rapid run-off during rainy seasons. These factors will add to the stresses that result from other social and economic pressures on pasturelands, like encroachments for housing and other purposes. The pasturelands in the programme area are therefore highly vulnerable, and so are the livelihood activities that depend on them.



Figure 5: Steep slopes and barren lands leave the Aravali Mountains in Udaipur district at high risk of soil erosion.



3. Rationale for pasture land development under the V&A pilot programme

In brief, the situation in the villages selected for implementation of the V&A pilot programme is characterized by

- high dependence of people's livelihoods on livestock, with small ruminants playing a particularly important role for poorer households;
- low productivity of livestock activities resulting, amongst other factors, from lack of fodder availability;
- high vulnerability to impacts of climate variability and climate change of the natural resource base needed to sustain livestock activities.

This situation is indicative of a high potential for enhancing security in the face of adverse climate conditions through a sustained community-led improvement of the natural resource base needed to sustain the mixed crop-livestock systems. Contributing to the regeneration of pastures was therefore identified as a key entry point to help communities build resilience against climate risks. A central element of the V&A approach was to enhance the capacities of the communities to develop and maintain pastures and to establish and manage buffer stocks of fodder. The underlying hypothesis was that building such management systems in the communities can enhance their adaptive capacity to deal with climate stresses and future climate change.

Both village commons and private pasturelands were taken into account as key livelihood assets with need for improved management. The maintenance of private pastures was in general highly neglected by their owners, and there was a lack of awareness about appropriate techniques to enhance their productivity. It was therefore decided to focus on interventions both on village commons and joint initiatives to protect and develop plots of pooled private pastures, referred to as *joint private pasture development* in the following sections.

The problem of degradation of village pasturelands has attracted the attention of many organizations over the last decades, and numerous approaches have been tested to improve the conditions of these lands with the participation of communities. Many lessons were drawn upon from these past experiences. The V&A field NGOs, namely Sahyog Sansthan and Vikas Sansthan, were selected as partners based on their longstanding experience with common and private pastureland development. The V&A pilot programme intended to capitalize on the existing local knowledge and make optimal use of field partners' valuable competences in this domain.

4. Development of common and private pasture land in Kundai and Amda

4.1 Awareness and capacity building

When the V&A pilot programme was commenced in Amda and Kundai villages in Udaipur district, the NGO field staff took regular initiatives to bring the issue of deteriorating pastures, both village commons and private pastures, on the agenda of village level meetings. In May 2006, a three day training cum exposure programme on '*Pastureland development and management*' was organized in which Sahyog Sansthan shared important lessons from their past experience in pasture land development with 15 participating farmers from both villages selected for implementation of the V&A pilot programme. Basic knowledge on pastures, useful trees, shrubs and grasses, typical factors leading to the degradation of common lands, and the importance of protection of these lands for regeneration of the vegetation were subject matters of the training. The process of community mobilization for common lands activities was also discussed. A revenue officer of the Government of Rajasthan was invited as a guest speaker to convey an in-depth understanding about the legal aspects of village pastures to the participants. He informed them that according to provisions under the 1950 Rajasthan Tenancy Act, 0.2 acres of pasture land must be reserved for each large animal (cows and buffalos) in a village. He further highlighted the existing strict rules against encroachments on village commons and the need to enforce them effectively.

There was also a detailed discussion about development of private pasturelands. Participants were enlightened about the benefits of pooling small private plots of land and taking a joint approach to building the required physical measures, including protection, to develop them as pastures. It was explained that for individual farmers, turning their uncultivable lands into pastures may be a great challenge, but that this challenge could be overcome if farmers formed groups and made joint efforts to implementing soil and water conservation measures for regeneration of vegetation on their adjacent plots of land. It was pointed out that scarce resources could be used more efficiently if a common protection was constructed around the pooled piece of land instead of each farmer making an individual effort to protect his/her portion of land. These issues caught the attention of the participants, and they showed a keen interest to learn more about collective initiatives to develop private pasturelands.

Earlier experience of the field NGO partners had shown that exposure visits to protected and developed pasture land sites where results were already visible was highly effective in triggering community initiatives for pasture land development. Accordingly, the training was coupled with a visit to pasture land development sites in Chhaperiya and Balicha villages, so that participants could see different physical interventions as well as results in terms of improved soil and vegetation conditions. In addition, a meeting was organized in the village for participants to interact with members of the Chhaperiya and Balicha communities, who shared their relevant experiences. Points of discussion included the difficulties they had faced with regard to community mobilization, yield sharing, and the role of women in the development and management of community pasturelands.

4.2 Development of joint private pasture land in Amda

4.2.1 Planning and implementation

The training cum exposure programme had a strong impact and triggered the decision by groups of villagers from both Amda and Kundai to initiate the development of joint private pasturelands.

Apparently, farmers found it a far less challenging objective to form small groups and take a joint approach to developing **pooled private pastures** than to take up community action for developing **village commons**.

In Amda village, farmers who had attended the training programme initiated the formation of three small groups of 3, 4 and 6 farmers³ owning adjacent plots of wastelands and prepared plans for developing these lands. The first step was to construct one continuous fence around each of the joint pastures to protect them from animal grazing. Two of the plots were surrounded by vegetative fencing with *thor* (*Euphorbia neriifolia*; native cactus), and one plot was equipped with both stone walls and vegetative fencing. Further, two groups decided to take soil and water conservation measures on their joint pasturelands in order to enhance the regeneration of vegetation and ultimately increase fodder production. Measures taken included the construction of trenches, loose stone check dams and gully plugs. The total labour cost of the interventions on joint private pasture land development in Amda was Rs 48,000. The works were undertaken before the kharif season⁴ of 2006. Table 1 provides an overview of the three joint private pasture plots in Amda and the measures taken on each of them.

Table 1: Joint private pastures in Amda village

Group	No. of participating farmers	Total area of joint pasture	Locality	Physical works
A	6	1.92 ha	Kiyara Fala	Stone walls and vegetative fencing, soil and water conservation measures
B	4	2.08 ha	Nagdaria Fala	Vegetative fencing, soil and water conservation measures
C	3	1.6 ha	Nagdaria Fala	Vegetative fencing

Source: Primary data from Amda, Udaipur district, Rajasthan, provided by AFPRO Udaipur.

The agreements among the members of each group with regard to sharing of efforts and produce was that development and maintenance works would be done collectively with equal contributions by all members, and that fodder would be collected by each member from her own piece of land.

4.2.2 Outcome

The first harvest of fodder from the joint pasture land was undertaken in the first quarter of 2007. Table 2 provides an overview of the amount of fodder that was harvested in 2007 and 2008 from the three joint private pastures in Amda.

As these lands were under open grazing earlier, there are no baseline figures on the amount of biomass taken away per year and the number of animals for which the pastures provided fodder. However, it can be established that the intervention contributed to a significant improvement of the livelihood situation of the families. Earlier farmers had to purchase additional fodder from outside during summer seasons when the degraded lands were dried out and vegetation was not sufficient to feed the animals. As a result of the protection and the soil and water conservation measures, the pasture now produced enough biomass to provide fodder for all animals owned by participating farmers,

³This size of the groups, which is small compared to other similar projects of pooling and jointly developing private pasture land, emerged as most appropriate for the topographic characteristics of the area and the scattered land holdings.

⁴The cropping season in the monsoon period from June to October is called kharif season.

Table 2: Fodder production on joint private pastures in Amda Village

Group	Fodder Production	
	Year	Bundles*
A	2007	2100
	2008	1820
B	2007	2500
	2008	2540
C	2007	2700
	2008	2460

*1 bundle = 3 kg of dry fodder

Source: Primary data from Amda, Udaipur district, Rajasthan, provided by AFPRO Udaipur.

throughout the year.

In the first quarter of 2008, villagers made an additional attempt to monitor the regeneration of the vegetation on the joint pastures. They counted the rootstocks per square meter on the protected pastureland and compared it with the number of rootstocks per square meter on adjacent open grazing land. Observations were made at three different points within the protected pasture after cutting of fodder and at three points on open grazing land along the same contour lines. The data are shown in Table 3. The observations indicate that the protection and conservation measures had remarkable regenerative effects after only 2 years. The protected land showed a much higher density of root stock than the open grazing land, with a sharper contrast between protected and unprotected land in the lower ranges of the hills.

Table 3: Root stock density on protected pastures 2 years after initiation of pasture development

	Count of root stock per m ²	
	Inside the protected pasture	On open grazing land
I Upper part	28	20
II Middle part	36	20
III Lower part	42	12

Source: Primary data from Amda, Udaipur district, Rajasthan, provided by AFPRO Udaipur.

4.3 Development of joint private pastures land in Kundai

4.3.1 Planning and implementation

In Kundai village, a group of four farmers and their 8 sons who belong to a tribal community living in Darjia Talai hamlet decided to pool their degraded pasture lands, covering an area of 5 ha, and take a joint approach to protection and development of the land. After consulting revenue maps of the Darjia Talai territory, which they procured from the Revenue Authorities of Kundai village, they held several



Figure 6: Fodder stock in Amda, Udaipur district, Rajasthan.

group meetings in 2006 to discuss a plan for development and management of their joint pasture. As regards the distribution of fodder, they came to a similar agreement like the joint private pasture groups in Amda village, i.e., equal sharing of efforts and sharing of produce as per land ownership.

Expert members of the advisory committee and of the national and international consortium of the V&A programme visited the site in 2006 after the decision for joint pasture development had been taken. They provided many valuable suggestions to the community on how to design soil and water conservation measure on the lands. The advice were well taken by the community and helped them in planning appropriate measures. The physical works were initiated in May 2007. The group decided to build a stone wall on the pasture boundary that runs along the outer boundary of the Darjia Talai territory to prevent the entry of grazing animals from other areas. Vegetative fencing with *thor* (cactus) was considered a sufficient protection measure on the "inner" boundaries of the pasture that lye within the Darjia Talai territory, as entry of non-authorized grazers was easier to control from this side. Accordingly, a stone wall of 404 meters and 295 meters of vegetative fencing were constructed.

Following recommendations by experts, 7 loose stone check dams were constructed to reduce the run-off velocity and to prevent soil erosion. In addition, one small water harvesting structure was built to hold back run-off and to enhance recharge of an open well, which is located down-stream from the pasture plot.

For all these interventions, a total labour input of 633 person days was invested in the development the joint pastureland. The group agreed to contribute 50 per cent of the labour cost and the material and the rest of the labour cost was covered by the V&A programme budget. The total costs of the interventions were Rs. 90,051.

4.3.2 Outcome

The joint protection and conservation measures generated remarkable benefits in terms of enhanced fodder productivity of the land. As farmers in the Darjia Talai joint pasture group had already practiced 'cut and carry' before the intervention, baseline data are available and the outcome of the measures can be clearly established. Table 4 shows the increase in fodder production after the implementation of the protection and conservation measures. The group is storing the bundles of dried grass in a fodder bank from which animals are fed throughout the year

4.4 Development of common pasture in Kundai

4.4.1 Planning and implementation



Table 4: Fodder production on joint private pasture in Darjia Talai, Kundai

Year	2006	2007	2008
Grass Production in number of bundles (one bundle = approx. 3 kg)	5,200	12,000	16,000

Source: Primary data from Kundai, Udaipur district, Rajasthan, provided by AFPRO Udaipur.

Figure 7: Fodder Bank in Kundai, Udaipur District, Rajasthan.

The village common pasture under the authority of the Gram Panchayat in Kundai village comprises an area of 142 ha. However, the major part of this land has suffered from mismanagement, overgrazing, and severe soil erosion. It has turned unproductive in absence of appropriate soil and water conservation measures.

One common pasture site in Kundai is the *Sand Magra* pasture which is spread over hillocks that constitute the catchment area of a *Dhudh Talai* water harvesting structure at the northern edge of the village. A main trigger for the initiative by the community to develop this common pasture was the renovation of the damaged *Dhudh Talai* water harvesting structure under the V&A pilot programme in 2006. At the time of planning the renovation works, it was noted that the catchment area of the structure was almost barren with very poor vegetation and highly degraded soil. In order to ensure maximum benefits from the investment in the water harvesting structure, efforts were needed to prevent further erosion from the drainage area to control sedimentation and ultimately maintain the water storage capacity in the structure. Thus, it was decided that treating the common pastureland with soil and water conservation measures was a necessary complement to the intervention on the water harvesting structure.

Discussions at community level were initiated in several village meetings in 2006 and 2007, and community members showed a muted interest in developing the common pasture. This was because earlier experiences with development of common pastures under a State Government Watershed Development Programme, implemented from 1992 to 1996, had been highly discouraging for the community. Ownership of the programme activities had been very low as they were planned and implemented in a top-down manner, with command over the operations in the hands of a few individuals. Villagers felt that they could not derive any benefit from the intervention on the common land as the appointed pasture guards were highly selective in allowing community members to harvest grass. Eventually, the resulting frustration triggered a complete destruction of the pasture by the community. This experience had apparently shaken the confidence of the villagers in successful management of their common resources for the benefits of all community members.

Nevertheless, an unwavering keen interest of a few individuals within the community and continuous persuasive efforts by the field NGO eventually resulted in a decision to take up works to develop the *Sand Magra* pastureland. The decision was taken by more than 40 community members in a village meeting in June 2008, which was soon followed by another meeting at the *Sand Magra* site attended by community members, the Chief Functionary of Sahayog Sansthan and AFPRO officials to discuss the key modalities of the pastureland development initiative. Subsequently, meetings were held on a monthly basis with the community to discuss the progress of the physical works and the emerging management issues.

The strong emphasis on community mobilisation is one of the guiding principles in the work of Sahyog Sansthan that has emerged from many years of experience of working with communities in the district. The NGO has found that full support by a large part of the community is a vital basis for any interventions on common resources and efforts towards building public goods. Sahyog Sansthan has also experienced that community mobilisation can be a protracted process, but that planning physical works in a project without a clear commitment from the community to implement the project is doomed to failure. The investment of time and effort in community level consensus building and generation of a

'demand' is therefore an essential element of any project supported intervention.

As mentioned above, exposure visits to other well-developed pastureland sites have proved an effective tool to strengthen communities' support for interventions on common lands. Hence it was decided to reinforce the momentum created in the June 2008 meetings by organizing another visit to a common pastureland site in Chhaparia village in Bhinder block, Udaipur district. A total of 38 villagers from Kundai participated in this one-day exposure tour and contributed Rs 25 per person to the travel cost.

The first important step in the common pasture initiative was to vacate encroachments on the common land by a few households who owned adjacent plots of land. To this end, a series of meetings were held to open a dialogue on the issue with the Gram Panchayat and the concerned households. The dialogue was led in a transparent manner so that the community could develop confidence in the process and continued to be highly motivated to take up the development of the land. After 'protracted' negotiations, the encroachers were finally forced to vacate the portions of the common land that they had taken control of.

The interventions on the common pastureland in *Sand Magra* were commenced in June and completed by mid July 2008. Initially an area of 15 hectares was developed. To protect the land from free grazing, continuous trenches were excavated along the boundaries and *Jetropha* saplings were planted along these trenches. Staggered trenches and loose stone check dams were constructed across the pasture land. In addition, *neem* (*Azadirachta indica*) and *khankra* (*Butea monosperma*) seeds were sown along the excavated trenches. These measures were implemented according to plans suggested by AFPRO and discussed with the community and NGO field staff. Table 5 provides the technical details and scope of the measures taken.



Figure 8: Treatment of Sand Magra common pasture in Kundai, Udaipur district, Rajasthan.

The total cost of the physical intervention was Rs 157,270 with a labour input of 1546 person days, undertaken by 77 community members. As per the initial agreements, the community contributed 25 per cent of the total labour cost.

A village level committee of 12 active villagers has been constituted for the management and maintenance of the pastureland.

4.4.2 Outcome

The outcome of the intervention is to date not quantifiable. The pasture management committee advised the community to let the vegetation recover for one full year before the first fodder harvesting is undertaken. However, the effect of the protection and conservation measures could already be seen 10 months after the physical works were completed. The Sand Magra ridge had developed a green cover of vegetation after this relatively short period of time, which contrasted with the surrounding barren

Table 5: Physical works undertaken on the Sand Magra common pasture land in Kundai

Type of works	Details
Construction of open trench and stone wall	Trench 785 meters, 1 m depth and 1 m width; Stone wall 21 meters 1.2 m height and 0.6 m width
Staggered trenches from ridge line down the slope	476 staggered trenches, 5 to 6 m length, 0.6 m width, and 0.3 m depth
Loose stone check dams	13 check dams 0.9 m width and 0.6 m depth
Sowing of Neem and Khakra seeds along trenches	10 kg of Neem seeds & 5 kg of Khakra seeds, on 3156 m of sand bunds along staggered trenches

Source: Primary data from Kundai, Udaipur district, Rajasthan, provided by AFPRO Udaipur.

hillocks in the summer of 2009.

4.5 Experience from common pasture land development projects in neighbouring villages

The following section presents two cases of other relevant experiences with common pastureland development in the area. This section is included to supplement the report about the V&A pilot experience with evidence from projects that were initiated 8 and 4 years ago with technical support by Sahyog Sansthan, in comparable settings and with a similar approach to implementation and management. The longer time horizon allows for a number of conclusions and lessons to be drawn from these cases which indicate what results may be expected from the common pasture land initiative under the V&A pilot programme.

4.5.1 Experience from Chhaperiya village, Bhinder block

The village has about 90 ha common pastureland, which were in a highly degraded condition and unproductive, so that farmers of the village had to buy fodder for their animals from outside sources. In 2001, an acute fodder shortage triggered the initiative, supported by a majority of the community members, to protect part of the common pasture. In order to also take into account the interests of approximately 15 families whose livelihood depended to a large part on sheep and goat rearing, it was decided to protect a 52 ha portion of the common pastures and leave the remaining part for open grazing. Physical works to develop the pasture included the construction of a protective stone wall and vegetative fencing, and soil and water conservation measures like loose stone check dams, staggered trenches and sowing of some seeds, whereas the main strategy was to allow natural regeneration of grasses, shrubs and trees. The works were started in March and completed in June 2003.



Figure 9: Regenerated vegetation on Sand Magra common pasture in Kundai, Udaipur district, Rajasthan, in April 2009.



The outcome of the intervention was a remarkable steady increase in grass production after the intervention from 13,000 bundles (of 3 kg of dry fodder) in 2004 to 40,000 bundles in 2008. The community agreed that the fodder harvest should be distributed equally among all the households in the village, independent of the number of livestock owned by each family. Trade in fodder from the common pasture has emerged between the families according to the varying livestock assets and fodder needs.

The community observed a fast natural regeneration of root stock of a wide variety of local species of trees and shrubs, including *khankra* (*Butea monosprema*), *adusa* (*Adathoda vasica*), *teek* (*Gmelina arborea*), *neem* (*Azadirachta indica*), *karanja* (*Derris indica*), *ber* (*Zizyphus mauritiana*), *khirni* (*Mimusops hexandra*), *ratanjot* (*Jatropha curcas*), *bamboo* (*Nandena*), *khair* (*Acacia catechu*). In 2008, the community decided to go for pruning of trees and shrubs in the pasture land. A total of 50,000 kg of fuel wood was collected from 25 ha of the pasture, which was distributed equally among all families.

The developed pasture is managed autonomously by the community. About 70 per cent of all families in the village are actively involved in protection and management. The community decided that additional protection of the pasture against intruders from other villages was required and appointed a watchman to guard the protected land. Each household pays Rs 50 per month into a village fund to cover the salary of a watchman.

4.5.2 Experience from Kadesa village, Bhinder block

The village Kadesa has a total of 130 ha of common pastureland, which was marked by very low productivity until a few years back. Observing the results achieved through the common pasture land development efforts in the neighbouring Chhaperiya village, 126 families of Kadesa village jointly prepared a proposal to develop 63 ha of their common pasture for increased fodder and fuel wood production. The proposal was submitted to the Gram Panchayat and the community agreed to contribute 25 per cent of the total cost in form of labor.

Physical works on the pastureland were taken up in April 2004 and completed by March 2005. The activities included stone fencing for protection and construction of loose stone check dams for soil and water conservation.

The outcome of the intervention was a notable regeneration of the vegetation in terms of quantity and diversity. The protection and improved management of the land enabled the spread of some 85 varieties of species of plants both for fodder and of medicinal value. Important trees like *khankra* (*Butea monosprema*), *khair* (*Acacia catechu*), *ber* (*Zizyphus mauritiana*), *salar* (*Boswellia serrata*), *neem* (*Azadirachta indica*), *ratanjot* (*Jatropha curcas*), *karanja* (*Derris indica*) for fuel wood and timber have regenerated from existing root stocks.

The community decided to cut grass only every alternate year in order to allow for optimal regeneration of the pasture. The first yield in 2005 was 22,000 grass bundles (of approx. 3 kg each), and in 2007 it had gone up to 45,000 bundles.

The community has appointed a watchman to ensure protection of the pasture against intrusion of

livestock rearers from other villages. Each family contributes Rs 10 per month for the services of the watchman.

5. Assessment of impacts

First of all, an important observation can be made with regard to the relation between annual rainfall and the amount of fodder produced on the joint private pastures over the same season. In Amda, even though the rainfall in the monsoon season of 2007 was 50 per cent less than in the previous season, vegetative growth was not affected drastically, as the figures of fodder harvest after each season indicate. Fodder harvested after the much drier monsoon season of 2007 was 15 per cent and 9 per cent lower than in the year before in 2 of the plots, and slightly higher in the third plot. In the case of Darjia Talai, the fodder production after protection of pasture increased from 5200 bundles in the high rainfall baseline year of 2006 to 12 000 bundles in the low rainfall year of 2007 with a total annual precipitation of only 480 mm.

It can be noted that through the water and soil conservation measures, enough moisture was retained in the soil to support growth and regeneration of vegetation. Sufficient fodder could be produced to feed the livestock of the households of all joint pasture groups. Independence from relying on purchased fodder has led to a great improvement in the financial situation of the households: In the baseline year of 2006, before the intervention, the Darjia Talai community had to purchase 20,000 kg of fodder from outside, as their degraded private pastures did not produce enough fodder even in seasons with above average rainfall. They spent an amount of Rs 20,000 on fodder in that year, which they could save after the intervention. This impact in financial terms is all the more relevant as prices for fodder are also highly volatile and tend to rise considerably in years of low rainfall. In the good monsoon year of 2006, fodder was purchased at a price of 2 Rs per bundle, whereas in the following 2 years, when rainfall was

Table 6: Seasonality of fodder availability before and after the intervention on pasture land in Kundai

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Rainfall										-	-	-
Availability of green grass for grazing												
Availability of cut fodder before intervention												
Period when fodder needed to be of purchased from outside before intervention												
Fodder available from pasture after intervention												

Source: Primary data from Kundai, Udaipur district, Rajasthan, provided by AFPRO Udaipur.



about 50 per cent lower, the price went up to Rs 3 and even Rs 5 per bundle. The need to buy fodder from outside thus tended to add significantly to the drought induced stresses, and eliminating this need has helped to reduce the vulnerability of the communities. Table 6 provides an overview of the seasonality of fodder availability before and after the intervention.

The jointly developed pastureland in Darjia Talai is also an excellent example of an intervention with multiple benefits for the local natural resource base. In addition to the increase in fodder production, the soil and water conservation measures in combination with the construction of a small water harvesting structure have enhanced soil moisture in the site with benefits for agricultural activities. Villagers also reported that the intervention had helped the recharge of groundwater which could be observed at the increased water availability in the well downstream from the private pasture site.

Another impact indicator of the pasture intervention is the development of the livestock population in the communities. Detailed data on changes in livestock population are available from Darjia Talai in Kundai (see Table 7). First, it can be noted that the total livestock population of the group members has increased from 101 animals in the baseline year of 2006 to 145 animals in 2009, with a sharp surge between 2008 and 2009. There are 11 more cows in 2009 than in 2006. The number of buffalos declined from the baseline count of 15 over the years 2007 and 2008, but rose again to 16 animals in 2009. The sheep population increased from 30 to 42 animals over the same period, and the goat population from 39 to 60 animals. It can be concluded from these figures that in Darjia Talai, the increase in fodder availability has provided a basis for families to augment their large ruminant assets, but has not compromised the rearing of small ruminants, which continue to be grazed on open lands. Even after the joint private pastures are protected for production of fodder, sufficient free grazing grounds seem to be available to sustain the small ruminants 'owned by' of the community. However, even if the cut and carry practice is appropriate for feeding cattle and the protection of the pasture has resulted in improved fodder availability, the community is considering to re-introduce controlled open grazing for short durations as some manure from grazing cows will enhance the fertility of the pasture.

The villagers sell their surplus milk in a milk collection centre of the Udaipur dairy cooperatives in a neighbouring village at a distance of only 0.5 km. The milk prices vary between Rs 10 and 20 per liter of milk, depending on the fat content. Hence, with an increase in the population of cattle, the community can directly augment their income.

Regarding the common pastureland development in Kundai, it is certainly too early to analyse broader impacts, as no fodder has been harvested to date. However, interviews with community members have

Table 7: Family-wise livestock population in Darjia Talai, Kundai village, 2006-2009

	Name	Cows				Buffalos				Sheep				Goats			
		06	07	08	09	06	07	08	09	06	07	08	09	06	07	08	09
1	Kanheyia lal S/O Varda Ji			1	1	1	3		1	10				2			
2	Narayan S/O Varda Ji		2	1	1	1		1	2					5	6	19	9
3	Ram lal S/O Limba Ji	2	3	1	2		2	1					15		10	3	4
4	Laxman Lal S/O Limba Ji	1		1	2	1	2	1				10	15		15	10	5
5	Mana ram S/O Limba Ji		2	1	5		3	1	1			15	12	15	15	10	11
6	Moti Ram S/O Kalu Ram ji	4	3	2	3		1		1						7	2	2
7	Ganga Ram S/O Kalu Ram	3	4	1										4	5	3	
8	Megh Raj S/O Ganga Ram		3	2		1		1	1						7	3	4
9	Deepak S/O Ganga Ram		3	3	5	1									4	2	4
10	Gokul S/O Varda ji	2	3	3	2	6			6					5	4	2	6
11	Limba S/O Kalu ji	3		3		1			1	5				4			
12	Varda S/O Kalu ji	2			2	3			3	15				4			15
	Total	17	23	16	28	15	11	5	16	30	0	25	42	39	73	54	60
	Total Livestock	2006	2007	2008	2009												
		101	107	100	146												

Source: Primary data from Kundai, Udaipur district, Rajasthan, provided by AFPRO Udaipur.



revealed that there are certain concerns of farmers who depend to a larger degree on the rearing of small ruminants for their livelihoods and do not own cattle, that the restriction of open grazing grounds impairs their livelihood basis.

6. Conclusions

6.1 Lessons Learnt with regard to planning and implementing pasture land development

Joint private pasture development

- Exposure visits to protected and developed pasture land sites where results are already visible, in combination with capacity building programmes to introduce practices for pasture protection, soil and water conservation measures, are highly effective in triggering community initiatives for pasture land development.
- Farmers are more confident about investing in the collective development of private pasture lands (joint pasture development), while they tend to find it challenging to take up community action for developing village commons as the locus of control is perceived to be far from themselves in the latter case. Small groups with high social and economic homogeneity and social cohesion find it easy to come to agreements about management and maintenance issues.
- Investment in building consensus and the informed participation of households is very important for long-term sustainability and conflict prevention.

Common pasture development

- The development of common pastures requires the participation of a large part of the community, and thus of different castes and socio-economic classes. Community mobilisation towards the development of these lands is a special challenge. Active individuals can play a lead role in this process. However, full support by a large part of the community is a vital basis for any interventions on common resources.
- Rather than the prospect of gaining benefits through upgrading a common resource that has been unproductive for a long time, the prospect of a damage or compromising of functionality of a new asset (namely, the Dhudh Talai water harvesting structure) has motivated farmers in Kundai to develop a plot of common land.
- Failed attempts to develop common lands can have highly negative consequences and curb the willingness of the community to take up new initiatives with regard to commons; frustration with such failures can endure for years.
- Ownership is key. If communities (i) take an active role in the planning of action for common pasture development; (ii) hold meetings on a regular basis to discuss the progress of the physical works and management issues, and (iii) remain actively involved in the protection and maintenance of the pasture, chances are higher that the pasture emerges as a sustainable community asset.
- Removal of encroachments on village commons can be cumbersome and requires prolonged negotiations. Even though it bears a risk of stirring up disputes between different groups of the community, it has proved a successful approach to resolve the issues in a transparent

process and builds trust in the process among the community members.

- Extent of involvement and the means of involving the Gram Panchayat in the negotiations is a question to which there is no universal answer: In the case of the Kundai common pasture intervention, the Gram Panchayat has helped to enforce the vacation. However, the field NGO partner also reported that as per their experience, in many cases Gram Panchayats were reluctant to interfere in the delicate issue of encroachments, and in other cases did not champion the public interest. Allegations of corruption were common.
- If the intervention is successful, the community will recognize the value of the common resource and show a willingness to pay for the benefit derived from it: collection of a monthly fee from each household to pay for the salary of a watchman has not proved to be difficult in such cases.
- It must be ensured that enough grazing grounds are retained for the communities' population of small ruminants. Small ruminants rearers who tend to be the poorer segments of the community can otherwise be disadvantaged by the protection of common pasture lands.

6.2 Contributions of pasture land development to enhancing adaptive capacity

The interventions adopted on joint private pastures under the V&A pilot programme have contributed to an improvement of the landholders' livelihood situations. As a result of protection of the pooled land and soil and water conservation measures adopted on the pastures, productivity could be raised to a level that sustains the fodder needs for the farmers' animals throughout the year. The development of common pastures, even though a greater challenge in terms of initiation and management, also has a high potential to enhance the availability of fodder, fuel wood and non-timber forest products and thus help secure people's livelihoods.

In both villages, even though the rainfall in one monsoon season was 50 per cent less than in the previous season, the process of vegetative regeneration on the treated pastureland was not affected. This indicates that the soil and water conservation practices adopted are well suited to the climatic and geographical conditions in the region and have a high potential to enhance the drought resilience of the pastures.

Improved pasture management has also yielded benefits for the surrounding natural resource base, in terms of groundwater recharge and increased soil moisture retention. Hence, the risks that erratic rainfall patterns pose to livelihoods of the local communities by causing shortage of fodder and loss of agricultural production could be reduced.

The interventions on both joint private and common pastures, by generating a secure source of fodder, help sustain the traditional mixed crop-livestock systems of the farming community even under adverse climatic conditions. Supporting these traditional production strategies which are characterized by flexibility and diversity to take into account climate variability helps to reduce the vulnerability of communities to future climate change.

A central element of the programme was to enhance the capacity of the communities to develop and maintain pastures and to establish and manage buffer stocks of fodder. The experience has demonstrated that a community-based approach to develop and manage commons is viable and can be sustainable. The communities in the programme villages have taken autonomous decisions with regard to the management



of pooled and common resources. Building these management systems has created a broader basis for joint community action towards improving livelihood resources and dealing with multiple stresses, including those related to climate variability and change. However, it must be noted that capacity building support for technical issues and management practices throughout the process was crucial.

6.3 Options for up-scaling initiatives for pasture land development in Rajasthan

The analysis has shown that there is a high potential in protecting and developing joint and private pastures for securing the livelihoods of the rural communities, particularly in the face of climate risks. The V&A experience makes a strong case for scaling up activities for pasture land development, taking into account the lessons learned with regard to implementation and management, which are outlined in chapter 7.1.

The reported cases of pasture land development under the V&A pilot programme were facilitated through financial contribution disbursed by the local V&A partner NGOs. One option for mobilizing funds for upscaling these interventions would be to tap funds under the National Rural Employment Guarantee Scheme (NREGS). Measures for building protection fences and walls, water and soil conservation are highly labour-intensive. Under the V&A programme, time did not allow to explore how the institutional mechanisms would work out in that case. However, as discussed above, a constraint towards initiating common land development under NREGS may be that it requires a central role taken by the Gram Panchayat, to which in many cases the removal of encroachments constitutes a major hurdle.

In addition, the National Mission for a Green India under the National Action Plan on Climate Change (NAPCC), endorsed by the Prime Minister's Office in 2008, seeks to enhance ecosystem services, including carbon sinks, while also maintaining bio-diversity. It identifies afforestation as a main lever to achieve these targets and will address the issue of degraded forest lands through direct action by communities. Given the experience discussed in this case study that pasture land development can be highly effective for vegetation and root stock recovery on degraded lands, programmes to implement the Green India Mission could also look into this approach. Earmarking funds for community-based action towards development

Table 8: Land available for pasture development in Kundai and Amda

Village	Village pasture land	Percent of total area	Non agriculture private land	Percent of total area
Kundai	142 ha	22.61%	170 ha	27.07%
Amda	92 ha	5.80%	371.33 ha	23.41%

Source: Revenue department, Udaipur district, Rajasthan.

of pasturelands would be a viable option to achieve the objectives of the National Mission.

There is ample non-agricultural private land in both the villages which could be developed as joint protected pasture land, and large areas of community pasture land of which further parts could be treated in order to increase its productivity (Table 8).

However, as noted above, if attempts are made to bring more village pasture land under protection to increase its productivity under cut-and-carry practice, adequate grazing grounds must be retained for the communities' population of small ruminants. A balance must be found between open grazing lands and

protected pastures to meet the requirements of all groups with different livelihood patterns within the community. To this end, it is vital to ensure participation of representatives of all groups when village meetings are held to discuss issues around common lands, and that all representatives have a realistic opportunity to voice their interests.

7. References

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