

Chapter 9

FROM STEWARDS TO TRESPASSERS: PASTORALIST MANAGEMENT OF FOREST RESOURCES

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Introduction

This chapter describes the community forests in Rajasthan known as *orans*, which historically have been maintained by local people as an essential resource. Today, however, areas have been taken over by the Forest Department as reserves, excluding local people. Considerable degradation of the forest has been observed. The chapter looks at the reasons for this in a case study in the buffer zone of the Sariska Tiger Reserve in Alwar District of Rajasthan.

Orans are community forests dedicated 'to some deities and spirits by the local people, both tribals and non-tribals ... preserved [and] maintained through people's participation'. (Sekhar 2004) Acknowledging their connection and dependence on the water, flora, and fauna of these forests, local people sanctified them by performing ceremonies to honour the deities that inhabit them, as well dictating a strict set of rules about the use of the resources (Singh and Bahl 2006). Each *oran* has its own set of established customs to ensure the protection of its specific combination of resources. These vary from completely banning the collection of any materials from the forest floor to only prohibiting the felling of particular species of trees (Malhotra 2001).

Also known as *devbanis*, these local forests vary in size from 100 to 500 *bhighas* (about 100 hectares), and in our study area are found nestling in the foothills of the Aravalli range. Most *orans* have sources of water, either small springs or rivulets running through them or a variety of ponds and *nadis* in their midst. A large collection of such forest patches is known locally as a *chhind*. 'Chhind' in the local dialect means a landscape used largely for grazing. These

can cover fairly extensive areas across interspersed habitation. The well-known Sariska Tiger forest reserve close to our study area is in fact one such collection of *orans* that together formed a substantial forest tract. To this day it is possible to identify the various *orans* that comprise the Sariska Tiger Reserve.

At the heart of every *oran* is a deity, whose domain has at some point in time been marked out by a ritual, usually consisting of the pouring of Ganges water or saffron-milk around the grove. Taking care of the shrine is a *sadhu* (monk), whose own modest needs are met by local communities. The *sadhu* is an interface between local community concerns and the preservation and wellbeing of the *orans*. These *orans* are a source of natural wealth like fodder, fuel, timber, berries, roots and herbs and, moreover, play an important role in promoting a flourishing livestock-based economy and growth of livestock rearing communities.

Singh and Bahl (2006) report that co-management of the *orans* by villagers and pastoralists contributed to a greater species diversity in cultivated and wild plants as well as guaranteeing sustainable access to all members of the community. If the sacred groves are to be preserved, traditional knowledge and cultural practices need to be included in the policies that determine who is allowed to utilise the natural resources found within them, and to what extent. Given the diverse academic and institutional backgrounds of those currently working on forestry in India, it is perhaps unsurprising that essentialist portrayals of 'traditional' ecological relations endure alongside more critical, historically and politically nuanced, readings. Rangarajan (1996) and Sivaramakrishnan (1999) have drawn attention to the multiple and divergent 'internal' pressures on colonial forestry, from the ideological anxieties of foresters to relations with local communities. Guha (1983) discusses the imperial interventions which were everywhere a malevolent force, disrupting the delicate, symbiotic balance between forest dwellers and the land that had evolved over many hundreds of years. Rather than introducing stability, Guha argued, imperial forestry succeeded only in dismantling age-old livelihood systems and replacing them with unsustainable, market-driven management models. Guha's work has had a profound influence on studies of colonial-era environmental relations, both in India and beyond. In Rajasthan, ideas about indigenous conservation and the 'ecologically noble savage' (Redford 1991, 46) are alive and well. The last few decades have seen a dramatic surge in interest in traditional ecological knowledge and 'environmental ethics' originating from this arid and semi-arid region. Much of the current concern with indigenous knowledge and practices stems from the pioneering work of Jodha (1985, 1992) and Brara

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Figure 1. Modernising pastoralism: Gujjar pastoralists with GPS, Bakhtpura Village. Photo: Aman Singh.

(1989, 1992) on common property resources in the state. Both argued that the introduction of land reforms in the 1950s disrupted traditional institutional arrangements for managing common resources—forests, wastelands, community pastures, etc. — leading to the current decline in the quantity and quality of such lands. Gold and Gujar (1989), for example, have employed collaborative oral histories to explore radical changes in the ‘politics of nature’ (Gold and Gujar 1989, Robbins, Gold and Gujar 2003) in pre- and post-Independence rural Rajasthan. Based on fieldwork in the erstwhile Kingdom of Sawar, their works interweave political economy, environmental history and folklore studies to chart the changing relations between state, subject and ‘nature’ from a subjective, subaltern standpoint. Critically, these studies call attention to the multiplicity of historical realities and the crucial role of memory – ‘symbolic and embodied, hence neither individual nor collective’ (Robbins, Gold and Gujar 2003, 88) – in configuring these.

The two major social groups living in this area that utilise as well as worship the sacred forest groves are the Meenas and the Gujars. The Meenas

are settled agriculturalists and make up forty per cent of the population while the Gujars are nomadic pastoralists and constitute around 32 per cent of the population (Sekhar 2003). Both depend on the *orans* for fuel, medicinal plants, fruits and fodder for their livestock. According to the pastoralists, the *orans* provide them with indispensable vegetation to feed their cattle. In addition to grazing grounds, shady *orans* afford a resting spot and a refuge from the scorching Rajasthani sun to both livestock and the herders (Singh and Bahl 2006). In addition, cultivated and medicinal plants are often planted in their drip line since the leaf litter contains nitrogen, a practice 'embedded in the local knowledge' (Jodha 1986). The forest resources most often collected by the Meenas include mango, timru and kikoda fruits for household consumption as well as honey, soapnut, neem and jamun which are used for consumption as well as trading purposes (Chaudhry et al. 2008). Although the Meenas and Gujars have co-existed in the same spatial and social context for generations, the government has generated a conflict between them by classifying the Gujars as a backward caste and the Meenas as an indigenous, scheduled tribe, thereby giving the Meenas exclusive territorial rights over certain *orans*.

Orans in context

Orans are situated in dry environments across western India. This makes them important water sources in Rajasthan; though the largest state (ten per cent of the country's total area) it has only one per cent of the country's water resources. Here *orans* protect springs and aquifers, and host centuries-old water storage facilities. Most sources are small springs or rivulets or a variety of ponds. Several *orans* have large perennial springs used year-round for irrigation. Gopal Das ki Devbani has a very old and architecturally ornate 'Oran talab' (rainwater harvesting structure). Jugrawar ki Rundh Bani, Gujjawas ki Bani, Bherunath ji ki Bani and several other *orans* likewise have large ponds which serve as water harvesting structures for the catchment area and are usually located to collect maximum run-off and serve the important purpose of providing water for irrigation and drinking. The need for a dependable water supply, such as from wells, has been a major incentive for communities to use *orans* in a sustainable manner.

Orans are very important to the lives of different resource users, meeting economic, social, cultural and spiritual needs of the community. Strong internal social control within *oran* communities enables effective sanctions to be imposed on violators, reflecting their importance to resource users. *Orans*

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generally have a well-defined boundary and are governed by an egalitarian system, with respect to all users. Normally, every *oran* has a mechanism for conflict resolution among its resource users with simple and clear rules for all users, and significant commitment from all resource users (for example annual contributions for maintenance). Strong religious beliefs also support the Oran; for respect for the Devbani stems from strong faith in God.

Many species are found within the *orans*; local societies use them for a variety of livelihood needs including traditional non-timber forest products (e.g. *kair* pickle, *ber* fruit, honey collection, *panni ghas/jhunda* handicrafts, clay, *chapun* for baskets). Some of the plant species that have been preserved or reintroduced in *orans* have medicinal value, such as *adusta*, which is used as a cough syrup. Other species, notably the *jharber*, *satavari*, *kuri*, *saava* and certain other wild grains, are valuable for home consumption and market sale. In addition, these species, along with minor forest produce such as honey, pottery (from the clay) and baskets (from grasses), can be sold at market, providing a supplement to village incomes which is invaluable during times of hardship (drought, poor harvest, blight, etc.).

There are some specific social norms with regards to the *oran* in the community. In and around some, noone is allowed to carry an axe. Alternatively, axes may be allowed but only for the lopping of branches, not to cut down the whole tree. However, the villagers in our case study indicated that community enforcement of the norms is no longer very strong, and said that some of the women are carrying axes into the forest. It was stated that there are no regular meetings regarding the forest and a meeting is basically only held when a prominent person is present. Earlier they used to have monthly meetings, but with the change in the number of people following the social norms, this has decreased. When they do have a meeting, fines and rules are agreed upon, and they usually invite a forest-guard to discuss management efforts in the forest. The members of this committee are not elected, but shifts and membership are based on the individual's performance.

The resilience of pastoralists regarding *oran* is reflected in legends about a people's tenacity in preserving their inheritance. This oral tradition was based on a curious mix of community folklore and the kind of official support they received from the traditional rulers of the region, known as the Rajputs, during the colonial period. An oral tradition of customary rules, still active in several villages, regarding access, use and decision-making in these groves is highly dependent on the historical circumstances of their foundation and on the strength of the culture and collective beliefs. The names of the *orans*

provide a clue to the historical origins of the woodland, for example ‘Kakad bani’ is an *oran* consecrated to ‘Kakad Devta’. Then if the woodland is within the common boundaries of a single village it would be ‘Rakhat bani’ and so would be the responsibility of that village alone. Likewise, the *oran* served as a common resource for the village livestock and a source of medicinal herbs, which was protected by the villagers collectively. Sometimes several villages shared such a woodlot and dedicated it to the deities whom they worshipped. Similarly ‘Dharadi’ symbolism attached to planting and protection of plants. Many *gotras* (clans) have a tree as a totem. The people belonging to the *gotra* regard this particular tree as sacred.

Orans also serve as socio-religious medicine – if disease breaks out in livestock then villagers gather in one place and promise the deity a feast if the disease is mitigated. The practices of the resident *sadhu* also have a preventative dimension; he is called upon to ensure that livestock are protected from sickness and other evil forces, ‘anointing’ the animals with twigs from the *neem* tree (the *jhara dena* ritual). Specialist knowledge of this sort is not limited to the *sadhu*; most of the older generations are aware of various plants used to treat, among other things, sore throats, migraines, open wounds and osteoarthritis. And, in many villages, tribal communities still gather once a year for the *dudh ki dhar dena* ritual, during which milk is collected from each household and then drizzled around the sacred grove with the whole village following in procession. This practice is thought to ward off evil spirits for the coming year.

Introducing the Bakhtpura field site

Grounded in research over two decades covering 900 *orans* in several districts of Rajasthan, this chapter focuses on the example of one *oran* – Bherunath Bani – in Bakhtpura village, located in the buffer zone of the Sariska Tiger Reserve, approximately twenty kilometres from the city of Alwar. Agro-pastoralism is the main livelihood activity undertaken in Bakhtpura. In attempting to understand the diversity of pastoralists’ roles in relation to natural resources and the institutions that mediate access, Bakhtpura appeared to be a promising site. Bakhtpura covers an area of approximately 346 hectares, of which around 150 hectares are recorded as agricultural land (irrigated and unirrigated) and a further 148 hectares are classified as Protected Forest (Census of India 2001, District Census Handbook (District Alwar)).

Local people had a good and precise understanding about the boundaries of the Bakhtpura village commons and the different areas of land. The

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*Figure 2. Pastoralist woman and her buffaloes, Lilunda village, Sariska Tiger Reserve.
Photo: Aman Singh.*

boundaries of the commons have a very long and well-known history in Bakhtpura village since the days of the Mughal Empire. Although the Forest Department has extended the area of the forest that comes under its control over the last fifteen years, this has only affected the total village commons to a very small degree, as the land has simply shifted category from Revenue Wasteland to Forestland. Given the religious significance of the *oran*, similar to the *orans* in Jaisalmer district, rules and norms of usage and access are very well respected in the community. But the areas within the forest reserve have become increasingly degraded.

Historically, the upkeep of the *oran* in Alwar district has been the responsibility of a traditional local institution in the village going by the name of 'Thain'. Comprising a group of five to seven village notables, the Thain appointed the *sadhu*, as well as having the power to dispense with his services. They also decided on the rules for use of the *oran* and the penalties for breaking the rules, including fines. This arrangement played an important role in mediating the community's interests and those relating to the preservation of

the *oran*. Around twenty years ago in Bakhtpura, there was a pass system in place, for entering the forest for grazing purposes and collection of fuelwood. The amount paid for passing into the area was determined by the number and species of livestock and/or by the number of axes taken into the forest, based on a calculation of how much wood one person with one axe would collect in a day. Thereby, it was a taxing system where the amount paid was determined by the amount of resource a household took from the commons.

In 1985 the area was turned into a Tiger Reserve and the village lost the majority of their grazing rights in the area, though they still have the rights for grazing within a distance of three to four kilometres from the village, in the periphery of the reserve. After 1985 a system of fines for breaking the rules in the reserve was set up by the Forest Department, but the number of fines registered is very low. The villagers believe that the Forest Officials are usually bribed by the trespassers; therefore a very low number of fines are given.

Robust institutions are necessary to counteract the profit-maximising actions of individual actors. This requires transparent systems with strict rules, graduated sanctions, clear incentives and such like. Rather than allowing people to make decisions (e.g. about resource use) based solely on narrow, economic/productive considerations, but instead including history, political concerns, beliefs, etc., institutional theory (and, as such, much development discourse), such systems will lead to individuals who conform to the logic of local standards. Our study depicts the following institutional design principles (Table 1).

Table 1. Considerations in institutional design.

Structures of authority	Different authority systems (traditional village institutions, elders, deity, Panchayat, Government) side-by-side, development players, religion
Internalised social norms	Rules contested, negotiated
Dynamic leadership	Village institutions and elders are important
Simple rules	Rules are presented differently between people, variations on a theme. Institutional inertia needs to be overcome in setting new rules
Accountability	Deities are not accountable in any conventional way, whereas the traditional village institutions are but Panchayats (constitutional village institutions) are not
Government policy	For management of orans, a committee of local people and trustees can be constituted

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*Figure 3. Bhagwana Gujjar: a pastoralist with with herd of goats from Binak village.
Photo: Aman Singh.*

Bakhtpura village has an ongoing conflict with the nearby village of Binka over the grazing. In 2010, one member of the Bakhtpura community was beaten up by members of the other village, and this resulted in a major fight between members of the two communities, where both sides used weapons, such as axes, stones and clubs. The police came and arrested some members from both communities and held them for several days. A settlement was made, to follow the traditional grazing rights and boundaries. In 2014, a group of twenty to 25 women from a nearby village often came to cut the trees. The members of the village community stated that it was very difficult for them to control this, and especially to do it without creating a new fight. But at the same time some damage was done to the forest because of this as the neighbouring villages have over-exploited their own forest and are now coming to collect forest resources from Bakhtpura's protected resource. This change in behaviour of the neighbouring village developed slowly over three years. The first two years they came and did some lumbering in the community forest, they took only a little and there was no real reaction from Bakhtpura community. However in 2014 the

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*Figure 4. A woman Gujjar pastoralist with her herd of goats from Vijaipura village.
Photo: Aman Singh.*

quantities they were taking increased due to the lack of earlier resistance. The community was of the opinion that inter-community cohesion was pretty strong and that over the last 25 years they have had good control of their own village members with regards to grazing, harvesting of wood and protecting the *oran*.

Similarly, a case in Bherunath *oran* reflects the local values. A Gujjar individual settled in this village and did not follow the rules and regulations about this *oran* but one day started chopping down trees. Villagers told him he could not do that, but he was very adamant and also physically very powerful, so he did not listen to the other community members. When he went back to his house with the logs, after a few days something happened so that he had to sell his whole land and leave the village; so the punishment is very severe if anything happens within the boundary of this *oran*.

Bhaktपुरा

The *oran* of this village has been cut into two parts, one that is community controlled and another that has been enclosed as a forest reserve. The result

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of this has been that the reserved forest has been stripped bare – presumably by the local community – whereas the community controlled forests retain fairly thick stands of trees. There is also a very good *johad* (water reservoir) in the *oran*. With the onset of rains in late July, the *johad* swells to its maximum, meaning that water will be retained in the forest for the dry season. Here, tree cover is extensive, the understorey dense and diverse. From March to October, the lush *bani* scintillates crimson then chrome with the flowers of *dhak* (*Butea monosperma*) and *khair* (*Acacia catechu*); in the dry winter months, the same trees offer shade to languid children and goats.

Bakhtpura is dominated by Gujjars (54 households). Jatavs (a Scheduled Caste) are the second most populous group (thirty households), with Rajputs (four households) and Bhil (three households) also represented, though in much smaller numbers. The total population of the village is 686 (Census of India 2001, District Census Handbook (District Alwar)). All the households in Bakhtpura kept livestock. Goats were by far the most common (846 in total, with an average holding of roughly a dozen head per household), followed by 274 buffalo and 34 cows (KRPAVIS 2009). Villagers are also considered pastoralists, using the terms interchangeably.

In Bakhtpura, Dhok (*Anogeissus pendula*) is the dominant tree species. Grass species like Satavari, Kuri, Saava, and certain other wild grains are found. Other tree species found are Babul (*Acacia nilotica*), Ber (*Zizyphus mauritiana*), Giant Milkweed (*Calotropis procera*), Kair (*Capparis decidua*), Kala Khair (*Acacia catechu*), Hingota (*Balanites egyptiaca*), Neem (*Azadirachta indica*), Peepal (*Ficus religiosa*), as well as creepers and fig species. A total of 404 indigenous and naturalised plant species belonging to 272 genera under 87 families are found in the Sariska Tiger Reserve area. According to Champion and Seth (1968), Dhok is an edaphic plant in tropical, dry deciduous forests. Dhok is a prominent tree species often found in pure stands in the middle slopes of the hills; its leaves are good fodder and this is the principal species growing in the reserve. The main niches of vegetation for village livestock grazing are:

- Hill top plateaus called *maalas*, where pastures of good quality are to be found
- Community protected scrub forests along the foothills
- Riverbeds and streams, where the riverbeds are also used for sand collection and reed production for sale in the nearby region
- Fallow fields in the tract and nearby areas.

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Research approach

The role of *orans* in pastoralist livelihoods was studied using a structured survey format, and field visits to get information both on the larger community and on individuals. This gave an indication of people's perceptions. This was cross-checked against other data sources: archival records; *shilalekhs* (stone tablets) on the *orans*; Government Census and Gazetteers; related website searches; NGO reports (including KRAPAVIS), and published case studies (Patwa 2013, Singh, A. 2010, Singh, A. and Gupta 2010, Singh, A. and Jobanputra 2009, Singh, R. 2009, Sisodia and Singh, A. 2002).

Information was also gathered through community meetings. Oral histories were sought on the issue, not only in meetings but discussing on-the-site, and in people's homes; through this process the community become more informed on the vital issues of *orans*. Initial inquiries in the villages focused on the practical aspects of resource use. The timing, spacing and major methods of resource extraction were established through semi-structured interviews with pastoralists and farmers. Investigators also spoke with women about water and wood collection and learned of the labours of livestock-rearing, from fodder and dung collection to veterinary practices.

Research culminated with a comprehensive survey conducted in Bhaktapura village, which recorded human and livestock demographics, agricultural practices and production, natural resource extraction, approximate area of the *oran* site, ownership, statement of significance, special or unique features of the site, biodiversity, present condition, threats, traditional practices followed for conserving *orans* and their unique values of sacredness, priority (for conservation management), agency/person/community (if any, involved in preservation and usage, names and contact addresses, including those of the key persons), particularly those who could be involved in future preservation and management of the site and could provide leadership in this regard.

The surveys registered villagers' opinions about the relative importance of institutions, the efficacy of rules and punishments, informal responses to rule violations and other analogous issues. They also sought to establish the nature and extent of participation in public decision-making forums by different individuals and groups. The behaviour of individuals vis-à-vis natural resources and formal institutions could not be understood apart from the social, historical and political context. Why people cut some trees while conserving others and avoided Forest Department trees was contingent on a range of factors that could be discerned only through enduring ethnographic engagement. In addition to those methods, oral histories were recorded from several

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older community members in order to gain some sense of the region's social and political past, in particular the frequent episodes of conflict between state and subjects over claims to natural resources. This process went hand-in-hand with archival research, the findings from which spurred further productive discussion in the village. Data on medicinal plants was also collected. The area under investigation was searched for veterinary medicinal plants used by the Gujjars and other pastoral communities of Alwar district. The field survey was carried out covering different seasons over a period of one year. As a first step we conducted a four-day workshop with local educated youth and pastoralist elders to understand their local medicinal system on animal health.

Findings

The viability of the *oran* lies in its role in fulfilling real needs of local people. *Orans* are critically important pasture tracts for local livestock. Geared mainly to the needs of cattle, they provide a rich reserve that is invaluable especially in times of environmental stress. Other animals use the *orans* and at times these cater to the needs of migrating herd owners. In addition to pasture, the *orans* are a year-round source of fuelwood. Thus while standing trees cannot be cut down within the *oran*, fallen branches can be collected. *Orans* often provide valuable medicinal herbs and plants for people and animals. What is more, they are a refuge for wildlife in an otherwise densely populated landscape. Finally, the *devbanis* and shrines are a locus for community gatherings at festival times. In a nutshell, *orans* and *devbanis* are a living and active part of the socio-ecological landscape of local communities.

Social factors

Regarding the level of dependency on the village commons, interview groups stated that about fifty per cent of their income was produced through the commons during normal monsoon rains. In the summer, pastoralists migrate for grazing or for manual labour. For approximately three months during the winter they depend on their private and often irrigated lands for crop residues and agriculture, and for about six months during and after the monsoon their livelihood is partly dependent on the village commons. In times of drought the village commons can sustain their livelihood for two to three months. The villagers will migrate with their buffaloes to the *Nogawa* plains, around ninety kilometres from the village, to graze the livestock. One member of the interview group said that during the last drought he lost fifty to sixty per cent of

his livestock as not enough fodder was available. He came back to the village with his remaining buffaloes and started using mustard plants, char berries and leaves from a specific tree that grows in the *oran* as fodder. He stated that the leaves from the tree are only used during severe famines; with this poor quality fodder he made it through the drought. Some special rules come into effect during drought. Some land is allotted to each household from the disadvantaged category for grazing, and no grazing in the forest is allowed so that the forest vegetation can regenerate. The villagers indicated that some households do break the drought rules, but not often.

'Yadi hamara devbani thik to sab kuch hai; yadi yah thik nahi to chara, pani aur bhojan ke lale.' [If our *oran* is intact we have everything, if not, we suffer from lack of fodder, water and wood] said Badri Gujjar, a sixty-year-old pastoralist, from Bakhtpura village. In rural Rajasthan, poverty and vulnerability to climatic changes (drought, famine) are common. Villagers highlight their dependence on *orans* for wood for fuel and timber, fodder for their animals, water and medicinal plants. *Orans* are critically important pasture tracts for local livestock and meet the real needs of local people; productive *orans* result in less poverty and more livelihood security in communities. People of Meena ki Dhani, a tribal village, said that

the driving force of our livelihood is the *oran* "Adaval"; we are all aware how useful it is for us, for if we need anything we take it from there. We have our animals to graze over there. So the binding force is our own livelihoods, and we recognise all people from this area. We understand that if we destroy the *oran* our lives will be compromised, and that is why we organise this way, have the Samiti [village organising body].

Even though the *oran* is geared mainly to the needs of cattle, other animals also use it. At times *orans* cater to the needs of migrating herd owners as well as the 7.5 million pastoralists residing in Rajasthan and their 54.4 million livestock, out of which 14.3 million are sheep.

As communities in Rajasthan are predominantly mobile and pastoral, they depend to a great extent on the grazing grounds provided by the *orans*; for example, 41 per cent of livestock in Barmer district depend on them for fodder. With grazing there is flexibility – as long as there is grass or leaves, animal graze. At other times people only use the *oran* for shade and water. For other forest produce, people may take as much as falls to the ground when the tree is shaken. And only a limited quantity can be taken home. This results in better grazing for livestock and increased availability of medicinal plants

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and other minor forest produce. According to our survey of 72 residents, the significance of Bakhtpura's *oran* can be summarised as follows.

Table 2. Oran significance to the local community.

	Not Important	Somewhat important	Important	More Important	Most Important
1) How important is the Oran to you?	0	0	0	0	72
2) How important is Devi to you?	0	1	0	0	71
3) How important is the Samiti to you?	0	1	5	4	62
4) How important is the Forest Department to you?	31	14	20	2	5
5) How much conflict over private land is there in village?	1	51	14	3	1
6) How much conflict over the Oran is there in the village?	69	2	1	0	0
7) How much conflict over other land is there in the village?	0	22	48	2	0
8) How is the state of the local environment now compared to the past?	0	46	22	3	1
9) How is the state of religious belief now compared to the past?	9	34	18	4	7

Environmental factors

The diverse *oran* water sources are very important for communities in terms of providing water for their livestock, irrigation and drinking purposes. Research into *oran* water resources suggests that these potentially provide a permanent solution to water scarcity and degradation in the area (Krishna and Singh 2014). They ensure a continued supply of water even after the monsoons and greatly benefit local livelihoods through the increased availability of water for livestock and crop irrigation. For example, Garuba ji Devbani and Adaval ki Devbani districts in Alwar irrigate about 200 hectares. According the potter

community from the Dehlavas village, 'Clay from the *oran's johad* is considered good for making pottery'.

Many trees found in *orans* are useful for a number of purposes. They are harvested in a sustainable manner and are by and large protected by all the sections of tribal society, having a sort of revered and totemic status. Even when the forest is destroyed in the quest for agricultural land by the local population, these multi-purpose tree species are generally left unscathed. A list of such trees is given below.

Table 3. Trees found in local Orans. Source: KRAPAVIS 2009.

Local Name	Botanical name	Purpose
Dhok	<i>Anogeissus pendula</i>	Fodder, shade
Jamun	<i>Syzygium cumini</i>	Fruit, shade
Gular	<i>Ficus glomerata</i>	Fruit, shade
Khajjur	<i>Phoenix sylvestris</i>	Fruit, male trees harvested for timber used in construction, leaves for mat and broom making
Neem	<i>Azadirachta indica</i>	Medicinal importance, shade, oil
Bans	<i>Bambusa arundinaceae</i>	Used in house construction, for mat, furniture and broom making
Khejari	<i>Prosopis cineraria</i>	Fruit for cooking and fodder, shade
Peepal	<i>Ficus religiosa</i>	Fruit, fodder, religious importance, shade
Bargad	<i>F. benghalensis</i>	Fruit, leaves for making plate and bowls, religious importance, shade
Imali	<i>Tamarindus indicus</i>	Fruit, shade
Kair	<i>Capparis deciduas</i>	Fruits for food; making vegetable pickle, medicines etc
Ber	<i>Zizyphus mauritiana</i>	Fruits and fodder
Salar	<i>Boswellia serrata</i>	Fodder, shade

Climatic change: Variability and reduction in rainfall

There are indications – based on both formal and folk knowledge – that changes are taking place in the local climatic conditions. Whether these form part of changing global scenarios is a subject for further research. What is clear, however, is that these changes have had important consequences at the local level on important aspects of the production system. Some of the more striking changes that are reportedly taking place at the local level are as follows.

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- *Declining annual rainfall:* The average annual rainfall of the district is stated to be 600 mm (Census of India 2001, District Census Handbook (District Alwar), 21). Over the last ten years it appears that only in two years has the rainfall reached 600mm. For the most part total precipitation has been well below the annual average. Popular local perceptions strongly support the view that there has been a fall in the annual rainfall.
- *Shortening rainy season:* there is a perception that the number of rainy days in the monsoon has decreased. Chaumasa, the local term for the rainy season, means 'four-months' etymologically. Today the rainy season rarely stretches beyond three months. There is also the impression that the frequency of light showers has fallen.
- *Unpredictable winter rainfall:* There is a local perception that winter rainfall has become irregular and delayed.
- *Changing seasonal succession:* although the region is characterised by a stable three-season succession, there has been a perceptible shift in the duration of each. Traditionally the two major festivals of Divali and Holi mark the beginning and end of winter. An informal measure of this change is when people sleep indoors and outdoors in the rural areas. Traditionally they would move out a week or so before Holi. Today people continue to sleep indoors well after Holi.

The reported changes in local rainfall and seasonality have had clear consequences on the status and biotic composition of the *orans*. The most apparent change has been in the decline of large plant species. Alwar *orans* were renowned for their bamboo; now its numbers have fallen sharply. A Bamboo Cooperative Society formed as early as 1952 is now defunct, largely due to low availability of bamboo. Another large plant species known locally as Kala Khair has visibly decreased in presence. The Googal tree, which was widespread, has now virtually disappeared. A most important species of the *oran* in terms of its grazing utility is Dhok. There are few young specimens of this tree available today.

The picture is similar for grasses and shrubs. For instance, the species of millet locally known as Sawan, mentioned above, is an excellent fodder grass and its grain is used to make *kheer*. Its peculiarity is that it needs sustained light showers to grow optimally. The shortening of the rainy season has directly affected its growth, and there is today a severe decline in its availability. In contrast a grass that has spread recently is Laumpla. This grass grows under dry conditions, and indicates the spread of aridity.

Similarly it was reported that some twenty odd species of bulbous plants of medicinal value were formerly available in these *orans*. Today these have become hard to find. Last but not least, most *orans* have water sources in the form of tanks known locally as *johads*, *talav* and *bawri*. Many of these have now run dry. The natural springs found in some *orans* now have reduced water flow or no longer flow throughout the year.

Orans also serve as ethno-medicinal centres. When livestock (buffalo, goats and cows) become ill, traditional healers are able to identify and apply plant medicines (in the form of a paste or powder) that have anti-bacterial, anti-inflammatory or pain-relieving qualities. Based on previous study (KRAPAVIS 2009), the ethno-medicinal functions of certain plants are as follows.

Table 4. Ethno-medical significance of the plants in the oran.

Local Name	Botanical name	Part used	Condition treated
Chapun	<i>Grewia hirsutae Vahl</i>	Root	Retention of placenta
Neem	<i>Azadiracta indica</i>	Stem, bark leaves	Fever, diarrhoea, skin diseases
Peelu	<i>Salvadora oleoides</i>	Leaves	Constipation
Chhila/ Dhak	<i>Butea monosperma</i>	Stem bark	Fever
Desi akda	<i>Calotropis gigantea</i>	Stem bark	Swellings , bloat
Kair	<i>Capparis decidua</i>	Fruit	Stomach
Sur kand	<i>Saccarum spontaneum</i>	Tuber	Poisoning
Jhad desi	<i>Zyziphus mauritiana</i>	Root	Foot rot

Conclusion

Orans evolved as a social mechanism to safeguard the livelihoods of some of the subcontinent's most economically vulnerable people by ensuring their access to water and other vital resources even in times of political or climatic instability. In the last sixty years, Rajasthan's *orans* have undergone a steady decline in both quantity and quality. Villagers are now facing not only an acute scarcity of resources and greater vulnerability to economic and climatic changes, but also, due to the dismantling of traditional institutions and entitlements, a weakening of customary social bonds of cooperation and reciprocity. There has been a serious depletion (up to fifty per cent) of some NTFP (non-timber forest products) species in the Aravali region in comparison to the situation fifteen to twenty years ago, including Khair, Salar, Paneer bandh and Bamboo (Chaudhry et al. 2008).

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Figure 5. Pastoralism in Kraska (Sariska Tiger Reserve), where human and livestock use the same source of water 'rain water harvesting'. Photo: Aman Singh.

The potential economic value of the *oran* is immense and significant for the economic well-being of the people. There is an urgent need to make an assessment of the annual financial value, and support the role of NTFPs from *orans* in the rural economy. At a more specific level, the diversity of the vegetation in the forest canopy as well as the under-storey is deteriorating. In particular, species that were useful for pasture and NTFPs have reduced and some have reportedly altogether disappeared. As a result, the perceived value of the *oran* is diminishing, and the community is reluctant to invest resources and energy in its upkeep. The easy availability of groundwater today thanks to mechanised borehole digging has also made redundant the traditional sources of water available in the *orans*. Over time water sources such *bawries* and *johads* have become neglected, and there is in general less interest in the management of community water resources.

It is quite surprising that, despite the critical importance of *orans* for local livelihoods and biodiversity conservation, there remains considerable ambiguity regarding their legal status and ownership. This ambiguity has resulted in *orans* being neglected by all relevant parties. When the Forest Department wishes to

take an *oran* over for its own purposes, it does so without hesitation; likewise when local administrations want to distribute *oran* lands they do so without a thought; when local farmers choose to encroach upon *orans* they do so legally. Local entrepreneurs have also disturbed *oran* lands for mining purposes. As a result, the fate of these community forests has been decided by everyone other than the local community.

It is evident that the *orans* are operating today in something of an institutional vacuum and indeed it is not clear at the present time what agency enjoys jurisdiction over them. As stated earlier, their upkeep was the responsibility of a traditional village institution (e.g. Thain). Today the traditional institutions have disintegrated. Modern institutions that have supplanted them, such as the official village Panchayat, have displayed little interest in the management of *orans*. Unlike the Thain, which represented community concerns pertaining to the use of the *oran*, the Panchayat is not in any way oriented to these ends. At the level of the village community, there is often tension between those who wish to preserve the *oran* and those who would rather turn it over to agriculture. This is nowhere manifested more clearly than in the weakening of village institutions that held the community together.

Local populations have been increasingly excluded from management of their resources. The Forest Department can easily restrict access to *orans* for government plantation purposes, or declare the grove an inviolable reserve. This has led to two consequences, one being the alienation of local people and the second being the deterioration of natural resources due to mismanagement. The village of Bakhtpura in our study area illustrates the difference a community's involvement in an *oran* can make. The *oran* of this village has been divided into two parts, one governed by the community and the other enclosed as a forest reserve. The results of this division have been that the reserved forest has been stripped bare, presumably by the local community, whereas the community-controlled forest retains fairly thick vegetation.

Another cause of alienation could be the relationship between the loss of the people's faith in the spiritual relevance of *orans* and the consumerist mentality of the private sector. The role of the state in promoting the growth of industry without heeding the concerns of local communities, as well as the lack of employment in the rural paradigm, results in out-migration and further weakening of socio-cultural and spiritual ties.

Encroachment is a recurrent problem affecting every *oran*. Cultivators living on the margins of the groves surreptitiously expand their farmlands into the *orans*. Substantial tracts of *oran* land have been distributed for cultivation,

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most recently for jatropha. This benefits a few people, mostly entrepreneurs from outside the local community, yet significantly contributes to the heightening of local tensions. In such instances local communities are formally deprived of access to the *oran*, although often enough grazing continues secretly. These processes (Box 1) have resulted in villagers transitioning from stewards to tres-

Box 1. Changes to Orans.

<p>Institutional vacuum: Government jurisdiction over <i>orans</i> is unclear. Previously the upkeep of the <i>oran</i> was the responsibility of a village institution (e.g. Thain). Today traditional institutions have disintegrated and been supplanted by the village Panchayat (village level legislative body) that has little interest in Oran management. At the village level there is often tension between those who wish to preserve the <i>oran</i> and those who would rather cut it down.</p>
<p>Community alienation: Bakhtpura residents have been increasingly excluded from management of their resources. The Forest Department can restrict access to the <i>oran</i> or declare a reserve, alienating locals and mismanaging resources. The village <i>oran</i> has been cut in two, with one part governed by the community and the other enclosed as a forest reserve. The reserved forest has been stripped bare, presumably by the local community, whereas the community-controlled forest retains fairly thick vegetation. There has been a loss of faith in the spiritual relevance of the <i>oran</i> and increasing consumerism, reflecting the promotion of industry over local concerns and a lack of employment. This results in out-migration and weakening of the socio-cultural and spiritual ties to the <i>oran</i>.</p>
<p>Encroachment: Land on the margins of the <i>oran</i> has been allocated for cultivation, most recently for jatropha plants, benefiting outsiders and heightening local tensions. Often local communities are deprived of access to the <i>oran</i>, though some grazing continues secretly. Villagers transition from being stewards to trespassers overnight, damaging the link between communities and their <i>oran</i>.</p>
<p>Changes in the production system: The <i>oran</i> had historically served as pasture for cattle. The species composition had consequently evolved in response to the grazing requirements of cattle. Today buffaloes use the <i>oran</i> for grazing and wallowing, especially during the lean parts of the year, and grazing by goats and sheep has increased, yet the species composition is not well-suited for buffaloes, goats or sheep.</p>
<p>Decline of flora and fauna: Among several ecological changes has been the decline of large plant species, grasses and shrubs. For instance, <i>sawan</i>, a type of millet, is an excellent fodder grass and its grain is used to make <i>kheer</i> (milk pudding). Shorter rainy seasons have affected its growth and there has been a severe decline in its availability. Over twenty species of medicinal plants in the <i>oran</i> are now threatened.</p>
<p>Perceived value of the <i>oran</i>: There is a mismatch between animal needs and <i>oran</i> pasturage. Moreover, the vegetation in the forest canopy and undergrowth is reducing in diversity. Species that were once useful for pasture have decreased or disappeared in some cases. As a result the perceived value of the <i>oran</i> is low and the community is reluctant to invest resources and energy in its upkeep.</p>

passers overnight, as government actions and laws affect local behaviour. These factors all contribute to the larger deterioration of the relationship between communities and their *orans*.

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