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**Institutional Change and Collective Action: Common Property Regimes in the Semi-Arid Region of Rajasthan, India.**

**Stream: Multiple Commons**

## **INTRODUCTION**

A majority of the people in arid and semi-arid areas depend on biomass resources from common lands which are often managed through local institutions. According to some, increasing population pressure and marketisation have resulted in degradation of commons in developing countries (Ehrlich and Ehrlich 1991; Myers 1991; Palo and Mery 1990; Palo 1993), whereas some researchers claim state interventions to be equally important (Salih 1990; Shanmugaratnam et al., 1992).<sup>1</sup> According to Bromley and Chapagain (1984), Bromley and Cernea (1989), and Shanmugaratnam (1996) development policies together with demographic and technological changes lead to the continuous shrinking of common pool resources (CPRs) and the breakdown of traditional CPR management institutions. For example, policies related to land reforms in developing countries have tended to be preoccupied with the institutionalisation of private property regimes while neglecting the task of creating an institutional environment for viable CPR management. A few others advance a provisional theory of resource degradation as a vicious circle, whereby population growth, increasing demands and access roads appear as driving forces (Palo and Salmi 1987; Palo and Mery 1990; Verma and Partap 1992; Young 1994). Rising demographic pressures, state and market interventions lead to accelerated degradation of CPRs, but their effects are mediated through local level institutions managed by resource users (Ostrom 1990 and 1992; Runge 1992; Uphoff 1992; Wade 1986). According to North (1992) history matters, and despite interventions institutions keep evolving and their continuity helps linking the present and future with the past.

In the last two decades several studies have focused on local-level solutions to resource management problems with approaches biased towards their respective disciplines. Different disciplines view interactive processes between communities and resources through their own theoretical lenses, but for all of them, institutions matter. Economists like North (1990), for example emphasize on rule systems and enforcement and sanction mechanisms in the conceptualisation of institutions. These institutional forces affect organisations and provide assurance mechanisms, which in turn influences the resource use and management. The manner in which communities

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<sup>1</sup> Lappe and Shurman (1989) and Simon (1990) say that the role of population and marketisation is limited. Lawry (1989) claims market to be the main driving force for individualisation and change in commons.

unite to act collectively, devise their own rules, define access, appropriation of resources, boundaries and negotiate with external interventions, take up enforcement measures, manage caste and economic differences and address gender issues, are critical to resource use studies. Not many studies in the past have explicitly attempted to analyse the role of local institutional arrangements in resource management through quantification studies or looked at variations and their affects across communities or villages.

The present study has analysed data from 37 villages in the semi-arid region of Rajasthan in India, by looking at variations between villages in terms of institutional arrangements and the communities, who were basically dependent on biomass resources for their livelihoods. The objective of this study is to analyse the institutional change impacted by historical factors and policies and the extent to which they influence the assurance mechanisms. The study explores the significance of institutions on forest resources on commons through quantitative analysis, despite population pressure and market integration.

### **THE STUDY AREA AND COMMONS**

The present study was done in the district of Alwar, in the semi-arid region of the state of Rajasthan in India. Since 1950, the region has experienced a series of land reforms which have contributed to resource degradation through institutional changes that discouraged endogenous authority and collective action. Demographic changes in the recent decades in the area has shown rapid growth, which is one of the highest for the semi-arid areas of India. From 1971 to 1991 population density has increased in all village groups in the study area (1.15 to 2.14 persons/ha), similar to the growth patterns of the district and the state of Rajasthan during this period. The livestock population in the sampled villages recorded annual growth of about three per cent from 1977 to 1992.<sup>2</sup> Demographic pressure and marketisation has brought about land use changes closely associated with the governments policy favouring *de facto* privatisation of commons since the land reforms started in Rajasthan. The region has also witnessed a rapid development of road network providing market access to the villages (70 per cent of the villages surveyed have been connected by paved roads in the last twenty years). During pre-reforms period, less population, physical and market isolation supported by authoritative institutions were major factors that influenced CPR management and assurance mechanisms to resource users.<sup>3</sup>

Prior to 1947 a number of policy changes were made in Alwar state that affected the rights of the people within commons and state lands. The first “Forest Settlement” in 1899-1900 in Alwar state brought about alterations in the boundaries of forests and commons of each village and rights of the local people.<sup>4</sup> Forest boundaries were drawn taking the *panidhal* (water course) principle into consideration, where the table land on hills were included in the state forests since this formed the main catchment of the region, and the land on the slopes adjoining the villages were left to common use. But, state officials in most cases extended their boundaries down to the skirts of the hills

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<sup>2</sup> Similar changes in livestock growth have been studied in dry areas of India by Jodha (1992) and Brara (1987).

<sup>3</sup> Jodha (1996) reports similar findings in dry tropical regions of India.

<sup>4</sup> The historical material used in this section was collected from district land revenue records (unpublished data).

and included even the slopes in the state forests, under the pretext that this was the only way to prevent trespass of village cattle on state grazing reserves. The process greatly limited the rights of the local people, since large areas including traditional commons were annexed to state forests, and the new boundaries ran very close to the village *Abadi* (where village settlements are located). The state realised the shortcomings and re-organised the boundaries in 1928, along with restoration of all state annexed commons, back to the villages. In 1935 the state policy attempted to accommodate both conservation interests and people's needs. In this exercise, the private forests owned by intermediaries<sup>5</sup> were to be designated as "Protected Forests" where local people could exercise their use rights. For example, in villages which had scanty grazing areas the state forest boundary was fixed at some point between the foot and summit of the hills. In other villages the boundary was fixed at the foot of the hill, but the villagers had free access to the slopes, which meant the owner was the state and the villagers had the use rights to the land. The villagers all the while recognised the old boundaries and *de facto* treated the state forests outside the old boundaries, adjacent to the villages as 'extended commons' which continues in majority of the villages even today.

The merger of state of Alwar into the Indian union in 1947 is a convenient point of departure for delineating the history of commons management in the area. Land reforms were initiated in 1950s in Rajasthan with the main objective of abolishing intermediaries, providing tenurial security to peasants and land to landless. This institutional change from intermediaries to the state controlled *panchayat* proscribed the customary rights of the people within the state forests and commons and disrupted the assurance mechanisms. Majority of the forest areas were nationalised in 1955 giving legal status of a protected area to the forests, which became much strict in 1982 when the area was notified as National Park under the Wildlife (Protection) Act, 1972. The 'commons' in the study area include: 1) '*gochar*' or village grazing lands, stream or rivulet beds, village ponds and bunds and supposed to be managed by village *panchayat* 2) '*Padath*' i.e., 'either Culturable waste' and 'Unculturable or uncultivable waste' controlled by State Revenue department and *de facto* used as free entry or restricted entry-open access. 3) State forests and Protected areas managed by Forest Department and 4) Private fallow lands. It was usually 'restricted entry-open access' to common lands in most of the villages, where outsiders were restricted and open access situation prevailed within village, unless there were prohibitions by the *panchayat*. In some villages, even outsiders used the resources, especially on *padath* lands, in which case it was 'unrestricted entry-open access'.

Major dependency of villages surveyed was on state forests through *de facto* rights, but *de jure* rights to collect fuelwood and fodder was permitted on a restricted basis. Fuel and fodder is partly supplemented from private lands, but only individuals owning the land have the use rights. However, it was common for individuals with large land holdings to allow village livestock to graze on their fields during fallow season, with the objective of improving soil fertility. In addition, property rights are attached to

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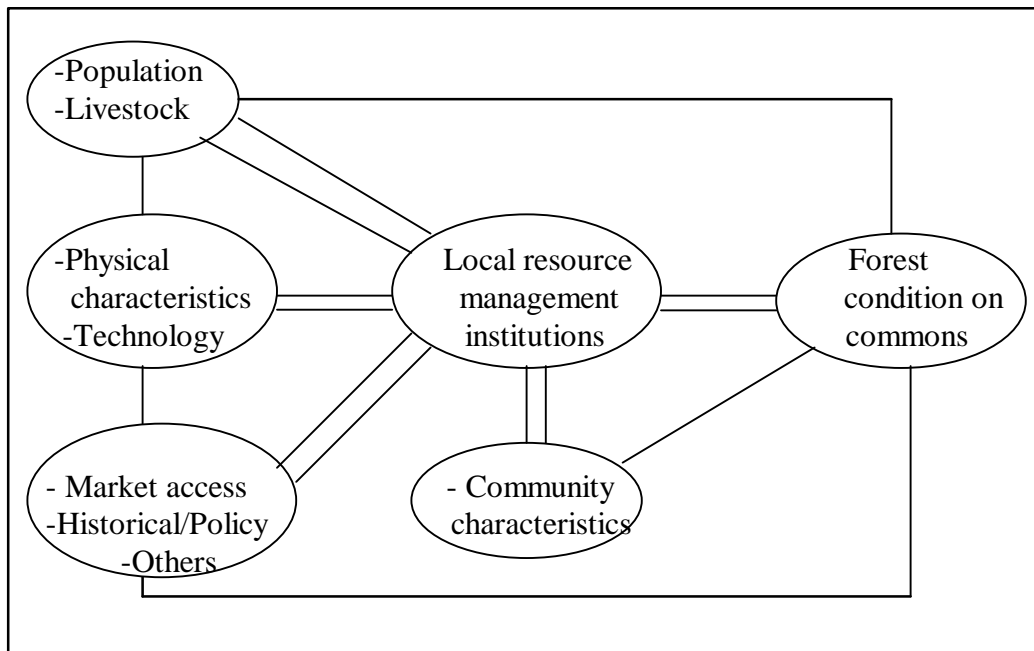
<sup>5</sup> Zamindars were proprietors of large land holdings spread out, sometimes even in more than one village and directly under the princely state. Biswedars were big farmers who paid fixed rent to state and owners of their land. Lumbardars held smaller parcels of land than biswedars, for example there could be several lumbardars within one village.

resources, for example, *chila* (*Butea monosperma*) trees are owned by the state even if they are present on private lands, but the leaf fodder from this tree is a CPR. Similarly, *Laud Sihali* (*Woodfordia floribunda*) and *Har Singar* (*Nyctanthes* sp.) are economically important plants used in basket making and are owned by the state irrespective of their location. Their use rights are auctioned by the state to individuals annually. Land use patterns (GOR 1991) indicate that area under legal or state forests has increased (from 6.5% in 1971 to 19.4% in 1991), while the area under *gochar* and *padath* during the same period, declined (from 11.5% to 9.5% and 46% to 36% respectively).

## ANALYTICAL FRAMEWORK

Figure 1 illustrates factors influencing forest condition on commons in villages surveyed and existing relationships between the causes and effects. The current analysis is more in line with variance approach which views independent variables as necessary and sufficient condition for determining the value of outcome (dependent). In contrast the process approach deals with “ a series of occurrences of events rather than a set of relations among variables” (Mohr, 1982).

*Figure 1 A theoretical framework illustrating the major factors affecting forest conditions, both through direct and indirect means in the study area.*



Data was collected in the thirty seven villages<sup>6</sup> through an open-ended structured questionnaire and field surveys. The villages selected through stratified random sampling were located both inside and adjacent to a protected area designated as Sariska Tiger Reserve situated in the Aravalli hill range, traversing through the district of Alwar, Rajasthan. Protected area itself implies some restricted use of resources by

<sup>6</sup> Villages were randomly selected (Gaussian quadrature) using four variables, the distance of the village from the Reserve border, population, number of households and area of the village.

The framework focuses on a few factors relevant to this study, that influence the resource condition on village commons: the nature of the resource (the subtractability and degree of exclusion)<sup>7</sup> and technology adopted to harvest common pool resources; the type of CPR management institutions, forest condition or status of natural vegetative cover on commons (the dependent variable); (ii) Market access (distance from market or nearest link to paved road) and state interventions (historical perspectives, current policy and laws); (iii) demographic factors which encompasses interventions (historical perspectives, current policy and laws); (iii) demographic factors which encompasses human population density (per capita land available) and livestock numbers and (iv) socio-cultural factors that include community characteristics. All these factors influence the forest condition directly, as well as indirectly through institutional arrangements. These are the four main factors that influence the functioning of institutions as indicated by the flow of arrows in the framework, but institutions are not the result of these forces only.

Data was collected in the 37 villages<sup>8</sup> through an open-ended structured questionnaire and field surveys. The villages selected through stratified random sampling were located both inside and adjacent to a protected area designated as Sariska Tiger Reserve situated in the Aravalli hill range, traversing through the district of Alwar, Rajasthan. Protected area itself implies some restricted use of resources by law and additional protection measures adopted by state.<sup>9</sup> This might have some implications on the forest condition on commons and mediated through institutional arrangements. It was tested through a proxy variable 'the distance of the village from the protected area boundary', since the access and use rights of villages both *de facto* and *de jure* vary with the location of a village with reference to the protected area boundary in the study area.

Institutional characteristics responsible for CPR management in each village were analysed taking into consideration variables such as, presence of rules governing access and use of resources, cases registered against rule breakers in the past one year (enforcement arrangements), frequency of meetings and elections held (institutional processes). These variables indicate the extent to which organisations are active and functional and helped to classify villages into different categories based on the kind of institutions (active, not very active or not active) and included in the analysis as an independent variable. The institutions were either formal (created through state initiatives) or informal (traditional), which were then categorised into active (held

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<sup>7</sup> 'Subtractability' affects common property in two ways. One, user of a commons subtracts a flow of benefits available to others. Two, cumulative use of the commons by many users will eventually subtract from the total yield of the commons. 'Exclusion' refers to the question of access to any type of good or the commons in this context. Complete openness or unlimited access is the opposite of exclusion. The physical nature of the common and the availability of technology will affect the degree to which exclusion can be achieved (for example, the size and shape of the boundary of the common and the cost and ability to fence) (Oakerson, 1992).

<sup>8</sup> Villages were randomly selected (Gaussian quadrature) using four variables, the distance of the village from the Reserve border, population, number of households and area of the village.

<sup>9</sup> Protected area (PA) establishment in India through the Wildlife (Protection) Act, 1972, empowers the State to impose protective and restrictive provisions for the conservation of wildlife and the environment.

monthly meetings; presence of clear access rules and rights governing CPR use and sanctions against violators; active in checking violators and elections held once a year) not very active (unclear rules and rights governing access to CPRs but still followed; not regular in identifying violators and imposing sanctions; meet only once or twice a year and elections held irregularly) and not active (rules and rights not followed; no check against violators; have not met in the past one year and elections not held since its formation). Weights were assigned depending upon the type of institutions (active = 3; not very active = 2; not active = 1).

The forest conditions around villages, the dependent variable is represented by the natural vegetative cover, including trees, shrubs and grasses on the commons. It was assessed through line transect survey method (Wildlife Institute of India; unpublished data, 1993) in each village to observe the impact of resource extraction and the extent to which the pressure is felt on the forest. Observations were recorded at 200 m interval along a two km long transect (1-2 transects in each village). At each point the number of trees in ten meter radius, number of shrubs in five meter radius plots and per cent grass cover in one meter radius plots was measured. The data was summarised and average number of trees, shrubs and per cent grass cover was assessed for each village. (For convenience of analysis, the data was converted by putting weights on values obtained; One tree = one unit; Three shrubs = one unit; 25 per cent grass cover = one unit). This method ensured a realistic estimate of the condition of the forest around villages.

A realistic estimation of population pressure or group size could be obtained by taking into analysis the amount of total land available per household, which is the basic unit of consumption in a village. All households in the village were considered potential users, whether they participate in collective action or not, since those who do not participate in collection also meet their requirements partly from village commons and partly from private lands. The approximated quantity of fuelwood and fodder extracted from common lands in each village is also included in the analysis, since it is expected to directly influence the forest condition and varies with the group size. The effect of market access is analysed by using a proxy 'distance to the paved road', since this brings villagers closer to the market and *vice versa*, where goods are sold by villagers to the middlemen from the nearby towns.<sup>10</sup> The historical factors and their impact on CPR institutions over time in the study area has influenced the evolving organisations in several villages and has been evaluated qualitatively.<sup>11</sup> However, the response of organisations in different villages has been different, that resulted in their survival or collapse against state interventions. Variations were observed in caste composition between villages, based on which they were classified whether they were homogenous or not.<sup>12</sup> This factor is likely to influence the forest condition directly as well as through institutions, represented in the framework by community characteristics.

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<sup>10</sup> The 'distance of village to the paved road' as a representative variable, has the obvious merit of being unambiguous (Agrawal and Yadama 1997) and was used in some previous studies to analyse the impact of markets on forest degradation (Banskota and Jodha 1992: 101; Sader et al., 1994; Young 1994: 972).

<sup>11</sup> The type of institutional environment at the time of formation of the organisations tend to have "imprinting" effects on the structure of the organisations (Scott 1996: 115).

<sup>12</sup> Homogeneity occurs when users share vital characteristics that define them as community. In the study homogenous villages are those in which at least two thirds or more of the population is represented by one caste whose members share similar interests in resources.

## INSTITUTIONS AND INSTITUTIONAL CHANGE

### Pre-reforms period

During the pre-independence period land tenure system in Alwar state was dominated by intermediaries such as the *zamindars* who controlled 50-60 per cent of the land owned by state. The essence of village life was a structure of authority and control and this system left few in doubt as to their choice in daily activities. The peasants did not own land but did possess highly divergent inheritable usage rights. The ruler of the state owned the land, defined property rights with the primary interest of revenue earning from cultivated and common lands, besides conservation motives and people's needs. This arrangement operated within the broader institutional framework of intermediaries based on coercive measures. The intermediaries whose status was that of proprietors<sup>13</sup> controlled large tracts of land and leased out land to tenants at high rents, sometimes even more than 50 per cent of the produce. The *zamindars* also managed the commonly used resources such as grazing lands and forests. However in interior villages, local people's use of CPRs was governed by customary rules dominated by caste *panchayats*. During this period, the level of exclusion on commons was reported to be high, attributed to the authoritarian style of management, which also provided the CPR users assurance about the expected behaviour of others. Assurance and property rights were closely linked in the pre-reforms period. Revenue from the 'commons' being the primary interest, motivated the intermediaries to enforce regulations through coercion.

The authority of intermediaries over commons prevailed in matters of enforcement and conflict resolution, except in some interior villages where caste *panchayats* took active role in devising rights and rules governing CPR use and enforcement of regulations and sanctions. The strong patron-client relationship between the intermediaries and villagers was responsible for better management of CPRs without letting it seriously degrade, as it provided revenue to the proprietors and assurance to resource user groups through continued access to commons. Through coercion, intermediaries enforced sanctions on violators, managed to extract labour for harvesting of resources, guarding and maintenance activities such as fencing, planting and de-silting ponds. Village communities mobilised resources through obligatory contributions of cash, labour, penalty fees and revenues from auction of resources. One such indicator was the "*Bagar Bachh*" a cess levied on grass cutting for the state, in the form of forced labour supplied by certain villages. During this period indicators for revenue earning, investments in CPRs and their use regulations were more clear which ensured the maintenance of commons.

The operational rules both formal and informal, directly affected the day to day decisions made by individuals and regulated the users from overuse of the resources. The rights of local people within commons, and the rules governing the rights to CPR use was carefully reviewed by the State in 1899. Customary fees were charged for grazing and removal of CPRs (Forest Settlement, 1947) were regulated by operational rules, that included:

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<sup>13</sup> 'Proprietors' have the rights of exclusion and this produces strong incentives for short term investments in resources.

- (i) Grazing fee on sheep and goats that existed even before 1899, when the ‘first Forest settlement’ was initiated by the state.
- (ii) On Reserved Forests, annual fee known as ‘*Daranti*’ (sickle) rate was in operation for cutting grass besides a special grazing fee.
- (iii) Cess on guarding grazing reserves (*Roondh*) existed before 1899 and continued till 1947 (*Shehna* or watchmen fees).
- (iv) The fee levied for thatching and fencing materials (*Chan chapper* and *Bar*) was discontinued.
- (v) Certain tree species such as Shisham (*Dalbergia sisoo*) and Bamboo (*Dendrocalamus* spp.) within forests and even on public lands were treated as state property and the individuals did not have any rights over them.

## **Post-reforms period**

### ***The Panchayat system***

The major thrust in land reforms was on the discontinuity of intermediaries, to provide better tenurial security to the peasants and conservation of state lands through nationalisation process. However, the objectives could not be accomplished due to inadequacies within the newly created *panchayat* system that replaced the intermediaries in 1955 under The Rajasthan Land Tenancy Act. This created an institutional void, as far as the management of village commons (*gochar* and *padath*) was concerned. Property rights and land reforms were in principle meant to reduce inequalities, but ignored the assurance factor that discouraged users to participate in CPR management. The officially constituted *panchayat* was presumably supposed to be democratic in its approach and carry out reforms which aimed at discontinuing coercive measures, but the *panchayat* (local self government) rather, proved to be a hindrance to the implementation of land reforms in principle and was also responsible for marginalisation of customary rules and collective action in CPR management. Continuation of some customary rules related to grazing and fuelwood collection from the pre-reforms period would have helped to strengthen the CPR base. In some villages social domination of the rural elite continued. Since, they no longer held proprietorship over the commons, they did not show any interest in commons management. In some villages the *panchayat* displaced the informal leaders and in others the feudal leaders. Despite legal powers and formal rules provided by land reforms, village *panchayats* and state agencies were incapable to manage CPRs and enforce operational level mechanisms. The policies have eroded the social arrangements such as village based authority systems, sanctions and rules, leading to the transformation of CPRs into open-access systems.

Village *panchayats* were faced with several constraints such as financial, administrative, class struggles, domination by rural elite interested in privatisation of commons and even lacked community structures including assurance mechanisms. Households with large land holding depended on their own lands for fuelwood and fodder, and hence did not show much interest in collective action. This was supported by a survey of 180 randomly selected households across four villages, where the hypothesis that land holding size does not influence the willingness to participate in collective management of commons was rejected ( $P(T \leq t)$  two-tail = 0.000007;  $t$  Stat



is 4.63; t Critical two tail is 1.97). The policy reforms in fact delinked property rights and assurance mechanisms and encouraged privatisation of commons.<sup>14</sup>

In the study area, *panchayat* was observed to be actively involved in 2 out of 37 villages surveyed (Dhamrer and Tolawas), in development and investments on village commons. In these two villages the *panchayat* leader (*sarpanch*) took the leading role in organising collective action and mobilising user groups. State funds were being invested in the development of commons and *panchayats* were effective in preventing encroachment into the commons. In Dhamrer, money was invested to build *anicut* (water retention structure) on *padath* land that helped to provide drinking water for the village cattle and also increased water level in the nearby wells. In Tolawas for example, tree fodder from village grazing land was being auctioned regularly and the revenue generated was used for community development. Tree felling and use of sharp implements on common lands was strictly prohibited in these two villages. These restrictive and investment measures addressed the assurance problem to some extent, according to the claims of the people. The good density of tree cover on commons was indicative of the active management institutions operating in these villages.

**Table 2** Institutional change with land-reforms in the study area

<i>Variables</i>	<i>Pre-reforms</i>	<i>Post-reforms</i>	<i>Consequences</i>
Institution	Intermediaries (Authoritative)	<i>Panchayat</i> (Democratic)	Institutional set up not interested in 'commons'
Control of access	Encroachments prevented effectively	Privatization of CPR area wide spread	Decline in CPR area
Usage rules and rights	Well defined rights; Collective/individual: Effective enforcement	Rights continued; More formal and legal status given	Enforcement weakened; CPRs to open access
Investments to develop commons	Contributions from users and proprietors	Grants & subsidies from state	Inadequate; neglected commons
Sanctions	Strictly followed and enforced through coercive measures	Bribery and manipulations with officials	Degradation of CPRs and CPR area
Assurance mechanisms	Property rights and assurance was linked	No linkage and assurance was ignored	Individual strategies to meet biomass needs

(Source: Fieldwork from October 1996-April 1997)

Land reforms brought about a discontinuity in the institutional mechanisms existing and the process resulted in degradation of CPRs as a consequence of the change (Table 2). Mostly, a single *panchayat* was responsible for administering several villages, in which case the spatial unit was too large to enable the development of institutional structures for natural resource management leading to the neglect of the concerns of the smaller villages. This was more serious when villages sharing common lands were

<sup>14</sup> Brara (1987) reports similar findings from a study in Sikar, Rajasthan.

located far apart. In villages surveyed only a quarter (27%) of them were directly under their own *panchayat* and the rest (73%) administered by neighbouring village *panchayat*. *Panchayat* in general has become an extension of the state arm at the village level pre-occupied with political tasks, putting activities related to natural resource management on the bottom of the priority list.

### ***Informal institutions***

Absence of *panchayats* in some villages led to the development of institutional mechanisms endogenously, whereas in others, the informal caste *panchayats* which already existed, continued even after reforms. In others, the failure of *panchayat* to address the assurance problem and develop community action was responsible for the development of formal and informal institutions (Table 3).

The informal institutions had to face challenges not only from the elected *panchayat* reduced to a mere state agency but also from adverse state legislation which deals with revenue lands, state forests and protected areas. Bureaucratic enforced controls often come in conflict with the informal arrangements within villages especially in case of ‘extended commons’. Informal institutions existed in nine villages (Table 3) where informal councils were managing commons, adjudicating local disputes related to natural resources, enforcing sanctions and organising collective action. Conflicts related to land and CPRs were addressed to caste *panchayats* before the land reforms, but in recent times people are being forced to seek justice from formal courts.

**Table 3** Institutional arrangements recorded in 37 villages within the study area.

	Present		Not present	
	Count	Percentage	Count	Percentage
Formal institutions (F)*	14	37.8	23	62.2
Informal institutions (I)**	9	24.3	28	75.7
Active (F or I) institutions	13	35.1	24	64.9
Temple lands	7	19.4	30	80.6

\*Formal institutions with Village forest protection committees constituted with the help of state initiatives under the Joint Forest Management policy (GOI, 1991).

\*\* Informal institutions are those traditional arrangements which have been in existence in the villages since a long time.

Source: field survey (October 1996 to April 1997)

In villages with informal institutions, land and CPR related disputes were heard in village meetings. Meetings in the villages are valuable forums for conducting the business of the community, for instance social disputes and sharing fellowship. Local leaders settle the matter through sanctions or fines, which adds to the village common fund or to the aggrieved party. A compromise is sometimes the solution where the disputing parties or offenders are required to compensate through service to community. All complaints were to be supported by at least two witnesses to provide authenticity to the case.

The *de facto* rules observed in villages with informal institutions were similar with a few differences such as the amount of penalty levied and social sanctions.

i) Only dead and dry wood or “*mor panki*” was to be collected from the commons.

- ii) Villagers were not allowed to take and use sharp implements in the forests.
- iii) Violators of rules were required to pay a fine (ranging from Indian Rupees 51 to 201 and even Rupees 552 in one of the villages surveyed). The amount varied with type of offence, the number of times a person had violated the rules earlier and the discretion of the caste *panchayat*.
- iv) Repeated violators or rule breakers were banned entry into commons for a certain period of time.

### ***Formal Institutions***

The 'formal' institutions observed in the 14 villages in the study area was the result of state's initiatives under the Joint Forest Management (JFM) policy, to encourage local people to participate in forest management. Formal institutions were active in only four villages and inactive or defunct in the remaining. The policy failed to understand the social and economic features at the local level and the users responses to changes. The JFM or collective management concept has become the forestry paradigm of the 1990s in India. The concept underpins the notion that the state and the local community can jointly manage forest resources to the benefit of both the parties. The idea of JFM implies the handing over of certain rights to village communities to appropriate natural resources for their own use. However, the lack of a clear definition of who precisely the right holders were; the kinds of rights and sanctions, impeded the process of establishing social institutions. One reason for the failure of JFM policy is its top down approach and hence the diffusion of the institutional elements was difficult. There was also the constraint of user groups being organised for collective action by external interventions. The lack of proper incentives for the users to participate and the legal flexibility to enforce regulations fail to address the assurance problem. JFM in fact does not apply to forests within protected areas in India and so the participants do not get a share of produce as opposed to institutions on forests outside protected areas. This is a policy constraint for villages located within Sariska where user groups cannot appropriate resources according to law, from the Reserve area. Formal institutions were found to be active in only four villages where active involvement of the youth was claimed to be the reason.

The formal institutions set up under the JFM policy were required to follow the rules framed by the state (listed in the state gazette notifications) with regard to collection of resources and grazing from forests. They included, a general restriction on use of sharp implements inside the forests, ban on tree felling, collection of only dead and fallen wood, penalties on people who resorted to illegal felling and grazing activities etc. The duties and rules prescribed in the government resolutions were not properly disseminated to the user groups, leaving little flexibility to site-specific adaptations unlike in traditional management where there is diversity in rule complex. The "Village forest protection committees" constituted under JFM were given usufruct rights over state forests to appropriate forest produce but do not have any legal authority over the land or power to impose sanctions. They were responsible for managing the 'state forests' jointly with the Forest department, but the power of enforcement still lies with the state. The 'jointness' of management was unclear in the policy, discouraging collective action at the local level. State has its own ideas of local level organisation specified in the policy which often does not correspond with the realities at the local level and equity oriented elements. The revenue and forest departments were

empowered to enforce rules, the former to regulate the use of village *gochar* and *padath* and the latter to control access to the forest resources.

#### *Lack of assurance and pressure on existing CPRs*

Increasing violations (Table 4) related to use of CPRs clearly indicates that institutions are not actively involved in CPR management. Since, *panchayat* has failed to provide the assurance mechanisms, users resorted to opportunist strategies to meet their current needs, although it implies degradation of commons in the long-run. *De facto* and *de jure* rights within the state forests primarily depended on the proximity of the village to the forest boundary and institutional arrangements governing CPRs. Formal rules were not effectively enforced and local officials manipulated the controls at their level encouraged by bribes.

**Table 4** Number of cases (violations) registered by Sariska management

Number of cases	1980-81	1995-96	Percentage change
Tree felling	262	381	45%
Grazing	118	377	>100%
Hunting	11	22	100%
Encroachments	4	128	>100%

*Source:* Data from Sariska Director's office (1980-81 and 1995-96).

*De facto* privatisation or encroachments on commons was a clear indicator for increase of pressure on land for agriculture and lack of institutional mechanisms to check the violators. It could also be viewed as alternative strategies adopted by individuals, especially landless who were not assured of biomass needs and the powerful rural elite who were not interested in commons. Encroachment process involved clearing of marginal lands, followed by fencing with brushwood and a shallow ploughing. The farmers refrain from making any investments on the land during the initial period, when there is a possibility of being noticed by state agents. Actual cultivation of such encroached lands normally starts 1-2 years after the initiation of the *de facto* privatisation process. If case was registered under the State Land Revenue Act (section-91), farmers preferred to pay penalties which was negotiable through bureaucratic rents in the form of bribes and political clout. Regularisation of such encroached lands is being encouraged on political agendas in the recent times. Encroachments were partly due to the short sighted policies such as, distribution of land mostly from commons to landless people, weak enforcement and legalisation of illegally encroached common lands including state forests. Formalising encroached lands was always viewed as a safe channel to privatise state lands, undermining the collective customary rights to common-pool resources. The area under *gochar* and *padath* put together has reduced by 25% percent from 1971 to 1991 in the surveyed villages, attributed mainly to encroachments on common lands. Field survey indicated that 13% of the land under cultivation was acquired through privatisation of commons encouraged by the prevailing institutional inefficiencies.

### **Quantitative analysis and findings**

#### ***"Forest condition" on commons***

The data from the 37 villages enabled to assess comparatively the effect of demographic pressure, marketisation (as measured by distance from nearest paved road), institutional factors, distance of the village from Reserve and community

characteristics on forest condition around villages. All the effects were simultaneously assessed using multiple regression analysis (at 95% level of significance), and then the impact of population pressure, marketisation and institutions on forest conditions were tested by Log likelihood test. The model is defined as:

$$F = f(i, d, p, l, m, h, w, g)$$

where F denotes the forest condition on common lands around villages; *i* represents the institution which is classified into six types; *d* is the distance of the village from the Reserve boundary; *p* is the population pressure measured by the land area available per household ; *l* is the livestock density; *m* is the distance of the village to the nearest paved road showing market access; *h* is the homogeneity factor indicating whether the community is homogenous or not; *w* and *g* are the fuelwood and fodder respectively, extracted from the commons by each village annually.

**Table 5** P-values of each variable showing their significance

Variable	Estimate	Standard Error	Pr>Chi
Informal institution (1)*	11.18	3.26	0.0006
Informal institution (2)	8.02	4.77	0.0927
Informal institution (3)	4.34	4.86	0.3719
Formal institution (1)	15.09	2.95	0.0001
Formal institution (2)	4.25	1.85	0.0214
Formal institution (3)	0.78	1.66	0.5024
Distance from Reserve	-3.38	0.79	0.0001
Land area/household	0.26	0.72	0.7212
Livestock density	1.23	1.11	0.2660
Market factor	0.51	0.50	0.3091
Non Homogenous	-2.52	1.95	0.1959
Homogenous	3.85	3.40	0.0247
Fuelwood from commons	-0.05	0.02	0.0332
Fodder from commons	0.02	0.21	0.2999

*Source:* Field work October 1996-April 1997 \*(1) Active (2) Not very active (3) Not active

The presence of active informal and formal institutions were found to have large significant impact on the resource condition. The significance values for these two variables suggest that the presence of active institutions has a positive effect on the resource base, whereas the forest condition gradually decreases with less active institutions and those which are not active at all as shown in Table 5. The effect of the variable ‘distance of the village’ from the Reserve also appears to be highly significant, suggesting that farther the village from the Reserve, the less is the forest cover on the commons. This is explained by the fact that all villages which were closer to the Reserve, had “extended commons” on which natural vegetation was comparatively higher, than those villages located far, some of which did not have “extended commons”. Both customary and formal rules were in operation in villages located within and closer to the boundary of the Reserve, which may have contributed to better resource condition than those situated far. In the latter, commons were neglected since a larger share of the biomass requirements is met from private property resources.

The demographic pressure, represented by total land available per household and per livestock unit respectively although not significant, indicate that the forest condition is dependent to a small extent on these two factors. Major biomass needs of the households are met from common and private lands as well. More total land available per household does not necessarily mean that it would directly decrease pressure on the commons and contribute to better resource conditions. It shows that, factors other than demographic are much more important and these collectively influence the resource conditions, for example the area under commons in a particular village. The impact of market factors measured through a proxy 'distance of the village from the paved road' shows that it does not have a significant influence on the resource condition of the commons. Better roads are expected to bring villages closer to markets, and increase demands for resources such as fodder and fuelwood. In the study area, market for fuelwood and fodder is not well developed (only four of the villages and 11% of the 180 households surveyed sell fuelwood in the markets), and so nearness of the village to the paved road providing better access to the market does not have much impact on the forest condition around villages. Better roads may in fact increase enforcement activities by government functionaries, and check removal of excess resources from commons, which is claimed to be true by local officials. The variable 'homogeneity' of villages has significant effect on forest condition around villages. Homogenous villages were found to be associated with informal institutions, where caste *panchayats* play an active role in managing commons, which may lead to better forest conditions on commons. The amount of fuelwood extracted from commons which involves removal of dead and living trees is negatively correlated to the dependent variable, but the effect is very low on the vegetative cover on commons. It shows that the pressure on commons due to removal of fuelwood is mediated through other factors, such as institutional. The variable 'amount of fodder removed from common lands' does not have a significant impact on the resource base, since fodder removed is mostly in the form of leaves (tree fodder) and grasses which grow annually and not removal of trees that depletes the stock.

#### *Demographic pressure*

The Log Likelihood criterion was used for assessing Goodness of Fit, to study the impact of population (total land available per household) on forest conditions on commons ( $-2(L_0 - L_1)$ ), where  $L_0$  is log likelihood without population and  $L_1$  is log likelihood with population variable in the regression. The null hypothesis that population does not have a significant effect on the forest condition is rejected ( $-2(1900.5862-1905.0809)= 8.99$ ; Chi-square value at 0.95 and 1 d.f. is 3.841). The test shows that there is an association between population and forest conditions confirming the popular assumption, but the association is not very strong in the present study. When the total land available per person is high, naturally the resource conditions is expected to be better. It also depends upon the per capita area of common lands available, since more common lands in a village denotes less pressure and better forest conditions on commons, since the resource conditions here is the natural vegetative cover assessed on commons in each village. The impact of population is mediated through other factors, most likely institutional arrangements as it is observed in the study. The results from multiple regression analysis (Table 5) where all variables were included also indicate a similar kind of trend.

#### *Market factor*

The proxy variable 'distance to paved road' for marketisation, statistically has no significant effect on the forest condition on commons around villages surveyed. The null hypothesis in the Log Likelihood test, that markets do not have significant effect on the resource condition is accepted ( $-2(1904.55-1905.08)= 2.16$ ; Chi-square value for 0.95 and 1 d.f. is 3.841). There is no association between markets and resource conditions in the area, since market for biomass resources is not prevalent, except in four out of 37 villages surveyed. The finding is contrary to several studies which have documented the impact of new roads on forest degradation. Most of the roads in the villages surveyed have been constructed in the past 10-20 years. However, the legal status of the area as a Tiger Reserve with stricter protection measures, prevent collection of wood and fodder from the 'extended commons' for marketing purposes. Market for milk has definitely increased in the study villages facilitated by new roads, which might indirectly have a small impact on the biomass resources, but could not be assessed in the present study. But, it is the number of buffaloes which is increasing to meet the market demand for milk, and buffaloes are usually stall fed, as observed in the villages surveyed. Stall feeding has less detrimental effect on the commons, when compared to grazing damage on vegetation. In a situation where markets for fuelwood and fodder are not developed, roads in fact may bring about better enforcement, as local officials visit the villages frequently and even help to improve the effectiveness of formal institutions. Where market for fuelwood and fodder is well developed, nearness to paved road might increase deforestation and integrate villages into larger market economies, as cited in many studies earlier. Further research may be necessary to measure market pressure through other indicators, since the proxy used here 'distance to the paved road' may not be the most appropriate. For example, the labour allocation by local villagers between farm and forest activities with response to change in product prices and changes in resource use patterns as villages open up to markets may give different results.

#### *Institutional effects*

The effect of institutions on resource conditions is tested through the Log Likelihood criterion. The null hypothesis that institutions does not have a significant effect on resource condition is rejected ( $-2(1889.84-1905.08)= 30.49$ ; Chi-square value for 0.95 and 1 d.f. is 3.841). The test results suggest that association between institutions and forest condition is very strong. It is evident from the analysis that, presence of active institutions, either formal or informal that observe access and use rules, and monitor and impose sanctions on rule breakers help to maintain tree and other vegetative cover on commons in good condition. The criteria such as, presence of rules governing access to, and use of commons, frequency of the meetings and elections of the user groups and sanctions, which were used to classify the institutions show how active they are. The presence of active institutions also help to neutralise the pressures that are likely to be caused by population and market forces through regulations, investments to develop commons and awareness, but such effects are difficult to be measured. Institutions also mediate the effects of socio-cultural factors (community and household) that are important in resource management.

## **DISCUSSION AND CONCLUSION**

The major enigma appears to be the discontinuity of institutional mechanisms as a direct consequence of land reforms and failure of the new arrangement to take up the task of CPR management. Despite legal powers and formal rules provided by land

reforms, prolonged absence of effective institutional mechanisms that were supposed to nurture collective action, has resulted in degradation of commons, both in terms of area and quality. Rapid population growth has increased the households dependency on commons for biomass resources in semi-arid areas.<sup>15</sup> This is contrary to the pre-reforms period when institutions were assisted by low demographic pressures, which ensured better enforcement of rules and sanctions against violators and investments in commons. Land reform policies have brought about institutional changes that have rather become hurdles for the development of common property regimes, favouring *de facto* privatisation or encroachments on commons, which is also an indicator that there is an increase of pressure on land. Privatisation of common lands is definitely not a positive development leading to sustainable utilisation of CPRs or a solution to answer the needs of the rural poor, mainly the marginal farmers, herders and landless. In the absence of effective institutional environment that can organise users and provide assurance, open access to commons would be preferable to the poor and the herders whose concern is their immediate needs. In the short run such a pattern of resource utilization may be optimal for the individual, given that others are behaving the same way, but is not collectively rational. It has been observed in the study that villagers respond actively to declining CPRs by intensifying production systems on private lands to supplement the biomass needs since the opportunity cost of time in pursuing collective management strategies appears to be too high. The *panchayat* was never trusted as an institution that can provide assurance mechanisms, and this has forced informal arrangements to become active in some villages and individual responses in others. Given the scarcity of commons in several villages, temporal and spatial expansion of the area under common property regimes is essential to meet the demands of the user groups. One way is to open private fallow lands after each harvesting season for grazing collectively to the users and not on an individual basis as it is done now. The transaction costs in this process will be shared by the land owners and the users collectively. The other is to transfer 'extended commons' to the respective village where active institutions already exist and provide support to the local organisations to manage them effectively, instead of state control and ownership. This might motivate other villages with inactive institutions to revitalise their institutional set up to take advantage of the new policy.

The key factors to be examined are the investments to be made for development of CPRs, policies to promote participation of user groups in CPR management and check privatisation of 'commons'. In general, investments to develop commons was not given much importance, even in villages with informal institutions, which focus mainly on rule enforcement and sanctions. Given this informal management of resources, higher investments may bring about better resource conditions. The newly formed councils need more administrative support for ensuring better participation. Investments to improve the productivity of CPRs may sometimes be restricted to mere closing of the 'commons' for a certain period of time through social or physical barriers and regulate use of resources. This requires institutional arrangements where the users respect the regulations and do not resort to violations, in the interest of the community. Programs to develop community pastures and woodlots whenever taken up should emphasise on involving "user groups" and placing "CPR improvement" as the central theme.

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<sup>15</sup> This is similar to the reports of Shanmugaratnam (1996) in his study on Western Rajasthan.



The organisation of user groups is the most important task for better management of CPRs. One way is to strengthen the existing informal institutions and encourage their participation in development activities initiated by the state. In some cases it might come in conflict with the existing formal institutions like the village *panchayats*. But, care should be taken to avoid such conflicts and the user groups should be a kind of intermediaries between the local government and resource regimes. Participation of user groups is increasingly being viewed as process in ensuring the success of local level institutions (Slater 1990; Uphoff 1989). Involvement in decision making processes in day-to-day operational activities and implementing decisions are important to institutional arrangements. The state should be aware of the circumstances which may obstruct the proper implementation of new policies such as JFM to promote formal institutions. Cernea (1989) is of the opinion that the knowledge of various social and cultural aspects of the local people and their response strategies to the new forces of change is important when new user groups are to be constituted. The rules specified in the policy need to be flexible to allow for local innovations and local specific situations. The local institutions governing CPRs should be provided with legal powers to impose sanctions against violators who break rules. Institutional strengthening will not only lead to sustainable utilization of CPRs but also conservation of biodiversity.

The findings from the quantitative analysis are based on data from several villages, which has demonstrated the impact of demographic, market, socio-cultural and institutional factors on forest condition at a given point of time. The changing levels of these factors especially demographic and markets may bring about changes in resource base, but institutional factors as seen through history occupy a key role in affecting the outcomes, and also mediating the pressures due to external factors. The results suggest that institutional impact on forest condition is very strong and the presence of active institutions, either formal or informal results in better resource condition. Further research based on inter-temporal data involving factors included in this study might reveal how the changing levels of these factors affect resource conditions. Much has been documented about communal arrangements and their role in human welfare. But, what is needed now is to take a comprehensive look at issues related to the cost of operating the institutional arrangements used to govern common-pool resource management and benefits derived from such arrangements.

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