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PROPERTY REGIMES AND INSTITUTIONAL ARRANGEMENTS: CONCEPTS AND THEIR RELEVANCE IN MANAGING THE VILLAGE COMMONS

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Since time immemorial, village communities have been the most potent natural resource management institutions in India. In recent years, however, most of the village commons have degraded into open access situation due to weak property rights relations, institutional arrangements and breakdown of local authority system (village panchayat). Curiously, most of the researchers who have addressed the issue of common property have grossly confused the open access situation [of Hardin's (1968) 'tragedy of commons'] with common property resources (CPRs). As a result of the persistent confusion in the literature, many researchers and policy makers suggested privatisation or state take over of the CPRs for their management. This misunderstanding has recently been increasingly challenged by many natural resource scientists and they have documented that the breakdown in common property systems may be due to the deficiencies in specifications of property and institutional arrangements rather than in its viability as a property rights regime (Ciriacy-Wantrup and Bishop, 1975; Jodha, 1986; Bromley, 1989; Bromley and Cernea, 1989; Marothia, 1992 *a, b*). Using concepts of property regimes and institutional arrangements, this paper, therefore, makes an attempt to analyse a number of CPR management regime systems operating in Kura village of Dharsiwa block of Raipur district in Madhya Pradesh.

PROFILE OF KURA VILLAGE AND DATA BASE

The study village Kura is located in Raipur-Bilaspur road at 25 km in north-west of Raipur town. A resource profile of Kura village is presented Table I. Kura village has 29 community village tanks which were constructed by *malgujars* (or *zamindars*) almost 200 years ago. In 1952, Government of Madhya Pradesh had appropriated village tanks along with the submerged area from *malgujars* to village panchayat. However, the ownership of tanks, bunds and trees on these bunds are still with lineage group (*malgujars*) and managed under private property regime. Irrigation Panchayat has been effectively managing village tanks for irrigation since 1931 under the Madhya Pradesh Irrigation Act (Government of Madhya Pradesh, 1990) as all the community village tanks are canal fed. During 1981-82 freshwater fish culture was introduced in community village tanks under Fish Farmers Development Agency (FFDA) programme (Marothia, 1992 *b*). Similarly, in 1986 fenced village woodlots have also been created by State Department of Forest on grazing common lands under social forestry programme.

Kura village has monocropped farming system with 72 per cent of the total cropped area under paddy crop. Community village tanks are the major source for irrigation, fish culture and domestic use. Fisheries co-operatives and irrigation panchayats are the two important CPR management regimes operating in Kura to manage water of community village tanks for fish and crop production. Village woodlots have failed due to a crisis of property relations

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TABLE I. RESOURCE PROFILE OF THE KURA VILLAGE

1.	Total geographical area (ha)	1,647.898
2.	Forest area (ha)	
3.	Total cultivated area available (ha)	1,397.49
4.	Net cropped area (ha)	1,357.26
5.	Double cropped area (ha)	396.59
6.	Farmers' fallow land (ha)	40.23
7.	Area under fruits (ha)	11.78
8.	Social forestry plantation on village grazing land (ha)	32.00
9.	Area not available for cultivation (ha)	17.59
10.	Barren and uncultivable land (ha)	232.80
11.	Pasture and grazing land (ha)	128.14
12.	Revenue fallow land (ha)	232.80
13.	Irrigated area (ha)	1,076.68
	Sourcewise irrigated area (per cent)	
	(a) Wells (No.2: private)	0.36
	(b) Tubewells (No.2: private)	1.30
	(c) Tanks (No. 29: panchayat)	98.34
14.	Average annual rainfall (mm)	880
15.	Monsoon	Sub-tropical
16.	Soils	Red lateritic to fertile black
17.	Cropping intensity (per cent)	129.22
18.	Average size of holding (ha)	1.05
19.	Land submerged in tanks (ha)	54.32
20.	Total number of tanks (rain and canal fed)	29.00
	Command area (ha)	
	A. Perennial (No. of Tanks - 12)	29.40
	B. Seasonal (No. of Tanks - 17)	24.92
	C. Percentage of total tanks having multiple water uses	
	(a) Fishing	100.00
	(b) Irrigation	100.00
	(c) Tending cattle	80.00
	(d) Bathing	40.00
	(e) Washing clothes	40.00
21.	Average size of tank (ha)	1.87
22.	Distribution of tanks according to size	
	(a) Upto 0.5 ha	4
	(b) 0.5 to 2 ha	16
	(c) Above 2 ha	9
23.	Total population (No.)	4,398
24.	Population density (person/ha)	0.37
25.	Literacy rate (per cent)	33.29
26.	Scheduled caste population as per cent of total population	11.14
27.	Scheduled tribes population as per cent of total population	0.09
28.	Number of total main workers	2,094
29.	Number of cultivators	1,334
30.	Number of agricultural labourers	684
31.	Total number of households	1,112
32.	Tank area per village household (ha)	0.05
33.	Grazing land per household (ha)	0.11
34.	Livestock population (No.)	2,095
35.	Livestock density	
	(a) Per ha cultivated area	0.67
	(b) Per ha grazing land	0.06
36.	Human-livestock ratio	1:2.10
37.	Source of drinking water	
	(a) Handpumps (No.)	12
	(b) Wells (No.)	
	(i) Private	15
	(ii) Community	2
38.	Number of co-operatives (fish/water/weavers/dairy)	One each

Source: Office of the Block Development Officer, Dharsiwa and Revenue Inspector, Kura village, 1992.

and institutional arrangements between village community and State Department of Forest. The required information to analyse the performance of irrigation panchayat, fisheries co-operative and village woodlots for sustainable use of community village tanks water and common grazing lands respectively was gathered from irrigation panchayat, fisheries co-operative, village panchayat, State Department of Forest and resource users. The information was collected between February to April 1993. Fish and crop production data used in this paper represented the average situation of the last three years, 1989-90 to 1991-92.

CONCEPTUAL FRAMEWORK

The key concepts in analysing CPR management systems are property rights and institutional arrangements. A resource regime is an explicit or implicit structure or institutional arrangements or working rules of rights and duties characterising the relationship of co-users to one another with respect to a specific natural resource (Bromley, 1989; Bromley and Cernea, 1989). According to Bromley (1989), property rights in resources exist under state property (where the secure claim rests with government) or private property (claim rests with individual or corporation) or common property (individual have claims on collective goods as members of organised group) or open access (or no property regimes with no secure claims). The basic requirement for any property regime is an authority system that can guarantee the security of expectations for the rights holders. When the authority system breaks down, a particular resource regime degenerates. Under such a situation, new institutional arrangements are used to define the resource regimes over natural resources and the authority systems protect the interests of those holding the rights under a particular regime (Bromley and Cernea, 1989; Marothia, 1992 *a, b*). These concepts have their roots in (Commons, 1950) institutional economics (see Marothia and Phillips, 1985; Marothia, 1989 *a*).

A number of analytical models have recently been formulated for analysing the CPR management regimes (Gibbs and Bromley, 1989; Oakerson, 1986, 1992; Ostrom, 1992; Gardener *et al.*, 1989). Researchers have used Oakerson (1986, 1992) model for analysing CPR management systems in the Indian context (Arnold and Stewart, 1991; Blaikie *et al.*, 1992; Singh, 1992). In this paper, Oakerson's conceptual framework was used to analyse CPR management systems, as property regimes and institutional arrangements are the core dimensions of this model. Four key attributes of Oakerson's conceptual framework are summarised in Table II and they are self-explanatory. Each set of attributes relates to the others. For example, physical and technological attributes and decision-making arrangement jointly affect patterns of interactions. The physical and technical characteristics of the commons can affect the outcome directly or through patterns of interactions. Oakerson model has also dynamic application if applied iteratively. In long run analysis institutional changes are exogenous and their effects could be iteratively assessed on interactions and outcomes.

ANALYSIS OF VILLAGE COMMONS

Using four key attributes and their sub-sets of Oakerson framework (see Table II), water of community village tanks for fish and crop production operating under CPR management regimes and village woodlots under crisis of property regime were analysed and presented in detail in Tables III to V. Oakerson identifies three sub-sets of physical and technical

attributes of a CPR, namely jointness, excludability and indivisibility. In the case of fisheries managed by the fisheries co-operative under common property regime, all co-users derive benefits jointly from the resource without subtractability of the total benefits, as all operations of fish culture are collectively managed by members of the fisheries co-operative at a specific time period. Whereas in the case of irrigation water jointness implies within limits, although each farmer subtracts from the benefits available to the others in the irrigation. Exclusion of free riding co-users is effectively implemented and the community village tanks water was collectively used and regulated for fisheries and irrigation without partitioning the tanks. The decision-making arrangements, the second attribute of the Oakeron framework, deals with the operational rules, collective choice and external arrangements and their relationships with the authority system (fisheries co-operative, irrigation panchayat and village panchayat). Given the resource attribute and decision-making arrangements governing community village tanks water use, it is important to identify the patterns of interactions that characterised the behaviour of fishermen community, farmers, fisheries co-operative and irrigation panchayat collectively concerned with community village tanks management. In the case of fish and irrigation use, fishermen and farmers contribute to each other's welfare in their respective groups through reciprocity which eventually leads to collective action.

TABLE II. KEY ATTRIBUTES OF OAKERSON CONCEPTUAL FRAMEWORK FOR ANALYSING COMMONS

A.	Physical and technical attributes
1.	Jointness - Resource base capacity to support multiple users simultaneously. Each user subtracts from the stream of benefits available to other co-users. Cumulative use by many co-users will eventually subtract from the total available yield and will reduce the capacity of a resource to generate benefits.
2.	Excludability - Ability of co-users to exclude other than members (free riding co-users) of the user group. Access may be fully regulated on an individual basis or partially regulated and it may be applied to outsiders or non-users.
3.	Indivisibility - Appropriateness for collective management to regulate the individual use.
B.	Decision-making arrangements
1.	Operational rules - Limits on users' behaviour, specifications of relationship among co-users if a resource has multiple use, rules about highly subtractive behaviour of co-users.
2.	Conditions of collective choice - Individual share of benefits is protected by the authority system and boundary rules determine the legal domain of collective choices. Procedures to set and change operational rules.
3.	External arrangements - Administrative, constitutional and legal support for enforcement of operational rules. Market infrastructure for a resource.
C.	Patterns of interaction
1.	Reciprocity - Individual co-users contribute to each other's welfare.
2.	Free riding behaviour - Degrades reciprocity, breeds destructive competition, conflicts and ultimately leads to over-exploitation of a resource.
D.	Outcomes
1.	Economic outcomes - Evaluated using concepts of efficiency (overall use rates of a resource).
2.	Distributive outcomes - Evaluated in terms of equity (fair share to co-users on their contribution to a collective choice, effectiveness of a management system to exclude non-users, enforcement of rules).

TABLE III. RESOURCE ATTRIBUTES, INSTITUTIONAL ARRANGEMENTS, PATTERNS OF INTERACTIONS, OUTCOMES AND IMPACTS OF IRRIGATION MANAGEMENT UNDER COMMON PROPERTY REGIME

Particulars	Irrigation panchayat					
A. Resource attributes (Irrigation tanks)						
1. Original property rights regime	Private (<i>zamindars/malgujars</i>)					
2. Original ecological status (during <i>zamindari</i> system)	Natural catchment, degraded private lands					
3. Current property rights regime	Common property owned by village panchayats					
4. Property rights of tank bunds and trees on bunds	Lineage group (erstwhile <i>zamindars</i>)					
5. Management system	Irrigation panchayat (common property regime)					
6. Sponsoring institution	Madhya Pradesh Irrigation Department					
7. Year of initiation	1931 (effectively working)					
8. Average command area of tanks (ha)	36.48					
9. Number of farmers in command area (No.)	1,083					
10. Average tank area per farmer (ha)	0.05					
11. Number of outlets per tank	1					
12. Social structure of beneficiaries	Heterogeneous					
13. Main product	Crops (and fish production from tank water)					
B. Decision-making arrangements						
1. Legal and administrative relation with state	Registered irrigation panchayat under Madhya Pradesh Irrigation Act, 1931 (modified in 1974)					
2. Organisational set-up						
(a) <i>Surpanch</i>	1					
(b) <i>Panch</i>	4					
3. Method of irrigation	Field to field					
4. Irrigation fees (Rs./ha)	80.00					
5. Percentage of recovery of irrigation fees	92.00					
6. Maintenance of tank	Village panchayat (using fisheries lease fund)					
7. Ability to raise funds	Charge for irrigation					
8. Ability to influence other panchayat/government activities						
	Organise to ensure adequate water in the tank during critical crop growth stages and timely canal water feeding of the tanks. Insist upon village panchayat for the proper maintenance of the tanks.					
9. External organisational and technical assistance						
	Micro irrigation network of the Mahanadi reservoir project provides sometimes technical guidance. State Department of Agriculture and Agriculture University provide technical inputs in production technologies.					
C. Patterns of interactions						
1. Membership, legitimacy and outsiders						
	All farmers in the command area of the tanks are members. Elections after every five years. Election norms, rights and duties of the members and executives of irrigation panchayats are well defined. Outsiders of the tank command areas are excluded in irrigation use and management.					
2. Reciprocal interactions: Conducive to collective behaviour.						
3. Protection						
	Violations of any rules relating to maintenance of water courses and distribution system and payment of irrigation fees may result in heavy punishment. Tanks protected collectively.					
4. Use regulations						
	Members must follow the water distribution rules and actively participate in resolving water conflicts, if needed. Members must pay irrigation fees regularly. Irrigation panchayat gets two per cent commission of the total amount of the irrigation fees recovered from the farmers. <i>Surpanch</i> gets half of the total commission and the remaining half is equally distributed among the <i>panches</i> . Outsiders have no access to water distribution system for irrigation purpose. Farmers have to pay Rs. 50 per ha for <i>rabi</i> irrigation to the fisheries co-operative in addition to regular irrigation fees to the irrigation panchayat.					
D. Outcomes and impacts						
<i>(i) Economic gains</i>						
Cost and returns of major crops/ha						
Crops	Yield (qtl.)	Total cost (Rs.)	Gross return (Rs.)	Net return (Rs.)	Benefit-cost ratio	Labour employment (man-days)
Paddy	38	5,040	11,400	6,360	1:1.26	128
Lathyrus	3	800	1,200	400	1:0.50	28
Wheat	10	2,500	5,500	3,000	1:1.20	40
Gram	5	1,800	3,000	1,200	1:0.67	39
<i>(ii) Distributive gains</i>						
Adequate equitable and timely supply of irrigation water for sustainable resource development without abusing of authority system. Co-users are fully satisfied with the existing institutional arrangements.						

TABLE IV. RESOURCE ATTRIBUTES, INSTITUTIONAL ARRANGEMENTS, PATTERNS OF INTERACTIONS, OUTCOMES AND IMPACTS OF FISHERIES MANAGEMENT UNDER COMMON PROPERTY REGIME

Particulars	Fish co-operative
A. Resource attributes (Fish tanks)	
1. Original property rights regime	Private (<i>zamindars/malgujars</i>)
2. Original ecological status (during <i>zamindari</i> system)	Natural catchment, degraded private lands
3. Current property rights regime	Common property owned by village panchayats
4. Property rights of tank bunds and trees on bunds	Lineage group (erstwhile <i>zamindars</i>)
5. Management system	Fisheries co-operative (common property regime)
6. Sponsoring institution	FFDA
7. Year of institution	1981-82
8. Number of fishermen households	70
9. Average tank area per fisherman household (ha)	0.77
10. Social structure of beneficiaries	Homogeneous
11. Main product	Fish (and irrigation water for crops)
B. Decision-making arrangements	
1. Legal and administrative relation with state	Registered fisheries co-operative society under the Co-operative Act.
2. Organisational set-up	
A. President, Vice-President, Secretary, Treasurer	1 (each)
B. Executive members	3
3. Duration of lease (year)	10
4. Lease rent per year/ha (Rs.)	765
5. Harvesting period of fish in a year	(5 months, maximum catches in October-December)
6. Days of intermediate fishing catches	Twice in a week
7. Harvesting method	Collective
8. Reasons of harvesting fish	Price incentives and need-based
9. Arrangement for inputs netting, marketing and distribution	Fisheries co-operative
10. Price fixation	Market forces
11. Mode of sale of fish	Local merchant/wholesaler
12. Time and mode of payment	Same day at tank site (cash) or within a day or two.
13. Ability to raise funds	
<p>Sell fish among members and outsiders, can take loan from banks and get subsidy from FFDA, if needed. Members contribute 60 per cent of the net income for creating assets to the fisheries co-operative.</p>	
14. Ability to influence other panchayat/government activities	
<p>Organise to ensure adequate water in the tank for fish cultivation. Support farmers to ensure adequate and timely canal water feeding in the tanks. Organise to get village wasteland for co-operative building construction and other facilities needed for the development of the co-operative.</p>	
15. External organisational and technical assistance	
<p>FFDA provides significant technical support. Also helps in arranging lease/nets, etc.</p>	
C. Pattern of interactions	
1. Membership, legitimacy and outsiders	
<p>All fishermen households are members, membership by household, elections after every five years under the Co-operative Act. Secretary is paid Rs. 300 per month to maintain records. President, Vice-President, Secretary, Treasurer and executive members are elected by the members of the fisheries co-operative. Norms about election and decision about rights and duties are well structured. Outsiders have no rights to participate in the fisheries co-operative meetings, decision and hence have no rights to products.</p>	
2. Reciprocal interactions: Conducive to collective behaviour	
3. Protection	
<p>Members watch against poaching and killing of fish. Offenders are fined by village panchayat. If the offender is from the members themselves, the executive body heavily punishes that member or excludes him from the fisheries co-operative. Farmers are required to seek permission of the fisheries co-operative for irrigation.</p>	
4. Use regulation	
<p>Members can buy fish for their consumption; they are paid only wages, must participate in all operations of fish culture, attend meetings regularly and abide by the rules. Members who do not participate in fishing operations are not paid wages. Farmers have to pay Rs. 50 per ha for <i>rabi</i> irrigation to the fisheries co-operative in addition to regular irrigation fees paid to the irrigation panchayat.</p>	
D. Outcomes and impacts	
(i) Economic gains/ha	
(a) Yield (qtl./ha)	
(i) Rohu, Katla, Mrigal	5.73
(ii) Local	1.85
(b) Price (Rs./qtl.)	
(i) Rohu, Katla, Mrigal	1,500
(ii) Local	600
(c) Gross return (Rs./ha)	9,705
(d) Total operating cost (Rs./ha)	3,668
(e) Net return (Rs./ha)	6,037
(f) Net income/kg (Rs.)	7.96
(g) Input-output ratio	1:2.64
(h) Employment generated for members (man-days)	80
(ii) Distributive gains	
Pattern of distribution of benefits (per cent)	
(a) Wages paid to members	20
(b) Share of benefits kept aside for next year expenditure on fish rearing	20
(c) Remaining amount for creating assets (fishing boats/nets/community building, recreation, etc.)	60
(d) Sustainable development of fish and tank resources	
(e) Users are fully satisfied	

TABLE V. SOCIAL FORESTRY ON VILLAGE GRAZING LANDS: A CASE OF PROPERTY RIGHTS AND INSTITUTIONAL ARRANGEMENTS CRISIS

Particulars	Village woodlots
A. Resource attributes (woodlots)	
1. Original ecological status	Degraded grazing land
2. Original land tenure	Village grazing land
3. Property rights regime	Village panchayat
4. Sponsoring institution	State Department of Forest
5. Year of initiation	1986
6. Current status of property rights regime	Usufructuary rights to State Department of Forest
7. Area planted (ha)	32
8. Plantation cost (including watchman's salary for five years)	Rs. 1,36,362.00
9. Number of trees planted	45,720
10. Number of trees survived on boundaries of the plantation site	300 (babul)
11. Tree species	Bamboo, Nilgiri, Siras, Amla, Subabul, Sisoo, Babul
12. Main products (after five years)	Fuelwood, timber and grasses
13. Transfer to village panchayat	No (disputed)
B. Decision-making arrangements	
1. Legal and administrative relation with state	Village land use approved by village panchayat for woodlots. Land and product rights were with the State Department of Forest during the project period.
2. Ability to raise funds	Nil
3. Ability to influence other panchayat/government activities	Negatively influence the village community towards development activities.
4. External organisational assistance	State Forest Department chooses site in consultation with village <i>surpanch</i> .
5. External financial assistance	State Forest Department planted trees without involving village communities in the project.
C. Patterns of interactions	
1. Membership, legitimacy and outsiders	Nil
2. Protection	One watchman provided for the whole area (inadequate)
3. Use regulations	Entry of villagers and cattles were prohibited. Villagers were not even allowed to cut the grasses (although available in large quantity after the second year).
D. Outcomes and impacts	
(i) Economic gains	Villagers grazing cattles and using babul sticks for dattons (Indian tooth brush)
(ii) Distribution losses	Resource degradation, negative social opportunity cost, conflict between State Department of Forest and village community over the use of available fodder increased the grazing pressure on village grazing lands. Unsustainable use of resources. Village community was dissatisfied.

Due to well-defined institutional rules and their effective implementation by the fisheries co-operative and irrigation panchayat free riding behaviour could not breed among users. The effective interrelationships of resource attributes, decision-making arrangements and patterns of interactions provided economic and distributive outcomes for fisheries co-operative and irrigation panchayat in terms of efficiency (fish or crop output, income and employment), and equity (distributive gains in terms of equitable distribution of benefits

and resources, effective enforcement of working rules by the fisheries co-operative and irrigation panchayat as authoritative systems). Besides equity and efficiency criteria suggested by Oakerson, two additional criteria, namely, sustainability and expression of satisfaction (Berkes, 1992) are also used in this paper to assess the outcomes of fisheries co-operative and irrigation panchayat as CPR management systems. The system is sustainable if it "meets the needs and aspirations of the present without compromising the ability of future generations to meet their own needs" (IUCN/UNEP/WWF, 1991). Using this definition of sustainability, it can be fairly said that decision-making arrangements adopted by the fisheries co-operative and irrigation panchayat under common property regime reflect long-term sustainability. The criterion of expression of satisfaction may provide a composite measure of outcomes as perceived by fishermen and farmers. Under both the situations, the resource users were satisfied with the existing management systems.

State Department of Forest undertook village woodlots plantation as part of its social forestry programme on village common grazing lands for a period of five years. The programme utterly failed as it was implemented without having a clear understanding of the sociological context, institutional arrangements (including property rights), insufficient consultation and involvement of the local people who depend upon the grazing land on which woodlots was developed (see Marothia, 1989 *b* for socio-economic interpretations of afforestation programme). For the entire project period of five years, village communities, particularly shepherds, were excluded through fencing and appointing a watchman (difficult to watch 32 hectares of area by one person). After the second year naturally grown grass was available in the project area in large quantity and its use even for stall feeding was denied. In the opinion of the village community, the *surpanch* and *panches*, the transfer of common grazing lands for woodlots was a losing proposition both in terms of shrinking grazing lands for 5-6 years and conflicts generated between State Department of Forest and village communities over the use of village commons. Village woodlots have resulted in poor patterns of interactions and inefficient, inequitable and unsustainable use of the village common grazing lands, besides dissatisfaction among villagers. The village panchayat now is in the process of getting back grazing land under its control to develop collective fodder grounds.

CONCLUSIONS

Success in the management of community village tanks for fish and crop production under common property regimes does not depend solely on the technical-physical nature of the resource or the decision-making arrangements or behaviour of the resource users, but on a combination of these key attributes. It may safely be concluded from this analysis that village commons can be effectively managed under the common property regimes. This study has also documented forcefully that while degradation of village commons incorrectly attributed to CPR management systems, intrinsically, actually originates in the dissolution of village level working rules whose very purpose is to manage natural resource use patterns efficiently, equitably, sustainably and satisfactorily for the society as a whole. Deterioration of village commons may occur more intensively under state property regimes, as shown in the case of village woodlots in this study, in the absence of clear understanding of institutional arrangements and property relations.

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