

LEADERSHIP ON THE COMMONS

Wealth distribution, Co-provision and Service delivery

Abstract

Studies of co-management projects have pointed to an ambiguous role for heterogeneity in fostering collective action. In a study we undertook in 2000 we reported on the positive effect of heterogeneity in fostering collective action in watershed management. This paper highlights the limitations of approaches that employ a narrow historiography to infer general and predictive theories based on a re-study of entrepreneur led collective action at our original study site. By employing innovative methodology, our re-study sought to systematically link major features of social organization and differential wealth and power embedded in the local-national linkages of states to the outcomes of effective leadership. We found that social difference and increasing group size may not a priori pose a threat to leaders when compared to a perception that some are accumulating wealth while others are in need. Social hierarchies rooted in a moral economy may foster cooperation especially because not all people within a community can be relied upon to live by their internalized ethical rules and contribute their fair share. From a methodological point of view therefore, how one integrates conceptualization of forms of heterogeneity with recognition of their axis of influence depending on the attributes of field- level situations is critical for analysis of collective action.

Key Words

Commons, Irrigation, Collective action, Co-provision, Heterogeneity, Leadership

Introduction

Approximately 1.2 billion poor and 800 million malnourished people in the world rely on agriculture for food and income security (Rijsberman, 2004). Common pool goods like forests, grazing pasture or irrigation systems while being non-excludable and rivalrous in consumption sustain multiple facets of livelihoods ranging from farming to cooking, livestock rearing and house construction (McKean, 2000, Beck and Nesmith, 2001). The literature suggests that reliance of marginal or landless households on common pool resources tends to increase with adverse terms of trade or declining farm productivity (Byron and Arnold, 1999). Studies have also valued the economic costs of a reduction in access to water that arising from deforestation induced soil erosion to emphasize the importance of conserving such resources (Myers, 1997).

In developing countries creation of physical assets (such as dams and trees) and their maintenance has historically been the responsibility of parastatals such as forest and irrigation departments (Brookfield and Blaikie, 1987). However, over the years there has been a realization that the public sector has failed to ensure cost-effective management due to rent seeking behavior by public officials and resulting conflicts with local communities (Peluso, 1992). Such trends have impaired mechanisms to monitor access to common pool resources and exacerbated problems of soil erosion. In recent years public choice theory has successfully argued that community based organizations can provide low-cost arenas for management of CPR's (North, 1990, Ostrom, 1990). Scholars have pointed out that factors such as trust, density of social ties, shared norms and minimal recognition by governments of the rights of citizens to organize may significantly lower transaction costs of monitoring access to CPR's (Woolcock and Narayan, 2001).

Given historical trends that have pointed to the role of predatory states in crafting revenue settlements that resulted in eviction of tenants with customary rights, co-management projects involving partnership between governments and community based organizations contracts have been viewed with skepticism (Shanmugarathnam, 1996). This skepticism is based on a couple of likely scenarios: (a) that benefits of co-management will be captured by elites (Dasgupta and Beard, 2007) and (b) that groups characterized by unequal asset distribution are most likely to produce an unequal distribution of benefits from management of CPR's (Platteau and Gaspart, 2003). Carrying on in this vein a number of studies conclude that homogeneity of economic interests is essential for cooperation (Ruttan, 2008). A study in Taiwan revealed a negative relationship between

inequality in endowments (land holdings) and performance of irrigation organizations (Lam, 1994). Another study of ten irrigation reservoirs in India suggested that the smaller the variance in farm size, the more farmers were likely to form water user associations (Easter and Palanisami, 1986). Similarly, a study in Nepal revealed a negative relationship between variance in average family income among irrigators and cooperation to operate and maintain the system (Tang, 1992).

In 2000 we undertook an assessment of a Ford Foundation project that aimed to reverse soil erosion in the Indian Himalayas. The assessment included a survey of the performance of 28 community based watershed management groups known as Hill Resource Management Societies (HRMS) responsible for management of 45 earthen dams. Our survey revealed the complicity of the Haryana Forest Department (HFD) to be responsible for faulty infrastructure design which resulted in only 17 percent of the dams functioning to their lifetime capacity of twenty years (Kurian and Dietz, 2007). From a collective action perspective we found that of the eight HRMS with functioning dams those groups that exhibited successful cooperation were the ones that were characterized by heterogeneity in asset distribution and a higher interest in CPR's on account of lower aggregate engagement with non-farm labour markets. To explore the relationship between group composition and collective action in greater detail we undertook a comparative case study based on innovative methodology. The methodology was innovative because of: (a) the development of a composite index of endowment and interest distribution based on household level food security assessments and (b) forest

vegetation studies that aimed to link robust dam management to an improvement in condition of soil and forest resources.

Our comparative case study revealed that individual entrepreneur made it possible for collective institutional arrangements to flourish in heterogeneous groups even after the conclusion of the Ford Foundation project. Entrepreneurs were actively engaged in crafting rules for benefit- distribution, negotiating with village elites, liasoning with local governments, making up-front investments for operation and maintenance of infrastructure, resolving conflicts and managing climate based risks (Vedeld, 2000, Jones, 2004). By playing this coordination role entrepreneurs were providing a service to both governments and local resource users; we call the undertaking of this role *co-provision*. Interestingly, when we returned to re-study a site of successful entrepreneur led collective action in 2008 we found that the entrepreneur had withdrawn from a leadership position. This paper attempts to validate our methodology by: (a) analyzing the conditions that led to the withdrawal of the original entrepreneur and (b) examining the failure of new entrepreneurs who supplanted him in sustaining a tradition of successful collective action at our study site.

The Political Ecology of Watershed Management in the Haryana Shiwaliks

Soil Erosion, Public Revenues and Participatory Natural Resources Management

The Shiwalik hill forests comprising approximately 6.5 percent of the land area of the North Indian state of Haryana perform an important ecological function of mitigating the effects of soil erosion. In the early seventies there was a realization that open grazing of

cattle and fuelwood collection by local communities had endangered the soil erosion function of the shiwalik forests. The most visible manifestation of forest degradation was the increasing rate of siltation of the Sukhna reservoir in the state capital, Chandigarh (Arya and Samra, 1995). The reservoir was an important source of tourism revenue and preliminary analyses indicated that the source of the risk lay in rapid deforestation of the catchment areas that was located in proximity to the village of Sukhomajiri (Dhar, 1994: 20).

The Ford Foundation facilitated a community based forest management initiative that involved construction of infrastructure to arrest movement of silt. However, when villagers destroyed check dams that were constructed and continued to open-graze cattle in the forests a substantive dialogue was initiated that resulted in usufruct sharing agreements between the forest department and Hill Resource Management Societies (HRMS). The usufruct sharing agreements that initially covered fuelwood, fodder and fibre grasses was later extended to include water harvesting dams that were constructed by the Haryana Forest Department (HFD) with in-kind contribution of labour by the HRMS. The dams by providing supplemental irrigation for the winter wheat crop proved to be a powerful incentive in encouraging forest dependent communities to change their behavior from open grazing to stall feeding of livestock (Grewal et.al, 1995). The Sukhomajiri model became a success story because irrigation from earthen dams yielded multiple benefits: increased fodder production on private fields and increased production of cattle dung that was used as cooking fuel in the area. Increased production of fodder grass and cattle dung led to a dramatic reduction in open grazing of cattle and harvesting

of fuelwood from forests which was in turn to lead to forest regeneration and lower levels of soil erosion.

Besides reversing levels of soil erosion the Sukhomajiri watershed management model ushered in a fresh perspective on the role of community participation in managing publicly owned forests (Ostrom, 1996). A Working Plan document of the Haryana Forest Department made its commitment to co-management explicit by stating “for the State government there will be no loss in existing revenues. The present levels of revenue will be maintained and in certain cases, this will increase over time. Simultaneously, through the government’s adoption of the policy of sharing the bulk of the increased production resulted from villager’s participation. The latter’s economic status will improve substantially without any additional cost. Further, with villager’s accepting responsibility for protection and management of forest areas near villages, the Department’s future costs for their protection and rehabilitation will be substantially reduced” (Kurian and Dietz, 2007).

Collusion in Infrastructure Construction

The success of the Sukhomajiri provided the HFD with the legitimacy it needed to go on a dam construction spree. Between 1985 and 1998 a total of 46 water harvesting dams were constructed in the Pinjore Forest Division. Lower level functionaries of the HFD exercised considerable discretion over decisions regarding design, operation and maintenance of the earthen dams. In many cases faulty design was overlooked to justify expensive repairs of parts of the dam that was washed away in the rains. In the process

collusion was encouraged with villagers who desired a share of the spoils of public investment. Collusion took the form of provision of wage labour for dam construction and award of contracts for specific tasks such as transport of distribution pipes from government warehouses to dam sites. However, in response to rising costs of infrastructure construction and evidence of rent-seeking behavior by field staff the HFD resorted to public auctions whereby the highest bidder would be granted contracts for specific tasks.

A Role for Private Initiative

The notion that public auctions could facilitate greater transparency gradually led the HFD to introduce auctions for sale of forest produce and even rights to distribute water from earthen dam. Over time a pattern became noticeable- contractors from outside the village bid higher than the HRMS at public auctions. But villager's preference was for contractors from within their village to purchase rights to forest products and water distribution. This preference was linked to their perception that a contractor drawn from within the village would be sensitive to individual household requirements for forest products and likely to accept installment payment for services rendered. Further, local contractors were more likely to invest a share of the proceeds from sale of forest and water towards maintenance of the dam itself and indulge in gift giving in the form of donations to repair the local school or temples (Datta and Varalakshmi, 1999: 117).

Broader Political Economy Trends

Forest dependent communities in the Shiwalik hills are not insulated from wider political economy trends occurring in Haryana in particular and India in general. Three trends are important from the point of view of understanding institutional change. First, there has been a marked integration of farming populations in markets for non-farm labour and dairy products on account of a secular decline in returns from pursuing a purely agricultural based livelihood strategy (Varalakshmi, 1993, Bhalla, 1999). Others have pointed out that given cultural norms in the region that prevent women from engaging in non-farm labour, women's workload in the domestic economy would have most likely risen to compensate for time spent away from the settlement by male members of the households on account of their engagement in non-farm employment (Agrawal, 1997). Second, in keeping with a larger trend of removal of import controls following the liberalization of the Indian economy imported paper and pulp have depressed demand for fibre grass sourced from the Shiwalik hill forests (Kurian, 1998). Finally, fiscal mechanisms have become regressive in response to growing profits of community based forest management cooperatives (Kurian and Dietz, 2007).

Data and Methods

Our comparative case study involved two HRMS: Bharauli and Thadion. Bharauli exhibited success with collective action and involved entrepreneur based service provision while on the other hand, Thadion failed with collective action and was under management of the HRMS. We found Bharauli to be relatively more heterogeneous when compared to Thadion. But despite being a relatively heterogeneous village in terms of

wealth/endowment distribution Bharauli was more effective in delivering irrigation services from the earthen dam. Between 1998 and 2000 an entrepreneur from within the water user group had purchased water distribution rights. By contrast in Thadion during the same period the HRMS was responsible for providing water services and failed to ensure compliance with water user fees. Three factors can explain the differences in collective action outcomes in Bharauli and Thadion (Kurian and Dietz, 2007).

1. Land Ownership, Hierarchical Social Relations and Labour Market Structure

Bharauli is a multi-caste village with eighty households while Thadion was a relatively homogeneous village in terms of caste composition with fifty households. Bharauli reflects delicate power relations because it is a multi-caste village with a skewed pattern of land ownership. Hierarchical social relations are reflected in occupational specialization and segregation. Occupational specialization defined by caste was also evident from the fact that the *tarkhans* provided blacksmith services for other caste groups and the *rajput* caste group monopolized the local transport business. Caste-based notions of impurity and hierarchy prevent the landless or untouchable castes from using communal drinking water sources, ponds or temples frequented by other castes. Caste also influences residential location of different groups within the village while untouchables invited to marriage ceremonies in the village are expected to sit at a distance from others and use separate utensils. By contrast such caste-based patterns of hierarchy, social segregation or occupational specialization were absent in the neighbouring village of Thadion. In Bharauli the structure of the labour market reinforces hierarchical social relations. For instance, landless households who work as hired labour on other people's fields or as domestic hands in the homes of the wealthy are

not always paid in wages but in kind- example, food or insurance during times of natural disasters like floods. From a gender perspective cultural norms that prevent participation of girls in the non-farm labour market can make families with limited supply of male children highly reliant on farm production.

2. Differences in Local Ecology and Location of Farm Plots

We found that Bharauli HRMS differed from Thadion HRMS with respect to local ecology (Wade, 1988). Groundwater is relatively easy to find in Thadion while in Bharauli, the groundwater table is deep. The prohibitive groundwater drilling costs increased farmers' reliance on common pool resources in Bharauli. In Bharauli, farmers also had access to *kuhls*ⁱ for land irrigated by the dam. However, the *kuhls* run dry by early February and, if rains do not arrive by early March, the supply of the last round of supplemental irrigation for wheat depends on water from the earthen dam. If rains fail altogether, reliance on water from the dam becomes even more critical. Not surprisingly, we found average land irrigated by earthen dams is the strongest explanation for understanding the degree of variance captured by household endowment scores (*Table 1*).

3. Previous Leadership Experience

It is important to note that differences in caste or wealth status need not necessarily prevent groups from working together in a society that shares values of democratic governance. For example, between 1995 and 2000 the water contractor (Bant Ram) was the *Sarpanch* (chief) of the Bharauli local government. He had developed experience of successfully leading a disparate group of people drawn from the different caste groups. Although caste rules prevented groups from inter-marriage or sharing of public space they were fully capable of collaborating on the basis of common but secular interests.

Table 1: Variance for Variables of Household Endowment Scores

Variable	Bharuali HRMS	Thadion HRMS
Average Irrigated Land	83.3	64.1
Average size of land owned	51	55.1
Average livestock size	82.6	86.1
Average family size	40	45.7

Source: Kurian and Dietz, 2007

The Entrepreneur and Service Delivery Outcomes

Our 2000 case study revealed that the strategic location of the entrepreneur's farm plots towards the end of the main distribution lines of the dam meant that he had to play an important coordination role to ensure that farmers with plots located at the head of the distribution network did not monopolize water use. The absence of sons in his household meant that agriculture was the primary source of household income for the entrepreneur and further heightened his interest in ensuring that water allocation rules were adhered to by resource users.ⁱⁱ Given his level of interest we found that the entrepreneur in Bharauli invested in purchase of water distribution rights, arranged for routine maintenance of the dam and even bore weather induced risks as in 1997 when due to lower rainfall, farmer's compliance with user charges were adversely affected (Kurian and Dietz, 2007).

The strong commitment of the entrepreneur to invest his resources of time and money to ensure that water allocation rules were adhered to by resource users resulted in positive outcomes. By adapting Ostrom's use of the concept of "water availability difference"ⁱⁱⁱ

we observed that the difference in predictability of water supply between head and tail end water users was lower in Bharauli when compared to Thadion (*Table 2*).

Table 2: Predictability of Water Supplied from Earthen Dams

HRMS	Level of Water Predictability among Head end Water Users	Level of Water Predictability among Tail end Water Users	Difference in Water Predictability between Head and Tail end Water Users
Bharauli	1.8	1.3	0.5
Thadion	1.7	0.1	1.6

Source: Kurian and Dietz, 2007

Reliable delivery of irrigation services also meant that the system was more efficient. Higher efficiency is reflected in the difference between average water requirement and water availability. Based on rule of thumb calculations of water requirement during the *rabi* and mean land sizes we arrived at the difference between water requirement and water availability^{iv}. Greater reliability and efficiency of water use in Bharauli also explains the lower variance in costs incurred by consumers in purchase of water which was 61.6 compared to 115.3 in Thadion. Greater reliability of water supply from the dam also induced more contributions from group members (*either in form of labour or in monetary terms*) towards repair and maintenance of the earthen. Between 1995 and 2000 on average 3.7 days of labour were contributed towards repairs when compared to 2.3 in Thadion. Water users belonging to higher wealth classes made cash contributions of Rs. 377 compared to Rs. 156 in Thadion. Success with delivery of irrigation services from

the dam in Bharauli also resulted in positive environmental outcomes. Forestry assessments that we undertook in the catchment of the earthen dams revealed that regeneration of saplings^v was greater in Bharauli when compared to Thadion (*Table 3*).

Table 3: Forest Regeneration in the Catchment of Bharauli Dam

Parameter	Bharauli Forest	Control Forest belonging to community with failed collective action(Thadion)
Slope (in degrees)	11	15.1
Plots with high intensity of soil erosion (%)	11.1	46.6
No. of Saplings	11	8
Basal area of trees	1.81	0.35
Basal area of saplings	6.42 (significant at 5% confidence level)	2.78
Diversity of saplings	2.08	1.54
Density of saplings	7.72	3.53

Source: Kurian and Dietz, 2007

Another environmental outcome evident from analysis of satellite imagery was that because of effective delivery of water services, land area under perennial agriculture increased by 60 acres in Bharauli (NRSA, 1999). Another 30 acres of land previously prone to river bed erosion was reclaimed and cultivated with cash crops like radish, onions and chillies in the winter season. Within the constraints imposed by topography of the command area of the dam the water entrepreneur played an important coordination

role in balancing between the demands of competing water users for a share of water resources. Interests of large landholders with political clout and members of his extended family received priority in his plans for extending the area of the dam distribution network.

While environmental outcomes of contractor based service provision were generally encouraging we found that results were mixed when we examined how pro-poor distribution of benefits was among resource users. This assertion is supported by the fact that cropping intensity rates, agricultural incomes, productivity increase for wheat and acreage under irrigation from the earthen dam tended to favor high endowment category households when compared to poorly endowed ones. Interestingly, although acreage under irrigation was highest for high endowment category households when we examined the proportion of land area irrigated as a percentage of land ownership we found that poorer households (*low and medium endowment category households*) benefitted more than high endowment category households. On the other hand at a household level we found that because of a doubling of agricultural yields under irrigated conditions the workload for women (*a culturally and educationally marginalized group in the region*) had risen more than that for men (see Kurian and Dietz, 2005).

Measures of Group Heterogeneity/Homogeneity

The influence of group heterogeneity/homogeneity on collective action is complicated because it is: (a) multi-dimensional and (b) mechanisms linking heterogeneity/homogeneity and collective action are recursive and non-monotonic (Bardhan and Dayton-Johnson, 2002). For these two reasons, we chose to embed our analysis of asset, income or caste heterogeneity/homogeneity within processes of social differentiation involving changing types of relationships between wealthier and poorer farmers in the context of commodity relations, local power structures and historically defined social exchange (Bebbington, 1999). Given this choice of approach, we identified measures of group heterogeneity/homogeneity by constructing household endowment and household interest scores (*Annexure 1*). To construct household endowment scores we considered four variables: (a) total rain fed land owned, (b) total irrigated land owned, (c) type of livestock owned and (d) size of household. In constructing household endowment scores, we devised weights for each of the assets outlined above. The weights were based on food productivity assessments^{vi} undertaken in Shiwalik villages (see Kurian and Dietz, 2007).

To construct household interest scores we made some assumptions. First, we assumed that the larger the area irrigated by a dam, the greater the interest in its use, conversely, the smaller the area the lower the interest. Second, the greater the reliability afforded by alternative sources of irrigation for dam-irrigated land, the smaller the farmers potential interest would be in contributing towards repair of dams. Finally, the greater the area under irrigation outside the dam command area, the lower the potential interest would be

in participating in collective action (purchasing water distribution rights during the annual auction or contribution towards maintenance). Interest scores of 1, 2, 4, 8 and 16 were decided based on household food productivity assessments. We noticed that access to irrigation could increase wheat production per acre by a factor of two. Likewise, irrigation could increase the number of people fed from one acre of land by a factor of two. In determining weights for: (a) area irrigated by the dam, (b) alternative sources of irrigation for dam-irrigated land and (c) land area outside dam command, we allocated weights that differed by a factor of two (see Kurian and Dietz, 2004).

Establishing Links between Behavior Change and Condition of Natural Resources

We undertook forestry vegetation studies to examine links between behavior change in the form of stall feeding of livestock and forest condition. A total of 33 plots were laid in forests under the management of Bharauli and Thadion HRMS. Within each 10 meter plot, smaller plots of 5 and 1 meter were laid. Within the 10 meter plot, local names of trees with girth exceeding 10 cm were enumerated. Within the 5 meter plot, saplings with girth in the range of 2.5 to 10cm were enumerated. Within the 1 meter plot the density and girth of all shrubs and saplings with girth less than 2.5cm were enumerated. In addition qualitative information on soil erosion, livestock use, presence of epiphytes and slope characteristics were collected from each plot (IFRI, 1997).

Co-Provision and Service Delivery: The Role of Local Leadership

In 2008 we returned to our study site to examine how collective action had evolved over an eight year period since our initial study. We found that as a result of several years of

failure to promote collective action the dam in Thadion had silted up and resource users had moved towards private water provisioning from tubewells. On the other hand we found that collective action for dam management had continued in Bharauli. In the ensuing discussion we adopt a longitudinal approach to examine the institutional basis of co-provisioning, its role in delivering irrigation services and implications of “successful collective action” for design of contractual arrangements rules that promote equity and environmental conservation.

Community Cohesion and Irrigation Management

The population of Bharauli village increased from eighty households in 2000 to 125 households in 2008. The village remains heterogeneous in caste composition: *gujjars*, *rajputs*, *tarkhans* and *harijans* being major castes. Occupational specialization among caste groups is retained and forms of social segregation are intact as is evident in residential location and use of public amenities like water points. Livestock composition has not changed significantly. Similarly, Haryana Forest Department (HFD) staffing arrangements remain the same: two guards are responsible for monitoring the use of forest areas and organizing annual water auctions. One significant development since our previous visit is the construction of a new dam in 2001 with a command area of forty ha. However, a combination of factors like high silt movement from forest catchment areas and poor design led to the dam falling into disrepair within the first year. Built at a cost of approximately US\$ 100,000 the dam has a catchment area of ninety ha. Given its large irrigation potential, the HRMS decided to plumb distribution pipes from this new dam into the first dam we studied in 2000.^{vii} This meant that when water levels declined in the

first dam, water from the new dam (located not too far away) was now available to ensure a reliable supply of water.

No new dam was constructed in Thadion although the dam there had fallen into dis-repair due to siltation. In discussions with HFD it became clear that officials considered another dam in Bharauli to be a safe “investment” given its prior record of natural resources management. It can be gleaned from minutes of meetings maintained by staff of the community watershed project that Bharauli was more adept at “arriving at a clear delegation of tasks to ensure that auctions were organized, records of funds were maintained and periodic repairs of dams were undertaken” (Sarin, 1991: 5). On the contrary it was noted in Thadion that “HRMS meetings were seldom organized, records were poorly maintained and irrigation service fees were not collected because of conflicts among water users” (ibid, 1991:5). Despite obvious social and cultural diversity in Bharauli the HRMS was more capable of projecting itself to public officials as being a more cohesive community group. This success with projecting itself as a cohesive group is attributable to the ability of the water contractor in the village who was able to balance the interests of a wide constituency in deciding on distribution of water from the earthen dam.

Land Fragmentation has Altered Thresholds of Collective Action

The arrival of the new dam in 2001 meant that irrigation could now be provided to a larger group of households involving 40 extra ha of land in Bharauli and neighbouring hamlets of Kambala, Thadion and Rethi. This altered the distribution of both household

interest and household endowment significantly. Thirty-three of thirty-five households we studied in 2000 witnessed an increase in acreage under irrigation with the arrival of the second dam. The increase in area under irrigation resulted in an increase in average size of irrigated land by 0.6 ha since 2000. Further, between 2000 and 2008, sub-division of land holdings took place involving ten water-using households.^{viii} This could explain the increase in mean level of interest from 19.6 to 21.7 (*Table 4*). Both these factors contributed towards significant homogenization of household endowments and interests. This is evident from a reduction in variance in distribution of household endowments from 69.1 in 2000 to 49.03 in 2008 and a reduction in variance in distribution of household interest from 14.73 in 2000 to 4.37 in 2008. This ensured that a substantial number of the fifteen additional households could receive irrigation water. Therefore, after allowing for land sub-division among the original water-user group and increased water availability because of the second dam, group size increased from thirty-five to fifty farming households.

Table 4: Variance in Distribution of Household Endowments & Interests

Parameter	2000	2008
Distribution of Interest	14.73 (mean= 19.6)	4.37 (mean= 21.7)
Distribution of Endowments	69.1 (mean= 9.3)	49.03 (mean= 8.3)

Source: Kurian and Dietz, 2007 and authors' revisit data

The Withdrawal of the Original Entrepreneur from a Leadership Position

Since the construction of the new dam in 2001 the original entrepreneur has been reluctant to purchase water distribution rights at water auctions. Instead, between 2002

and 2004, he participated as a member of the HRMS management committee. Between 2002 and 2003, an elected committee of the HRMS was responsible for organizing service provision. In 2004, two new entrepreneurs decided to purchase water distribution rights at auctions. However, they failed to ensure water distribution because of disagreements over hourly water allocation rules. As a result, farmers did not comply with the rule stipulating payment of an hourly water rate of Rs 10 (*Table 5*). Nevertheless, our analysis suggests that the entry of these two new entrepreneurs signifies democratization of decision making with regard to the management of the dam in Bharauli. The reduction in the tariff for water for example besides reflecting a broad perception of reduced water scarcity could also suggest that the scope for arbitrary tariff setting by a profit-maximizing entrepreneur could now be curbed by the presence of countervailing influences within a water-user group. The following trends evident since our initial visit support this contention:

- The threshold endowment level, which signifies households with potential to engage in service provision declined from 15.6 to 12.9.
- The number of households with endowments higher than the threshold level had increased from four to eight.
- The number of households most certain to provide a collective good (i.e. higher resources matched with higher than mean level of interest) had risen from one to three.
- The variance in endowment distributions for households most certain to provide a collective good declined from 20.4 to 14.5 between 2000 and 2008.
- The mean level of interest increased from 19.6 to 21.7 during the same period

Table 5: Trends in Mode of Provision and Water Tariffs at Bharauli

Year	Lease Amount paid by Entrepreneur to HRMS at auction	Hourly user fee	Entrepreneur Success with Cost – Recovery
1997-98	20,000	Rs. 25	No profits due to poor payments arising from poor rains
1998-1999	18,800	Rs 25	7500
1999—2000	18,600	Rs 25	4,000
2000-01	HRMS provisioning	Rs 10	Not applicable
2001-02	HRMS provisioning	Rs 10	Not applicable
2002-03	HRMS provisioning	Rs 10	Not applicable
2003-04	HRMS provisioning	Rs 10	Not applicable
2004-05	14,000	Rs 10	Low payments resulting in no profit
2005-06	14,500	Rs 10	Low payments resulting in no profit
2006-07	HRMS provisioning	Rs 10	Not applicable

Source: Kurian and Dietz, 2007 and revisit data

Conditions of Successful Leadership

The inability of the two new entrepreneurs to ensure collective action despite a lowering of the water tariff leads us to examine some of the conditions that supported the success of the original entrepreneur. Our analysis points to three conditions that may explain his success as a leader:

- *The Moral basis of Power and Authority:* Caste status when examined in the context of wealth differentials provides a fairly accurate description of the sources

of power. Wealth ranking discussions with a cross-section of water users and village residents revealed that irrigated land was considered a source of power. Interestingly, when we considered other factors such as land size or ownership of tractors we were able to identify a different sub-set of individuals within the group. But when we ranked households on the basis of the composite endowment index that we developed we were able to identify the water contractor as being a “powerful” individual. He owned the largest acreage of irrigated land, owned a tractor and possessed a small family which implied fewer mouths to feed and potential to retain a large grain surplus that could be sold in local markets. Land sub-division at the time of marriage of male children has the potential to reduce levels of household wealth. But the absence of male children in his family posed no secular threat to household wealth. Our focussed group discussions revealed the contractor to be a benevolent patron despite his ability control access to credit, land and labour in the village. For instance, the water contractor has traditionally been a source of credit at times when crops failed due to pests or droughts. He also is known to provide loans during marriages. Discussions revealed that in the past when loans were not repaid on time, the ownership of land that was pledged as collateral was transferred to the water contractor after allowing for a sufficient grace period. During harvest periods when family labour is not sufficient to perform harvesting and threshing tasks labour from landless households is hired. Not always though are labourers paid in cash. But instead by being viewed as an extension of the patron family labourers and their families are compensated in the form of food or credit to purchase households items at the village store. In all

cases households remain obliged to patrons for help rendered as when in 1984 the water contractor advanced an interest free loan to repair the homes of the landless families whose homes had been washed away in a massive flood.

- *Political Factions:* In 1995 Bant Ram (the water contractor) did not own the largest area of land in the village. That distinction belonged to another powerful person in the village hierarchy- Jagir Singh who represents a powerful political faction. Political factions in the village are typically represented by members of the extended family of the patron (brothers, cousins) and clients (landless labourers). There are complex social norms that dictate behaviour within factions. For example, an unwritten rule during a water auction is that members of a particular faction will not compete once one of their members has decided to place a bid. Prior to arrival of irrigation in the village Jagir Singh dominated politics in the village. He served as liason with local government. For instance, documents show how Jagir Singh travelled to a nearby village to meet the District Commissioner to petition him to supply distribution pipes for the newly built dam in Bharuali. A sum of Rs. 3,38,926 was eventually disbursed in 1995-96 to facilitate repair of the dam (HFD, 2000). However, the laying of distribution pipes was not a simple affair- there was intense jostling among farmers to get the pipes to pass through their fields. After allowing for constraints imposed by topography, though when the pipes were finally laid the water contractor had the largest acreage under irrigation in the village. Jagir Singh by having a larger family and more mouths to feed was now no longer in a position to exercise his power as he

once used to do. Power had shifted to gradually to a new political faction led by the water contractor^{ix}.

- *The Calculus of Profit*: Our revisit in 2008 reveals that desilting of the dam pondage area is a pressing requirement, but the important question that arises in this context is what type of contract form (*HRMS vs entrepreneur*) is better placed to bear the political risks associated with tariff increases that are required to facilitate adaptive environmental management. The combined effect of increasing group size (*facilitated by land fragmentation*) and lower tariffs (*shaped by emergence of countervailing forces within HRMS*) has potential to alter the “threshold of co-provision”. The threshold of co-provision is a function of: (a) the marginal revenue to be derived from extending the irrigation network to accommodate new resource users who are paying a reduced tariff and (b) availability of public subsidies that would enable the entrepreneur to retain the possibility of making a profit by charging poor consumers a lower tariff while undertaking de-silting of the dam pondage area. The absence of fiscal support from government could explain the withdrawal of the water contractor from a leadership position in irrigation management.

Implications for Theory

Public choice theory offers useful perspectives and conceptual tools for analysis that focuses on the “start up ” phase of collective action. The categorization of common pool goods as being non-excludable and rivalrous in consumption can be helpful when attempting an delineation of transaction costs relating to: (a) transforming resource user

preferences and their willingness to pay into articulated demands for packages of publicly provided goods and services, (b) arranging to finance and produce these packages, (c) monitoring performance, (d) regulating consumer use patterns and (e) enforcing compliance with resource mobilization techniques (Schroeder and Wynn, 1993). The notion that the value of a given level of collective good could decline proportionately with the number of users who share in its use can be useful in structuring incentives for participation in managing common pool resources (Oliver and Marwell, 1993; Heckathorn, 1993). In this connection Olson's formulation of "selective incentives" led him to argue that smaller groups may be more amenable to exercise of such incentives when compared to large groups (Olson, 1965: 62).

Poteete and Ostrom highlight the role that different production technologies can have in influencing distribution of interest: particularly when the technology used by one group within the same community has negative impacts on the use of a resource by others (Poteete and Ostrom, 2008: 443, Baland and Platteau, 1999).^x Marwell and Oliver used the concept of *thresholds to action* to argue that two conditions must be met for heterogeneity to be beneficial or harmful for collective action (Oliver and Marwell, 1993: 21). The first is the *mean level* of distribution. If the mean distribution level is too low, so that individuals with the mean value are unwilling to participate, greater heterogeneity will force a higher proportion of people into the upper percentage of willing participants, and so promote collective action.^{xi} In contrast, if the mean is already high enough to favour collective action, greater heterogeneity would put a greater proportion of cases into the lower end of the distribution where people are unwilling to participate, and thus

would not be helpful to collective action. The second condition relates to *conjunction of probabilities*. Simply, when groups are heterogeneous, there is risk that people with enough resources to provide the good, will not be interested enough in the good to contribute. In this connection it has been pointed out that the presence of private alternatives can dissuade wealthy individuals from investing time or money to meeting start-up costs of collective action (Bardhan and Johnson, 2002).

The limitations of public choice theory become apparent however, when our concern is not limited to the “start up” phase of collective action but extends to include an understanding of the conditions that would sustain rule making, enforcement and modification over time. For instance our re-visit highlights two conundrums: (a) if the decision to undertake a leadership role is based purely on a rational cost-benefit calculation based on available information then why did the new entrepreneurs decide to purchase the right to allocate water when the tariff for water had been reduced the year before? Further, from a methodological point of view how is it possible that an approach based on the use of statistical means could not explain the failure of the new entrepreneurs although they retained a “conjunction of probability”- an interest in the dam backed by the financial resources needed to support provision of a collective good? From a theoretical standpoint we may conclude that while an increase in group size (*resource users*) need not *a priori* be a constraint the inclusion of new members with whom entrepreneurs do not have a past history of working together can prove detrimental to cooperation. A Study of rangeland management in Kenya, for example showed that

inducting new members from dispersed hamlets involving ever widening ethnic and cultural differences reduced the possibility of cooperation (Galaty, 1988).

Our analysis leads us to argue that effective co-provision is an outcome of strategic manipulation of local power structures (*potentially involving competing factions*) and exploitation of social ties with the representatives of the local state to facilitate the delivery of public services. In most cases co-provision is made possible by leaders who operate in milieu of caste and gender based hierarchical social relations, exercise of discretion by public officials, uncertainty in factor and product markets and risks posed by variability in climatic, soil and groundwater conditions (Long and Long, 1992). Our methodology by focusing on developing a composite index of interest and endowments based on assessments of household food security constitutes an improvement over single metric measures (*land or income*) of wealth distribution. Such an approach is better placed to understand institutional processes by which differential access to assets (*such as land, credit, irrigation or labour*) at the level of individual households are translated into power (White, 1989). Power is understood here as the extent to which one could control the action of others; through recourse to use of cultural symbols like gift giving (Thapar, 1994). Power can also exercised through patronage relations between landed and landless households that are embedded in labour tying and informal credit arrangements that serve to insure groups against market and climate based risks^{xiii} (Scott, 1976, Kozel and Parker, 2003). Our approach offers us a nuanced understanding of differentiation as a dynamic process involving the sharpening of differences within a population that does not necessarily constitute increasing inequalities in income or access to land (White, 1989). A

framework that can accommodate for processes of differentiation could potentially strengthen feedback loops between policy, structural change within communities and the effectiveness of contracts forms in ensuring delivery of services while accommodating for changes in the natural environment (Poteete and Ostrom, 2008)^{xiii}.

The attributes of leaders reflected in their ability to raise resources, organize labour and implement repairs of public infrastructure can be supported by higher order inter-governmental financing processes that ensure their access to subsidies and performance based grants (World Bank, 2004). In this connection a re-articulation of the state's role is imperative so as to ensure that its role is not limited to "a minimal recognition of rights of groups to organize" but one that includes greater accountability in public sector decision making. Budget instruments by containing vestiges of the old paradigm focused on allocation of resources is one example of where policy science can contribute by shifting the focus away from a focus on infrastructure spending to one that is concerned with establishing robust links between public expenditure and delivery of reliable, affordable and quality services (World Bank, 2009). Environmental management is particularly prone to unaccountable fiscal behaviour because of the non-linearity between policy interventions and environmental outcomes at different scales (Scoones, 1999). Discretion exercised by public officials can further compound the complexity of human-environment interaction (Lipsky, 1980). Therefore, if one were to view policy goals not as problems to be solved once and for all, but as norms and standards that are maintained and modified over time then, information can prove to be a powerful instrument in

ensuring greater accountability in decision making by placing for public scrutiny the use of discretionary instruments by public officials (Gregory, 1997: 188).

Conclusions

Scholars focussed on economic performance have emphasized the importance of a stable polity with complimentary norms that can provide the flexibility required to adjust to evolving technological and demographic changes as well as shocks to the system (North, 1995). With respect to the developing world however, there is an acknowledgement that policies focussed on enhancing public sector efficiency that are perceived to be inequitable will engender political reactions. It has been argued in this connection that one pathway to beneficial institutional change in the short term could be to remove a critical political stumbling block: asymmetries in political bargaining power (Bardhan, 2005). It is precisely this short-term perspective on institutional change that has guided policy interventions focussed on management of CPR's. A key assumption that guided this phase was that of targeting homogeneous groups on the belief opportunities for political bargaining over benefit distribution will be promoted because of broad based equality in income and land ownership and absence of deep cultural divisions within such groups.

This paper by reporting on the findings of a re-visit to a site of successful collective action emphasizes the benefits of adopting a 'longer-term' view that would accommodate for a nuanced understanding of the state's role in supporting wealth accumulation strategies, land fragmentation and leadership change within groups of resource users.

Such a perspective can yield a number of insights on the conditions that make rule making, enforcement and modification possible. Rational choice scholars offer us valuable perspectives on the structure of costs and benefits of providing a collective good. However, analysis of contract evolution that is rooted in a moral economy of wealth based inequality can further improve our understanding of how to strengthen feedback loops between policy and structural change within communities. Feedback loops are especially important in supporting effective co-provision because of the imperative to “strategically manipulate a network of social relations and discipline the discretion of other agencies” (Long and Ploeg, 1992).

Our study shows that the absence of ‘historical narrative’ in analysis of collective action by rational action scholars can lead us to over-emphasize the risks of elite capture. But in as much as the wealthy are guided by the calculus of profit their actions can be motivated by a moral basis to their exercise of power and authority. Previous leadership experience and familiarity of working together to achieve secular goals can bridge wide differences in culture and ethnicity. As a result increasing group size need not *a priori* pose a threat to collective action. A more potent threat to leadership in pre-industrial societies however, lies in a perception that some of its members accumulate wealth while others are in need (Fafchamps, 1992). Therefore, one of the positive benefits of external intervention can be to expand opportunities for the poor and non-poor to cooperate since coalitions made up exclusively of the poor are likely to remain powerless in dealing with the challenges posed by poor standards of service delivery (World Bank, 2004).

Irrigation is systematically linked to major features of social organization, closely affected by differential power and embedded in the local-national linkages of states (Hunt and Hunt, 1976). Hierarchy arising from inequality in wealth distribution is a key feature of pre-industrial societies. CPR research on the effect of heterogeneity on collective action led us to inquire if an equalization of wealth differentials will remove constraints to the development of trust and shared norms? Our revisit study leads us to conclude that social hierarchies rooted in a moral economy may be necessary especially because not all people within a community can be relied upon to live by their internalized ethical rules and contribute their fair share (Fukuyama, 1995). From a methodological point of view therefore, how one integrates conceptualization of forms of heterogeneity with recognition of their axis of influence depending on the attributes of field-level situations is critical for analysis of collective action (Poteete et. al.2010).

END NOTES

ⁱ Each family or *gotra* is allocated water from the *kuhl* or seasonal water channel by a twelve-hour rotation. One water user has responsibility for monitoring the rotation. For his services, he receives six hours of water from the *kuhl* in excess of his designated share of twenty minutes of water. The size of their land holding determines the number of water-hours a household receives (see Kurian and Dietz, 2004: 39).

ⁱⁱ Cultural factors among communities like the *Gujjars* prevent unmarried women from engaging in non-farm labour markets.

ⁱⁱⁱ For a description of the method we adopted to assess water predictability see Ostrom, 1994.

^{iv} During a period of normal rainfall three rounds of watering are required for a wheat crop. Four hours are required to water once acre of wheat crop from the dam. Mean land size among water users in Bharauli was 4.7 acres. Therefore, mean per-capita water requirement for water users is 18.8 hours (4.7 times 4). But in 1999-2000 a total of 555 hours of water was supplied in Bharauli at a mean per-capita rate of 16.1 hours. In Thadion on the other hand mean land size was 5.8 acres. Therefore, mean per-capita water requirement for water users was 23.2 hours (5.8 times 4). But in 1999-2000 a total of 479 hours of water was supplied in Thadion at a mean per-capita rate of thirty two hours.

^v Sapling regeneration is a good indicator of the relationship between behaviour change (open grazing of cattle) and forest condition. Saplings regenerate in a relatively short period of four to six years when compared to trees which take a much longer time to reflect changes in behaviour (IFRI, 1997; Becker Leon, 2000).

^{vi} For an interesting discussion on the usefulness of calorific terms of trade to understand dimensions of household livelihood strategies see Dietz and Zaal, 2001

^{vii} Earthen dams continue to be the main technology supported by public investment in the region as is evident from sanction for construction of two new dams in a neighbouring village.

^{viii} Sub-division occurred when male members received their share of property at marriage. In the Haryana context when girls are married into another village her husband benefits with land due to sub-division in his village. The girl leaves her village with movable items such as gifts, household items or even money. It is unlikely she inherits land except in cases where she returns to her parents' house due to death of her husband or divorce (see Agrawal, 1994).

^{ix} For an interesting analysis of the role of role of factions in rural development see Bandhopadhyay and Eschen, 1988 and Vedeld, 2000.

^x A study by Balasubramanian and Selvaraj (2003) in South India points out that an increasing number of private tube-wells in a watershed had a negative effect on collective action for maintenance of public tanks.

^{xi} In this context, it has been argued that chances of elite capture may arise since a group of highly interested and resourceful individuals may cooperate to derive benefits by excluding resource poor individuals from participating in management of the common pool resource (Platteau and Gaspard, 2003).

^{xii} For example, studies in rural India have shown how labour tying ensures that contributions by asset less households towards their patrons collective endeavours (example: operating and maintaining an irrigation system) are compensated not in monetary terms but in terms of access to free food, especially during times of natural disaster (Bardhan, 1984).

^{xii} By contrast the assumptions, theory and methodology that guide rational action analyses of collective action emphasize a historiography which discounts the importance of historical narrative (Johnson, 2004, Mosse, 1997).

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