NORMS, RULES AND CO-OPERATION

THE EVOLUTION OF CPR INSTITUTIONS

Zakir Husain
Department of Economics,
Rabindra Bharati University
56A, B.T. Road, Kolkata 700 050.
Email: zakir@vsnl.net

&

Dr. Rabindra Nath Bhattacharya
Professor of Economics,
Kalyani University,
Kalyani, Nadia, West Bengal.
Email: rnbeco@yahoo.com

Abstract

Common Property Resources (CPRs) are an important component of the rural resource base. The recognition of this idea has coincided with an appreciation of the environmental sustainability of communal management systems. Studies have focussed on the features of successful CPR systems. But how do these institutions evolve in response to changing socio-economic conditions?

We have used a systemic view of the formation of CPR institutions. We have argued that the cognition of resource degradation will generate a process of reaction where the resource community constantly tests the environmental response and the reaction of the economic and institutional framework. This process enables agents to realise the limits of their abilities and the constraints on their reactions. Over time, however, with the greater intrusion of market forces, the restraining power of social norms will decrease. In that case voluntary contracts will have to be replaced by formal contracts. This contract will take the form of a specific resource management system. We have described the components of such a regime. While such regimes can take different forms, we have argued that the advantage of CP regimes is that they minimise transaction costs.

However, such regimes may lack the legitimacy of the earlier regimes operating in traditional communities. In that case, the State must intervene to strengthen CPR institutions and increase their controlling power. This calls for co-management of resources.

The Evolution of CPR Institutes

1. Common Property Resources

Rural development depends upon the effective utilisation of the environmental resource base. This implies that, on one hand, we use the natural resources *efficiently*. Alternately, it also implies that these resources be used *sustainably*. The problem of resource use is compounded by the fact that efficiency may conflict with the objective of sustainability. In this context the question of ownership and management of the natural resources become important.

Ownership - or the concept of property rights - refers to the sets of rights and obligations governing the access of an individual or group to the stream of benefits that can be obtained from the resource. Based upon ownership of natural resources it is possible to differentiate between four types of resource regimes:

(a) State property regimes;

(b) Private property regimes;

(c) Common property regimes; and,

(d) Open access regimes.

Initially it was believed that common property regimes were the same as open access regimes. This led to the proposition that common property resources (CPR) are inevitably over exploited and are doomed to be exhausted - known as 'Tragedy of the Commons' (Hardin, 1968). The recognition of this difference led to a rejection of Hardin's paradigm, and an acceptance of the importance of CPR regimes. It was pointed out that the dependence of the resource community on the common property resource and their knowledge of the local ecological system enabled the resource community to manage such resources sustainably. It was further pointed out that common property regimes performed several important functions in the rural economy: they comprised part of the stable diet of the population, added variety to

daily diet, constituted low value inputs to the production process, generated employment opportunities, form an important component of the social security system, etc., and contributed to income - particularly that of poorer households in many ways.

2. Evolution of CPR Institutions

The importance of common property resources in the rural economy has led to attention being focused on CPR regimes. Researchers have examined successful CPR institutions to understand how these institutions function, and what are the features of successful CPR systems. However, in attempting to rebut Hardin' s model, these studies have focussed on cases of success. This has led to a neglect of the study of the dynamics of CP regimes - there has been an absence of attempts to analyse how CP regimes evolve over time in response to changes in socio-economic parameters. Our paper will address precisely this issue. We will try to develop a systemic framework to analyse how CPR institutes have to evolve in response to changes like commercialisation and integration of local communities with the national economy.

A common approach to the emergence of co-operation in resource communities is using the concept of iterative games. However, game theory has some limitations. Game theory suggests that co-operation may be rational with a given pay-off. It fails to explain how the pay-off matrix is formed by the interaction between the economic sphere and the institutional structure, or how this interaction creates the “rules of the game”. Further, game theory assumes that people behave predictably and consistently in response to the same rewards and costs. This in turn implicitly assumes that the relation between attitude and behaviour is simple and unidirectional. However, this view is simplistic and has been rejected by the works of social psychologists (Fishbein & Ajwen, 1977).

In order to explain the dynamics of a CPR institution we have to concentrate on the nature of the linkages between the resource community, and its natural, economic and institutional environment. The presence of a large number of non-quantifiable and qualitative forces influencing this process complicates this issue. We, therefore, feel that the use of a systems approach (Ansoff, 1979) will be more appropriate to study this problem. This method focuses on the nature of linkages and inter-relationship between mutually adjacent slices of reality. Groups of adjacent slices are next connected to other groups; thus making possible a structure characterised by an arbitrary degree of complexity. The advantage of this approach is that we will not have to comprehend the total complexity of the model – we need only to appreciate the slices and the adjacent inter-relationships.

We will commence our study by examining how co-operation between resource users starts in a traditional society. Such co-operation is voluntary and is related to the characteristics of the traditional community - we will show that the forces like commercialisation and integration with the national economy will lead to a disappearance of the forces that enables such voluntary contracts to be binding in traditional societies. The response of the community will be directed towards formalising the involuntary contract. We have described the likely components of this formal structure and examined its form. Finally, we have examined the relevance of our study for policy making.

3. Emergence of Co-operation in Traditional Communities

The works of social psychologists (O' Riordan, 1976; Fishbein & Ajwen, 1977) have shown that response of resource users to an environmental resource problem will not simply depend on their attitude. It will be conditioned by the interaction between information flows, experience, awareness, concern for others, norms, etc. Other

factors too have to be considered: the specificity of the attitude and the behavioural response required for solving the problem. Simultaneously socio-political forces both mould cognition and define the set of behavioural responses. O'Riordan (1976) suggests that a plausible behavioural model should conceptualise some sort of a transactional arrangement in which the individual negotiates with the environment in a symbiotic manner, each influencing the other. Responding to a resource problem then becomes somewhat like a game in which the individual is constantly testing both the environmental response and the reaction of the socio-political system to which he belongs. This process also enables the individual to realise the limits of his abilities and the social and institutional constraints on his reactions. The goal of optimisation might then have to be replaced by *satisficing*.

Based on these concepts we have tried to indicate a systemic view of how a CPR institution emerges. We argue that the cognition of an environmental hazard will generate a process of interaction between the agents and their social, economical and institutional framework. The nature of this interaction has been illustrated below using a flow chart.

Insert Figure 1 here

Our first proposition is that the resource community will act only if there is a resource scarcity problem. We are not suggesting any ' brink of disaster' models (Basu & Mishra, 1993) where the community reacts in the last possible round. Actual response is not of the last ditch type as it is too uncertain. The change may be irreversible; random effects may operate in the last round. Further, in certain resources it may be access to the resource that is threatened - not the resource itself (Steins, 1999).

In general, we observe that resource communities possess local knowledge acquired through long experience and observation, and passed from one generation to the next. Such diachronic data (series of observations at a single location over a long period of time) may act as a grass root indicator for any emerging catastrophe. The structure of the cosmology of the community is also important in this context: indigenous communities generally have a pantheistic attitude towards nature, which inculcates a sense of stewardship within the community.

However, such knowledge is not a static concept – just as it may expand, so too may information be distorted or lost or forgotten during the process of inter-generation transmission. *Retraditionalization* may also modify the cosmological belief of the community and replace the earlier sense of communion and stewardship with one of domination over nature. There is also the possibility that the community, concerned with local conditions, will ignore the regional/national ecological consequences of their actions.

In such cases, indigenous knowledge will have to be supplemented by efforts by the State. The State will have to educate the resource community and make them aware of the ecological consequences of their resource appropriation behaviour. In this process of dialogue three problems can be identified (de Vreede, 1993):

(a) Language as a constraint to communication;

(b) Communication problems between the State and the resource community; and,

(c) Guidelines of behaviour may be unacceptable to the resource community, who may come to view as political rights, their traditional resource usage rights.

Even if the resource community becomes (or is made aware) of an impending resource problem, action may not follow. We follow here the propositions made by

Darley and Latane (1977) in their model of helping behaviour. We argue that the attitude towards the crisis is also important – does the community feel that the crisis is serious or that it is a long-term crisis? A pinning down of responsibility follows this stage – is it the actions of the community that is responsible for the crisis? Or is the resource problem due to exogenous reasons?

Insert Figure 2 here

The economic feasibility of co-operation is also important. Game theory is important in this context. The commons problem has been interpreted as a Prisoner's Dilemma. Extending the one shot game to infinite rounds – iterative games – will allow resource users to learn to co-operate. A Tit for Tat strategy may dominate such games and ensure co-operation (Axelrod, 1984). A critical review of the contributions of game theory is avoided as it involves digressing from the main thrust of our study. We merely emphasise at this point that economic parameters affect the pay-off structure and returns to strategies. This indicates a potential tool for State encouragement to the emergence of co-operative dispositions.

The works of Ajwen & Fishbein (1977) indicate that a co-operative disposition will lead to co-operative behaviour depending upon personality variables and norms. Personality variables refer to the psychological characteristics of the individual. Studies by Alcock & Mansell (1993) indicate that persons with a predisposition to co-operate do tend to co-operate in Prisoners Dilemma situations.

The presence of norms is another important factor. "*…Norms are the matrix that forms the social relations among social relations among groups and individuals. These values and norms … shape the course of social life in the society and the social patterns that emerge in particular groups.*" (Blau, 1964)

The norm of social responsibility can be a powerful force in leading to the emergence of co-operative behaviour. When such norms are internalised (i.e. it becomes part of the personality of the individuals) then people will co-operate not for material gain or social approval, but for personal approval. In economic terms, we may conceive of internalised norms affecting preference functions. In the diagram given below, we may conceive of a "selfish' person having a preference function given by I_S, so that he consumes more of the common property resource (X). In contrast, a person motivated by internal norms of co-operation has a preference function given by I_N, so that he consumes less of X.

Insert Figure 3

It has been suggested that norms prevent the emergence of non-co-operative behaviour. But many researchers believe that norms have a limited influence on behaviour. There are three reasons for this.

(a) Norms tend to be contradictory and vague.

(b) Norms may conflict in a given situation.

(c) Norms may be outweighed by economic costs of co-operation.

Further, we have to explain how a specific norm emerges – for example, uncertainty over strategies in a CPR Dilemma may be resolved by following a norm of defection also. The resultant equilibrium is stable. Schotter (1981) has argued that though norm formation is conditioned by initial conditions it constitutes a stochastic process. Therefore, the same initial settings may generate several norms.

This process by which individuals decide to co-operate (or not to co-operate) will have an effect on the resource stock. The response to environmental problems may involve a sacrifice; if this sacrifice is to be sustained then individuals have to be

assured that their sacrifice are having a positive effect on the resource stock. Feed backs about the impact of resource conserving behaviour is commonly supposed to be an important factor in determining future decisions to co-operate, or changes in the nature of resource consuming behaviour. Studies indicate the importance of feed backs in the following circumstances:

(a) The feed back is believable;

(b) Feed back is frequent enough to give people knowledge of the effects of behavioural responses to resource problems.

(c) The resource community has a strong commitment to curbing resource consumption.

(d) Resource costs constitute a large proportion of the budget.

4. The Community and Voluntary Management

The co-operation that emerges is basically of a dyadic nature – *"…the way pairs of individuals are, in many different spheres of life, bound into relationships almost similar to contracts, though they are not enforced by law. … They persist partially, because, they are never precisely balanced, and hence call for continuing reciprocity.*" (Keesing & Keesing, 1971) Now it can be seen that the emergence of the co-operation described in the last section was purely voluntary. This raises an important issue. In the absence of any monitoring and sanctioning system, strategic defection appears to be a safe and optimal strategy as it maximises returns, without the risk of being detected and inviting punishment. The question then arises: Why do resources voluntarily adhere to incomplete contracts? The answer can be found in the nature of the institutional context in which they occur - the structure of the traditional community (Bowles & Gintis, 1998).

Traditional societies are characterised by their cohesive, integrated and closed nature. This means that people are highly inter-dependent upon each other – they

are linked through a network of certain common customary obligations towards one another in matters of social and economic life. In the economic sphere this is characterised by the presence of inter-linked markets. Secondly, these relations are very often based on personal relations. Thirdly, the closeness of the community members' results in a high degree of social and economic interaction resulting in all parties getting access to information about other members. Fourthly, this information rapidly spreads across the community – as the person who obtains the information himself interacts with other members. Finally, the closed nature of the community reduces mobility of each member. This can be seen in terms of the inability to obtain access to alternative economic opportunities outside the community. Now, what are the implications of these features for voluntary co-operation?

Firstly, the dense social network existing in traditional communities which leads to each individual possessing intimate knowledge about each other. In other words, the prevalence of economic and social interaction acts as a substitute for a monitoring system. Members obtain micro-knowledge (Roy, 1998) about each other from these interactions. A sort of spontaneous peer monitoring system by neighbours prevails, especially as social links are very strong. This allows identification of agents who have defected. Further, the closeness of the community enables news of default being transmitted rapidly across the community. This creates a particular reputation for each member. Defectors are labelled as untrustworthy persons who can renege on a contract. He becomes an intrinsically bad prospect for entering into transactions. As Colson points out: "*Radcliffe-Brown pointed out long ago that the one public crime in such societies was often that of being a bad character. (This decision) is a consensus achieved only after discussion and a pooling of a variety of experiences, all carrying much the same implication. Only an individual, and his supporters, are interested in what he has done, for this is the basis of their claim for*

compensation. The general public, on the other hand, is interested in what he is and what can be expected to do in the future since this is a guide to the risks that they encounter dealing with him. It gives them some incentive to assess what has happened on particular occasions, …" (Colson, 1974).

This reputation is crucial in the absence of an information system and the presence of high monitoring costs in inter-linked markets. In other words, reputation acts as a substitute for information and monitoring in arenas where repeated interaction takes place. Therefore, defection in one arena will impose high costs, as it will create a reputation that automatically locks out the individual from transactions in other markets – of which the credit market is an important example. Simultaneously, the closed nature of the system and the consequent lack of mobility deprive the individual from utilising alternative sources outside the community. For one thing, the source to which he will turn to is itself part of another closed system, and he (as an outsider) will first have to establish a reputation for himself in that community before getting access to the inter-linked markets. Secondly, psychological ties linking an individual to his homestead may prevent him from thinking of a hit-and-run strategy.

In brief, voluntary co-operation is reinforced by informal group monitoring which enables the pinning down of responsibility for degradation, and the inter-linked nature of markets which acts as a sanctioning system by locking out the defector for a number of rounds, or imposing some other form of costs. Simultaneously, the high entry and exit costs into the system discourage the adoption of a hit-and-run strategy.

5. Impact of Modernisation

Most of the writings on CPRs have treated such systems as islands isolated from the dynamics of the external world. This is unrealistic. As the political, economic and

social macro-environment (of which the CP regime is part of) changes, and the integrated nature of the villages or communities are destroyed, these regimes too will have to evolve. The reason is that the assumptions of perfect knowledge, homogenous, dominance of non-market relations, inter-linkage, etc, can no longer be applied in the changed environment. Dyadic relationships loose their strength. In such cases, it is not easy to impose social penalties on activities that imposes costs on society but generates private benefits. The problems of moral hazard and adverse selection will emerge and the tendency to free ride on others will become dominant.

The problem of moral hazard can emerge in three ways:

(a) *Asymmetric information:* Some resource users may possess exclusive information. The iinformation available to each agent may differ because *actions are hidden* (actions cannot be accurately observed or inferred by others), or *information may be hidden* (actions are observable, but their appropriateness cannot be judged).

(b) *Barriers to Contracting:* A detailed contingent contract is not available. If the costs of anticipating and preparing a detailed contingent exceeds its benefit, then it is optimal to leave a contract vague and wait for he uncertainties to be resolved before reaching an agreement to the course of action to be undertaken.

(c) *Problems of enforcement:* Enforcement may be costly. In that case, it is better to live with the inefficiencies generated by the moral hazard than to try to enforce the optimal contingent contract.

In the case of a dyadic society, monitoring is informal and compliance enforced by the threat of retaliation in other spheres. As inter-linked markets disappear, this will encourage resource users whose actions cannot be readily observed to violate rules.

For instance, households living on the edge of a forest can monitor the activities of households living further away from the forests, but are themselves not easily observable (hidden action). There will be a strong incentive for them to group together to illegally fell trees. Another possibility is that, in the absence of definite rules, it is not easy to ascertain to the sustainable level of exploitation. Again, the resource community may not be able to judge the appropriateness of the prevailing level of exploitation (hidden information).

Secondly, as mobility of individuals, the range of opportunities available to him increases. Instead of entering into inter-linked transactions with a neighbour – who knows his reputation – the individual can establish links with a distant agent. The incentive – in fact, the feasibility – to adopt a hit-and-run strategy increases. According to Elster (1989) increased mobility has two additional effects.

> "*First it tends to undermine bonds of altruism and solidarity, simply because people are not around each other long enough for these to develop. Secondly, social mobility reduces the scope of arguments from long term self interest. It is generally recognized that TFT arguments works best in small and stable societies, where there is a high probability that the same people will interact over and over again. Conversely, in modern societies interaction is often too ephemeral for implicit promises and threats to ensure co-operation.*"

In these circumstances, opportunist individuals will take advantage of the absence of an efficient contingent contract, monitoring system and sanctioning system to free ride. The rate of defection will increase. The resource will either degenerate into an open access resource (and the Tragedy of the Commons will occur), or the

community will seek to enhance complete contracts and improve enforcement. This can be attained by establishing a formal resource management institution.

6. A Case Study From Thailand

Shigetomi (1992) provides an interesting account of the evolution of co-operative management of natural resources in Thailand following a similar pattern. Thai villagers are dependent to a significant extent on their surrounding natural resources. One of the most important of such resources is water. However, the co-operative management of water was been largely restricted to North Thailand. Villagers had to participate in building, repairing and management of the irrigation facilities. Such systems clearly lay down the rights and duties of members and enforce a sanctioning system.

Other than irrigation, ponds and swamplands provided alternative sources of water. These resources were plentiful. Hence they were held in the form of open access resources – there were no rules for their sharing, nor were outsiders excluded from using these water bodies. Villagers did work collectively to repair embankments and clean the ponds. But there was no system to compel participation – it was purely voluntary.

The surrounding forest cover also provided economic sustenance to the villagers. Forests provided food and other necessities of life, fodder for cattle, etc. Despite their economic importance, forests too were open access and unregulated. Again, this was because of the relative abundance of the forests.

Starting from the end of the 19th century changes began to occur in the Thai economy. This new economic environment altered the social organisation of Thai villages, and created new forms of co-operation. The underlying principles of these

new forms were different from the voluntary dyadic principles underlying the traditional forms of co-operation.

With the advent of commercialisation, labour markets started developing within the villages itself. This afforded means of earning income within the community. The pressure of market forces also led to pressure on forestlands – which began to be cleared and used for cultivation or in new commercial ventures. Unclaimed forestland, which was generally of poor productivity, was gradually appropriated by the villagers as demographic pressure on land mounted. Such appropriation could be carried out for private use with impunity when the concerned villagers had exceptional power. But, in relatively cohesive societies, such appropriation could come only through collective agreements. In this way, hitherto 'public land' became 'communal land', and used collectively for the benefit of the entire village.

In many villages, a strong perception emerged that swamplands were collective property. For instance, Shigetomi reports, in 1983, a villager living in Nong Khe appropriated a neglected swamp. This was not objected to initially, as the other villagers did not feel that he land had any economic value. But when the swamp was converted to paddy land and started yielding revenue, a demand rose that the person should pay rent to the village coffers. The village council accepted this demand. Here we find that one individual's gain stimulated the self-interest of other villagers. This, in turn, strengthened the perception of public land being communal land.

In general conflicts between villagers prevent such forms of appropriation. But as population and market forces are increasing, there is increasing pressure to extend cultivation to such public lands. The largest swamp in Ban Thon, called Nong Khi

Ped, had fallen into the same state of neglect as the swamp of Nong Khe – it was no longer usable for fishing, watering cattle, or other activities. The village headman had been unable to mobilise the required force (through voluntary contribution of labour) to restore the swamp for the past 20 years. Consequently, the village council proposed that the swamp should be leased out to a group of villagers for 5 years on condition that they keep it clean and repaired. After the proposal was approved a group of 30 villagers came forward to take up the lease. They cleaned the swamp in a short time, pooled their capital to purchase fish fry, and started a pisiculture scheme. They took turns to keeping watch over the swamp at night. When the fish had grown sufficiently large, they sold tickets to villagers for the rights to fish in the swamp. Part of the profits was paid to the village temple, and the rest shared out amongst the members of the group.

Other villages too have followed the example of Ban Thon. They have leased out public natural resources (generally land) to groups of individuals. This enabled the effective use of public property utilising the desire to maximise individual gain. Simultaneously, there are other villages that compel all households to participate in the management of village ponds and provide labour for raising fish. The yield from such activities is shared out equally between all households.

Commercialisation and other changes in the objective conditions, therefore, changed the nature of both Thai society and the system of co-operation. Firstly, people found it more difficult to elicit voluntary co-operation from other person's. Consequently, they sought new means to obtain co-operation – through collectively decided rules. Secondly, the traditional co-operative activities organised on dyadic principles were replaced by co-operative activities organised collectively. Thirdly, the force of this agreement and membership of the organised activity was clearly delineated and

remained intact for the specified period of time over which the activity was undertaken.

7. Components of Resource Regimes

So we see that informal rules can constrain and guide behaviour of economic agents in traditional societies. As exchange becomes more complex, however, returns to opportunism increases. Cultural values get eroded and there is an increase in individualistic and household-centric activities. Mutual trust can no longer contain deviant behaviour. A mutually agreed force explicitly directed towards controlling resource withdrawal becomes necessary (North, 1994). This implies that norms have to be replaced by rules. In other words, a formal resource management institution will have to be introduced. Such institutions will have several components:

(a) External norms, or conventions

(b) Rules determining resource use

(c) Monitoring system

(d) Sanctioning system.

Let us now discuss these components in details.

The earlier system of norms was internalised – adherence to them led to internal gratification. They formed part of the preference set of the actors. Here, norms are basically conventions, or regularities of behaviour. They relate to the delineation of the boundaries of the choice set within which choice must be made based on the preference function. Lewis defines conventions as follows:

> " *A regularity R in the number of members of a population P when they are agents in a recurrent situation S is a convention if and only if it is true, and common knowledge in P, that in instance S among members of P,*
>
> *(a) Every one conforms to R;*
>
> *(b) Every one expects every one else to conform to R;*

(c) *Every one prefers to conform to R on condition that the others do, since S is a co-ordination problem and uniform conformity to R is a co-ordination equilibrium in S.*" (Lewis, 1969)

The motive for adhering to conventions becomes different. In cases of uncertainty or imperfect information it is not easy to determine the optimal strategy. Conventions are generally accepted (and followed) strategies: they contain probabilistic information about the set of strategies of rational players. Adherence to such conventions by individuals makes it comparatively easier to determine the optimal response to a co-ordination problem or assurance game.

The second component of CPR institutions is the existence of definite resource sharing rules. The *raison d'être* of the CPR institution is to control resource use. It is here that the economics of determining the optimal harvesting rate becomes important. The lack of sophisticated techniques possessed by the farmers is compensated by their collective possession of information about intricate details of the resource and its growth rate. The efforts of the State to supplement conserving efforts of the resource community are also important.

Given the optimal rate of resource consumption, the resource users will have to distribute this amount between individual members. This is an intricate problem, involving a consideration of bargaining abilities – which in turn may be determined by factors like asset holdings, caste, status, political clout, etc. The Nash bargaining approach is a potentially useful tool in this context.

In this context, the distinction between rules and conventions should be made. Norms are non-punishable informal principles. Rules are formal constraints created

to serve a specific communal purpose and imply a sacrifice. Violation of norms provokes social resentment and creates a reputation. Violation of rules, however, leads to punishment directly linked to the offence.

Such punishment may consist of monetary compensation, appropriation of equipment and tools, social ostracism, forcible contribution of labour, physical reprisal, etc. Such punishment has two effects: they act as a general deterrent, and they imprint upon individuals the need to follow external norms. Punishment, however, is more than an instrument of control - it is an indication that authorities are in control, that crime is an aberration, and that the norms governing social norms retain their force and vitality. Hence, it has been suggested, even those who do not sanction deviants should be punished - metanorms (Axelrod, 1987).

The sanctioning system announces behavioural standards, attaches penalties for deviations and then leaves it to the individual to decide whether to comply with the rules or not (Andeneas, 1974). Compliance, therefore, is not voluntary. At the same time, any deviation will set into motion processes coercing the individual to adhere to the rules. In other words, compliance is *quasi-voluntary* in nature.

This implies that sanctioning has to be supported to monitoring, which will increase the risks of being detected and apprehended. Ostrom (1990) argues that in contingent contracts, compliance will be high when agents perceive that he collective action is being fulfilled and that others are also adhering to rules. Monitoring, therefore, is necessary not only to detect arrant individuals, but also to assure law-abiding individuals that they are not being taken for a ride.

Monitoring can be of different types. In Japan, hired detectives patrol communal land. Villagers, too, may take turns to monitor these fields. In some instances, there might be an absence of formal monitoring agencies - any villager can report violations, or make a ' citizens arrest' . Self-monitoring has also been reported. In the irrigation system of Valencia, Spain, succeeding drawers monitor appropriation of their predecessors (Ostrom, 1990).

However, monitoring and punishment has costs: not only financial, but also in terms of the opportunity cost for labour contributed to monitoring. In addition, they are the costs of resolving disputes and enforcing the punishment. These may reduce the benefits to strict implementation of a monitoring and sanctioning system. In an experimental study, Walker et al (1991) observed that monitoring and punishment increased gross yields from the common pool from 21% to 37%; net yields, however, declined to 9%. This implies that a trade-off has to be made between reducing costs of punishment and increased benefits from ensuring compliance. Consequently the community may decide to deliberately overlook or forgive evasions. Empirical studies (Agrawal, in Ostrom et al 1994; Steins, 1999; Bhattacharya & Husain, 2002) indicate that significant levels of evasion can be tolerated by the community. The rationality of forgiving is to reduce costs of administering justice and to avoid rounds of mutual recriminations.

Balland and Platteau (!996) have argued that when monitoring is imperfect, rule breaking may be consistent with a co-operative equilibrium - with both monitors and resource users evading their responsibilities and duties. Taylor (1977) has shown that in the case of metagames, there is a threshold level of violation. So long as actual rates of violation the community tolerates remains below this level defection. In terms of the models of social psychologists (Fishbein & Ajwen, 1977) forgiving can

be interpreted as an acceptance of the fact that specific behaviour need not be related to a general attitude (the *correspondence principle*). Fishbein and Ajwen have argued that general attitude leads to a class of behaviour supportive of attitudes in general. In the case of specific behaviour, however, situational variables like family needs, seasonal falls in income, etc. may become important. The punishment mechanism must be flexible enough to accommodate this aspect.

We suggest that the actions of the resource community when faced with rule breaking can be analysed based on the following classification of possible reactions to rule breaking, and the attitude towards such offences (Koller, 1994).

Insert Figure 4

Deliberate free riding will provoke an offensive reaction and bring forward punishment. But, based upon past actions and reputation, accidental free riders (actual, or misperceived to be free riding) or those resource appropriators who generally co-operate, but are forced by temporary exigencies to defect in one round, will be pardoned (NW cell).

This implies that each system has what we term as a “carrying capacity for defection”. This capacity is the limit of defection that will not provoke any reaction from the sanctioning authority. The problem with this capacity is that – although it provides much needed leeway to exercise discretion – a mismatch between the carrying capacity for defection and the carrying capacity of the resource will lead to resource degradation. The CPR regime exists and is obeyed – but fails to prevent resource degradation. It is, therefore, dysfunctional.

8. Institutional Form of Resource Regime

It may of course be argued that privatisation provides an alternative institutional solution to this problem. This is a valid argument. The exact form of institutional arrangement that will emerge will depend upon the surplus being generated. We are reversing here the following relation:

Surplus = f (Institutional form)

to :

Institutional Form = g (Surplus).

This implies that the surplus being generated from the resource will determine the feasibility of adopting a particular institutional form.

Dahlman (1981) provides a good illustration of this in the context of medieval England. He pointed out that the optimal scale of operations was different for arable and pastoral activities. While crop cultivation could be carried out in small discontinuous plots, grazing had to be carried over a wide area. This led to differing types of property rights emerging for these two activities. In the former, private plots were prevalent. But, for pastoral activities, division of the land and the resultant restrictions on access would require frequent negotiations to determine the terms and conditions on which cattle could be grazed on some other's land. In addition, policing would be necessary to detect over grazing, or breaking any other terms of the agreement between the parties. These two conditions led to high transaction costs.

The problem was by-passed by the introduction of open access to pastoral land. Thus for the same community, we have different property regimes for different resources.

It was argued by the property rights school that the distinct demarcation of property rights (and hence also user rights) will reduce uncertainty and, consequently, the expenses to ascertain the probabilities of outcomes or insure against unfavourable events. For instance, if an agent wishes to purchase an asset whose ownership is not clearly defined then he would not know who would claim the asset. Similarly, if rights to an asset were not defined, then the security of income flow in the future would be threatened. In both cases, precise valuation of the asset would not be possible. Defining exclusive property rights would eliminate such uncertainties - in the absence of transaction costs - and increase efficiency by allowing economic agents to bargain away the negative effects of the externalities. Natural resources should, therefore, be privately held.

However, there is a fallacy in this line of reasoning: transaction costs are not zero. In that case we have to compare the transaction costs of creating each type of property regime and operating it. Now, transaction costs can be classified by analysing different phases of the exchange process. In order for an exchange to occur it is necessary for the parties to seek each other out. If this search is successful then it may be necessary to inform them of the opportunities from the exchange. Bargaining will also be required, especially if the number of involved parties are large, to determine the terms of trade. Finally, there are the costs of policing and monitoring the enforcement of the contract. This implies that that transaction costs can be classed under three heads:

(a) *Information Costs*: whom to bargain with, what is the value of the contract, etc.

(b) *Contracting Costs*: the costs of anticipating possible eventualities and preparing a complete contract making allowances for each eventuality.

(c) *Enforcing Costs*: Costs of detecting violations of the contract, punishing violations and resolving conflicts.

The introduction of private property rights may reduce uncertainties related to ownership and hence save transaction costs to some extent, but it will entail other costs - of establishing and protecting ownership rights, and enforcing compliance. It is quite possible for these costs to exceed the transaction costs saved.

Thus the formal structure of the resource institution cannot be specified *a priori*. However, CPRs can reduce transaction costs of establishing and operating a property regime under certain cases. In the following cases, therefore, CP regimes constitute the most appropriate institutional form:

(a) CPR institutes employ the restraining power of pro-social norms and conventions.

(b) Activities like negotiating, monitoring, etc. are carried out by the entire economy. This enables the attainment of economies of scale.

(c) Natural resource systems are complex systems. In many cases, they cannot be sub-divided into small-size holdings.

(d) Lastly, in the case of low value subsistence resources, the surplus from such resources cannot sustain privatisation.

9. Role of the State

Thus, commercialisation leading to the integration of the local communities to regional, national and even global markets will lead to changes in the form of the property regime. Instead of voluntary co-operation, there will be a shift to formal structures. This shift will increase the role of the State in the sphere of resource management.

According to sociologists, as a result of modernisation and globalisation, society will undergo a process of *detraditionalisation* (Heelas et al, 1996). This occurs as follows.

Traditional societies are founded on belief in established, timeless order. Such orders, rooted in the past, and legitimated by such association, are highly authoritative. This means that these norms, conventions, beliefs, practices cannot be questioned, modified, or revised in the light of any utilitarian or rational exercise. The individual, therefore, has no scope and incentive to exercise autonomy. Further, given that thought is directed in terms of others, the order is basically communal and encourages co-operation and other socio-centric activities.

But, over time, social and economic processes will undermine the sacred or authoritative properties of cultural narratives. Technological changes, opening up of the society through linkages with distant (regional or global) markets, greater mobility of individuals – these processes will introduce diversity within the previously unified cultural realms. And, as culture acquires a fragmented, variegated and pluralistic nature, conceptions of what is sacred will loose credibility. People will acquire the opportunity to stand back, critically examine, and loose faith in the traditional order of beliefs and way of life. The balance of authority will shift from the society (or community) to the individual. Individualistic exercises - rational, or utilitarian - will become the driving force behind action.

These changes may pose challenges to the socio-cultural legitimacy of the resource management authority. We propose that the State will have a role to play in the new order of things. The informal CPR regimes of traditional communities draw their strength and legitimacy from belief in the traditional socio-centric forces. But, with the increase in importance of individual optimisation exercises, this belief in the inviolate

nature of the tradition will be challenged. The loss in social authority will have to be compensated by the granting of political legitimacy. We propose that, in the future, the concept of co-operative management will have to become increasingly relevant in the management of local natural resources. The State should delegate its powers through a process of political decentralisation to resource users and resource management institutions.

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Figure 1: Stages of Creation of CPRs In Response to Resource Degradation

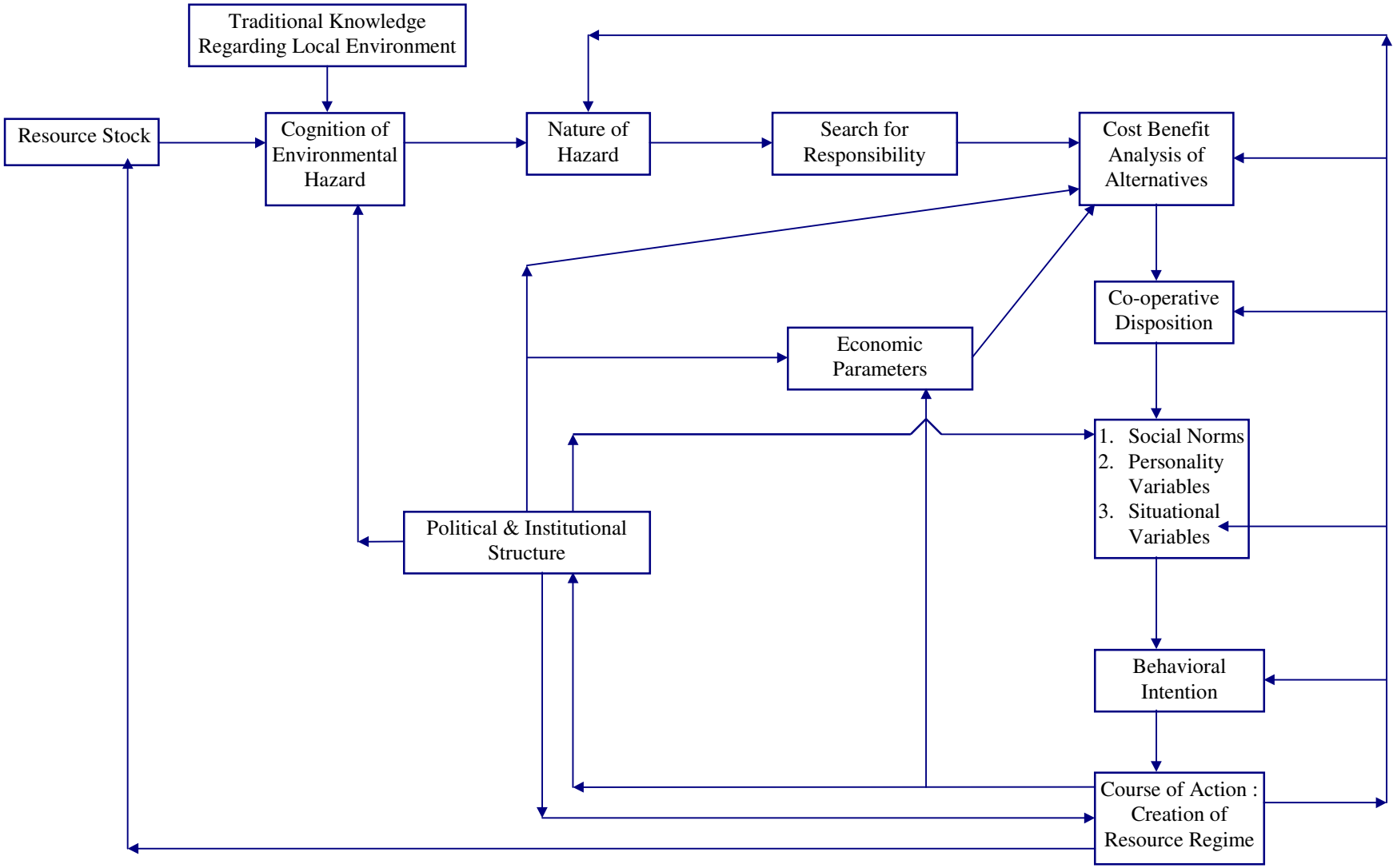
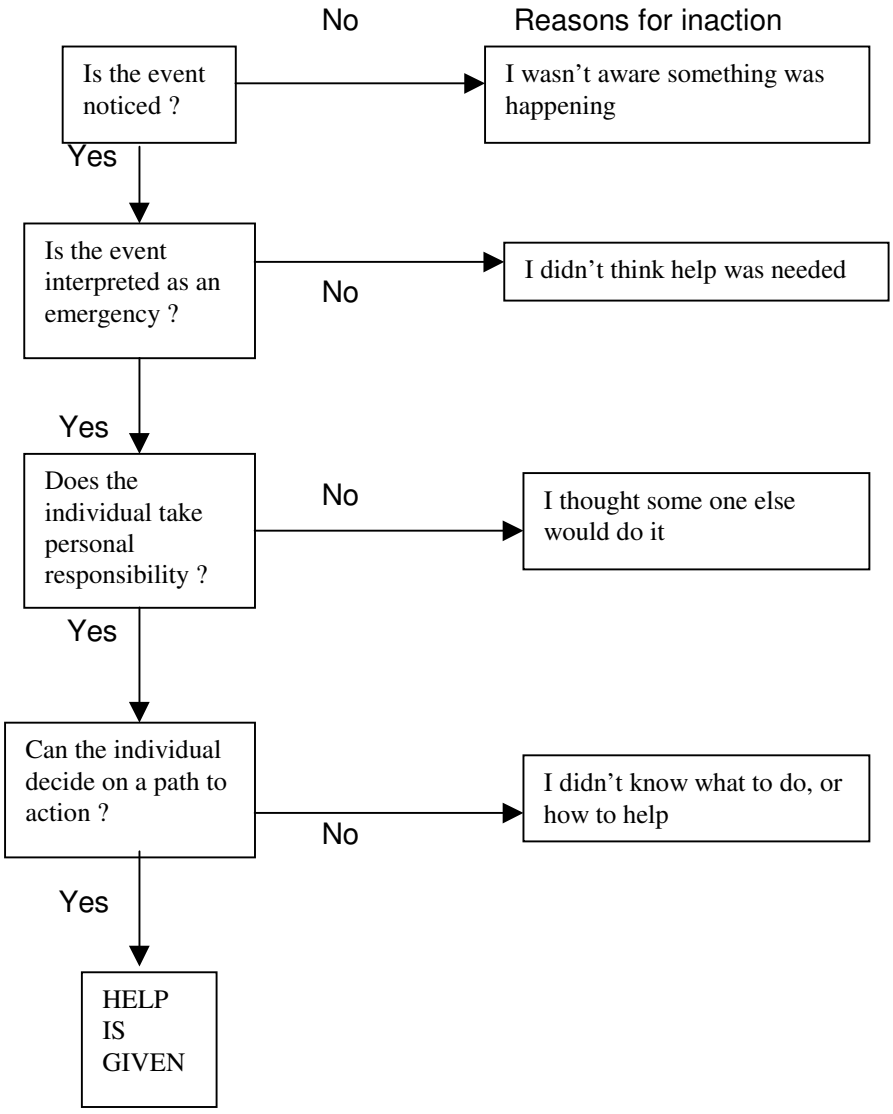


Figure 2: Darley-Latane Scheme of Helping Behaviour



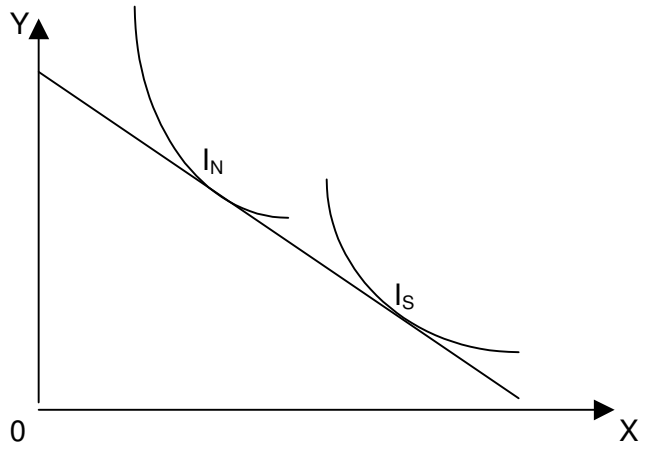
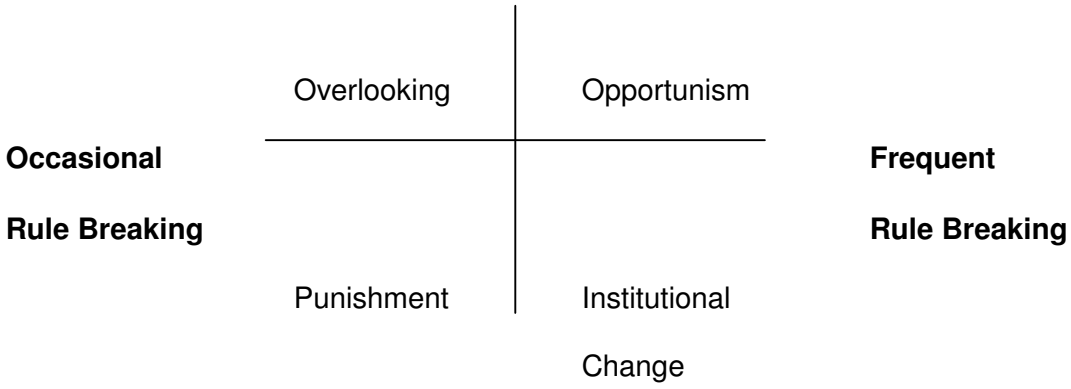


Figure 3: Internal Norms and Optimization

Defensive Reactions



Offensive Reactions

Figure 4: Reactions to Rule Breaking