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'Hidden Failure' of 'Successful Institutions': The Case of Community Management of Common Pool Resources (CPRs).

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Abstract:

Elinor Ostrom, who is the co-recipient of the Nobel Prize in economics in 2009, has made seminal contributions to the literature on management of common pool resources (CPRs). Contrary to the neoclassical assumption that the free-riding behavior of the selfish maximizing individuals leading to under-provision of CPRs, Ostrom empirically demonstrated that communities themselves devise institutions in order to bring in collective action to 'successfully' manage the CPRs on a sustainable, efficient and equitable manner. In this article, we argue that there is a 'hidden failure' even in those cases where the community management is claimed to be 'successful' within Ostrom's framework.

Key Words: Institutions, common pool resources, community management, externalities, free-riding behavior.

Introduction:

Elinor Ostrom, who shared this year's *The Sveriges Riksbang Prize in Economic Sciences in Memory of Alfred Nobel* (popularly known as Nobel Prize in Economics) with Oliver Williamson, made a notable contribution to the literature on management of 'common pool resources' (CPRs). To a vibrant debate on which form of institution is more efficient in managing the CPRs that enhance sustained wellbeing of a large number of resource dependent communities, Ostrom (1994), by using empirical evidences around the world, demonstrated that

in many cases it is *neither* the government *nor* the market but the *institutions* devised by the communities themselves play a catalytic role in bringing collective action among the members to promote efficient, equitable and sustainable CPR management (Ostrom, 2010; Ostrom, 1990; see also, Bandyopadhyay *et al*. 2009). Following the work of Ostrom, a substantial amount of literature that critically evaluates the collective action and CPR management has already emerged in the academic and policy arena (see Araral, 2009; Agrawal and Chhatre, 2006; Wade, 1988); a section of the existing literature deals largely with a particular research question namely, under what circumstances the collective action emerges to manage the CPRs 'successfully' (see Mainzen-Dick et al. 2002). A narrow econometric approach to answer this question is to take the 'discrete' outcome –i.e. the probability of an outcome (such as, cooperation) becoming either 'success' or 'failure'- and to analyse the extent to which certain observable, confounding factors influence that outcome (see Naidu, 2009). But the problem with this part of the literature is that it does not critically evaluate how 'successful' the community management is, in terms of maximizing larger social benefits. In this article, we are trying to analyse this issue.

Community Management and Positive Externalities:

The issue in economics of CPR management is fundamentally a 'behavioral issue'. The neoclassical assumption is that the groups managing the CPRs consist of selfish maximizing individuals and the 'free-riding' behavior of these individuals is predicted to usually result in under-provision of these CPRs (Olson, 1965). In a prisoners' dilemma set-up, each rational individual will have no incentive to contribute a positive sum towards managing the CPR since they believe that his or her contribution to the common pool does not make a larger difference in the overall contribution. When faced with a discrete choice of either 'to contribute' or 'not to contribute', the rational individuals are expected to choose 'not to contribute' even if the individual benefit derived by contributing is greater than that of not contributing. Hence, 'shirking' becomes a dominant strategy in the absence of institutions to curtail such a behavior. Unless the selfish motive of the rational individuals is contained through institutional arrangements, the users committing self-destruction either through over-use or through destruction of the CPRs by an act of under-provisioning becomes inevitable (Hardin, 1967). Moreover, if the behavior is myopic –reflected usually in terms of the individuals' high rate of

discount on resource consumption –the self-destruction is expected to set-in faster than the one that may occur in the normal course of action.

It is assumed that *ceteris paribus,* the free-riding behavior in the context of CPRs becomes a over-riding phenomenon under the centralized (usually, the government) management regime. Under such a regime, the transaction cost of not only carrying out the free-riding behavior but also transmitting such a behavior over a time period is negligible to the free-riders because of a low probability of getting caught or punished for such a behavior; the net benefits associated with this behavior are also higher compared to an alternative management regime where such a behavior is restricted. On the other hand, monitoring and punishing the free-riders becomes a costly affair for the centralised authority. Though the free-riding behavior is absent under the private property regime, privatization of CPRs as a solution for this problem is less practicable because of issues such as, 'indivisible' nature of these CPRs. Since the government intervention as well as the market solution is either inefficient or infeasible, Ostrom (1998) suggests that informal institutions such as norms, rules and habits that are embedded in the communities provide incentives for suppressing the free-riding behavior and bring in cooperative behavior among the members in order to generate desirable outcomes. Many CPRs including irrigation water, forests, fisheries and grazing lands are cited as examples of how they are being collectively managed successfully by the communities (Ostrom, 2000). However, the word 'successful' requires a critical evaluation.

Ostrom (2000) admits that though successful in many cases of CRPs, there are cases where the community failure has also been observed. As we have already pointed out, a substantial amount of literature has been devoted to probing into the causes for success and failure of the community management. However, there exists a scarcity of studies that critically evaluate how successful the communities are in terms of maximizing the social benefits falling outside their purview. In other words, the communities that are successful in terms of brining collective action to maximize their private benefits may in certain cases fail to maximise the social benefits occurring to the users outside the community. To understand the above issue in a proper context, let us look at the economic benefits that could be potentially generated by a community managed watershed. The total benefits generated by a watershed can be broadly classified into: *direct use values* (e.g. increased availability of irrigation water, fodder and fuel

wood) and *indirect use values* (e.g. downstream benefits such as reduced soil erosion, increased groundwater recharge and improved water quality). While the former can be utilised by the immediate community/users within the watershed area, the latter can be realized by users located several miles downstream of it. It should be noted that the nature and scale of the watershed determine the size (or the value) and the composition of these two benefits; in certain cases, the direct benefits may constitute a major portion of the total benefits and in certain other cases, the indirect benefits may feature in a larger way. The benefit-side of the watershed suggests that Ostrom's prescription of the community management is applicable only to a limited number of CPRs with the following characteristics: a) when the size of the 'direct benefits' constituting a major part of the total benefits; b) when the volume of the indirect benefits as well as the number of users of these benefits is negligible; c) when the indirect users can be easily identified to be either included or excluded from the resource use, and the transaction cost of doing it being negligible; and d) when implementing the rules and sanctions on the indirect users does not have any future negative consequences on the resource base and does not impose substantial amount of transaction costs to the rule-implementing community. All the above imply that the community management of the watershed, even if it is successful in terms of direct use benefits, will not be 'socially efficient' if: the indirect benefits constitute a larger total benefits; the proportion of users of the indirect benefits (non-participants in decision-making) is substantially greater than that of direct beneficiaries (decision-makers); the management institutions are designed mainly around the direct benefits ignoring how these institutions affect the indirect benefits downstream; inclusion of users of indirect benefits in the decision-making is prohibitively costly; and size of the resource base required for generating indirect benefits is larger than the actual size being managed by the upstream community.

It should be noted that Ostrom (2000) defines CPRs based on 'non-excludability' (i.e. excluding a free-rider is highly costly) and 'subtractability' (i.e. consumption of a service by one person adversely affecting the consumption of the same service by another person). If these two conditions hold, then the CPRs become vulnerable for over-use. However, Ostrom demonstrated that the communities managing the resource base have devised cost-effective institutions –such as, norms, rules and sanctions- either to exclude the free-riders or to bring cooperation among the members, thereby avoiding the subtraction of the resource base (Ostrom, 2000). But there exists a number of CPRs (like the watershed above) where the excludability criterion is applicable only

to the 'identifiable users' of mainly the direct benefits; this does not consider the 'actual users' of the indirect benefits downstream who continue to enjoy the latter benefits but do not virtually participate in decisionmaking. The latter category users may not necessarily be the new entrants (so that they could be excluded by using certain rules or sanctions) but they might have been already using the services of the resource base (or, the positive externalities) along with the upstream users –the community- of the direct benefits. These indirect users, in most cases, do not 'voluntarily' contribute towards the cost of managing the resource-base upstream but may bear the cost of negative externality imposed by the upstream users. The downstream users are put in a greater disadvantage when major decisions by the upstream community ignores the indirect benefits that fall outside its own well-defined physical boundary. Here, the non-excludability of downstream users is still obvious which causes the disadvantages. As Ostrom (2000) puts it: 'Groups of individuals are considered to share communal property rights when they have formed an organization that exercises at least the collective choice rights of management and exclusion in relationship to some defined resource system and the resource units produced by that system' (p. 342). So, the community is concerned only about the 'defined resource system' and not the entire resource use system that also includes the indirect benefits falling outside its property rights domain. If Coasian bargaining between the upstream and downstream communities is possible, then one can expect a Pareto optimal outcome. However, if the Coasian bargaining is constrained by asymmetric information, high level of transaction cost and intense conflict between the users, then status-quo would become the feasible outcome. Therefore, the crux of the problem is that if the decision-making community or the group of direct users acts as a 'selfish maximizing rational individual', the social outcome becomes sub-optimal. This is reflected from Ostrom's (2000) statement that

> ……whether it is difficult or costly to develop physical or institutional means to exclude non-beneficiaries *depends both on the availability and cost of technical and institutional solutions to the expected benefits of achieving exclusion from a particular resource'* (p. 343, emphasis added).

If the decision to exclude or include others is a rational decision based on the private benefits and costs affecting the decision making community, then, by analogy, the decision to manage the 'size' of the resource base should also be based on the associated benefits and costs.

If the costs of managing the resource base for the upstream community are greater than their expected benefits, one can expect the community to adopt 'shirking' as a dominant strategy which will lead to reduce the size of the resource base up to that level where its marginal costs are equivalent to the marginal benefits. Since the marginal benefits of the community includes only the expected value of the direct benefits alone, the optimum size of the resource managed will be smaller than the social optimum that includes the indirect benefits as well. Let us explain this diagramatcially.

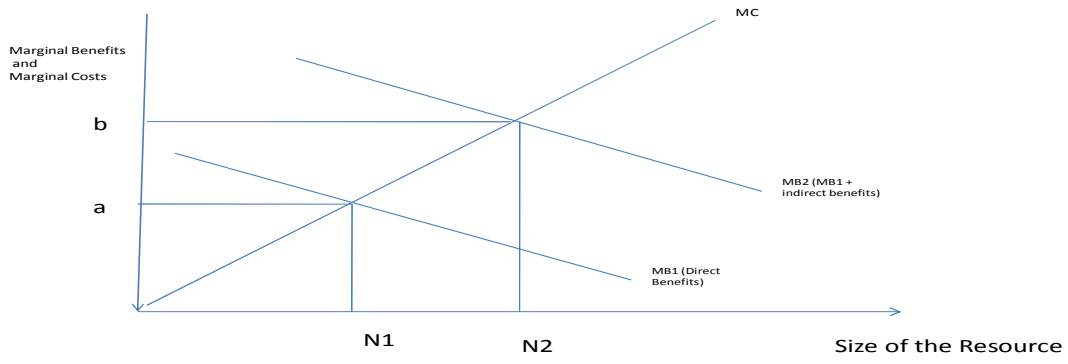

Diagram -1: Benefits and costs of managing the resource base at different levels

In the above diagram, N1 refers to the optimum level of resource base being managed on the basis of marginal benefits and marginal costs when the direct benefits and direct costs alone are taken into account. But moving from N1 to N2 shifts the marginal benefit curve (MB2) to the right suggesting that more efficiency can be achieved by expanding the size of the resource base. This is because the size of the indirect benefits are positively correlated with the size of the resource base (e.g. moving from N1 to N2 shifts the MB curve to the right); however, increasing the size of the resource base also increases the community's marginal cost above its marginal (direct) benefits (i.e. the community has to bear a marginal cost equivalent to the difference between 'a' and 'b' on the Y axis if it expands the resource base from N1 to N2). This implies that though there is a potential improvement in the social welfare due to increased size of the

resource base, there is a disincentive for the 'rational, maximizing' community to do so. Even if the resource base starts at N2 level initially, the community will reduce the size of the resource to N1 because, that is where it could manage the resource base economically successfully. In other words, from the community's point of view (as well as from the researchers' point of view) the resource managed at N1 is efficient but from the society's point of view, N1 is still sub-optimum.

The 'size of the community', the size of the resource base and the size of the benefits generated are positively corrleated, any reduction in the community's size is expected to reduce the size of the indirect benefits. The community's decision to manage the resource base is mediated by both exogenous as well as endogenous factors. Sanctions are one form of institutional rule imposed on the non-cooperative individuals, in order to bring collective action. But sanctions will lead to counter-productive outcomes if the free-rider finds her private benefits from cooperation to be lesser than that of from non-cooperation and has the power of altering the optimum size of the community, adversely. For example, if the community consists of sub-groups that are heterogeneous in nature (caste groups in India, for example), sanction imposed on a member of one sub-group may induce this sub-group to adopt non-cooperative behavior. Similarly, the opportunity cost of resource management may increase over a period of time for certain members of the community due to the influence of exogenous factors such as, better employment opportunities in urban sectors. These factors would increase the marginal cost of management for the remaining members of the community who may reduce their cost by shrinking the size of the resource base. So, the dynamic interaction between the size of the community, endogenous and exogenous factors influencing the behavior of the individual members, size of the resource base and the associated costs and benefits has a direct bearing on the welfare of the users of indirect benefits. In other words, the above dynamism creates an imbalance between the community equilibrium and the social equilibrium –the former being smaller in magnitude than the latter.

Empirical Studies:

To our knowledge, empirical attempts to estimate the trade-off between upstream and downstream benefits under a 'successful CPR regime' are limited. However, there are studies which implicitly provide empirical support to our theoretical argument that if the upstream community behaves in a rational manner, it would alter the welfare of the downstream users

either positively or negatively. Pattanayak (2004), for example, studied change in the tropical forest watersheds and the resulting impact on the base-flow which in turn affected the drinking water availability in the downstream areas. He used Ruteng park watershed in Indonesia as a case study. Utilising the cross-sectional variation of base-flow across different sub-watersheds to study its impact on opportunity cost of water collection at the household level, the author found that increase in the forest cover leads to increase the base-flow, enhancing drinking water availability in the 47 villages downstream of the park. It was estimated that a 100 mm increase in the base-flow (i.e. 10 percent increase in the current level) would result in reducing household water collection cost by 30 Indonesian Rupiahs, on an average. An earlier study by Pattanayak and Kramer (2001) in the same region established that increased base flow due to forest protection increased the agricultural benefits, through enhanced drought mitigation service. A recent study in the Western Ghats region of Karnataka, India by Lele *et al*. (2009) categorically established that regeneration of forest cover in the upstream areas of the Western Ghats resulted in reducing the stream-flow which in turn reduced the agricultural output in the downstream villages. Similar results are observed in watersheds areas in semi-arid regions, including those watersheds managed by the communities. Hope (2007) reported that the watershed programme implemented in the dry areas of Madhya Pradesh state in India resulted in significant reduction in the domestic water collection time, though it did not do better in terms of increasing the agricultural income of the farmers significantly. The findings of this study imply that if the major objective of managing the watersheds to increase the agricultural productivity and if that objective is not being met with, then there is a possibility that communities would give up managing these watersheds, which would affect the other benefits such as, drinking water availability for different users. Shiferaw *et al* (2008) conducted a study in 12 villages in four semi-arid districts of Andhra Pradesh, where watershed programmes have been implemented to recharge the groundwater and found that these programmes redistributed the benefits and costs unevenly across different stakeholders due to depletion of groundwater, caused by unregulated use in the watershed areas. They argued that '…..unless households and communities make sufficient investments in groundwater recharging systems and adopt regulating mechanisms, the remaining aquifers are likely to be depleted in the near future' (p.332).

These empirical studies above suggest that: a) any change in the forests or watersheds will lead to change in the indirect benefits generated by these resources (Lele and

Venkatachalam, 2006). In certain cases, increased resource base leads to increase the quantum of environmental benefits and in certain other cases, the quantum of benefits declines. But this has larger implications on the community management and collective action. If the community reduces the size of the resource base when the level of resource and the volume of indirect benefits are positively correlated, then there will be loss of welfare to the users somewhere else; if the relationship between resource base and the quantum of indirect benefits is negative, then community's effort to increase the resource base would also lead to reduce the social welfare; and b) in many cases, the 'required collective' action to maximize the total benefits has not emerged at all. Moreover, if the upstream community has a greater comparative advantage to change the resource base under its management, it can deliberately impose welfare loss on the downstream communities in order to retain or maximize their own benefits. A study by Xiaogang (2001) highlights this issue. Concentrated logging by communities living in the upstream areas in the Lashi watershed region in Lijiong, China, adversely affected the quality of water supplied to the downstream town of Lijiang. When government intervened to prevent logging activities, the communities managed to maintain their benefits by way of using practices that are more harmful to the downstream users. For example, when the logging was banned, the upstream community started cutting the trees in the form of fuel-wood. Since the fuel-wood fetched low revenue than logging, people started cutting more trees to compensate the income loss, resulting in more damage downstream. In another incident in the same region, the upstream communities indulged in clearing more forest lands in their region so that increased flooding can damage the downstream villagers in order to bring in a halt on the illegal logging in their region, carried out by the downstream villagers. In another reciprocal act, the upstream community deliberately cut the water supply to the downstream villagers who carried out illegal logging upstream. This is a clear-cut evidence of how community's reciprocal behavior would curtail the opportunistic behavior of the opponents; but at the same time, these examples also tell us how the rational communities can behave opportunistically in such a way that it can impose larger amount of social cost on other users in order to maintain or increase their own private benefits.

Conclusions:

It should be noted that the CPR management becomes a 'real success' only when there is adequate incentive for maximizing the joint production of both the direct as well as the indirect

benefits by the decision-making communities. This is also evident from the case studies cited in Ostrom (2000). For example, the Swiss peasants divided the common land on the plains into private property but maintained the upstream land in the Alpine hillside as 'common property'. This may be due to the fact that they are fully aware that dividing the hillside land into small parcels would lead to reduce the flow of benefits on their private land downstream. Since they know that managing two different lands with different property rights system maximize their overall benefits, their decision is a socially optimal decision. The managers as well as the beneficiaries are the same and therefore, they know how to optimize between land under different property rights system. Rather, if the mangers of the upstream common land are different from the beneficiaries of the private land in the plains then imbalance in the incidence of benefits across the agents would have been the net outcome. Our analysis suggests that community-based institutions need to be complemented with other types of incentive-based institutions so that the social benefit of CPR management can be maximized in future.

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