

Critical necessity of local monitoring and enforcement for sustainable governance of forests

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1. Introduction

There have been numerous attempts by researchers and practitioners to identify factors that determine the sustainability of forests in general and community-based approaches in particular. Indeed, a large number of variables are suggested in literature that may potentially determine the success or failure of forest governance. For instance, a review of large body of earlier research identified 33 critical enabling factors for sustainability of the commons resources (Agrawal, 2001). Another meta-analysis of 31 articles on community forestry, encompassing 69 case studies worldwide identified 43 independent variables that influence the success or failure of community forestry (Pagdee *et al.*, 2006). Likewise, integrating the scientific knowledge as well as experiential understanding of more than 500 practitioners in the field has distilled 6 factors that determine the success of joint forest management in India (Table 1; Pandey, 2007). Indeed, there are many other context-specific recent studies that identify factors responsible for successful resource management outcomes (Wade, 1988; Ostrom, 1990; Baland and Platteau, 1996; Dietz, *et al.* 2003; Agrawal and Chhatre, 2006; Nagendra, 2007; Ostrom, 2007). Notwithstanding these efforts, success in finding critical drivers has remained elusive. There is now a great urgency to identify the institutional mechanisms that are most likely to succeed in management of multifunctional forests in an era of growing anthropogenic stresses and climate change (Pandey, 2002).

The search for leading success factors is often hampered, because field-based data collection, using uniform methods across continents and countries (i.e. large-N studies based on a large number of sample sites) have been difficult to design and implement. While good science on its own is no guarantee for better implementation, production

of knowledge from large-N studies is necessary to improve the policy and practice in the field. A research network called International Forestry Resources and Institutions (IFRI) is attempting to precisely resolve this issue. IFRI is a unique field-based research network that has accumulated sufficiently comparable data to support large-N analyses related to collective action in natural resource management (Poteete and Ostrom, 2008). The Nobel Prize for 2009 in Economic Sciences has been awarded to Elinor Ostrom who made major contributions to our understanding of the governance of forests and common pool resources. Ostrom has spent considerable amount of time and efforts with IFRI programme that produced some of the most useful research relevant to practitioners of natural resource management in the field.

Drawing chiefly on the recent IFRI work this brief review provides justification for instituting local monitoring and enforcement systems in the field for sustainable governance of India's forests. The review aims to identify lessons for consolidation of joint forest management as tool for sustaining the forests and improving livelihoods of people.

2. Reasons for focus on community-based management systems

There are three motivations for our focus on the community-based management systems. First, influenced by the seminal paper by Hardin (1968) titled as "The Tragedy of the Commons", accepted theory has assumed that forest users will never self-organize to maintain their resources and that the common property, such as forests, should either be privatized or governments must impose control. Elinor Ostrom (1990) challenged this conventional wisdom that common property governance necessarily implies a "tragedy". A third solution—rather than privatization or government control—she argued, is to facilitate the users create their own system of governance. Drawing on a large body of available evidence on the management of common pool resources, Ostrom (1990) found that local users themselves can indeed design rules and enforcement mechanisms that enable them to sustain resources. Since then, experiential knowledge as well as research in multiple disciplines, have again and again confirmed that "the tragedy of the commons" is not inevitable (Ostrom, 1999a&b; Ostrom, *et al.* 1999; Ostrom, 2009). No single ownership— government, private, or community— uniformly succeeds or fails to prevent forest degradation. As shown for forests across several countries, some

government policies accelerate resource destruction, whereas some resource users have invested their time and efforts to achieve sustainability (Dietz *et al.*, 2003).

Our second reason for concentrating on community-based management systems in this review is that while community-based management is one of the approaches to forest governance (Dietz *et al.*, 2003; Agrawal *et al.*, 2008), evidence is now mounting that local monitoring and enforcement by community-based institutions can potentially halt deforestation and bring forest transition (Nagendra and Gokhale, 2008). When management is initiated and owned locally, communities have demonstrated their capacity for putting effective and adaptive forest management practices in place to address future forest governance (Ostrom and Nagendra, 2006; Pandey, 1993 & 2003). Effective implementation of community-based forest management also offers potentially significant livelihoods outcomes. Indeed, institutional arrangements to govern forests that incorporate local knowledge and decentralized decision making substantially influence carbon storage and livelihood contributions (Chhatre and Agrawal, 2009). For example, a recent study (Milne *et al.*, 2006) estimated that for the area presently under JFM alone in India, total forest income from commercial timber, bamboo and non-timber products on improved forests could rise from an estimated US\$222 million in 2004 to approximately US\$2 billion per annum in 2020. These potentials could only be realized if effective systems of forest governance in India are implemented.

Our third motivation for explicitly focusing on the community-based management systems is the factor of cost-effectiveness. For instance, state forests in Central Himalaya cost at least 7 times as much per hectare to administer as do village council-managed forests with similar outcomes (Somanathan *et al.*, 2009). While, this particular conclusion for Himalaya has been questioned by the forest managers, in general practitioners acknowledge that community-management systems including JFM are indeed more cost-effective than government-managed systems. Thus, local management is more cost-effective than state management, and therefore worth promoting.

3. Evidence for critical necessity of local monitoring and enforcement

While a large number of different causal mechanisms including local monitoring and adaptations may potentially influence the management outcome in the field (Pandey,

1996), local monitoring and enforcement of locally-made rules is now emerging as one of the most important determinants of sustainable governance of forests and protected areas (Gibson *et al.*, 2005; Hilborn *et al.*, 2006).

The pioneering study by researchers at IFRI (Gibson *et al.*, 2005) demonstrated that fundamental necessity of just one factor—enforcement—is so critical for the better outcome of natural resource management that other factors (such as high level of social capital, presence of formal organization, and peoples' degree of dependence on forest products) seem either less important, or rather these factors may simply influence the outcome via their positive effect on monitoring and consequent improvement of interventions on the ground. The study showed that it is highly unlikely for forest condition to be good if there is no monitoring and rule enforcement regardless of whether social capital of stakeholders is high or low. Likewise, better forest outcome is also associated with rule enforcement (i.e. adaptations based on the insights through local monitoring) regardless of the degree of formal organization of the stakeholders. And finally, better monitoring and local rule enforcement is also significantly associated with better forest condition, regardless of whether or not a group's dependence on the forests is light or heavy.

Advancing the research on local enforcement, recent work (Chhatre and Agrawal, 2008) used a sample of 152 cases from 9 countries, including India, to study the relationship of enforcement with changes in the condition of forests. The analysis examined local enforcement in conjunction with four other factors that are supposed to be central to the sustainable governance of forests: size of forests, collective action around forests, user group size, and dependence on forests. The analysis also explores how local enforcement moderates the impact of these four factors.

This new research shows that forests with a higher probability of regeneration are likely to be small to medium in size with low levels of subsistence dependence, low commercial value, high levels of local enforcement, and strong collective action for improving the quality of the forest. Larger forests in the sample with high subsistence dependence, low enforcement, and high commercial value have a higher probability of having degraded. While the influence of individual factors—group size, patch size, collective action, subsistence dependence, and commercial value—is as predicted, Chhatre and Agrawal (2008) demonstrate the significant role played by the level of

enforcement in moderating the influence of these factors on changes in the condition of forests.

In terms of local enforcement, collective action, and changes in forest condition, Chhatre and Agrawal (2008) find that probability of degradation of a forest declines with increases in the level of local enforcement, and, as expected, the probability of regeneration increases with levels of enforcement. Controlling for other factors, forests with high levels of enforcement are far more likely to have regenerated compared to those with no enforcement even for large sized forests. Forests where local communities have undertaken collective action related to improvement activities (planting of saplings and weeding and hoeing) are more likely to have regenerated. But more importantly, as the study shows, “such forests respond better to increasing levels of enforcement, so that a forest with improvement activities has a more than 50% probability of regeneration at a medium level of enforcement, compared to a 25% probability for regeneration for forests without any improvement activities but the same level of enforcement” (Chhatre and Agrawal, 2008). Likewise, change in level of enforcement has a similar effect on the relationship between change in forest condition and improvement activities, i.e. higher the levels of enforcement more the probability of forest regeneration and lesser the probability of degradation.

In terms of local enforcement, forest use/dependence, and changes in forest condition, the study demonstrates that the number of people using a forest for subsistence has almost no relationship with the probability of degradation. Instead, they find that the probability of degradation increases—and probability of regeneration decreases—with increasing proportion of firewood needs supplied from a forest. But, this relationship changes when enforcement comes into picture: “Forests that supply higher levels of firewood and also have high levels of enforcement have a more than 60% probability of regeneration, compared to less than 20% for forests with similar firewood dependence but no local enforcement” (Chhatre and Agrawal, 2008).

In an era of global climate change forests are required to be managed in such a way that they play a multifunctional role such as contributions to mitigation of climate change through carbon storage and livelihoods improvement of forest-dependent people (Pandey, 2002). In this connection, data derived from 80 forests in 10 countries across Asia, Africa, and Latin America collected using IFRI methods

demonstrate that that increasing forest size and greater local autonomy in making appropriate rules to match resource characteristics result in a win–win relationship with carbon storage and livelihood benefits from forest commons (Chhatre and Agrawal, 2009). Thus, local monitoring and enforcement of rules are crucial, but it is essential to emphasize here that autonomy of rule-making at the local level (and not the government-imposed rules) is a key predictor of both better forests as well as better availability of goods and services to support the livelihoods of local people.

These crucial investigations, reviewed above, emanating from IFRI are of exceptional importance in the domain of sustainability science. These studies not only examine the importance of enforcement in combination with a large number of other causal factors, they also draw on field data on local forestry initiatives from multiple countries, including India. To our knowledge these are the most comprehensive and significant scientific works that provides insights on collective action with practical implications for sustainability of forests.

4. Why some villages have rules that are well-enforced?

As discussed here, the existence of monitoring of resource use and local enforcement of locally-made rules has a strong correlation with improved forest condition. But this also begs the question: why some forests have rules that are well enforced, and others do not? Two recent studies have attempted to break new grounds in this direction. One of the studies examined the role of informal and formal institutions in monitoring and sanctioning. Results of the study (Coleman and Steed, 2009) using data from 100 forests in 14 countries collected by IFRI show that when local user groups are given the right to harvest from the forest, they are more likely to engage in local monitoring and sanctioning. The other study, based on the IFRI data from 12 countries representing 173 distinct forests and 230 distinct user groups, suggests that user groups that are formally organized, that have users that are involved in making rules, and that engage in monitoring and sanctioning outside of the forest are more likely to engage in rule-enforcement (Fleischman, 2009). Recent studies on JFM demonstrate the beneficial impact of women's presence in village organization on conservation outcomes, mainly attributable to women's contributions in designing the stricter rules as well as improved rule compliance (Agarwal, 2009).

5. Linking knowledge to action

Tropical forests are vital for social, economic, and ecological reasons. Connecting science to decision making is fundamental to sustainability of forests, and livelihoods of people dependent on these ecosystems. As discussed here IFRI research clearly shows that even when a number of other factors are taken into account, higher levels of local enforcement can result in improved regeneration and reduced possibility of forest degradation across a variety of ecological, economic and social contexts. This understanding has immediate practical utility in the field (see table 1).

Table 1: Experiential knowledge on factors that make JFM successful and their relationship with local enforcement

No.	Key factors that determine the success of JFM (practitioners' perspective)	How key success factors relate to local monitoring and local enforcement?
1.	Institutions (I)	Locally evolved institutional arrangements (norms, rules and regulations which are locally made and enforced) are major factors that contribute to functioning of JFM. Good leadership and layered institutions are capable of local rule making, local monitoring and local enforcement.
2.	Interactions (I)	Social capital, social networks, peer-to-peer learning and local interactions of stakeholders (and, how the decision taken in these interactions are followed / ways in which promises are kept or broken, or conflicts are resolved) contribute to design and implement local monitoring and local enforcement.
3.	Monitoring and adaptation (MA)	Local monitoring is a powerful tool for management of ignorance among stakeholders and managers. Participatory monitoring helps generate locally-relevant data, information and knowledge, and adaptive actions by stakeholders ensure the use of knowledge for solid actions on the ground. These adaptive actions directly contribute to enforcement.
4.	Local rule making and local enforcement (LE)	As opposed to exogenous rule making and enforcement by external agencies, local rule making and local enforcement is the key driver for success. Key indicators of existence of local enforcement are continuous learning about the social—ecological systems, rule compliance, patrolling, guarding against unauthorized use, fines and sanctions in dealing with offenders.
5.	Livelihoods improvement (LI)	Livelihoods improvement through JFM is possible through four ways—employment, village development, sharing of goods, and sharing of service payments. Payments for environmental services (ecotourism, watershed protection, carbon sequestration, biodiversity conservation) provide new avenue for livelihoods improvement. All these contributions are realized when managers design and implement effective local monitoring and enforcement on the ground.
6.	Generating and linking knowledge to action (KA)	Linking knowledge to action and enforcement of rules is necessary so that the creative ideas result in solid innovations. Different components such as availability of resources to link knowledge to action, easy access to knowledge, a habit of evidence-based decision making, co-production and co-synthesis of problem-based knowledge, integration of knowledge systems work only if there is a mechanism for local monitoring and local enforcement.

The most important implications for practice are that in order to ensure the sustainability of forests through community-based management we must design and implement local enforcement mechanisms in the field. In the context of joint forest management, for example, village forest management and protection committees that have a local rule-making, local monitoring and local enforcement are more likely to succeed in their efforts directed towards better forests and improved livelihoods.

Joint Forest Management in India, as the largest community forestry initiative globally, embraces the philosophy of sustaining the forests and improving the livelihoods. Accordingly, Forest Department makes strong claims about the contribution of JFM to both improvement of forests as well as livelihoods of people. These claims and the stated objectives of JFM notwithstanding, evidence in favour of the impact of JFM on livelihoods improvement and betterment of forests remains contested, and the outcome remains mixed. There is, thus, an urgent need for the establishment of credible local monitoring, local rule-making and local enforcement systems in every village-level JFM organization to facilitate local learning and adaptation.

In conclusion, we are now at a juncture when enough scientific evidence is available to persuade practitioners to craft robust systems of monitoring and enforcement in community-based forest management systems. Practitioners themselves have argued earlier that given the stakes and complexity involved, the crux of the sustainability of JFM is the proper monitoring and adaptation (Ghose, 1996; Pandey, 1996). As demonstrated here, these sentiments have been reinforced through new and accumulating empirical evidence for giving the desired thrust for *local monitoring* to generate context-specific knowledge, and *local enforcement* to link that knowledge to action in the field.

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Summary

A large number of variables may potentially determine the success or failure of sustainable governance of forests, yet the success in finding the necessary condition has remained elusive. Recently, the Nobel Prize for 2009 in Economic Sciences has been awarded to Elinor Ostrom who made major contributions to our understanding of the governance of forests and common pool resources. Ostrom has spent considerable amount of time and efforts with the International Forestry Resources and Institutions programme that produced some of the most useful research relevant to practitioners of natural resource management. This paper reviews the recent research that clearly demonstrates that even when a number of other factors are taken into account, higher levels of local monitoring and enforcement of locally-made rules can result in improved regeneration and lower the possibility of forest degradation across a variety of ecological, economic and social contexts. This understanding has immediate practical utility for joint forest management in India.

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