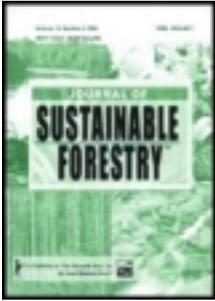


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### Can Environmental Services Payments Sustain Collaborative Forest Management?

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# Can Environmental Services Payments Sustain Collaborative Forest Management?

Jagannadha Matta  
John Kerr

**ABSTRACT.** Collaborative forest management (CFM), where local communities and government agencies collectively manage forests, is anchored on the premise that the communities can protect and manage forests if their efforts in undertaking these tasks are compensated with resultant forest produce such as fuel, fodder, timber, and non-timber forest products. In marginally productive forests under such management, however, these benefits are meager. As a result, villagers' interest in CFM is short-lived. Although improved forest protection and ecological restoration are recognized as potentially delivering environmental services, there is little effort to assess them and little discussion on compensating local communities for rendering them. This paper documents the limited scope for on-site benefits to support CFM and explores opportunities for revitalizing it through a focus on payments for environmental services (PES). It concludes with the observation that PES is a promising alternative in view of its direct and performance-based payment approach. doi:10.1300/J091v23n02\_04 [Article copies available for a fee from The Haworth Document Delivery Service: 1-800-HAWORTH. E-mail address: <docdelivery@haworthpress.com> Website: <<http://www.HaworthPress.com>> © 2006 by The Haworth Press, Inc. All rights reserved.]

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### *INTRODUCTION*

With the growing recognition of decentralized governance as a major natural resource management strategy, community groups to manage common pool resources such as fish, forests, watersheds, and wildlife, are increasingly being established the world over (Pretty, 2003). In particular, the thrust for local people's participation in forest management has resulted in the emergence of various collaborative forest management (CFM) strategies such as Joint Forest Management (JFM) in India (Kumar, 2002), Community-based Forest Management (CBFM) in Nepal (Kellert et al., 2000), and Co-management in Canada (Beckley, 1998). Especially in developing countries, where forest resource degradation has a significant impact on rural livelihoods, local communities are encouraged to actively participate in CFM. For example, in India alone, more than 60,000 local forest resource management bodies or Village Forest Councils (VFCs) have been established over the last decade to manage about 14 mi. ha of state forests (Kumar, 2002). Despite the popularity of the CFM as a policy with potential ecological and social benefits and noted successes (TERI, 1998), concerns are now increasingly being expressed over its sustainability (Lele, 2000). Its performance has been found to be variable, especially when applied in broader contexts (Davies and Richards, 1999; Sundar, 2000).

The literature assessing the sustainability of the CFM approaches it from two perspectives. One approach dwells into the institutional aspects of it drawing on issues such as the structure and organization, sharing of power, and political bargaining. The other one analyses stakeholder incentives in management from an economic perspective. Most literature that examined community members' incentives to collectively manage forests focus on forest produce such as timber, fodder, and fuelwood available to villagers (Misra and Kant, 2004). When CFM is introduced in marginally productive forests, however, such benefits are meager. While communities' contribution to forest protection and management in CFM is believed to provide a variety of environmental services, little effort has been made to study these benefits and no consideration has been given to the possibility of sustaining this collaborative approach through compensation to villagers for providing such benefits.

The objective of this paper is to document the limited scope of on-site benefits to support CFM when it is introduced in degraded forests and to explore the prospects for sustaining it through a focus on environmental services. The insights for the paper are drawn based on a review of pertinent literature and from an analysis of JFM program in Tamil Nadu, India. In the following section we discuss the concept of CFM strategy, its benefits, and potential beneficiaries. Section "Study Area: JFM in Tamil Nadu" provides a description of the study area and research context. In the section "JFM Outcomes," the implications of the current approach for local communities' participation in CFM are discussed. The next section discusses the prospects of PES to sustain CFM. Summary and conclusions are provided in the final section.

### ***CFM, ITS BENEFITS, AND POTENTIAL BENEFICIARIES***

Collaborative forest management entails sharing of certain rights and responsibilities between government agencies and local people in managing state forests. Typically, in a collaborative management set up, a local forest management body (VFC) cooperates with a government agency to protect and restore a predefined forest area.

Forest restoration and improvement provides several apparent on-site benefits such as fuel, fodder, timber and non-timber forest produce. In all CFM approaches, the participating village forest management bodies receive either a partial or full share of these benefits for their efforts. These benefits are meant to compensate local communities for ensuring forest protection and to mitigate the hardship incurred by the some of the existing forest users.

Improved forest management also provides several environmental benefits such as climate regulation and watershed protection. Although identifying and quantifying these benefits is difficult, some of these off-site forest benefits are well established. For example, forests sequester carbon from the atmosphere, and this is gaining importance with growing concerns about global climate change and the role of greenhouse gasses such as CO<sub>2</sub> in contributing to global warming. The value for carbon sequestration is likely to increase with the recent ratification of the Kyoto Protocol and the prospects for eventual US legislation to support a reduction in net emissions of greenhouse gasses.

Forests and other natural vegetation also can have strong hydrological impacts, though in many cases they are poorly understood. It is well known that vegetative cover stabilizes soil and increases the infiltration

of water into the ground, thus increasing soil moisture and reducing siltation of downstream water bodies. Similarly, natural vegetation helps absorb pollutants and thus provides a cleaning service for downstream water supplies. These important hydrological functions are well appreciated and uncontroversial, although often their quantitative extent is unclear. Recent literature questions whether forest cover (as opposed to other kinds of vegetative cover such as grass) actually helps promote water conservation, because most trees consume substantial amounts of water (Calder, 2002). Assessing the situation is very complex where trees replace bare ground, and where afforestation is accompanied by water harvesting measures making it difficult to attribute water regime changes to any single intervention. Forests also have high recreation value, which is increasingly important with growing demand for recreation, tourism, and scenic beauty all over the world. Healthy, scenic forests are important in that context, especially if they support wildlife populations. Apart from economic values, forests also have significant cultural values in society.

Potential beneficiaries of these off-site environmental services include regional and global communities. Thus the concept of *collective management* implies that the advantages of local community involvement can be combined with that of the state for the *collective benefit* of both the local and regional and global communities.

If the forest products harvested adequately compensated villagers' efforts, as assumed in CFM approaches, operation of such a self-paying incentive mechanism could be reasonably simple and sustainable although it would face typical collective action challenges (see, for example, Agrawal and Gibson, 1999; Ostrom, 2000). Such a mechanism would have also served to meet the local as well as regional, national, and global interests as implied in CFM. Several JFM success cases in India attest to the idea that local people's interest in CFM can be sustained through the provision of a share in forest produce. Lise (2000) noted significant positive association between local collective action and good forest condition.

As has been largely applied in the field, the objective of CFM is mainly to restore marginal forest areas. Although they are poor in terms of their forest productivity, they are of significant ecological value to the overall landscape. In such situations where on-site benefits for the communities' involvement are low, often various development interventions, or payments that are not directly related to the conservation objective are used. However, recent literature indicates that such development interventions are plagued by complexities involved in their im-

plementation and the ambiguity of conservation incentives they generate (Ferraro, 2001; Kerr, 2002). Another approach of recent origin is to pay directly to individuals or communities for their conservation performance (this approach is the focus of discussion in the section "JFM Outcomes"). This "conservation contracting" strategy has been credited for its simplicity and effectiveness relative to development-based interventions (Ferraro and Kiss, 2002). Although such direct conservation performance payment systems are common in high-income countries, they are slowly finding place in other countries as well.

Viewed from both its intended objectives and potential results, CFM renders substantial environmental services. While there is literature on this aspect in other natural resource management contexts (Sanders et al., 1999), developing institutional arrangements for forest-based environmental services is still a new field of study (Pagiola et al., 2002), especially under common property arrangements. Although participatory forest management approaches have received worldwide attention, discussion on compensating local people for providing such a positive externality remains absent and this represents a major gap in the literature.

### ***STUDY AREA: JFM IN TAMIL NADU***

As mentioned earlier, this paper draws on the insights gained from a study of JFM implementation in Tamil Nadu, India. Forests constitute about 17.4% of the total geographical area of the state. The per capita forest area is a meager 0.04 ha, half that of the national figure. From an ecological point of view, these forests are, however, of immense value to the state, which is located in a rain shadow region. They function as critical catchments for a majority of water resources in the state. With about a million cattle and other domestic animals grazing inside unrestricted, and an estimated 100,000 villagers entering into them for various consumptive uses, however, these areas are exposed to severe degradation. Regular forest fires set by cattle herders and heavy removal of young vegetation for green manure are a few other causes of forest degradation. As a result of these pressures alone, about 25,000 ha are estimated to be getting degraded every year (TNFD, 1997). Groundwater tables have gone down steeply and about half the state is in "absolute water scarcity" (TERI, 1998). Barren land in degraded forest areas contribute to the problem of falling water tables because the lack of vegetation reduces the capacity for moisture infiltration.

JFM was initiated in Tamil Nadu, with a theme of “save the forests to save the water,” as part of a \$100 million project in 1997 under the Japanese Overseas Economic Co-operation Fund (OECF). It was introduced in about 1,000 villages that were identified as severely degraded (a crown density of 0.4 and less, compared to a good quality forest area with a crown density of 1.0) and watershed development through large-scale afforestation and water harvesting activities undertaken on a micro-watershed basis with the active involvement of local communities formed the core component of the program.

While the project funds fully paid for afforestation and water harvesting, the major incentive to local communities for their participation in Tamil Nadu, like many other JFM initiatives in India, was forest produce. As per the program guidelines (GoTN, 1997), all the forest produce such as fuel, fodder, green manure, and NTFP that could be harvested from the restored forests on a sustainable basis goes to VFCs free of cost (with a priority to the poor and landless). However, in view of the long gestation period involved in harvesting any substantial forest products in the initial years, the JFM also provided a seed money of Rs. 600,000 during the first year 3 years of the program (\$1 = about Rs. 45). This fund was meant to meet various costs incurred by the VFC in managing JFM and to undertake village development and individual assistance activities. Village-level development activities included laying roads, providing drinking water facilities, and constructing community halls etc. Individual assistance was meant to compensate those who were dependent on forests but lost access to them due to restrictions on grazing, etc. after the onset of JFM. Individual incentives were also provided to some community members who were interested to work for JFM to compensate their time and effort, even if they were not previously forest-dependent. The individual benefit component included activities such as establishment of self-help groups, provision of micro-credit and vocational training, etc.

Our data collection methods for the analysis of JFM outcomes in Tamil Nadu included in-depth field observations in five forest divisions and interviews with 28 forest officials of various ranks. A survey of 278 inhabitants of five JFM villages in the above forest divisions, and interviews with 24 key VFC functionaries have provided data on villagers' perspectives. Drawing on current literature on payment for environmental services (PES) mechanisms, this paper uses a subset of the above data and explores the potential of PES to sustain CFM.

## **JFM OUTCOMES**

As discussed in the earlier section, successful conservation investments can yield benefits at three levels: local, regional, and global. To date, little effort has been made to measure these impacts and so it is difficult to assess the overall outcomes of JFM. Some specific studies of local impacts have been undertaken, but there has not been any attempt to disentangle the effects of different investment components. Regional and global effects have not been assessed.

### ***Local Ecological Impacts***

At the local level, soil and water conservation activities undertaken have not only checked erosion and impounded water, but also revived many natural springs, despite harsh agro-climatic conditions prevailing in the project areas (Sivanappan, 2002; Swaminathan and Vidhyavathi, 2002; Business Line, 2000). In 20 of the sample watersheds where hydrological observations were made, an increase of 3.8 to 14.2% in the ground water table was recorded (Sreedharan, 2002). This is consistent with the performance of water harvesting structures elsewhere in India (Hanumantha Rao, 2000).

With the increased moisture, barren areas were put into productive purposes, and positive changes were observed in agricultural yields and cropping patterns in several project areas (Neelakantan, 2000). Heavy investments made in water harvesting and revegetation, and active cooperation of villagers harnessed through JFM in protection of plantations are attributed as the major reasons for success. Significant reductions in goat population, cattle grazing, wildfire occurrence, and forest encroachments were also recorded in almost all the JFM villages (TNFD, 2003). As many Forest Department (FD) officials and VFC presidents recall, villagers came in hundreds to put out forest fires in JFM areas. The support of local leaders for forest protection, sometimes braving several political and economic hardships in the villages, was extensive.

Despite the resurgence of vegetation, the degraded forests failed to produce any forest produce to be harvested in significant quantities by the VFCs. The areas under JFM are characterized by very little topsoil, low nutrient availability, and severe soil compaction caused by decades of cattle movement.

### ***Regional, National, and International Impacts***

At the regional level, the JFM areas in Tamil Nadu are critical catchments for major rivers, reservoirs, and irrigation tanks in the state. Earlier discussions on forest management benefits suggest that the regional hydrological effects of these forests are poorly understood, and there is no data available on the relative magnitude of these effects at the regional level.

At the national and international levels, forest conservation and regeneration sequesters carbon, helping stabilize the global climate (Verweij, 2001). In addition, the forests of the Western Ghats spanning the Tamil Nadu-Kerala border are home to significant biodiversity (Menon and Bawa, 1997), including medicinal plants and important megafauna such as elephants and tigers with high international appeal. To date, the authors are not aware of studies that have attempted to measure the effects of JFM on provision of such global public goods.

### ***Impact on Local Resource Management Institutions—the VFCs***

A significant outcome of the institutional development and local resource management is that the VFCs' control rendered the forests the status of a property. The regulations on the use of forest resources brought in a general feeling that forests are of some "value" and not free for all, unlike the previous situation. Further, the political processes and the interactions among the villagers after the onset of JFM in villages has led to substantial collective action resulting in forest protection. Elections to the VFCs became a prestigious issue. Formation of self-help groups, strengthening micro-credit and income generation institutions, and capacity building led to considerable community mobilization and organization. These developments also enabled JFM villages to develop tie-ups with local commercial banks and other institutions. In some instances, local industrial houses, religious and philanthropic organizations collaborated with NGOs and the FD, to support the efforts of VFCs.

The incentive available to the VFCs, as mentioned earlier, either to meet its operating costs or to help needed individuals, was primarily the forest produce and its sale proceeds. The very low productivity of degraded forests in these areas, however, made this rather insignificant. The total estimated value of forest produce taken in kind by the VFC members in 2000-01, for example, amounted to a meager sum of Rs. 3

or less than seven cents US per capita (RUPFOR, 2002)! Such low returns to participating households and high variation between JFM conception and actual results have been reported in other places in India as well (Kumar, 2002).

### *Perceptions of the Program and Its Benefits*

In our survey of JFM villagers, for the question on the most important problem facing the village, a majority of the participants (38.4%) mentioned developmental issues such as lack of roads, health, and unemployment. An almost equal number of people (37.7%) identified drought and water scarcity as their most pressing problems. Among survey respondents who reported obtaining benefits from JFM, three quarters listed access to loans, employment, and other development benefits. In addition, about half of all respondents said that obtaining more of these same benefits was their primary recommendation for improving JFM. Very few people, on the other hand, mentioned direct or indirect benefits from forest cover. There is also a unanimous opinion among field-level forest staff that it is impossible to sell the message of JFM to local people and seek their participation purely on the basis of forest produce. "When will the plants we planted grow and give benefits? Even if you say that to people, they (villagers) are laughing at us," remarked a DFO.

Clearly, in the absence of any direct forest benefits, seed money provided to the VFCs for village development (Rs. 600,000 over three years as discussed in the earlier section), proved to be a major attraction to the villagers. Compared to other areas in the state, the villages situated in and around forests historically lagged in several basic necessities and development assistance and the onset of JFM provided a major opportunity for local leaders to help remedy this situation. Interviews with foresters indicate that several villages came forward to take up the onerous task of protecting the forests through JFM, anticipating some development assistance made available in the form of seed money. Further, catering to local communities' long pending concerns helped attract influential people in the villages, rendering much visibility and popularity to the program among the local people.

The availability of seed money to the villages was restricted to the first three years, which is a very short period compared to the long gestation period required for JFM to yield any substantial forest produce. After the third year of the project, as the nonexistence of promised forest benefits has become apparent, local villagers' interest and involvement in JFM has drastically declined. Summarizing the importance of

sustainable benefit flow to the communities, a DFO remarked: "Unless we produce economically viable solutions, we fail. That means as soon as we (project) withdraw, things will be back to normal." Corroborating these observations, other authors have also highlighted the need for extending financial assistance to VFCs to sustain JFM (Annamali, 2003; Somasundaram and Sreedharan, 2003). These findings on the decline of VFCs in the absence of sustained benefit flow are consistent with observations made elsewhere in India (Kumar, 2002).

### ***PROSPECTS FOR ENVIRONMENTAL SERVICE PAYMENTS TO SUSTAIN CFM***

A payments for environmental services (PES) system involves external actors making direct contractual *quid pro quo* payments to local communities in return for their participation in forest management that would ensure production of certain environmental services. Thus, PES, with its focus on explicit recognition of trade-offs in the interests between those interested in paying for environmental services and those interested in providing them, represents a new conservation paradigm.

As discussed above, the objective of introducing CFM in degraded forests is in part to produce environmental services; hence, it would be more appropriate to structure the incentive payments to communities on the lines of PES rather than on some non-existent forest produce. Such an arrangement also makes the stakeholders more conscious of this ultimate objective of the program than the current indirect approach that focuses on forest produce and developmental benefits. The payment could be for a variety of services such as carbon sequestration and storage, biodiversity protection, watershed protection, and cultural and aesthetics; and different agencies interested in the supply of these services could be partnered with. Such direct-compensation multi-service PES schemes are slowly spreading. In Costa Rica, for example, the National Forestry Financial Fund generates money from international donors, fuel taxes, payments from hydroelectric companies, and other sources and pays individuals and groups directly involved in forest preservation and reforestation (Subak, 2000). In Southeast Asia, the Rewarding Upland Producers for Environmental Services (RUPES) program uses a variety of rewards systems, including cash but also secure land tenure. Unlike in Costa Rica RUPES works with groups of land users rather than just individuals (ICRAF, 2003) and this could help serve as an example for CFM approaches, which work with communities.

A typical PES mechanism in a CFM set up would involve at least four components: a buyer or a group of buyers who are interested in environmental services, a village-level body interested in providing these services (or in undertaking management actions that ensure production of these services), a contractual agreement that clearly defines the service (management actions), and a conditionality that the payment to the provider is direct and contingent upon production of defined services (undertaking needed management actions).

The first one represents the demand-side dimensions; clearly there are many interested parties in CFM. For example, in our case study of JFM in Tamil Nadu, the external donor, OECF, the state government that implemented the program, the local NGOs, industrial groups, cultural and religious organizations supported the program in various measures and for various reasons. In particular, the cash and kind support of the TVS Group of Companies, a major industrial house in Tamil Nadu in the state, demonstrates the potential for industrial financing of environmental restoration (TERI, 2002). In the current approach, however, several of these stakeholders and their efforts are invisible. With the result there were glaring communication gaps. For example, while the villagers and local NGOs were mostly engaged in village development and forest protection, the FD undertook afforestation and watershed development. In many instances, these two sets of activities ran isolated from each other. Further, the FD kept to itself detailed records of hydrological changes occurring in the project areas and largely assumed that the benefits would become automatically apparent to the local public. Consequently, for many stakeholders, the link between watershed development efforts and increased groundwater levels was not apparent, though local media and the general public in far-flung places praised such efforts. PES could serve as an effective institutional mechanism to galvanize the interests of different stakeholders systematically.

The second component of the PES mechanism represents the supply-side dynamics, represented by the incentives for local community groups in CFM. Here the questions such as how much needs to be paid, who is to be paid, and fairness and equity in the distribution of benefits from management and payment arise.

Regarding how much to be paid, clearly, someone who pays for watershed services must know what he or she is buying. However, this thinking is rooted in a demand-side perspective. On the other hand, if viewed from the supply side, we could consider the opportunity cost of local communities' efforts to arrive at payment amounts. Thus, if the objective is to give people in forest fringe areas a viable incentive to

protect forests, measuring the precise level of forest benefits seems less critical. This seems to be a better option than the current approach of giving indirect development incentives, the demand for which is ever increasing. In our study, the JFM program managers and VFC functionaries confidently indicated that VFCs could be made viable at a cost of as little as Rs.100,000 per year per JFM village (about \$2200 or a few dollars per ha), with the payment dependent on the quality of forest protection they provide. What is needed are test cases to find out what works and some studies conducted on the lines of "willingness to accept" measures. The point to be noted is that a PES mechanism could provide a better basis for systematically arriving at the "cost of conservation" than the current approaches.

With so much emphasis on decentralized resource management and several studies attesting the advantages of local community groups in effectively managing local resources, the question of "whom to pay" may not need much analysis. Local governments are being strengthened all over the world with significant powers and hence will invariably have a vital role in forest management. Our case study indicated that when an opportunity is given and when sufficient resources are in place, communities show considerable interest and enthusiasm to work collectively. A bigger hurdle in CFM would, however, be in ensuring equity and fairness in management; this is a major challenge in any kind of collective action. Nevertheless, we consider that a compensation mechanism that focuses on opportunity costs for use-restriction would be less complicated than the current development-based approaches that rely on asset building, alternative employment, gender empowerment, etc. This is not to say that these altruistic objectives are less important but a thrust on achieving all of these may perhaps dilute the main objective of conservation. However, in most cases, issues concerning fairness and equitable distribution largely depend on local, historical, political, and cultural contexts and PES is not free from such challenges (Landell-Mills and Porras, 2002; Smith and Scherr, 2003).

The third aspect of a PES system is defining what services are produced, for which the payment is intended. Measuring and valuing environmental services, however, remains a major challenge all over the world. Also, since many of these potential benefits did not receive much attention until recently, they have not been studied. So it is not possible to assess their value at this time for each and every participating area. However, as our focus is restoration of degraded forests, and since additional regeneration will provide off-site benefits, their precise measurement is probably unnecessary. Isolated studies have proved such

generation of environmental services through forest improvement and watershed development. For example, Chopra et al. (1990) cite an annual savings of \$200,000 in saved dredging and related costs in the case of Sukhna Lake, India, which involved upstream afforestation and watershed improvement. Sehgal and Abrol (1994) cite alarming levels of siltation of important reservoirs in India, suggesting high off-site benefits of soil conservation and revegetation in their catchments. Ravindranath et al. (2001) found that, in the Harda district of India, dry deciduous forests under protection were sequestering between one and three metric tons of carbon per year. The amount of carbon that a tree sequesters increases as it grows and its leaf area expands. Because this process is dynamic, carbon sequestration is commonly measured as the total stock of carbon stored within a tree over a period of time (ECCM 2002). Regenerating forests under JFM would likely sequester an amount closer to the lower end of the 1-3 ton range since the trees are small. The price of carbon ranges in value from about \$1 to about \$25 per ton on the international market (prices are taken from [www.ecosystemmarketplace.com](http://www.ecosystemmarketplace.com) on April 10, 2005). The market for CO<sub>2</sub> credits is poorly developed and segmented as of now; the \$25 figure is from markets within countries who are party to the Kyoto Protocol and the \$1 figure is for other countries. Very few landowners actually can access these markets but they provide an indication of possible financial value in the future. Smith and Scherr (2003) cite likely future price figures of \$15-20/ton.

What is, however, necessary is a clear baseline measure of the existing forest condition. Payments to the VFCs could be structured based on the additionality (such as additional forest cover) achieved through their efforts. This type of analysis will also help in selecting areas for CFM, e.g., where the marginal benefits (in terms of potential additionality) exceed the marginal costs (compensation amount to the VFCs). In the future, as capability to measure and value off-site services develops, it might be possible to identify appropriate beneficiary organizations to fund VFCs.

The last but not the least requirement of a PES is a conditionality that the payment to the VFCs is direct and contingent upon production of defined services. This is a major distinction from the current indirect development-based schemes where the conservation compliance is hardly monitored and payments are made up front and in lump sum, rather than in installments and contingent upon the delivery of promised results. Also, often these schemes involve outright and irreversible benefit provisions such as awarding "tenure rights" and large-scale subsidies. Once they are given, there is no guarantee that the recipient will not re-

vert to habitat-destructing practices. In a PES mechanism these lacuna can be sufficiently addressed by laying out appropriate conditions in the beginning itself.

Perverse incentives are often cited as a concern in many conservation schemes (Pagiola et al., 2002). Hence it is important that a PES system is sufficiently backed up with appropriate legal mechanisms. That is, it is necessary to combine “carrot” with “stick” to avoid undue payments and to retain the environmental benefits secured through past PES efforts. In addition, compensation for environmental services may be particularly important in the early stages of afforestation efforts. As mentioned above, on-site benefits of afforestation might be realized after 10 years and compensation for off-site benefits may become less important. For example, in Sukhomajri in India, the initial impetus for investment was the desire to save Sukhna Lake downstream in the city of Chandigarh, but eventually the on-site benefits were very high. Sukhomajri was transformed from a very poor village to a very rich one through the combination of irrigation and afforestation. In this small village of about 1,000 people, milk sales reached about \$8,000/yr, bhabbar grass fetched about \$3,000/yr, crop yields skyrocketed, and the economy diversified. Tree density rose by about 100-fold over twenty years, to the point that Agarwal (1999) estimated that it could generate \$700,000 annually through sustainable yield harvesting. Sukhomajri is a special case and such high benefits should not be expected everywhere, but the point remains that eventually on-site benefits could be valuable. The combination of on-site economic benefits and small payments for environmental services could eventually be the basis for a sustainable forest economy.

## CONCLUSIONS

CFM has a potential to address the challenge of forest degradation (Kumar, 2002). The problem, however, seems to be in ensuring the sustainability of this approach in the absence of sustained and perceivable benefits to the local people involved. The current CFM approaches that offer only the forest produce benefit to the participating villagers may not be appropriate where the strategy is implemented to improve degraded forests. Providing development benefits may also be inappropriate because there is no link between the benefits and forest protection. Where there are off-site benefits, the stated principle for long-term planning of CFM should be to concentrate on offering compensation for

forest protection. While such an approach will face challenges of its own, both in ensuring conservation and providing benefits to the poor, it is worth exploring its possibilities for CFM given the contradictions of the program's current approach. We hope this paper will set a new trend in CFM thinking and pave the way for research to identify and develop innovative mechanisms to sustain local resource management.

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