

Presence and effectiveness of material benefit provisions under Joint Forest Management in India: the cases of World Bank-aided Village Forest Committees in Madhya Pradesh

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Abstract

Provision of material benefits by external agencies has been widely adopted in developing countries' forest management, although their effectiveness in improving local livelihoods and conservation has been controversial. We provide empirical evidence of the presence and effectiveness of material benefit provisions under Joint Forest Management (JFM) in a forest division of Madhya Pradesh State, India. We conducted an extensive survey of 18 World Bank-aided Village Forest Committees (VFCs) and case studies of two committees, one tribal and one non-tribal. Material benefit provisions by the forest department were the most predominant type of economic activity. Provisions were dispensed in a top-down manner lacking communication and facilitation, and consequently were not sufficiently effective in improving local livelihoods and conservation, especially in tribal communities. The policy implications we derived are; the provision of material benefits should be properly explained to beneficiaries for them to be effective as conservation incentives; technical assistance for the maintenance of the dispensed materials should be provided by village development specialists; and collective forest-based activities should be gradually promoted so that beneficiaries gain a sense of ownership for forest resources and programs. These improvements should be implemented with particular attention to disadvantaged or marginalized populations.

Introduction

In the last few decades, one of the most significant trends in developing countries' forest management is the focus on the well-being of local forest users (e.g. Maryudi et al. 2012; Chhetri et al. 2012). The enhancement of local livelihoods has been mainly addressed through co-management of state forests by government agencies and local forest users. Under co-management, generally, certain rights to forest resources are granted to local forest users groups (Meinzen-Dick and Knox 2001). The entitlement of official rights provides opportunities for local users to conduct various activities apart from the daily collection of forest products and thereby gain commercial benefits from these resources. Licensed timber or non-timber forest product (NTFP) production, benefit sharing from timber or NTFPs, payments for environmental services, or eco-tourism, are examples (Table 1) (e.g. Salafsky and Wollenberg 2000; Abbot et al. 2001; Kerr 2002; Kerr et al. 2007; Dhakal and Masuda 2009; Pandit et al. 2009; Chhetri et al. 2012; Fujiwara et al. 2012; Ota et al. 2013). With such co-management arrangements, local users are supposed to be motivated to maintain the resource base from which they will obtain future benefits (Salafsky and Wollenberg 2000).

However, it has been reported that economic activities not directly linked to the conservation of a forest resource base are also widely implemented in forest co-management programs (e.g. Salafsky and Wollenberg 2000; Abbot et al. 2001; Sethi and Khan 2001; Prasad and Kant 2003; Arjunan et al. 2006; Kerr et al. 2007; Fujiwara et al. 2012). These activities may be classified into two categories, i.e. non-forest-based income generating activities and material benefit provisions (Table 1). The former generally requires collective action among a group of local people. The rationale for forest management is that these activities may contribute to reducing the existing local dependence or pressure on forest resources by providing economic substitutes (Salafsky and Wollenberg 2000); this is analogous to the Integrated Conservation and Development Project (ICDP) concept for protected areas. The latter category includes village development materials or infrastructure, seedlings for agroforestry or farm forestry, employment opportunities for forestry operations, or loans for individual needs, that are generally offered by external agencies such as government agencies or non-governmental organizations. Provision of these material benefits is considered 'ice breaking' or 'entry point' activities, aimed at motivating local users to participate in a forest co-management program that would ultimately reduce pressure on the forests.

[Table 1 around here]

Some studies claim that material benefit provisions are effective in improving both livelihoods and conservation (Sethi and Khan 2001; Prasad and Kant 2003). In particular, Sethi and Khan (2001) clearly mention that usufruct of forest products alone is not a sufficient incentive for resource conservation, and hence non-forest-based village development initiatives should be provided. However, Kerr et al. (2007) pointed out that although material benefit provisions are often provided, they are theoretically least effective in conservation because forest users' benefits are not directly linked to the sustainable use of a resource base. It has also been argued that activities not directly tied with conservation behavior are difficult to implement for conservation purposes (Salafsky and Wollenberg 2000). For instance, Arjunan et al. (2006) reported a case in which the attitudes of local people towards conservation were quite mixed, although they received material benefits from the forest department.

In this paper, we focus on Joint Forest Management (JFM) in India, a program for the co-management of state forests by state forest departments and locally-formed committees, with two objectives. One is to explore the range of associated economic activities to assess the occurrence of material benefit provisions. The other is to present empirical evidence on the effectiveness of material benefit provisions in improving local livelihoods and conservation. Although JFM was originally based on the concept of benefit sharing of forest products (Bhattacharya et al. 2010), a number of studies indicate that non-forest-based instruments, e.g. provision of irrigation facilities, wells, other village development materials, or forestry labor opportunities, are widely implemented in JFM projects (e.g. Sethi and Khan 2001; Prasad and Kant 2003; MoEF 2006; Kerr et al. 2007).

We targeted the cases of World Bank-aided Village Forest Committees in Madhya Pradesh. Madhya Pradesh is a state where material benefit provisions have been emphasized under JFM (MoEF 2006). This state has implemented JFM since 1991, and as of 2006 it has the largest JFM area (5.95 million ha), equivalent to around one fourth of the total JFM area in the country. Outside protected areas, there are two types of JFM committee, namely Village Forest Committee (VFC), set up for degraded forests, and Forest Protection Committee (FPC), set up for good forests. Under the Madhya Pradesh Forestry Project implemented from 1995 to 1999 with support of the World Bank, a number of village development initiatives were undertaken for VFCs (Sethi and Khan 2001). Hence, examples of VFCs having received project aid were expected to provide the most suitable evidence to fulfill our objectives.

We applied a two-tiered research method. First, we conducted an extensive survey

on a number of the World Bank VFCs to assess the activities undertaken and their combinations. With these data, we also explored the factors that had probably influenced the implementation of each kind of activity. Secondly, we carried out two contrasted committee case studies to identify the effects of the activities identified through the extensive survey at the village level.

Methods

Study Site

Madhya Pradesh is located in the central part of India (Figure 1) and comprises an area of 308,252 km². The annual rainfall in the state ranges from 800 mm to 1,800 mm. Forests are mostly concentrated in the eastern part, lying in a dry deciduous forest range (FSI 2011). The forest department classifies the forests as teak (*Tectona grandis*), miscellaneous, and sal (*Shorea robusta*). Apart from these, bamboo and various NTFPs are also widely found.

[Figure 1 around here]

The total population as of 2011 was 75.70 million and the population density was approximately 250 persons/km² (GoI 2011). This state is part of Central India's tribal belt, and hence the ratio of the tribal population is high: approximately 22.3% as of 2001 (GoI 2001). Tribal people in Central India are a historically marginalized population and consequently socio-economically backward; Generally they are characterized by smaller land holdings, lower crop productivity, lower educational levels, greater dependency on wage labor, greater dependency on forest resources particularly NTFPs, geographical remoteness and social shyness (Poffenberger et al. 1996; Saxena 2002). They are also not proficient in negotiation with outsiders. For example, they are often cheated by middlemen in the sale of NTFPs due to the lack of calculation skills or negotiation power (Saxena 2003). The ratio of tribal population is higher in forest-fringe areas than the state-level figure.

The West Chhindwara Forest Division in Chhindwara District was focused on, considering its very high ratio of JFM area to the total state forestland in the division: 89.2% as of 2007. This division lies in a dry deciduous forest range. Of the 175,945 ha of total state forests (reserved forests and protected forests) in the forest division, 28% are teak-dominant forests, 33% are miscellaneous forests, 7% are sal-dominant forests, 2% are plantation forests, 26% are wasteland or low-stock forests, and 4% are others

(WCFD 2006). According to the WCFD (2006), forest fires, grazing, human-induced damage through firewood collection, natural calamities (especially drought), and soil erosion are the main pressures on forests, and firewood collection and grazing are especially responsible for the loss of forest resources. Similar to other dry deciduous areas (Arjunan et al. 2005; Kumar and Shahabuddin 2005), small-scale use by local people is most likely the primary cause of gradual forest degradation. The district's population density is approximately 177 persons/km². It is also a typical tribal district, where approximately 34.7% of the population is tribal (as of 2001).

Data collection and analysis

Regarding the extensive survey, there were 321 JFM committees in West Chhindwara as of 2010. There were 38 World Bank-aided VFCs, 15 World Bank-aided FPCs, 130 non-World Bank-aided VFCs and 138 non-World Bank-aided FPCs. Out of the 38 World Bank-aided VFCs, which are our focus in the present paper, 27 were concentrated in two forest ranges (Saori and Parasia), which are close to Chhindwara township. A total of 18 out of these 27 committees were surveyed. In each committee, we interviewed the president or other executive members about the kinds of economic activities ever undertaken or continued, using a structured questionnaire.

Seven criteria were identified as the basic characteristics of the 18 committees (Table 2); number of participant households and caste composition represents the demographic conditions, distance from the nearest market and landscape represents the geographic conditions, and area of assigned forest, forest type and forest area per household represents the ecological conditions. The numerical data from these seven criteria were categorized according to the definitions shown in Table 2 and chi-square or Fisher's exact tests were undertaken. All the committees were formed during 1992 to 1996.

[Table 2 around here]

With regard to the village-level case studies, we focused on the difference between tribal communities and other types of communities, and thereby addressed how processes and outcomes of JFM would vary with socio-economic conditions, particularly poor economic status, low education, and weakness in negotiation with other social groups. These points are most significant when considering any program outcomes in the context of forest-fringe areas of Central India, where the presence of

the tribal population is significantly high. Out of the above 18 World Bank-aided VFCs, two committees, Rajolamal and Talpipariya committees, were selected as the tribal and non-tribal cases respectively. In each committee, a total of 40 households were selected using a random sampling method, and household heads were asked about basic household characteristics and activities and perceptions of JFM. Household interviews in Talpipariya were conducted between February and March 2010, and other data was collected between February and March 2011.

For the analysis of the extensive survey's data, we firstly counted the number of committees having implemented and continued with each activity by sorting activities into the following categories: forest-based income generating activities, non-forest-based income generating activities, and material benefit provisions. Secondly, in cases where not all the committees had implemented an activity, we performed chi-square or Fisher's exact tests to ascertain the statistical associations between the committee characteristics shown in Table 2 and their implementation. Thereby, factors that were likely to influence the implementation of an activity were clarified.

From the information derived from the case studies, firstly, the processes of implementing JFM at the village level were described. Secondly, to what extent the material benefits provided had been utilized and maintained was confirmed, and thereby implications for their contribution to local livelihoods were derived. Thirdly, the conditions of firewood collection were examined as this is the most important proxy of dependence on forest resources.

Results

Economic activities ever undertaken

Forest-based income generating activities

Benefit sharing from timber production was offered by the forest department to all 18 committees. Reforestation was one of the components in the World Bank project, hence implemented in every committee. As of 1995, it was arranged that VFCs would receive 30% from the revenue of timber production from plantations after deduction of the harvesting costs. This ratio was changed to 100% in 2001 (Ota et al. 2013). However, at the time of this survey, no committee had received benefits because planted trees or bamboo groves were not sufficiently mature; a few committees were planning to harvest bamboo clumps at the time of our survey. In 12 committees, executive members knew about this benefit sharing arrangement. In the remaining six committees, even executive

members had no idea about this arrangement.

Four activities were confirmed as related to NTFPs (Table 3): tenders of grass, sugar apples (*Annona squamosa*), and mahua (*Madhuca indica*) flowers, and the purchasing and selling of NTFPs by the committee. Seven, two, one, and two committees had ever implemented these activities respectively, of which two, two, one, and one committees were still continuing the activities at the time of the survey. A total of nine committees had implemented more than one activity, of which five were still continuing at least one activity.

Through grass tenders, a few individuals acquire rights to collect grass from a particular tract inside the assigned forest, either natural or planted, and earn money by selling the harvested grass independently. A rights holder will manage and protect the grass grown in the tract until the harvesting season, generally from December to February. Monitoring costs are solely borne by this person. Seven committees had implemented this activity, of which two were still continuing at the time of this survey. Through tenders of sugar apples and mahua flowers, similar to those of grass, a few individuals acquire the rights to collect these NTFPs from the assigned forest. If villagers sell the collected NTFPs to middlemen individually, the middlemen buy the products at unreasonably low prices (e.g. Saxena 2003). However, if the committee buys NTFPs directly from villagers, stores them until the harvesting season is over and prices rise, products can be sold for a lump sum and a significant profit can be realized. Two committees had implemented this activity, of which one was still continuing at the time of this survey.

[Table 3 around here]

Non-forest-based income generating activities

Three kinds of activities were identified as non-forest-based income generating activities (Table 3): the making of small commodities such as candles, bed sheets, carpets, *kum-kum* (color powder applied to the forehead) and *triphala* (ayurvedic medicine), honey collection, and fish cultivation/pond lease. Three, three and two committees had implemented these activities, respectively, but none of them continued at the time of this survey.

Material benefit provisions

Material benefits were classified into three categories: reducing dependence on firewood, increasing agricultural productivity and improving quality of life (Table 3).

In the two committees to which LPG (liquefied petroleum gas) facilities were provided, approximately 10% and 45%, respectively, of committee members benefited. In the four committees to which biogas facilities (from cattle dung) were provided, approximately 5%, 5%, 5% and 12%, respectively, of members benefited. In the three committees to which pressure cookers were provided, around 10%, 15% and 20%, respectively, of members benefited. Smokeless ovens (energy efficient) and seedlings for planting on private land were also provided, but reliable information on numbers could not be obtained. Irrigation facilities such as ponds or motor pumps were provided to seven committees. For the improvement of life quality, drinking water facilities were provided to nine committees, roads to two committees, buildings such as community halls, schools or stores to 13 committees, and other commodities such as threshers, sewing machines, utensils for common use, and blankets to 12 committees. In total, 17 committees had received such aid, and most, with the exception of blankets, were for common use. Thus, all 18 committees received at least one facility and/or commodities.

Under JFM, a number of forestry operations were implemented. The forest department provided wages for labor for these operations. Large labor opportunities were thus created in all 18 committees, although amounts varied across committees. From our informal interactions with local people, it was implied that paid wages were perceived as a significant benefit under JFM. However, these benefits were provided only when forestry operations were carried out, hence, they represent a temporary, not permanent or sustainable, way for gaining cash income.

Summary

Percentages of the committees which had undertaken forest-based income generating activities, non-forest-based income generating activities, and material benefit provisions were 100.0%, 27.8%, and 100.0% respectively. Of these, excluding timber benefit sharing, which was uniformly implemented by the forest department as a component of JFM, the percentage of the committees having undertaken forest-based income generating activities was 50.0%. Thus, it is clear that material and labor opportunity provisions were the most predominant type of economic activities under JFM in this region.

Backdrop of the material benefit provisions

How decisions regarding the provision of material benefits for each committee were made, and to what extent money earned from income generating activities was used for purchasing materials could not be fully clarified through interviews. At the very least, the fact that all the committees had received some kind of material even though not all the committees had implemented income generating activities obviously indicates that the forest department provided aid. In addition, even in committees with income sources, considering the amount of funds needed to purchase or prepare materials, it is clear that expenditure for materials was not managed with earnings from enterprise activities alone. As Sethi and Khan (2001) pointed out, financial support from the forest department must have been critical in providing materials.

From our field observations, even in committees with income generating activities, the account books were solely managed by the forest guards concerned; villagers had little concrete knowledge about account balances. Decisions about what material a committee would receive were not necessarily made by committee members; in many cases, materials were provided by top-down initiatives of forest officers.

Classifying the 18 committees as either groups with ‘experience with any enterprise activities’ or groups with ‘no experience’ and calculating the average amount of material aid that each group received as scores for each group, it becomes clear that committees which had implemented enterprise activities received more material benefits (Figure 2). This result implies that money earned from income generating activities contributed to the amount of material benefits provided. It also implies that the forest department appreciated the enterprise of the committees that undertook activities, and thus provided more materials.

With regard to conservation, however, little apparent linkage was confirmed between the levels of conservation performance and material benefit provisions.

[Figure 2 around here]

Factors affecting the implementation of activities

Only caste composition showed statistical association with the implementation of some income generating activities at the 5% level. The tribal category was less likely to have implemented grass tenders, more than one NTFP-based income generating activity, making of small commodities, and honey collection (Table 4). It is obvious that tribal people are less likely to implement collective income generating activities.

Identifying rights holders by tender is inextricably linked with the exclusion of use by other persons. In places where most villagers are highly dependent on grazing, fodder collection or commercial NTFP collection inside the forests, arrangements entailing exclusions are difficult. Conversely, in places where grazing, fodder collection or NTFP collection is possible on private land, such exclusions would be more acceptable. The fact that land holdings are small and dependence on forests is high among tribal societies (Saxena 2002) implies that enterprises such as tenders are difficult to implement among tribal communities. In addition, it is obvious that educational levels among tribal people are low (ibid), and hence it would be true that collective activities which require a modern sense of calculation or organizational management would be a challenge for these least modernized tribal societies.

[Table 4 around here]

Effectiveness of material benefit provisions from committee case studies

Basic characteristics of the two case-study committees

In the two selected committees, tribal Rajolamal had lower educational levels, smaller land holdings, and lower income (Table 5). These characteristics representing overall poverty and low human capital are quite common among tribal communities (e.g. Saxena 2002) and highlight the differences between tribal and non-tribal communities in quantitative terms.

[Table 5 around here]

Process of JFM implementation

There were significant differences between these two committees with regard to the processes of implementation. According to the state JFM resolutions in Madhya Pradesh, the forest guard, who is a representative of the state forest department at the village level, is to be the secretary of the committee and supervise JFM activities. For tribal Rajolamal, initiatives by the forest department were quite restrictive; the forest guard, as the secretary of the committee, decided almost every issue and collective action for activities or arrangements was lacking. This committee held tenders for sugar-apple trees every year, but they were initiated by the then forest guard, and right-holders were consistently outsiders from urban areas; it may not be appropriate to label this activity

as collective. In non-tribal Talpipariya, the structure whereby the forest guard became the secretary and exercised strong decision-making authority was not different *per se*: However, in Talpipariya, villagers gave their opinion on species planting, and grass and mahua flower tenders were initiated by villagers; so there was at least a certain amount of participation in the decision-making process.

Knowledge of JFM in each committee reflects these aspects; in Rajolamal, only 7.5% and 52.5% of the committee members knew about timber benefit sharing and tender of NTFPs (sugar apple) respectively, whereas in Talpipariya percentages were 50.0% (timber benefit sharing) and 82.5% (grass and mahua flowers) respectively (Table 5). These facts imply that tribal Rajolamal villagers' awareness of JFM benefits was lower.

Effects on livelihoods and conservation

The percentage of households whose members joined forestry operations as wage labor was 92.5% in Rajolamal, as opposed to 57.5% in Talpipariya (Table 5). These figures imply that villagers from both committees, particularly in Rajolamal, gained certain benefits from wage labor opportunities. However, from our informal interaction with informants, in both committees, it was implied that wages earned were used mainly for daily needs, and not invested in structural changes of livelihoods.

With regard to the conditions of maintenance and utilization of the provided materials in the two committees, in Rajolamal, all the provided materials except for a warehouse had been damaged one or two years after they were provided (Table 6). In addition, forest officers or other government officials provided little technical facilitation. On the other hand, in Talpipariya, a built primary school had been a symbol of JFM in this village; during construction of the primary school, the village households contributed some money according to their economic condition. A community hall and dams for cattle were also completed. Monetary subsidies for LP gas facilities were provided for ten households, of which eight were still utilized. Bio-gas facilities were provided for five households, of which three were still utilized. Smokeless ovens, irrigation facilities, and a tube well were broken within two or three years.

[Table 6 around here]

From these facts, it is obvious that the effects of the provided materials on livelihoods in Rajolamal were quite limited as only one warehouse had been maintained.

In Talpipariya, the provided materials were more substantively utilized. In particular, LP gas and bio-gas facilities had been utilized to a certain extent, which could have reduced dependence on firewood and time spent on firewood collection. However, even in this committee, significant transformation of livelihoods or improvement of farm productivity had not taken place with the materials provided under JFM.

With regard to conservation, comparing the primary energy sources of a household before the introduction of JFM and the present, Rajolamal has experienced few changes in the locations where they collect firewood (Figure 3). On the other hand, in Talpipariya the dependence on state forests was low even before the introduction of JFM, but this dependence had decreased further by the time of the survey.

[Figure 3 around here]

This shows that the materials provided to reduce dependence on firewood probably affected the change in Talpipariya, although other factors such as promotion of the use of trees on private land, animal dung cakes, or agricultural residues for energy were also likely factors. A greater number of trees on private land and higher incomes probably played a role as well. On the other hand, in Rajolamal, little change had taken place.

Discussion

The results of the extensive survey confirmed that material benefit provisions by the forest department were the most predominant type of economic activities under JFM in this region. Not all the committees had undertaken income generating activities; tribal committees were less likely to have implemented such collective activities. However, village-development materials were provided for the committees having no income source. Although the amounts of materials were greater in the committees with experience of income generating activities, the decisions and procedures regarding the provisions were mostly dominated by the forest department and villagers were not likely to be involved in the decision-making processes. In addition, the linkage between conservation and the provision of materials was not obvious.

We postulate that upon realizing that high transaction costs through external facilitation would be incurred to bring about collective action among local people, especially tribal people, the forest department gradually shifted to implementing JFM in a form that was possible with a simple increase of budgetary input and did not

necessarily require collective local action. Probably the forest department implemented material benefit provisions despite no income generating activities as a top-down remedial action, aiming at bureaucratically preventing the consequences of no benefits in the JFM program.

The committee case studies again confirmed that the implementation of JFM was not a participatory or democratic process. This was particularly true in tribal Rajolamal committee. The fact that only a few people knew about timber benefit sharing clearly indicates that substantive information provision was absent and that this arrangement was hardly working as an incentive for forest conservation. The NTFP income generating activity in place was also dominated by the forest guard concerned; it implies that such attitude hindered collective action and resulted in activities being conducted by an official and a few progressive villagers. Several materials had been provided, and yet their provision was also in a top-down manner with little discussion with committee members as well as limited technical facilitation. These facts most likely reflect the degree of negotiation ability or influence over outsiders. Tribal communities generally lack such ability due to poor economic status, low education, or overall historical marginality, and therefore it is inferred that forest officers, who are generally non-tribal people, held domineering attitudes over tribal Rajolamal committee and decided almost everything paternalistically. Regarding the effectiveness, most of the materials were not properly maintained and utilized. Our data on household firewood collection also implies limited conservation outcomes. Tribal people benefitted from large wage labor opportunities through JFM, but these have not led to structural and sustainable improvement in livelihoods.

These facts indicate that the provision of material benefits by the forest department in a top-down manner was not effective both for local livelihoods and conservation in tribal Rajolamal committee, where extreme economic and social marginality was evident. Material benefit provisions could theoretically have been a first step for improving local well being and conservation, yet, as the processes lacked substantive consultation, discussion, and facilitation, their impact was marginal.

On the other hand, non-tribal Talpipariya had a relatively participatory process of JFM, reflecting stronger negotiation skills than tribal people. In addition, the fact that villagers bore part of the expenditure for constructing a primary school indicates that non-tribal villagers were willing and could afford to contribute towards a relatively large cost sharing arrangement; in tribal communities, such an investment is less likely to have taken place as earnings are spent on daily subsistence. The provided materials were more likely to be maintained. Although it is difficult to consider they had

significant effects on livelihood transformation or improvement, LP and bio-gas facilities provided were considered to have, at least to some extent, contributed to the reduction of existing pressure on forests. There appears to have been some positive effects on conservation.

These facts imply that material benefit provisions could work more effectively in non-tribal committees, which have greater project implementation capacity due to relatively higher economic profiles and human capital. However, even in this committee, JFM implementation was not a sufficiently participatory process, and hence there is room for improvement.

Conclusions

Our analysis does not necessarily represent the whole JFM situation in the forest division or state, as it exclusively focused on World Bank aided VFCs, which presumably received more material benefits than other types of committee. In addition, the low number of detailed case studies - one in a tribal village and one in a non-tribal village - is not enough to allow a quantitative extrapolation of our results. Nevertheless, our results strongly suggest that material benefit provision by government agencies in a top-down manner is unlikely to be sufficiently effective in motivating local people and in improving local livelihoods and conservation. This is especially true in communities of disadvantaged or marginalized people, where improvement in local livelihoods is truly anticipated. Our findings thus provide important qualitative policy implications, for a better implementation of forest co-management.

Firstly, the reason why material benefits are provided should be properly explained to beneficiaries, especially socio-economically backward or marginalized populations, to be successful as conservation incentives. In the present study, the provision of material benefits was dominated by the forest department with local, particularly tribal, people hardly involved. Such process does not allow beneficiaries to understand why something is provided, and consequently it hardly works as a proper incentive for conservation. Local forest officers should explain the reasons for providing material benefits properly with more substantive communication and downward accountability to beneficiaries (Ribot et al. 2010). Communication efforts are deeply needed in any forest co-management process. For instance, the Indian government is currently implementing the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006 (so-called the Forest Rights Act), by which rights to manage common forest resources are to be vested in village assemblies (*gram sabha*) (e.g.

Springate-Baginski et al. 2013). However, the implementation of the act may not significantly change the existing relationship between the government and tribal people without substantive communication and downward accountability.

Secondly, technical facilitation for the proper utilization and maintenance of the given materials should be regularly provided by village development specialists. Forest officers may perceive that such village-development aspects are beyond their responsibility, hence, it would be necessary to cooperate with village development specialists. Cooperation with non-governmental organizations would be most favorable in places where such organizations are available, but if not, government officials in charge of rural development could also serve. Where official local autonomous bodies, such as *gram panchayat* in India exist, it is recommended that forest programs be incorporated into their activities. This improvement should also be implemented with particular attention paid to marginalized populations such as tribal people.

Lastly, collective forest-based activities should be gradually promoted so that beneficiaries gain a sense of ownership for forest resources as well as programs; this point is also particularly important for marginalized populations as they may be more dependent on NTFPs than other populations. Material benefit provisions can be a first step for inviting local participation, but should not remain as the dominant activity under a program. Of course, as shown in the present study, such collective enterprise activities may not be possible in every environment. However, at the very least, efforts for promoting such activities should be made.

Integrating these suggestions into forest co-management programs could lead to more effective and efficient implementation. Similarly, integrating these suggestions would also be relevant to the up-coming implementation of REDD+ (Reducing Emissions from Deforestation and Forest Degradation Plus), which will concern a number of forest-based and non-forest-based activities, similar to co-management initiatives in recent decades. No matter how sensational the concept, without proper effort at the implementation level, REDD+ may not produce the expected outcomes.

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References

- Abbot JIO, Thomas DHL, Gardner AA, Neba SE, Khen MW. 2001. Understanding the links between conservation and development in the Bamenda Highlands Cameroon. *World Dev.* 29:1115–1136.
- Arjunan M, Puyravaud JP, Davidar P. 2005. The impact of resource collection by local communities on the forests of the Kalakad–Mundanthurai Tiger Reserve. *Trop Ecol.* 46: 135-143.
- Arjunan M, Holmes C, Puyravaud JP, Davidar P. 2006. Do developmental initiatives influence local attitudes toward conservation?: A case study from the Kalakad–Mundanthurai Tiger Reserve, India. *J Environ Manage.* 79: 188-197.
- Bhattacharya P, Pradhan L, Yadav G. 2010. Joint Forest Management in India: experiences of two decades. *Resour Conserv Recycl.* 54: 469-480.
- Chhetri BBK, Lund JF, Nielsen OJ. 2012. The public finance potential of community forestry in Nepal. *Ecol Econ.* 73:113–121.
- Dhakai M, Masuda M. 2009. Local pricing system of forest products and its relations to equitable benefit sharing and livelihood improvement in the lowland Community Forestry Program in Nepal. *For Pol Econ.* 11: 221–229.
- FSI. 2011. State of forest report 2011. Dehradun: Forest Survey of India.
- Fujiwara T, Septiana RM, Awang SA, Widayanti WT, Bariatul H, Hyakumura K, Sato N. 2012. Changes in local social economy and forest management through the introduction of collaborative forest management (PHBM), and the challenges it poses on equitable partnership: A case study of KPH Pemalang, Central Java, Indonesia. *Tropics* 20: 115-134.
- GoI. 2001. Census of India 2001. Delhi: Government of India.
- GoI. 2011. Census of India 2011. Delhi: Government of India.
- Kerr J. 2002. Sharing the benefits of watershed management in Sukhomajri, India. In: Pagiola S, Bishop J, Landell-Mills N, editor. *Selling forest environmental services: market-based mechanisms for conservation and development.* London: Earthscan Publications. p. 63-76.
- Kerr J, Milne G, Chhotray V, Baumann P, James AJ. 2007. Managing watershed externalities in India: theory and practice. *Environ Dev Sustain.* 9: 263-281.
- Kumar R, Shahabuddin G. 2005. Effects of biomass extraction on vegetation structure,

- diversity and composition of forests in Sariska Tiger Reserve, India. *Environ Conserv.* 32: 248-259.
- Maryudi A, Devkota RR, Schusser C, Yufany C, Salla M, Aurenhammer H, Rotchanaphatharawit R, Krott M. 2012. Back to basics: Considerations in evaluating the outcomes of community forestry. *For Pol Econ.* 14: 1-5.
- Meinzen-Dick R, Knox A. 2001. Collective action, property regimes, and devolution of natural resource management: a conceptual framework. In: Meinzen-Dick R, Knox A, Di Gregorio M, editor. *Collective action, property regimes, and devolution of natural resource management: exchange of knowledge and implications for policy.* Feldafing: DSE/ZEL. p. 41–73.
- MoEF. 2006. *Measuring milestones: proceedings of the national workshop on Joint Forest Management (JFM).* New Delhi: Ministry of Environment and Forests.
- Ota M, Masuda M, Tani Y. 2013. The institutional design and effectiveness of timber benefit sharing under Joint Forest Management in Madhya Pradesh, India. *Small-scale For.* 12: 215-234.
- Pandit RH, Albano A, Kumar C. 2009. Community-based forest enterprises in Nepal: an analysis of their role in increasing income benefits to the poor. *Small-scale For.* 8: 447–462.
- Poffenberger M, McGean B, Khare A. 1996. Communities sustaining India's forests in the twenty-first century. In: Poffenberger M, McGean B, editor. *Village voices, forest choices. Joint Forest Management in India.* New Delhi: Oxford University Press. p. 17-55.
- Prasad R, Kant S. 2003. Institutions, forest management, and sustainable human development: experiences from India. *Environ Dev Sustain.* 5: 353-367.
- Ribot JC, Lund JF, Treue T. 2010. Democratic decentralization in sub-Saharan Africa: its contribution to forest management, livelihoods, and enfranchisement. *Environ Conserv.* 37: 35–44.
- Salafsky N, Wollenberg E. 2000. Linking livelihoods and conservation: a conceptual framework and scale for assessing the integration of human needs and biodiversity. *World Dev.* 28: 1421–1438.
- Saxena NC. 2002. Forests and the people: policy issues in Madhya Pradesh. In: Jha PK, editor. *Land reforms in India Volume 7: issues of equity in rural Madhya Pradesh.* New Delhi: Sage Publications. p. 337-359.
- Saxena NC. 2003. From monopoly to de-regulation of NTFPs: policy shifts in Orissa (India). *Int For Rev* 5: 168-176.
- Sethi P, Khan H. 2001. Structuring financial empowerment for localized development

within Joint Forest Management (JFM): examples from Madhya Pradesh, India. *Sustain Dev.* 9: 87-102.

Springate-Baginski O, Sarin M, Reddy MG. 2013. Resisting rights: forest bureaucracy and the tenure transition in India. *Small-scale Forestry* 12:107–124.

WCFD. 2006. Working plan for West Chhindwara Forest Division 2006-2007 to 2015-2016. Chhindwara: West Chhindwara Forest Division.

Table 1. Economic activities under forest co-management.

	Forest-based income generating activities	Non-forest-based income generating activities	Material benefit provisions
Resource basis	Forest		Non-forest
Body of conduct	Collective		External agencies
Examples from existing literature	<ul style="list-style-type: none"> • Timber production with official licenses • Benefit sharing from timber • NTFP enterprises • Lease for commercial use 	<ul style="list-style-type: none"> • Small-scale collective village industries 	<ul style="list-style-type: none"> • Village development materials or infrastructure • Seedlings for agroforestry or farm forestry • Employment opportunities for forestry operations • Loan opportunities
Distribution	Monetary benefits generated are pooled by a local organization and distributed to the organization's members, often in the form of village-development materials or infrastructure		Materials or opportunities are directly provided by an external agency
Linkage to conservation	Resource bases from which local users obtain future benefits are appropriately managed	Existing local dependence or pressure on forest resources may be mitigated	

Table 2. Basic characteristics of the sample 18 committees.

Aspects	Criteria	Ave.	Min.	Max.	Categories for chi-square or Fisher's exact tests
Demographic	Participant households	101.6	26	214	Small (<50): 3 (17%) Medium (50-100): 7 (39%) Large (100<): 8 (44%)
	Caste composition ^a	-	-	-	Tribal: 11 (61%) Mix: 4 (22%) Non-tribal: 3 (17%)
Geographical	Distance from nearest market (km)	3.9	0	15	Close (<1): 4 (22%) Medium (1-5): 8 (44%) Far (5<): 6 (33%)
	Landscape	-	-	-	Hilly: 8 (44%) Plain: 10 (56%)
Ecological	Area of assigned forest (ha)	379.3	234.7	676.6	Small (<300): 4 (22%) Medium (300-400): 8 (44%) Large (400<): 6 (33%)
	Forest type ^b	-	-	-	Teak: 8 (44%) Miscellaneous: 10 (56%)
	Forest area per household (ha)	4.8	1.4	16.8	Small (<3.0): 4 (22%) Medium (3.0-5.0): 8 (44%) Large (5.0<): 6 (33%)

^a Where the ratio of tribal households to the total participant households is more than 70%, tribal; 30%-70%, mix; and less than 30%, non-tribal.

^b Where more than 40% of the assigned forest is teak according to the information in WCFD (2006), teak; otherwise miscellaneous

Table 3. Economic activities ever undertaken by the sample 18 committees.

		Kinds of activities	Number (n=18)	%	
Forest-based income generating activities	Timber	(1-1) Timber benefit sharing	18	100.0	
		(1-2) Grass tenders	7	38.9	
	NTFPs	(1-3) Custard apple tenders	2	11.1	
		(1-4) Mahua flower tenders	1	5.6	
		(1-5) Purchase and sale of NTFPs by the committee	2	11.1	
		(1-6) More than one NTFP-based income generating activity	9	50.0	
		(1-7) More than one forest-based income generating activity	18	100.0	
Non-forest-based income generating activities	(2-1) Making of small commodities	3	16.7		
	(2-2) Honey collection	3	16.7		
	(2-3) Fish cultivation/ pond lease	2	11.1		
	(2-4) More than one non-forest-based income generating activity	5	27.8		
Material benefit provisions	Reducing dependence on firewood	(3-1) LPG facilities	2	11.1	
		(3-2) Bio-gas facilities	4	22.2	
		(3-3) Smokeless ovens	6	33.3	
		(3-4) Pressure cookers	3	16.7	
		(3-5) Seedlings for private land	17	94.4	
		(3-6) More than one material for reducing dependence on firewood	18	100.0	
	Increasing agricultural productivity	(3-7) Irrigation facilities	7	38.9	
		(3-8) Drinking water facilities	9	50.0	
		(3-9) Roads	2	11.1	
		Improving quality of life	(3-10) Buildings	13	72.2
			(3-11) Others	12	66.7
			(3-12) More than one material for improving quality of life	17	94.4
			(3-13) Labor opportunities	18	100.0
		(3-14) More than one material benefit provision	18	100.0	

Table 4. Activities that showed statistical associations with caste composition in chi-square tests.

Activity	Ever undertaken	Tribal (n=11)	Mix (n=4)	Non-tribal (n=3)	χ^2	<i>df</i>	P-value																																
(1-2) Grass tenders	Yes	1	4	2	11.37	2	0.003																																
	No	10	0	1				(1-6) More than one NTFP-based income generating activity	Yes	3	4	2	6.606	2	0.037	No	8	0	1	(2-1) Making of small commodities	Yes	1	0	2	6.655	2	0.036	No	10	4	1	(2-2) Honey collection	Yes	1	0	2	6.655	2	0.036
(1-6) More than one NTFP-based income generating activity	Yes	3	4	2	6.606	2	0.037																																
	No	8	0	1				(2-1) Making of small commodities	Yes	1	0	2	6.655	2	0.036	No	10	4	1	(2-2) Honey collection	Yes	1	0	2	6.655	2	0.036	No	10	4	1								
(2-1) Making of small commodities	Yes	1	0	2	6.655	2	0.036																																
	No	10	4	1				(2-2) Honey collection	Yes	1	0	2	6.655	2	0.036	No	10	4	1																				
(2-2) Honey collection	Yes	1	0	2	6.655	2	0.036																																
	No	10	4	1																																			

Table 5. Basic characteristics and knowledge of JFM among interviewed households.

		Rajolamal (tribal)	Talpipariya (non-tribal)
	Year set-up	1995	1992*
Characteristics of the committee	Allocated forest area (ha)	676.6	348.0
	Number of households	136	98
	Forest area per household (ha)	5.0	3.6
Characteristics of the interviewed households (n=40)	% of the household head having graduated primary school	22.5	72.5
	Average private land owned (ha)	1.5	2.2
	Average irrigated land owned (ha)	0.2	1.0
	Average number of trees on private land	12.7	49.0
	Average annual gross income (Rs.) **	20,180	57,909
Knowledge of JFM among the interviewed households (n=40)	% of the households who know about timber benefit sharing	7.5	50.0
	% of the households who know about NTFP tenders	52.5	82.5
	% of the households whose members have ever joined forestry operations as wage labor	92.5	57.5

* Registered in 1996 in the document provided by the West Chhindwara forest division

** A year equals June 2009 to May 2010, 1 US Dollar was 46.6 Indian Rupees in 2011

Table 6. Conditions of provided materials.

	Rajolamal			Talpipariya		
	Material	Number	Condition	Material	Number	Condition
Reducing dependence on firewood	Smokeless oven	Unknown	Broken	LP gas facility	10	Continued (8 HHs)
				Bio-gas facility	5	Continued (3 HHs)
				Smokeless oven	60	Broken
Increasing agricultural productivity	Motor pump (irrigation)	2	Broken	Dam (irrigation)	1	Broken
	Warehouse	1	Continued	Primary school	1	Continued
Improving quality of life	Thresher	1	Broken	Community hall	1	Continued
	Sewing machine	1	Broken	Tube well	1	Broken
	Tube well	2	Broken	Dam (water for cattle)	3	Continued

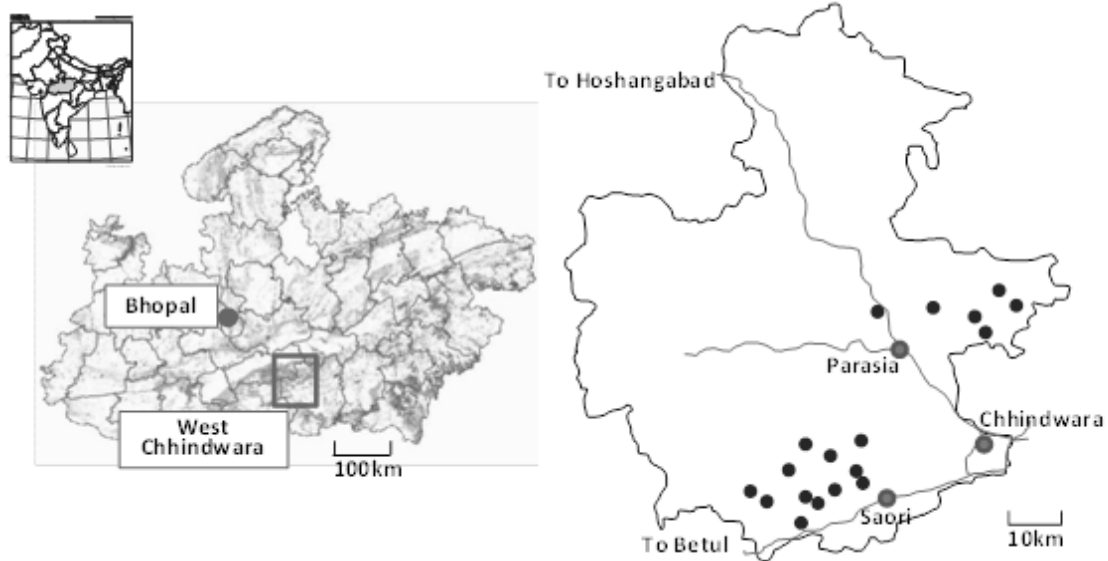


Figure 1. Location of the state of Madhya Pradesh and West Chhindwara Forest Division, with locations of the 18 selected committees.

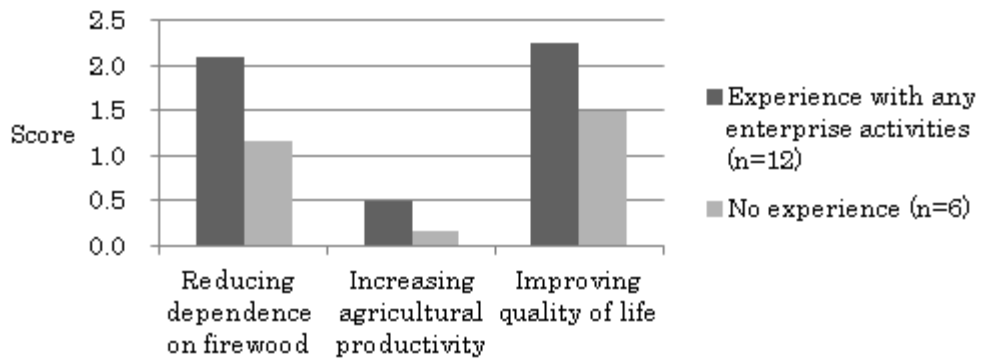


Figure 2. Relationship between the experience of income generating activities and amounts of material provision.

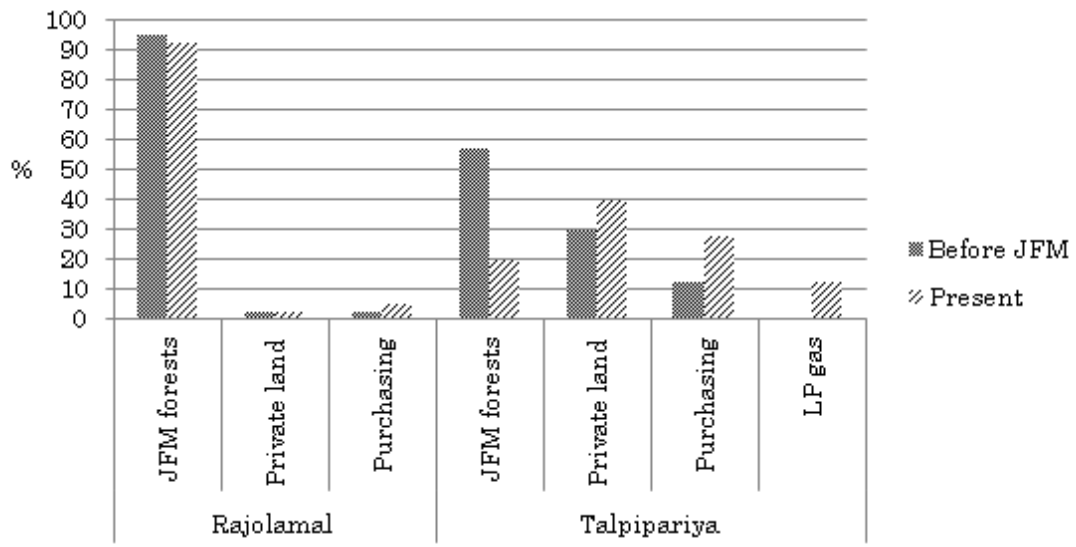


Figure 3 Changes of primary energy sources among households (n=40).