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Review Article

Change We can Believe in? Reviewing Studies on the Conservation Impact of Popular Participation in Forest Management

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Abstract

This article presents a review of methods in 60 empirical studies on forest conservation impact of popular participation in forest management. The review illustrates a high degree of variance in methods among the studies, and shows that a majority of the studies could benefit from a stronger focus on one or more of the following three areas: (i) the empirical verification and characterisation of popular participation as it exists on the ground, (ii) the indicators of impact and the method used to assess them, and (iii) the disentanglement of the effect of popular participation from other developments in the study area that may impact on forest condition. The variation in methods inhibits comparisons and meta-analyses, as well as questions the basis on which policy recommendations on popular participation in forest management are made. Based on the review, we provide recommendations for future evaluations of the conservation impact of popular participation in forest management.

Keywords: participation, community, conservation, forest, impact evaluation, methods

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INTRODUCTION

Popular participation in the management of forests is an important policy in developing countries. Popular participation signifies peoples' participation in the management of the forests they live in and around, and, hence, includes many of the management regimes entitled decentralized forest management, participatory forest management, joint forest management, community-based forest management, indigenous forestry, and social forestry found around the world. At least 35 developing countries are officially engaged in promoting some form of popular participation in forest management, and recent estimates on the share of the World's natural forests officially managed, with some degree of popular participation, range around 10 to 12 percent (Sunderlin *et al*. 2008). However, these estimates probably fail to capture the large share of the World's forests that are officially managed exclusively by the State, but where local communities and private individuals are the *de facto* managers. Hence, the importance of popular participation to the fate of the World's forests is larger than what appears in the statistics.

At the inception of the latest wave of promoting popular participation in the management of forests, in the 1970s, the primary objective was to promote forest conservation. Since then, the scope has been widened to encompass rural poverty alleviation and improvement of livelihoods, as well as, more recently, promotion of good governance and democracy in local communities (Ribot *et al*. 2009). The objective of forest conservation, however, remains important.

The global significance of the trend of promoting popular participation in forest management has implied that a good number of studies to evaluate its impacts have been conducted. These studies are potentially an important source of information for development agencies, national policy makers, implementing agents, and scholars on where, how, and under what conditions popular participation in forest management is feasible, or perhaps the superior approach to forest conservation.

The majority of studies evaluating the impact of popular participation in forest management are case studies of relatively limited coverage, in terms of variation in biophysical and institutional settings. Hence, broader analyses of the conditions under which popular participation in forest

management is feasible, or perhaps the superior approach to forest conservation, require comparisons or meta-analyses of the case studies. Efforts at such comparisons, meta-analyses and drawing of general and broader conclusions are, however, impeded by a number of generic and idiosyncratic problems in the individual case studies. Generally, the body of studies is characterised by a large heterogeneity in the methods. Furthermore, some of the studies provide scarce information about the context and methods, implying that it is difficult to assess the validity of their findings and generalise on that basis.

This issue is exactly the point of departure for this article. We will provide an analysis of the methods and findings of the body of empirical studies that evaluate the impact of popular participation on forest conservation as reported in articles, in (mainly) peer-reviewed and international journals, with the aim of suggesting good practice for the future studies. Specifically, we will aim at answering the following questions:

1. How do studies that evaluate the impact of popular participation on forest conservation differ in terms of methods?
2. How do these differences affect the opportunities for comparisons and meta-analyses?
3. What general recommendations and directions for future research can be made with regard to the methods?

The article proceeds as follows. First, we describe the analytical framework for the review. Second, we outline the method of the review. Third, we present the results of the review. Fourth, we conclude and provide recommendations for future impact evaluation studies.

ANALYTICAL FRAMEWORK

The analytical framework for the review focuses on three issues of key importance for establishing the causal link between the policy (popular participation) and the policy impact (forest conservation). First, we will review how the studies investigate and describe the nature of the *policy* and the degree to which it is actually reflected on the ground in the study area. This aspect is interesting for at least two reasons. First, there is a tendency for popular participation in forest management to be described in dichotomous terms; either management is participatory or it is not. There is, however, a huge variation in the institutional setups on the ground. Second, several studies have documented that popular participation in forest management does not exist in areas that are officially designated as managed under such a regime (Ribot 2004) and vice versa (Benjamin 2008). In addition to the *policy*, we will investigate the studies' indicators of, and approach to, the empirical investigation of the *policy impact*, that is, the outcome in terms of forest conservation. Forests provide multiple products and services to multiple actors, and we will explore the degree to which the studies selected as indicators of forest conservation reflect this variation. In addition, we will evaluate the approaches to the empirical investigation or measurement of these indicators in an attempt to draw out recommendations about efficient methods. Finally, we will investigate how the studies have dealt with the issue of *disentanglement*, that is, the unravelling of rival explanations for the observed differences to that of the policy. This aspect is a basic enquiry in research that seeks to discern an effect of a 'treatment', that is, to differentiate between causality and correlation. Our approach to the review is inspired by the approach to studies of decentralised natural resource governance suggested by Andersson & Gibson (2006) and the thoughts on impact evaluation approaches presented by Ferraro (2009).

We will assess the studies' investigations of the *policy*, that is, popular participation, by posing the following questions: How do studies investigate and characterise popular participation as it appears on the ground in the study area? Do the studies empirically investigate the nature of popular participation or simply assume that it exists? A number of studies have demonstrated that even though forest areas may officially be designated as managed by popular participation approaches, the situation on the ground can look quite different (Ribot 2004, Benjamin 2008). On the other hand, popular participation may exist in relation to management of forests under different tenure regimes, as described by Poteete & Ostrom (2004:437), who note that "Communal management, for example, occurs when governments grant villagers formal control, but also when local residents exercise *de facto* control in the absence of formal rights." We will look for three characteristics of popular participation in the studies. First, we will look for descriptions of the degree of local collective action on forest management. In characterising the degree of local collective action we will follow the approach of the International Forestry Resources and Institutions (IFRI) programme, by investigating whether there is a local forest management group, rules governing access and appropriation from the forest, and the degree to which these rules are enforced.[1] We believe that the degree of local collective action on forest management is the primary manifestation of the existence of popular participation, and hence, a critical assumption for studies that seek to investigate any effects of such participation. Second, we will review the studies' description of the powers wielded at the local level. This is particularly important given that numerous studies show that the autonomy of local managers in many areas is severely constrained by rules and oversight by higher levels of the State (Oyono 2005, Behera & Engel 2006, Blaikie 2006). It is relevant to know whether the observed outcomes are a result of rules and management decisions made at the local level or simply implementation of directives and instructions from above. Following Agrawal & Ribot (1999) we will review the studies' descriptions of powers by looking at the powers to: Make rules; make decisions; implement[2] decisions and enforce rules and; adjudicate conflicts. Finally, we will look for descriptions of the local managers' accountability relations. Is management discretion in the hands of local elite who disregards the interests of the community? Such cases do not, in our view, merit the designation popular participation. Finally, accountability relations also matter to the incentives facing the local community. If the community is free to manage the forest as it pleases, that is, there are no State-

enforced conservation requirements, then it may consciously decide to overexploit or even convert the forest, for alternative land uses. Conversely, where the State can reassume authority over forests if they are being overexploited, the managing communities face entirely different incentives.[3]

We will investigate the *policy impact* by looking at the studies' choice of indicator of impact and empirical investigation of the chosen indicator. The indicator is concerned with the expected effect of the policy on the forest, that is, which forest areas are expected to be preserved (areas actually targeted by the policy or all forests in the area), and which forest characteristics are expected to be preserved or enhanced (biodiversity, productive value (timber species and diameter distribution), standing stock, forest cover). In our view, there are several important aspects to the indicators of policy impact. First, what is the policy target? Some studies compare Land-Use/Land-Cover Changes (LULCC) in entire watersheds or regions, with and without popular participation in forest management, to see if those with popular participation experience less overall deforestation over time. As argued by Andersson and Gibson (2006), there is little reason to expect popular participation to solve deforestation problems outside the forest areas designated for conservation.[4] Hence, the criterion may better be confined to cover areas that are actually targeted for conservation under participatory management regimes. Second, what is a good and relevant indicator of forest conservation? LULCC studies mainly show changes in land cover, whereas, qualitative changes in the forest, that is, changes in diameter and species distribution of trees and changes in the composition of the understory vegetation, cannot be discerned. This leaves us with little information about what is actually being conserved, as the value of a forest in economic and ecological terms may be heavily depreciated, while the forest cover is maintained. Third, what is a realistically verifiable indicator of forest conservation given the vast areas concerned, the often low-value nature of the forests, and the resource constraints faced by the managing communities and the Forest Departments in charge of verifying the quality of management? Most forest legislations carry provisions on re-centralisation in the case of mismanagement — usually defined in ecological terms. Such re-centralisations have taken place in numerous instances, but often without empirical basis (Ribot *et al*. 2006). Research on popular participation should, among other things, provide mutually agreed upon data on forest condition and development that can be used in negotiations between the local and central levels. Such research should, in our view, also seek to develop indicators and measurement procedures that can be carried out on a larger scale by both local communities and Forest Departments given the limited resources under their command. We will review the available body of research to identify what indicators have been chosen, for example, LULCC and standing stock, and how these have been measured, for example, remote sensing and inventory.

We will investigate *disentanglement* by looking at how the studies seek to isolate the effect of popular participation in forest management by accounting for other policies (Eg., agricultural development and land-use policies) or developments (Eg., tree planting on farm land) that could mimic or mask the impact of popular participation[5]. First, we will look at the counterfactual of the studies, that is, that which change or difference is measured against. Then we will investigate whether any policies or developments that could potentially swamp the effects of popular participation are addressed in the studies. An important issue here is how studies have dealt with the potential problems of biases arising from sampling of forests to be studied among a population of forests that have previously been selected for implementation of popular participation, for example, when working in project areas. Even if one is selecting a random sample of forests within the population of forests where popular participation in forest management has been implemented, there is a risk of bias as the implementation itself may have focused on forests that were already managed or are in good/bad condition. In such cases, any observed "impact" could be due to confounding factors, that is, other factors about the communities that led to their selection for implementation in the first place and that also affect forest quality and development (see Ferraro 2009 for a good discussion of this issue). This issue is, of course, less relevant to areas where popular participation exists as a consequence of long-standing local developments — which is the case in many of the Latin American countries — or areas where popular participation has spread to the majority of the forests, for example, in Nepal.

MATERIALS AND METHODS

The literature review covers mainly articles in peer-reviewed journals. The literature search was initiated in the bibliographic database Web of Science, using the search criteria: 'local; participation; community; decentralised; indigenous; village; common; joint" that were combined with "forest; woodland'. The review was then expanded with any relevant studies referred to in the articles identified in the initial search as well as studies identified through the authors' collegial networks. The main inclusion criterion was that the article had to report empirical data on forest management or conservation aspects from a forest area managed with some degree of popular participation — encompassing local management setups formally supported by legislation or existing in spite of the legislation, but in lieu of low enforcement efforts by the State.

Empirical data, in this context, are understood as information collected through a structured method that is reported in the article. Hence, articles that casually pass a comment on the sustainability of forest management have not been included (Klooster & Masera 2000, Bray *et al*. 2002, Matta *et al*. 2005, Southwold-Llewellyn 2006), whereas, articles with weak empirical bases, for example, basing assessment of forest condition on a few rapid rural appraisal exercises, have been included when the method has been described in the study (Eg., Chakraborty 2001, Misra & Kant 2004, Bajracharya

et al. 2006). The same definition of empirical data is used to assess whether or not the studies have empirically investigated key parameters in relation to the policy, policy impact and disentanglement. As the focus of this article is the methods applied by the studies, meta-studies such as Gibson *et al*. (2005), Hayes (2006), and Nagendra & Gokhale (2008) have also been excluded. On the other hand, studies that do not conclude whether popular participation leads to forest conservation or not (because they lack a baseline or control for comparison), but focus more on specific conditioning variables affecting the likelihood that popular participation leads to forest conservation (Antinori & Rausser 2007, Benjamin 2008), have been included for the analysis. This is because the focus of this article is on methods rather than assessing the link between popular participation and forest conservation *per se*. Finally, only articles in English speaking journals have been reviewed. Although we cannot claim to have made a complete review of all potentially relevant studies, we believe we have covered enough ground to be able to provide an analysis that reflects the status of this research area. The results of some of the empirical studies are repeated in more articles and some articles report more than one empirical study.[6] Accordingly, for the purpose of descriptive statistics, we have chosen to focus on empirical studies rather than the research articles reporting them. The list of articles (n 57) reporting the empirical studies (n 60), upon which the descriptive statistics in the review are based, is given in Appendix 1.

The sample contains studies from a mere 12 countries. Nepal (20), India (15), and Mexico (8), dominate the sample in terms of number of studies. These three countries feature some of the oldest and most prominent processes of popular participation in forest management. Apart from Tanzania (5), Honduras (3), and Brazil (3), the remaining six countries are represented with one study only (Bolivia, Guatemala, Indonesia, Malawi, Mali, the Philippines). Hence, it seems fair to say that empirically based research (as appearing in peer-reviewed articles) on the contribution of popular participation to forest conservation is relatively scarce[7]. We do, however, recognise the drawbacks in our literature search, particularly owing to our exclusive focus on English speaking journals, implying potential biases in relation to the representation of studies from the Latin American countries that may have been published in Spanish or Portuguese.

RESULTS

The Policy

Table 1 shows the combinations of the studies' choice of indicators of policy impact and empirical investigation of the policy. The table shows that 18 (30%) of the 60 empirical studies have not empirically investigated any of the three characteristics of popular participation in forest management, implying that any conclusions on the presence of popular participation as well as any difference between treatment and control sites rest on either empirical findings in other studies or on pure assumption.

The accountability pattern receives the least focus of the three characteristics of popular participation in forest management. This is not surprising, as this aspect receives less attention in the theoretical studies on popular participation than the other two (Ostrom 1990, Agrawal 2001).[8] In addition, empirical investigation of accountability patterns may be more difficult and resource demanding than the other two. While the degree of local collective action and powers devolved can often be traced through written documentation or investigated by a few questions, the hidden and sensitive nature of accountability makes it a more challenging object of investigation. We do, however, maintain that accountability matters to empirical investigations of the contribution of popular participation to forest conservation. Local communities can be highly empowered and show high levels of collective action, while the elites favour the interests of large-scale timber contractors or farmers over those of the broader local community. In such circumstances, the policy of popular participation may lead to deforestation, but it could be questioned whether it is proper to judge popular participation on the basis of such a case. Besides, more attention to the issue of accountability would improve our understanding of how accountability affects forest conservation in forests managed by popular participation.

Fourteen empirical studies have investigated all three policy characteristics. Among them are five of the studies employing the method developed by the IFRI Programme at Indiana University[9] (Schweik *et al*. 1997, Gautam & Shivakoti 2005 (reported twice), Nagendra *et al*. 2005, Balooni *et al*. 2007). Twelve[10] of the 14 studies are case studies focusing on a few (11 or fewer) local management units, but Conroy *et al*. (2002) and Antinori & Rausser (2007) with 43 forests

Table 1

The studies' indicators of policy impact and empirical investigation of popular participation

Indicator of policy impact	Studies in sample	Collective action	Local powers	Accountability pattern	All three characteristics	None of the characteristics
LULCC	19	8	7	1	1	9
Forest condition	10	9	5	5	4	1
Multiple indicators	24	16	10	8	8	7
Standing stock	2	2	1	1	1	0
Other	5	4	1	0	0	1
Total	60	39	24	15	14	18

and 44 management units in their samples, respectively, have managed to do a relatively detailed investigations of the policy, while covering more ground. In the case of Antinori & Rausser (2007) the empirical data on whether important decisions in the communities are taken by the community authority, general assembly or forest officers, as well as institutional preparedness for fire prevention, in our view constitute proxies for local collective action, powers devolved, and accountability. Accordingly, an investigation of the policy does not necessarily imply weeks of field work in each community, although we acknowledge that the use of crude indicators to investigate the policy carries a risk of not reflecting the realities on the ground, and impedes a more thorough understanding of how the variables shape the outcomes.

Generally LULCC studies pay less attention to the policy.[11] This makes sense as LULCC studies usually cover large areas encompassing many local management units. Hence, empirical verification of the policy is resource demanding. Six LULCC studies do, however, characterise both the degree of local collective action and the degree of powers devolved (Schweik *et al*. 1997, Gautam *et al*. 2004, Andersson and Gibson 2006, Dalle *et al*. 2006, Ellis & Porter-Bolland 2008, Nagendra *et al*. 2008). Gautam *et al*. (2004) used a very resource-efficient approach to characterise the degree of collective action, by asking leaders of forest user groups and district forest officers to characterise forests as community forests, semi-government forests (with some *de facto* local management), and government forests (State control and no local management) while looking at maps. Dalle *et al*. (2006) shows how the quantification of LULCC, through remote sensing, can be combined with a more in-depth investigation on the ground, including interviews on land tenure systems and their historical developments, to yield a convincing analysis of the driving factors of the development in a forest condition.

The review has shown that the vast majority of studies do pay attention to the issue of the policy, that is, there is a high degree of integration of disciplines in the studies, which we find encouraging. We do, however, believe that more detailed assessments of the policy and, not in the least, the history of local management in the study areas, would be beneficial to our learning from the experiences with popular participation. Although the studies that portray popular participation in forest management in dichotomous terms provide evidence that popular participation in their particular case is inferior/superior to the tenure regime it is compared with, they do not allow for much learning about why, under the specific conditions, popular participation produced the observed outcome. Some of these studies do, however, provide such analyses when seeking to disentangle the policy effect from other developments in the study area, which we will return to later in the article.

The Policy Impact

Table 2 shows the 60 empirical studies' choice of indicators of policy impact and methods to measure the indicators. There is a huge variation in both.

The LULCC studies cover up to hundreds of thousands of hectares, but usually do not provide details beyond changes in forest cover (Semwal *et al*. 2004, Wakeel *et al*. 2005). The multiple indicator studies usually cover much smaller areas and provide detailed investigations of multiple indicators of changes in the forest condition, for example, species count, basal area, standing stock, diameter class distribution, forest condition, density of saplings, count of cut stems, herbaceous ground cover, shrubs and species diversity index (Gautam & Shivakoti 2005, Rao *et al*. 2006, Tiwari & Kayenpaibam 2006, Balooni *et al*. 2007, Sauer & Abdallah 2007). Finally, the perception-based and validated perception-based methods base estimates of the status and/or development in forest condition (or indicators of forest condition) on peoples' perceptions elicited through interviews, surveys, or Participatory Rural Appraisal (PRA) techniques (Agrawal & Yadama 1997, Chakraborty 2001, Conroy *et al*. 2002, Adhikari & Lovett 2006, Bajracharya *et al*. 2006, Dahal & Capistrano 2006). We believe that the balancing of scale versus detail should be done in due consideration of the objectives and context of the individual studies. An example may illustrate the point. The majority of LULCC studies from Mexico only look at changes in the distribution of coarse land-use/cover categories. However, a few studies have looked into the differences in crown cover as a proxy for forest quality (Wakeel *et al*. 2005). This level of detail may, however, conceal quite important changes in the quality of forests, in terms of, for example, economic value, and a number of studies have argued that although *ejido* forestry seems successful in maintaining forest cover (Bray *et al*. 2004, Durán-Medina *et al*. 2005, Dalle *et al*. 2006, Ellis & Porter-Bolland 2008), it is questionable whether the value of the forest has been maintained, due to a relatively short timber logging rotation period of mahogany (*Swietenia macrophylla*) that constitutes the high-value economic backbone of the *ejidos* (Turner II *et al*. 2001, Durán-Medina *et al*. 2005). In other contexts, such as East African dry miombo woodlands that supply charcoal and firewood to local and regional markets, the relatively broad array of species used and low economic value of the resource implies that ocular or remote sensing assessments of the forest status and development may suffice.

An important finding of the review is that impact can be measured on variables that act as intermediaries between management setup and forest condition, such as rule conformance (Antinori & Rausser 2007) and illegal deforestation (Andersson & Gibson 2006). While Antinori & Rausser (2007) and Andersson and Gibson (2006) cannot establish a statistically significant relationship of popular participation to the actual forest condition, they find significant relationships between popular participation and these intermediary variables. This underlines one of the inherent difficulties facing studies on the contribution of popular participation to forest conservation; the biophysical nature of forests implies long delays from change in management until results can be measured. A further complication is that forest condition may be affected by a plethora of other factors,

Table 2
The studies' indicators of policy impact and methods to measure the indicators

Method Indicator	Remote sensing	Inventory	Perception-based	Validated perception-based	Other	Total
LULCC	19	0	0	0	0	19
Forest condition	0	0	7	1	2	10
Multiple indicators	0	14	2	8	0	24
Standing stock	0	2	0	0	0	2
Other	0	1	3	0	1	5
Total	19	17	12	9	3	60

implying that the disentanglement of the policy impact can be difficult — an issue we shall return to later. Hence, including intermediary variables in studies may allow for shorter delays between management change and evaluation, as well as assist in unravelling the causal factors. Other studies using intermediary variables to evaluate the impact of popular participation on forest management include Lund & Treue (2008), who use evidence of control with utilisation and changes in forest management practices to argue for the superiority of local management to more centralised management setups in their case study area.

Andersson & Gibson (2006) use their findings to stress that popular participation in forest management should not be expected to do more than what it is created for. Hence, if the mandate of the local forest managers is limited to one forest area only, spill-over effects into the neighbouring state-managed (open-access) forest is to be expected. Whether increased restrictions lead to the spill-over effects is an empirical question.[12] Some studies in our sample do find spill-over effects (Chakraborty 2001, Balooni *et al*. 2007), whereas, others find that the increased control with forest utilisation and pricing of forest values through local licensing and taxation systems induce efficiency in resource use and/or changes in livelihood strategies away from the dependence on forest products at the local level. Among the studies in our sample, Edmonds (2002) and Sauer & Abdallah (2007) show higher efficiency in use of firewood for subsistence and inputs in agriculture, respectively, whereas Conroy *et al*. (2002) and Kumar (2002) find that some people switch to other, less forest-based, livelihood options.

Finally, we wish to address the issue of validity of the perception-based and validated perception-based methods and what variation in approach these terms cover. These approaches are used in more than one-third of the studies, and we argue that they carry some inherent risks. First, what exactly are people asked to evaluate? The word forest condition could mean anything to anybody, and if more detailed criteria are employed, are they then coherent? Meshack *et al*. (2006) for instance used forest cover/forest regeneration as one criterion although it covers two very distinct things. Second, who is evaluating and do we have good reasons to believe that the answer is both informed and sincere? In a majority of the studies, one (sometimes the only) respondent group is the local management authority, which may have been sensitised about the value of conservation during implementation and, almost invariably, stand to lose the management authority if the forest is over-exploited[13]. Hence, there are many and good reasons to expect strategic answers from this group. A way to increase trust in the validity of perception-based evaluations is to do triangulations, that is, asking different individuals or groups to evaluate the same criteria to see if the answers match. A number of the perception-based studies have done so. Some have triangulated the perception-based assessments by asking both forest officers and communities, checking management plans and other records, and doing forest walks, but have generally not reported the results of this triangulation and how the different estimates have been combined to yield the final estimate (Eg., Conroy *et al*. 2002, Bajracharya *et al*. 2006,[14] Antinori & Rausser 2007).

As our definition of the validated perception-based assessment method implies that the perception-based estimate is supported by some kind of inventory, the studies using this method, by definition, perform triangulation. Of the nine validated perception-based studies, we found that four (reported in three articles) compare the perception-based and inventory results. Varughese & Ostrom (2001) asked the perceptions of villagers and forest officers about forest condition development in 18 forests: worsening, stable, and improving, and validated the assessment of forest condition development in six forests by repeated inventory methods[15]. In three of the six sites, two approaches yielded similar results. In all the six cases, the changes in the standing volume, regeneration, and understory of the forests, as revealed by the repeated inventories, are quite distinct (Varughese & Ostrom 2001). This, we believe, should cater for higher accuracy of the perception-based method than what was actually achieved, which to some degree questions the validity and applicability of the perception-based method as applied in this particular study. In their comprehensive study of 95 forests in India, Agrawal & Chhatre (2006) used the average of the perceived value of forest condition (on a scale from one to five) by six groups (including the enumerator group), and validated these perceptions by forest plot data for 30 forests with stem density and tree diameter. They found a correlation of 0.68 between the perceived value and forest plot data. Gautam & Shivakoti (2005) analysed local forest users - 'perceptions, of changes in forest conditions in terms of density of trees, shrubs and ground cover, and forest area, in two locations in

Nepal, during the previous five years, along with the forester's appraisal of forest condition, in terms of vegetation density, species diversity, commercial values and subsistence value which indirectly supports the users' perceptions. They have further validated these perceptions by collecting botanical data (average basal area of trees, average density of trees and saplings, and species richness) through forest inventories from randomly selected forest plots in the two locations. Gautam & Shivakoti (2005:160), however, conclude that the "inconsistent patterns in the value of the dependent variables" preclude any firm conclusions about the relative condition of the forests.

Disentanglement

As mentioned, we have focused on exploring the studies' choice of counterfactual against which the forests managed under popular participation are evaluated, as well as investigating how the studies seek to account for the potential confounding factors that could be (partly) responsible for any observed impacts. Table 3 shows that the majority of the studies use Spatial, Temporal, or a combination of the two as their counterfactuals. Some of the studies in the Spatial category include the dynamic aspect of conservation by eliciting peoples' perceptions of the development in the forest condition, that is, in addition to the snap-shot status of forest condition, we get an idea of whether it is improving or deteriorating over time (Varughese & Ostrom 2001, Nagendra 2002, Nagendra *et al*. 2005, Gautam 2007). We argue that the combination, where the policy impact of popular participation is assessed both against forests under other tenure arrangements (Spatial), for example, central or local government forest reserves, national parks, open-access forests or similar, and over time (Temporal) provide the most convincing analysis, as this ensures both an evaluation against forests managed under alternative regimes, but under comparable conditions, and that the dynamics of conservation is captured by measurements over time. With respect to the comparison with forests under alternative regimes, we have found much variation in tenure and the enforcement of tenure in the forests under alternative regimes, against which popular participation is assessed, ranging from forests under active management, for example, forest reserves and other protected areas to more or less open-access regimes. Evidently, this variation has implications for comparisons and meta-analyses, as we would expect the relative performance of popular participation to vary between the cases. Hence, the tenure situation of both 'treatment' and 'control' forests should be investigated and reported in the studies. Furthermore, it is not always clear from the studies whether the comparison is "fair" in the sense of an equal pressure on the forests for deforestation and forest degradation. The approach taken by Nepstad *et al*. (2006) who compared deforestation and fire occurrence along the inside and outside of the borders of four types of 'protected' or managed areas in Brazil, solves this problem by using a relative measure (deforestation inside/ deforestation outside) to compare the performance of the different management regimes.

Only six studies compare the performance of the popular participation regime to a baseline scenario, usually based on a combination of empirical data and authors' speculations. This could, however, be due to the eligibility criteria for the review, as many studies using these types of counterfactuals do not explicitly account for their methods, and, hence, have not been included in the review. Three of the six studies using baseline scenario compare with prior popular participation regimes. Palmer & Engel (2007) ask people to compare various indicators of environmental costs of firms' logging operations before and after decentralisation. Zulu (2008) asks people to compare forest utilisation and development with the scenario prior to implementation. As with the perception-based policy impact evaluation, this approach of addressing disentanglement requires that respondents have a correct knowledge about the change in forest condition and that they do not give strategic answers. Lund & Treue (2008) assess the change in management and control with utilisation rather than forest condition and development *per se* from the situation before implementation, using interviews and earlier studies on centralised (district) forest management, thereby avoiding asking people difficult questions, such as how forest condition or environmental damages associated with logging have developed over time.

Of the 10 studies in the category none, implying that the study does not evaluate against any counterfactual, five are large-N studies, concerned with factors affecting forest conservation in forests managed under popular participation (Agrawal & Yadama 1997, Misra & Kant 2004, Perez-Cicera & Lovett 2005, Agrawal & Chhatre 2006, Antinori & Rausser 2007). Although these studies certainly contribute to enhancing our knowledge on the factors affecting the chances of forest conservation in forest managed by popular participation, they do not present a counterfactual against which the performance of the management strategy can be evaluated. Two of the studies, however, find a correlation between forest condition and the degree of collective action or the time passed since initiation of the popular participation regime, both of which could be taken as indicators of the degree of popular participation[16] (Agrawal & Yadama 1997, Agrawal & Chhatre 2006).

This leads to a discussion of disentanglement, that is, how studies seek to account for or discuss other developments within the treatment sites and differences between the treatment and control sites that could cause the observed changes or differences. Two-thirds of the 60 empirical studies address disentanglement in one way or another. All 19 LULCC studies address disentanglement. LULCC studies, per definition, assess larger landscape changes and may thus be more sensitive to other changes than a policy affecting the management of the forest only. In the other categories, approximately half of the studies address disentanglement. A number of studies that ignore the aspect of disentanglement may do so because they do not have the contribution of popular participation to forest conservation as their primary focus (Misra & Kant 2004, Adhikari & Lovett 2006, Bajracharya *et al*. 2006, Dahal &

Table 3
The studies' choice of counterfactual and whether or not disentanglement is addressed

Indicator of policy impact	Number of studies	Counterfactual					Addressing disentanglement
		Spatial	Temporal	Spatial & Temporal	Baseline scenario	None	
LULCC	19	1	8	10	0	0	19
Forest condition	10	4	0	0	2	4	5
Multiple indicators	24	11	3	4	2	4	14
Standing stock	2	1	0	1	0	0	0
Other	5	1	0	0	2	2	2
Total	60	18	11	15	6	10	40

Capistrano 2006, Meshack *et al*. 2006, Sauer & Abdallah 2007, Thoms 2008). A few of the other studies that do not attend to the issue of disentanglement are studies merely reporting the results from forest inventories and published in a less renowned journal (Aggarwal *et al*. 2006, Ravindranath *et al*. 2006, Sudha *et al*. 2006). Hence, the vast majority of studies that report the contribution of popular participation to forest conservation as their primary focus do attend to the issue of disentanglement, albeit to varying degrees. Many studies pass a casual comment on the potential effect of project support, population growth, distance to markets, changing farming practices and biophysical characteristics of the study site. Others provide thorough descriptions and assessments of the history of the study site. Finally, a number of large-N studies include some of the mentioned variables in regression analyses. We argue that studies should pay attention to potential confounding factors behind the observed impact, for example, the history of land-uses, population density and development, distance to markets, biophysical characteristics of the forest, project support and land-use policies and practices, to further our understanding of when, where and how popular participation can assist forest conservation or even be superior to other approaches.

An important issue in disentanglement is the potential biases arising from the studies' sampling of forests or forest managing communities. Even if we draw a random sample from within the population of forests that have been selected for implementation of popular participation, there is a risk of bias, because the implementation process may have focused on forests and/or communities with certain characteristics that affect the forest condition. This risk is particularly relevant in countries or areas where popular participation has been implemented only in select areas, for example, by donor-led projects, which is overwhelmingly the case today. In Tanzania, Blomley *et al*. (2008) have found improved forest conditions and lower disturbance levels in forests selected for implementation of popular participation by recent projects as compared to government reserves and open access forests. Blomley *et al*. (2008) do not investigate the possibility that the observed effects could be caused by confounding factors arising from the initial selection of forests by these projects. Similar concerns could be raised in a number of other studies (Kumar 2002, Durán-Medina *et al*. 2005). Agrawal & Chhatre (2006) provide a good discussion of this problem and how they have strived to find a balanced sample, but generally, this issue is only scarcely attended to in the literature. We have come across only one study that directly seeks to investigate how such a selection bias may affect the results, through a statistical test (Edmonds 2002). Such tests would be beyond the scope of many studies, but we do believe that future studies should attend to this issue by exploring how and based on what criteria the communities and forests in their sample were selected for implementation of popular participation in forest management.[17]

CONCLUSION

This review brings forward a number of observations in relation to the methods and the reporting of methods and results by the studies investigating the conservation impact of popular participation in forest management.

First, we note that the body of studies that we have identified are from a mere 12 countries, and that 35 studies (58%) are from Nepal and India. Apart from Mexico (8), Tanzania (5), Honduras (3), and Brazil (3), the remaining six countries feature one study only. Hence, the empirically based knowledge (as reported in peer-reviewed journals) on the conservation outcomes of more than 35 national processes of popular participation in forest management in the developing world, indicates a need for more research on this issue. Second, we note that the empirical studies show enormous variation in research approach and methods. This has implications for both how well we believe the conclusions of the individual study are supported by the empirical data and for the opportunities for comparisons and meta-analyses.

With reference to the policy, we find that more than two-thirds of the studies empirically investigate at least one of the three policy characteristics and that almost one-fourth investigate all three. This we perceive as a positive indication of a relatively high level of integration of the natural and social sciences within this field. We do, however, also find that some studies tend to perceive popular participation as a dichotomous variable. Considering that a growing body of research has demonstrated how differences in policy design and implementation lead to vast variation in structures and processes on the ground in areas designated as managed under popular participation, we find it a close-to-indispensible prerequisite

for judging outcomes that it is empirically established what form and degree of popular participation exists on the ground. Further, we propose our three characteristics as a useful approach towards that objective. Such investigation should, of course, also be done in relation to any forests chosen as counterfactuals. Finally, a detailed investigation of the policy can serve both the purpose of verifying the nature of the management regime and the counterfactual, as well as provide better opportunities for improving our knowledge about which characteristics of popular participation regimes are important for conservation outcomes.

With regard to the policy impact, the review has shown an enormous variation in the definition and investigation of the impact. We found the expected trade-off between detail and scale in the studies, and found a correlation between assessment detail in policy and policy impact. On this basis, we urge future studies to align the approach to the objectives and context of the study, that is, give priority to detail in high value forests and/or where resource extraction targets key species. Further, there seems to be scope for more research on assessment methods that Forest Departments and local communities can use to provide evaluations of forest condition and development in sufficient detail, which can be used in the negotiation of the rights and responsibilities in popular participation processes. Such methods should not only be able to provide reliable data, but also be low-cost to facilitate assessments covering large forest tracts. In this context, we believe refinement and validation of the perception-based method could be a promising area of research. This method, if refined to provide reliable estimates under diverse conditions, would be a very efficient and low-cost assessment tool. In the absence of such refinement and validation, however, we caution against the uncritical use of perception-based methods. Peoples' perceptions are highly subjective and can be shaped by many factors such as livelihood concerns. Further, there is a genuine risk of strategic answers because of the political and sensitive nature of the processes of popular participation in forest management. Often, local communities' rights to forests are conditional — depending upon the outcomes of management in terms of forest conservation. Finally, we believe that the use of intermediary impact variables — such as those used by Andersson & Gibson (2006), Antinori & Rausser (2007) and Lund & Treue (2008) — is a promising way of supporting forest measurements that may also assist in unravelling the causality behind any observed changes.

In relation to the issue of disentanglement, we found that more than half of the studies assess the forests under popular participation against forests under other tenure regimes. We found that the combination of a Spatial and Temporal counterfactual provides the most convincing empirical background for evaluating the conservation impacts of popular participation. Further, we found that the majority of studies do pay attention to the issue of confounding factors, that is, policies or developments other than popular participation that could be driving the observed impacts. Many, however, do this by passing a comment on the potential effects of other developments in the study area, rather than systematically assessing what other factors and developments could explain the observations. Accordingly, we argue that future studies should pay more attention to this crucial issue and suggest that the following factors should be included in any attempt at disentanglement: history of land-uses; population density and development; distance to markets; biophysical characteristics of the forest; project support, including why case study forests were targeted by implementation of popular participation; and land-use policies and practices. Evidently, in studies using Spatial counterfactuals, these factors should be explored in both 'treatment' and 'control' sites.

The pace of change in forest policies towards more participation in their management by the people living in and around forests has been rapid in the developing world. This review has indicated that the research foundation upon which these policies may be designed and adjusted is rather slim in terms of the geographical coverage of the existing impact studies, and that the variation in approach and methods among these studies inhibit meta-analyses, particularly if we depart from the dichotomous perception of popular participation in forest management and seek to consider the many variations inherent in this concept. We have thus pointed to a number of important areas for research that can assist in improving future evaluations of the impact of popular participation on forest conservation.

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Notes

1. The IFRI programme was created in 1992 using the Institutional Analysis and Development (IAD) Framework (Ostrom, 1999) to devise a systematic and rigorous way to collect, store, and analyse data on forests and communities in order to support wider analyses that compare data collected in different regions and countries. The strength of the IFRI approach is the interdisciplinary methods that allow assessments of hypothesised relationships among demographic, socio-political, economic, institutional and biophysical variables to explain the impact of popular participation in forest management on forest condition. This approach also "allows comparisons between actual forest conditions and patterns of use associated with particular institutional arrangements" (Poteete and Ostrom, 2004:438). It is the first approach that systematically combines detailed forest sample plot data on trees, shrubs, and groundcover with data about local institutions and other variables (Gibson *et al*. 2005).
2. This carries with it the notion of financial empowerment. In many instances, the powers of forest managing communities are limited to management of low-value forest resources and/or access to subsistence products only, which inhibit the incentives for local communities to engage in and take on the costs of management and protection of the resource (Ribot 2004). Hence, our assessment of the studies' description

will include the financial issue, i.e. whether the resource and powers to raise revenue from it inherently carries with it financial empowerment or other financial means are made available to the local managers.

3. In many cases, local communities are being held to account for their management by the State through legislative provisions that communities' rights to forests can be taken away should they overexploit them (Lund and Treue 2008, Ribot 2004).

4. Although, in some cases, increased restrictions on and costs of forest products appropriation associated with popular participation in forest management (going from open-access to a rule-based management regime) may induce more efficiency in resource use, as demonstrated by Edmonds (2002) and Sauer and Abdallah (2007).

5. We owe the 'mimic or mask' wording to Paul Ferraro (2009).

6 Examples of the former include Klooster (1999, 2000), which essentially repeat the same empirical results and analyses, Alix-Garcia (*et al*. 2005, 2007, 2008) and Antinori and Rausser (2003, 2007), which, however, use the same data to analyse different analytical questions. Examples of the latter include Gautam and Shivakoti (2005), Tucker *et al*. (2007) and Blomley *et al*. (2008). Hence, in the descriptive statistics these articles are represented by the empirical studies only, whereas in the qualitative discussion and analyses, we draw on all the articles.

7. A brief look at the publication years, however, indicates that it is a research area in growth. Of the 60 empirical studies, 37 are reported in articles published in 2005 or later, and only six studies are reported in articles published before 2000.

8. Jesse Ribot, Arun Agrawal and Anne Larson, in particular, have, however, stressed the importance of downwards accountability in their writings about decentralized forest management, which, under certain conditions, falls under our definition of popular participation in forest management (Eg., Ribot *et al*. 2006)

9. Of the 60 reported empirical studies, fourteen use the approach developed by the International Forestry Resources and Institutions (IFRI) Programme at Indiana University (IFRI, 2007). The fourteen studies are Schweik *et al*. (1997), Tucker (1999), Southworth and Tucker (2001), Varughese and Ostrom (2001), Nagendra (2002), Gautam and Shivakoti (2005) (reported twice), Nagendra *et al*. (2005), Adhikari and Lovett (2006), Agrawal and Chhatre (2006), Balooni *et al*. (2007), Tucker *et al*. (2007) (reported twice) and Nagendra *et al*. (2008). Among the studies reviewed, this is the only group employing the same method.

10. The 11 studies are Schweik *et al*. (1997), Chakraborty (2001), Kumar (2002), Johnson and Nelson (2004), Gautam and Shivakoti (2005) (reported twice), Nagendra *et al*. (2005), Dahal and Capistrano (2006), Balooni *et al*. (2007), Benjamin (2008), Lund and Treue (2008) and Zulu (2008).

11. One of the LULCC studies investigates all three characteristics of the policy. The study, however, does this in two communities only – one in each of two adjacent sub-basins of Khair Kola watershed in Nepal – with the aim of supporting the inferences at the sub-basin level (Schweik *et al*. 1997).

12. Conventional economic theory has it that the increased costs of use of forest products associated with increased restrictions and/or taxation will induce substitution to product alternatives and, for those having earned cash income in extraction and selling of forest products, alternative income generating activities, hence, lower total extraction. In rural areas of developing countries, however, substitute products and income generating activities are not necessarily readily available (see Eg., Anthon *et al*. 2008) implying that spill-over effects is a likely outcome in areas with nearby forests with less enforcement of property rights.

13. In our experience, it is standard that the management rights to locally managed forest resources can be taken over by higher authorities if management fails silvicultural and environmental criteria specified in national legislation and/or management plans.

14. In Bajracharya *et al*. (2006), the reader is referred to previous and unpublished works by the authors for such details.

15. For the case of Varughese and Ostrom (2001), the comparison is only reported in Varughese (1999) in which the data that Varughese and Ostrom (2001) build upon are reported in more detail, including a check on the perception-based estimates.

16. The duration of the popular participation regime (i.e. time passed since implementation or initiation) is an important indicator because of the inevitable delay in response from management change to change in forest condition. Hence, studies finding relation between age and condition do actually have a 'control' ('young' regimes) and do contribute with knowledge on the linkage between popular participation and forest conservation. The same argument goes for degree of local collective action. Areas with little collective action can be perceived as areas of 'open access' or continued State or other tenure, implying that studies with variation in this variable within the sample have a 'control' against which to measure the effect of (increased levels of) popular participation.

17. This is, of course, only relevant in the cases where popular participation has actually been implemented top-down, which is not the case in many of the Latin American cases.

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