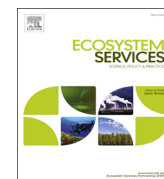




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The social distribution of provisioning forest ecosystem services: Evidence and insights from Odisha, India

Roan P. Lakerveld^{a,b,*}, S. Lele^b, T.A. Crane^{c,1}, K.P.J. Fortuin^a, O. Springate-Baginski^d^a Environmental Systems Analysis Group, Wageningen University, Wageningen, The Netherlands^b Centre for Environment and Development, Ashoka Trust for Research in Ecology and the Environment, Bangalore, India^c Livestock Systems and the Environment, International Livestock Research Institute, Nairobi, Kenya^d School of International Development, University of East Anglia, Norwich, UK

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ABSTRACT

Ecosystem services research has highlighted the importance of ecosystems for human well-being. Most of the research, however, focuses only on aggregate human well-being and disregards distributional and equity issues associated with ecosystem services. We review approaches from institutional economics, political ecology and the social sciences in order to develop an analytical framework to understand the distribution of benefits from ecosystems across different socio-cultural groups and the underlying social processes involved. We then present a case study of the distribution of provisioning ecosystem services in a forest-fringe village in Odisha, India. Our analysis shows the unequal distribution of ecosystem services and complex social processes that determine these. We identify the determining factors and processes to include: differential resource-specific needs, different cultural identities, differentiated social status and bargaining power, exclusionary and inclusionary social practices, differential access. Our analysis proves therefore that aggregation of forest ecosystem benefits obscures crucially important patterns of distribution, and the underlying social processes that determine these. This also demonstrates the necessity of applying social science frameworks in such analyses. Our study also shows that most ecosystem services are co-produced through both ecosystem processes and social actions, and so their assessment cannot be separated from the social context in which they are embedded. In conclusion we recommend that ecosystem services research engages more with process-oriented, context-specific and integrated approaches, based on a recognition of the complexity of social-ecological realities.

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1. Introduction

In the last decade, 'ecosystem services' has become a dominant concept for researchers, global development agents, and policy makers in thinking about the relationship between human societies and ecosystems (Gómez-Baggethun et al., 2010; Lele et al., 2013; Norgaard, 2010). The Millennium Ecosystem Assessment (hereafter MA) (MA, 2005) defined ecosystem services as "the benefits people

Abbreviations: NTFPs, non-timber forest products; CFM, community forest management; ST, scheduled tribe; SC, scheduled caste; Hhs, households; PES, payments for ecosystem services; REDD, reducing emissions from deforestation and forest degradation

* Corresponding author at: Wageningen University, PO Box 47, 6700 AA Wageningen, The Netherlands. Tel.: +31 317 484033.

E-mail address: roanlakerveld@gmail.com (R.P. Lakerveld).

¹ Formerly part of Knowledge, Technology and Innovation, Wageningen University, Wageningen, The Netherlands.

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obtain from ecosystems" and classified the multiple forms of these services, both direct and indirect, essentially arguing that conservation of ecosystems can simultaneously serve development goals. The MA, followed by The Economics of Ecosystems and Biodiversity report (TEEB, 2008), triggered a large body of ecological-economic research that has focused on identification, quantification, mapping and aggregate economic valuation of ecosystem services (Fisher et al., 2009; Nicholson et al., 2009; Vihervaara et al., 2010).

Although the concept of ecosystem services has helped emphasize the role of ecosystems as important contributors to human well-being, the vast majority of studies only consider aggregate well-being, without questioning how these contributions are socially distributed². This follows, perhaps unconsciously, from the normative bias in the MA conceptual framework, wherein the

² Some notable exceptions are van Beukering et al. (2003), and Lele and Srinivasan (2013).

ecosystem is the primary consideration, and human well-being is derived from ecosystem services in a somewhat unilinear manner (see [Lele, 2013](#)). Contributions to well-being are specified as 'security', 'social cohesion', and 'freedom' ([MA, 2005](#)), but concepts which would differentiate the distribution of benefits (and costs); like 'equity' or 'fairness' are not mentioned. A further limitation of the ecosystem services literature is that social analysis is limited to estimating economic value or marginal change in it. The underlying assumption is that ecosystems degrade because policy-makers do not know their 'true' contribution to human well-being. This is a major oversimplification, but it has nevertheless prevailed in ecological-economic research circles (see [Norgaard, 2010](#)). The findings generated by such research find easy entry into neoliberal policy processes that are already heavily biased against distributional questions. We argue that ecosystem services research will be unable to fully achieve even the objective of combining ecosystem conservation and development if equity issues are ignored. The link between ecosystem services and well-being is poorly conceptualised for at least two further reasons. Firstly, ecosystem services are rarely the result of nature simply giving them to society. Instead, most ecosystem benefits are co-produced through social processes involving labour and capital interacting with ecosystems, mediated through institutions like property rights. ([Lele, 2009](#); [Lele et al., 2013](#)). Secondly, procedural and distributional equity are important autonomous aspects of well-being. Therefore, whether one's goal is to conserve ecosystems, to enhance human well-being, or to alleviate poverty, an understanding of the relevant social processes is essential. With this paper we put equity and social justice on the agenda of ecosystem services research as essential aspects of human well-being, by showing how access to ecosystems and the ability to derive value from them is shaped by various social factors.

As development sector actors have attempted to link their agendas such as poverty alleviation and inclusive growth (implicitly recognizing issues of equity and social justice) to the concept of ecosystem services, the normative and analytical lacunae discussed above have become increasingly obvious ([Lele, 2013](#)). As [Daw et al. \(2011\)](#) point out, "By definition, aggregate measures of ES [ecosystem services] flows are poor indicators [...] in the same way that national aggregate indices of wealth [...] hide wide variations in the wealth and fortunes of the poorest members of society". They argue that ecosystem services research needs targeted disaggregation approaches that "identify appropriate groups for disaggregation by examining access mechanisms for specific ES and livelihood profiles, perhaps using grounded ethno-ecological research" (*ibid.*). Similarly, [Fisher et al. \(2013\)](#) present an analytical framework focused on "social differentiation and its implications for access to ecosystem services: the social 'filter' regulating the contribution of ecosystem services to wellbeing". However, these authors present little primary empirical evidence to substantiate their contentions. We believe that if ecosystem services research is to move beyond these oversimplifications and encompass the distributional dimension currently absent from the operational definition of human well-being, it must begin to scrutinize the dialectical processes between ecosystems and well-being. This paper is an attempt to exemplify such an approach.

In this paper, we take the normative position that the concepts of development and human well-being by definition include paying attention to the distributive dimension ([Mitlin and Hickey, 2009](#)) and we seek to characterise the nature of ecosystem service flows through this lens. In addition, we demonstrate that the social processes that shape the distribution of ecosystem services can be very complex and require drawing upon multiple explanatory models from the social sciences. As a means of theory testing (proof of principle) and a base for theoretical generalization, we present an in-depth case study of the social

distribution of benefits from the use of forest ecosystems in a community-managed forest in Odisha state of India. We use this case study approach to (1) describe the distribution of three provisioning ecosystem services (goat grazing benefits, bamboo benefits, and benefits pertaining to the three most widely used non-timber forest products (NTFPs)) across socio-cultural groups (including class, caste, gender), and (2) explain the observed distribution of ecosystem services in terms of the underlying social processes.

In this paper, we first summarise the main theoretical approaches in social sciences used to explaining the distribution of benefits from natural resources. We then present the case study, describing the study area and context and then presenting the distribution of benefits from three provisioning ecosystem services derived by households belonging to various social groups. Subsequently, we provide a detailed qualitative explanation of the factors shaping this distribution, and finish by discussing the theoretical and methodological implications of these findings.

2. Explaining social distribution of ecosystem services: An overview of relevant theories

The social science literature features several ways of considering and explaining the social distribution of benefits from natural resources (natural resources ranging from mineral resources to (NTFPs)). Economists studying common property resources in developing countries have a long tradition of examining the comparative distribution of benefits and costs from such resources, in what forms and why. Pioneering studies of the commons for instance (e.g. [Jodha, 1986](#); [Nadkarni et al., 1989](#)) were sensitive to institutional arrangements and outcomes, although later work (e.g. [Adhikari, 2005](#); [Coulibaly-Lingani et al., 2009](#); [Narain et al., 2008](#)) has tended to focus more on the role played by private asset ownership in influencing what benefits individuals can derive from the commons³.

Such assessments typically study existing distributions of resources and their relation to (common property) institutions, but do not research underlying processes of how these institutions of natural resource use emerge and are under continuous change as a result of political processes ([Mosse, 1997](#)), nor the strategies that different actors take to negotiate such institutions ([Milgroom et al., 2014](#)). Also, this literature generally assumes that if actors have the preference for certain resources, little prevents them from accessing them.

Economic geographers, among others, have pointed to the role of spatial and demographic factors in the social distribution of natural resource benefits. Specifically, they have highlighted the bio-geographical context (e.g. soil condition, topography, hydrology and distribution patterns of useful species) and the location of users in relation to the natural resource and to markets and administrative centres. These affect, for example, the effort required per unit of resource harvested ([Gallup et al., 1999](#)), thereby bringing into play demographic factors such as household size.

Some distributional differences, such as choice of species harvested or method of resource management, affecting nutritional and economic outcomes, have been explained by ecological anthropologists in terms cultural preferences, knowledge and ethnic identity ([Fa et al., 2002](#); [Maikhuri and Ramakrishnan, 1991](#)). Here the focus is on differences in cultural preferences between social groups, not imposed structural inequity.

In contrast to these individualistic, geographical or cultural explanations of resource use distribution, political ecology and political

³ The literature on the institutional aspects of common property resources has typically focused more on the sustainability of institutions rather than their distributional outcomes (e.g. [Agrawal, 2001](#)).

economy researchers have traditionally had a stronger concern for equity (Bryant and Jarosz, 2004) and have explained this distribution as the outcome of place-based histories and structures of unequal social and power relations. These may be disparities in class (Blaikie, 1985; Peet and Watts, 2004), caste (Agrawal, 2005; Beck and Ghosh, 2000; Bose et al., 2012; Gadgil and Guha, 1992), gender (Peluso, 1991; Rocheleau, 1995) as well as other forms of social stratification. As Thomas-Slaytor and Rocheleau (1995) note, access to and control of resources is strongly influenced by local cultural classifications of ethnicity, race, class and gender (see also Crane, 2010). Political ecological research has also shown how environmental change and resource use can reinforce unequal social relations, or are even purposely used to do so (Bryant, 1992; Bryant et al., 1993). Institutions of resource use and access are thus seen by this field as emerging phenomena of complex, multi-scale, multi-actor political relations (Crane, 2010; Watts, 2000).

An important point highlighted by a limited sub-section of the political ecology literature is that not only might distribution of benefits within a user community be skewed, but some user groups may be structurally excluded from benefits altogether (Du Toit, 2004; Fisher, 2007; Gore, 1994). This may be easily overlooked in common property and ecosystem services research which tends to only study benefit flows to existing users, while non-users remain invisible.

The “Theory of Access” proposed by Ribot and Peluso (2003) provides a bridge between the focus on variations in individual asset ownership and preferences, and the focus on social access and structure. It argues that the extent of resource access is influenced by a combination of the ability to gain *basic access* through access mechanisms such as access to other physical assets, credit, financial capital, labour, knowledge, and social networks, and the ability to make use of additional constellations of such access mechanisms to gain *complementary access* and so derive more benefit from the same resources (Ribot and Peluso, 2003; Ribot, 1998). Building on access theory, Milgroom et al. (2014) argue that access should not be seen as a structural and static given, governed by customary law, rights-based access and access mechanisms, but as an ever-evolving assembly of

practices of a wide variety of actors who employ their skills and power to creatively negotiate rules and structures to optimize their benefits.

Below we summarize the factors influencing the social distribution of ecosystem services:

Agent-level factors

- individual preferences
- ownership of assets and abilities
- household size
- locational factors (distance, terrain and resource quality)
- ethnicity, collective identity and cultural preferences

Structural factors

- caste, class, gender disparities
- social exclusion
- access (basic and complementary)

Structure–agency dynamics

- access negotiation (skill/power)

We keep these multiple dimensions in mind as we investigate the distribution of benefits from a tropical forest ecosystem in Odisha, India.

3. The case study context

3.1. Community forest management as the focus

We chose a community-managed forest as the site for this investigation, because in community-managed forests, there is generally a ‘one-to-one’ relationship between the forest as a resource catchment and the user community. Moreover, in this management form there is a clear connection between the provisioning and distribution of forest ecosystem services and village-level social institutions, which are in turn embedded in social organizations and relations. This makes studying the social processes governing the distribution of ecosystem services feasible.

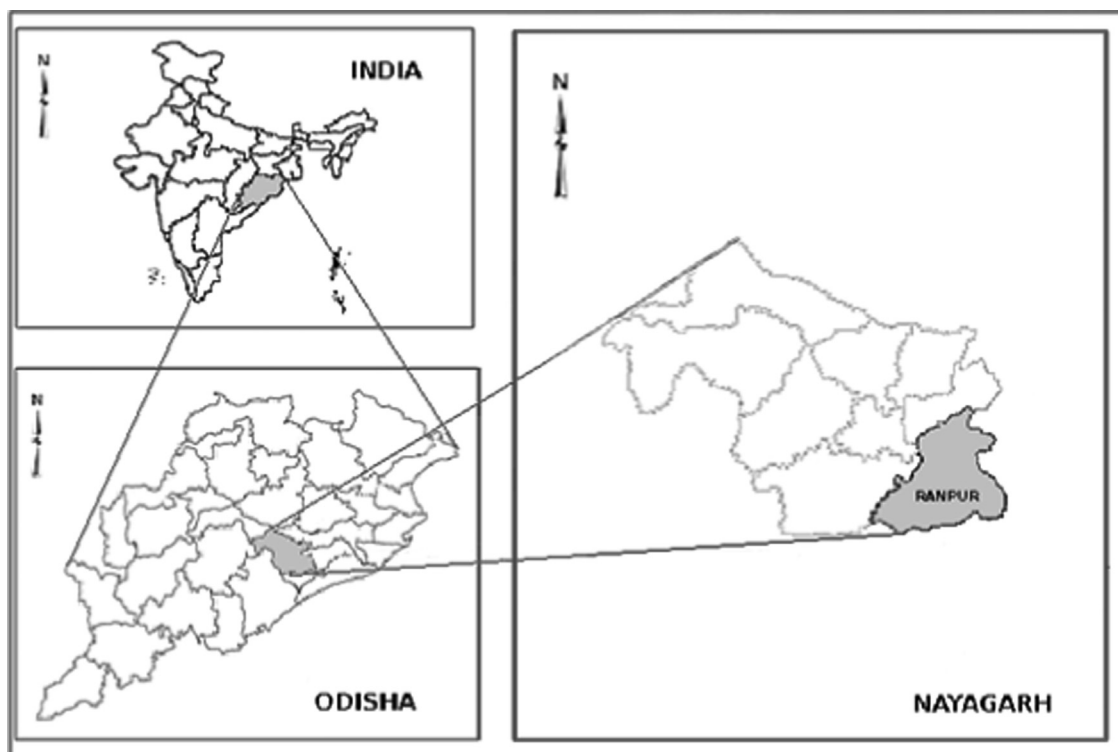


Fig. 1. Location of study site in India.

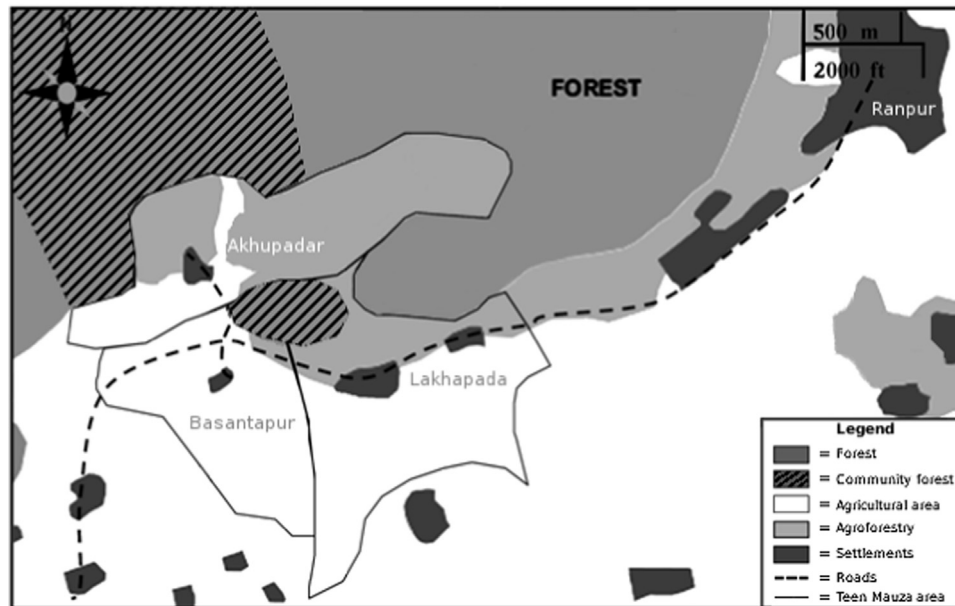


Fig. 2. Teen Mauza and its village areas relative to the forest (shaded area is CFM), adapted from <http://www.odishasampad.in>.

The state of Odisha was selected for this study because it has among the highest densities of community-initiated forest protection anywhere in the world (Conroy et al., 2002). In India, the Forest Department gradually took control of most forests, after Independence declaring many 'Deemed' Reserved Forests, without properly settling rights. The State appropriation ruptured them from the prior institutions, most of which near settlements were community-based (Gadgil and Guha, 1992). However, the department, which due to limited institutional capacity and political pressures to favour commercial interests, was not able to prevent large-scale deforestation in these forests, effectively turned many into degraded open-access areas. As a consequence, local resource users were no longer able to find enough wood for their daily needs in these forests, and in many locations they organized to reappropriate and protect the resource (Springate-Baginski and Blaikie, 2007). In Odisha, starting from the 1970–1980s, this reappropriation has especially been successful (Conroy et al., 2002). It is estimated that between 8000 and 12000 initiatives combine to protect a forest area of 2 million hectares (Y. Giri Rao, personal communication). Although the Forest Department remains the de jure owner and manager of most of the forests in the state and does not officially recognize community-based initiatives, it has tolerated de facto community control, as this has proven an effective form of forest protection which does not require any governmental input.

As a case study site, we have chosen the Teen Mauza community, which is situated in the Ranpur block of Nayagarh district, Odisha (see Fig. 1). The reason for selecting this community is that it is occupationally diverse and ethnically heterogeneous (including Scheduled Tribes (ST)⁴, Scheduled Castes (SC)⁵, and General Caste⁶ households) with a well functioning day-to-day protection system that has been in place for almost a decade without interference from the Forest Department. The Ranpur range is

part of the Eastern Ghats and its forests are classified as “moist mixed deciduous” in the Champion and Seth (1968) classification, being dominated by *Anogeissus latifolia*, *Aegle marmelos*, and *Dillenia pentagyna*. Calcutta Bamboo (*Dendrocalamus strictus*) is also a major species in the forest. The main livelihood activity of most rural households in the region is agriculture, but there is significant and varying dependence on livestock rearing and the collection of NTFPs. Forests thus play a significant role both in the domestic sector (providing firewood, edible plants and house construction material) and the production sector (providing grazing and commercially valuable NTFPs).

3.2. Forest protection and ecosystem services use in Teen Mauza

The Teen Mauza (literally meaning ‘three villages’) community forest management (CFM) initiative was started in 2002 by the villagers of Akhupadar, Basantapur and Lakhapada. They took over a degraded patch of Reserve Forest, adjoining Akhupadar village. Although community protection (involving only Akhupadar and Basantapur) had been attempted in 1998, it had broken down within two years and then was recommenced in 2002 with the inclusion of Lakhapada households. The location of these villages vis-à-vis the community forest and the larger landscape is shown in Fig. 2. The forest is only five kilometres from Ranpur town, where the nearest market is situated. Due to the community's efforts over the past ten years, the forest has regenerated steadily from shrubland to a denser forest stage, but regeneration is still on-going. In physical terms this means that at the moment less than 5% of the trees are above 50 cm in girth (at breast height); the total standing stock is around 93 t per hectare⁷.

The community forest protection group currently consists of all resident households of Akhupadar (15 hhs, all Scheduled Tribes), and of Basantapur (24 hhs, all General Caste), and 39 General Caste households out of 85 resident households of Lakhapada, that is, 78 households in all (see Table 1). They are protecting 155 ha of forest

⁴ The term Scheduled Tribes (STs) refers to over 400 indigenous and fringe communities that were in 1950 included in an official schedule of the Constitution of India (Bose et al., 2012). Tribal people have traditionally been outside of the caste system.

⁵ Just as the tribal people, the lowest castes of the caste system have also been included in an official constitutional schedule: these have been classified as ‘Scheduled Castes’ (SCs), also known as ‘untouchables’, or, Dalits.

⁶ We classified all the people who are not STs or SCs as General Caste in our study.

⁷ For the larger PEFESPA project (http://www.atree.org/The_Political_Ecology_of_Forest_Ecosystem_Services_and_Poverty_Alleviation_PEFESPA_project) of which this study served as a case study, a team of researchers and field staff assessed the standing stock of different forest sites in Odisha, using standardized girth at breast height (GBH) measurements and ecological, geometric calculations.

Table 1
The socio-economic composition of Teen Mauza's households.

	Number of households involved in protection	Social composition	Wealth rank distribution, by household			Main livelihood activities	Landholdings (ha)
			Richer	Medium	Poorer		
Akhupadar	15	Scheduled Tribes	6 (40%)	9 (60%)	0 (0%)	Agriculture, NTFP* sale, wage labour	Mean: 1.05 Min: 0.61 Max: 2.02 No. of landless hhs: 0 (0%)
Basantapur	24	General Caste	12 (50%)	7 (29%)	5 (21%)	Agriculture, horticulture, wage labour	Mean: 1.21 Min: 0 Max: 4.05 No. of landless hhs: 1 (4%)
Lakhapada	39	General Caste	7 (18%)	11 (28%)	21 (54%)	Agriculture, wage labour, horticulture	Mean: 0.53 Min: 0 Max: 2.83 No. of landless hhs: 8 (21%)

* NTFP=non-timber forest products.

using a daily forest patrol duty carried out in rotation by two adult men at a time. The total population of Teen Mauza, including those households which have not been accepted for forest protection is about 550.

The participating households are expected to protect the forest against fire, enforce a no-hunting rule, collect dry fuel wood (not fresh) only in weekends, and maintain an annual harvest ceiling of two bundles of fresh bamboo. The occasional harvesting of poles can be done upon payment, but only if permission of the forest protection committee is gained. The sale of fuel wood, bamboo and poles outside the community is not allowed. The Forest Department, the de jure owner of the forest, does not allow the harvest of timber beyond low-intensity subsistence use.

In Ranpur, access to at least the essential forest products such as bamboo and fuel wood is generally organized on a per-community base: collection of these resources by non-community users is considered a violation of the CFM rules. As all the people of one protection community have roughly the same access to forest products, access is mainly determined by whether one is considered part of the community or not.

This situation has not been static since the start of CFM: there have been many immigrants and people have moved between communities. Because these 'newcomers' are seen as free-riders by the protecting communities, these people are excluded from the CFM system altogether. Currently, 46 households in Teen Mauza are considered outsiders by the pre-existing community and they are not allowed to use the forest. This includes a small hamlet just outside Lakhapada with 10 Scheduled Castes households of bamboo artisans who are excluded from both CFM and community life. Most of these excluded households are landless and have no livestock. They get the majority of their income from wage labour and sharecropping; the bamboo artisans are solely dependent on bamboo basket-making, and so can be expected to suffer significantly from the exclusion.

For this study we look at the distribution of pertinent provisioning ecosystem services for the community: bamboo benefits (bamboo is overall the most-used forest product, extracted by 75% of the protecting households, hence we address it separately from the other NTFPs), grazing benefits (the Teen Mauza forest forms an important catchment for goat grazing, cattle do not enter the forest), and NTFP provision (siali leaves (*Bauhinia vahlii*), edible tubers and mushrooms; the three most collected NTFPs). We excluded fuelwood from our distributional study, as fuelwood extraction is only for domestic use and is relatively equal on a per capita basis, as fuelwood is the prime cooking fuel in the area.

4. Methods

Data was collected through a range of methods to understand the social processes around the distribution of ecosystem services and costs. Between November 2011 and February 2012 the lead author lived in Teen Mauza and participated in daily livelihood activities, including grazing, the collection of fuel wood, bamboo and NTFPs, and agricultural activities. The lead author, with help of the PEFESPA project research team, conducted a mixed-method methodology of focus group meetings, a stratified household survey (sampling rate 40%) and semi-structured interviews with key informants using snowball sampling. The household survey was conducted among 32 randomly selected households in three different wealth strata (derived through community-verified wealth ranking). It covered households' demographics, occupation, assets, land ownership and livestock grazing, crop damage, forest governance, and included a detailed fuel wood, timber and NTFP survey. Survey results were analysed using SPSS statistical software.

To qualitatively explain the variation in ecosystem service benefits across households and communities in terms of underlying social processes, we used an abductive approach (Walters and Vayda, 2009) based on eliminative inference. This implied systematic testing of alternative explanations of ecosystem service distribution which emerged from qualitative data from participant observation, key informant interviews and focus group discussions, and eliminating evidently false ones. In the following sections, we first describe the distribution of bamboo, grazing and NTFP collection between the different user groups, and then give a grounded explanation of the social processes shaping this distribution.

5. Results

5.1. Distribution of ecosystem services in Teen Mauza

5.1.1. Bamboo benefits

There are three important user groups involved in bamboo harvesting: Scheduled Tribes CFM households, General Caste CFM households, and a group of non-CFM Scheduled Castes basket weavers living in a hamlet just outside Lakhapada. On average, the Scheduled Tribes households of Teen Mauza collect more bamboo per year (significant under a 80% confidence interval) than the General Caste ones: 111 kg (2.2 head loads/bundles; a bundle/headload of bamboo was measured to averagely be approximately

Table 2
Distribution of bamboo in Teen Mauza.

Type of user group	Scheduled Tribes households of Akhupadar	Basantapur and Lakhapada households	Scheduled Castes people
Number of hhs in Teen Mauza	15	63	10
Reported average use of bamboo/hh/year	111 kg	75 kg	0 kg
Total yearly bamboo use (percentage of total)	1.67 t (26%)	4.73 t (74%)	0 t (0%)

Table 3
Distribution of grazing ecosystem service amongst graziers of Teen Mauza.

Type of user group	Teen Mauza graziers	Graziers from neighbouring communities	Absentee herd-owner
Number of goats	130	135	235
Goat.days ^a of grazing in Teen Mauza CFM area	150	285 ^b	570
Goat.days of grazing in other areas	760	510 ^b	1075
Total goat.days in Teen Mauza CFM (%)	150 (15%)	285 (28%)	570 (57%)

^a Goat.days is used as a unit to reflect grazing intensity, and is defined as the number of goats multiplied by the number of grazing days per week.

^b Do not count up to a total of 945 goat.days, because not all grazing localities of these graziers are known.

50 kg), compared to 75 kg (1.5 head loads) for the latter (see Table 2). The Scheduled Castes bamboo artisans were included in this ecosystem services flow comparison, because they are critically dependent on bamboo for their livelihood, because they are landless, own no livestock and do not collect any other NTFPs. We consider them legitimate bamboo users, as they have been collecting bamboo from the Teen Mauza forest for years in the past, but are currently effectively excluded by the community protection system.

5.1.2. Grazing benefits

The users deriving grazing benefits in Teen Mauza may be divided into three distinct groups: graziers from within the CFM community (3 households holding 130 goats in all), graziers from neighbouring communities (four households together holding 135 goats), and one rich, town-based, absentee herd owner, owning 235 goats. These groups differ from each other in two ways: group 1 (from within Teen Mauza) contributes to forest protection, whereas groups 2 and 3 don't. In terms of socio-economic position, groups 1 and 2 are similar (mid- or low-income), while group 3 (the absentee herd owner) belongs to a higher socio-economic class.

The grazing areas and grazing intensity of these three groups of graziers are given in Table 3. Non-community graziers are making 5.7 times more use of grazing benefits of the community forest than those who are part of the protection community, who might be seen as the 'rightful' beneficiaries of the service. The absentee herd owner, who is not in any way part of the traditional grazing system, accounts for 57% of the grazing benefits of the community forest of Teen Mauza. The community forest is thus being heavily utilized by graziers from outside the community, whereas community goat graziers are confined to less suitable grazing lands, such as village fallows and degraded wasteland. In Section 5.2.2, we explain why this is happening.

5.1.3. NTFP provision

In this section we compare between the three most collected NTFPs in the community: siali leaves, tubers and mushrooms. Looking at the wider NTFP use pattern in Teen Mauza, there are only two user groups and both are from within the community. Of these user groups, the Scheduled Tribes people of Akhupadar are the most forest-dependent, collecting and consuming a wide variety of NTFPs from the forest. The General Caste people of Basantapur and Lakhapadadepend on the forest for fuelwood and bamboo, but do not collect much else.

About 83% of the Scheduled Tribe households collect siali leaves from the forest for the making of leaf plates, and none of the non-ST households. Additionally, 100% of the Scheduled Tribe households collect tubers and mushrooms, while for the non-ST households this is less than 50%. Both relatively and absolutely, the Scheduled Tribes households of Akhupadar are using the large majority of the NTFP provision service, while they only make up 20% of the Teen Mauza protection households. On a per household basis, the average yearly collection of tubers in Akhupadar is almost 150 times greater than that of the General Caste households, while for mushrooms the difference is a factor of 21 (see Table 4). Another aspect of NTFP use reflected in Table 4 is the difference in the involvement of women in NTFP collection between Scheduled Tribes and General Caste households: in over 80% of the Scheduled Tribes households, women are involved in the collection of the listed NTFP species, while the General Caste women only collect mushrooms, and that holds for only 4% of the households.

5.2. The social processes of ecosystem service distribution in Teen Mauza

5.2.1. Bamboo collection and social exclusion

Bamboo is one of the most important NTFPs in the Ranpur region, as it is a crucial roofing material for most of the house types in the area. Also, bamboo forms a very important NTFP for artisanal craftsmen who make baskets and other agricultural equipment. All bamboo users of Teen Mauza's protection community have the same rights to the collection and use of green bamboo: a maximum of two bundles (100 kg) per household per year is allowed to be harvested. Sale of bamboo and bamboo products is not allowed.

Because of its importance, bamboo is not an open-access resource: only members of a forest protection community are customarily entitled to collect bamboo. Therefore, access pertaining to bamboo in Teen Mauza is determined by the history and politics of who has the right to call themselves a community member and use the forest resources, and who does not. If 'outsiders' want to gain access to bamboo from the community's forest they have two options: either paying a relatively large fee (10000 Indian rupees (or about 160 USD), equivalent to over two months minimum-wage salary) to become an official member of the protection community, or using "illegal access mechanisms" (Ribot and Peluso, 2003) to harvest bamboo. In Teen Mauza, none of the new families has been able to afford the expected fee, and thus none of them has been allowed in the forest protection community.

Table 4
Distribution of main NTFPs in Teen Mauza.

Type of user group (village-based)	Akhupadar (ST) (15 hhs)		Basantapur and Lakhapada (General Caste) (63 hhs)	
		Percentage of hhs collecting (% by women ^a)		Percentage of hhs collecting (% by women ^a)
Average yearly income per hh from <i>Siali leave</i> sale in Indian Rupees (min–max)	7,350 (3,000–14,400)	83% (83%)	-	-
Average annual collection of <i>edible tubers</i> in kg/hh (min–max)	400 (15–700)	100% (83%)	2.7 (1–30)	42% (0%)
Average annual collection of <i>mushrooms</i> in kg/hh (min–max)	23 (15–35)	100% (80%)	1.1 (1–10)	50% (4%)
Percentage of totality of tubers collected in Teen Mauza	97%		3%	
Percentage of totality of mushrooms collected in Teen Mauza	80%		20%	

^a Percentage of households (of the total number of hhs in respective village) in which women collect.

Amongst those who have access, the difference in use level between the Scheduled Tribes and General Caste community households (111 compared to 75 kg of bamboo per year, see Table 2) cannot be explained in terms of a difference in access. Instead it is related to a difference in bamboo needs for housing. Although the Scheduled Tribes people on average collect slightly more bamboo than the allowed quota, this is tolerated by the community, as their more traditional housing requires more bamboo.

Thus, while the higher domestic needs of the ST community are accommodated, the critical livelihood dependence of the basket makers is not. Even if they were able to afford to pay the 'entrance fee' to gain usufruct rights, their bamboo-based livelihood would still be in conflict with the community rules, as these forbid sale.

It appears that the exclusion of SC bamboo artisans from the CFM group is a reflection of a wider pattern of exclusion in traditional rural Odisha society. As in the social hierarchy of rural Odisha, the Scheduled Castes people's status is at the very bottom, the formulation of the no-sale rule for bamboo could be seen as a political policy aimed at structurally excluding SC people from the outset. This especially holds because there is an abundance of bamboo in Teen Mauza forest, which implies that the ecology of the forest does not require bamboo harvesting restrictions⁸.

5.2.2. Grazing: Basic and complementary access, livelihood preferences and power

This section starts with a description of the social process of gaining basic access to goat grazing in Teen Mauza. As the community forest lies available, every household in Teen Mauza can gain access to grazing benefits by starting a herd. However, in practice certain assets and cultural norms form a barrier for households in turning to grazing in the first place.

The most important assets are access to financial capital to invest in an initial herd, and access to labour, as goat grazing requires daily herding. Some grazing households start with a relatively small herd, while also grazing other households' goats as a paid service. For this however, one has to have sufficient status in the community in order to be trusted. In addition, specialized knowledge is required, especially when it comes to dealing with the birth and rearing of baby goats and medical treatment of goats in case of injury or disease.

⁸ The community forest of 155 ha has an average bamboo biomass of 55 t/ha, while the total forest biomass is 93t/ha; this generates a total annual increment of about 260 t of bamboo. We used Tripathi and Singh's (1994) value of the annual pole increment of five-year-old *Dendrocalamus strictus* of 3.17 t/ha/year (20% of 15.83 t). Considering that the current annual bamboo harvest in Teen Mauza is only 6.4 t, even if we assume an annual pole increment of 1 t/ha/year the overall biological productivity of bamboo is ample to also accommodate the SC people's bamboo needs.

Cultural norms codetermine why only three households in Teen Mauza are engaged in grazing as a livelihood. In Ranpur, although goat rearing can be a rather lucrative livelihood strategy, social status depends on land ownership. All the grazing households in the community own at least one acre of land, which means that part of their available labour is used for agricultural work besides grazing; it would be seen as culturally very inappropriate to sell all one's land and become a specialized grazing household.

Like all social and livelihood activities in Teen Mauza, grazing is influenced by cultural identity. The General Caste households of the culturally homogeneous village of Basantapur are of a caste that locally is associated with land ownership and rice cultivation. Although some of these households own goats, grazing is seen as an inappropriate livelihood strategy for them, which leads them to outsource this work to others. Remarkably, none of the poor, landless households in Basantapur village have resorted to grazing as a livelihood option.

Ultimately, grazing forms only a viable livelihood for those households in the community which have enough start-up financial and/or social capital, which do not have much land, are not from Basantapur, and have the prerequisite knowledge. At the same time, starting a large herd in Teen Mauza was no problem for the absentee herd-owner, as he easily meets the socio-economic prerequisites and through hiring caste-herders he is not affected by cultural norms regarding livelihood identity.

The variation in existing forest grazing benefits enjoyed by different graziers (see Table 3), who have all gained basic access can be explained by differences in the use of additional complementary access mechanisms. Given the steep, thickly forested, thorny, and leopard-infested nature of the forests in Ranpur, at least two graziers are needed to safely guide a herd of goats, but few families can afford to spend so much on labour. This problem can be circumvented by pooling the labour of two grazing families, which is currently done by some outside graziers, but is not practiced in Teen Mauza. Because of compromised access to labour and labour-pooling and no capital to hire it, the Teen Mauza graziers are mostly restricted to the much poorer village fallows and wasteland on which one grazier per herd is sufficient. Only some community graziers spend part of their time in the community forest; as much as they can afford, with those who can spare more labour being better able to benefit. For example, one of the community's goat herds spends 2.5 days in the forest, because only on these days the son, who is in charge, can get support from one of his aging parents (see Table 3). The community protected forest thus cannot be converted into grazing benefits for the community.

Differences in herd size between the different grazing households in Teen Mauza can also be explained in terms of available labour: the two community grazing households which graze 50 goats, have more available labour (one main grazier and regular

help from the household) than the household which grazes only 30 goats (only one grazier). Comparing across all graziers, it becomes evident that the absentee herd owner commands a much larger bundle of access mechanisms pertaining to goat grazing and thus has a higher degree of access. This entrepreneur has enough financial capital to acquire and maintain a large herd of 235 goats by permanently hiring a group of three professional goat herders of the herder-caste lineage, who are specialized in managing large herds. The complementary access mechanism of labour availability is thus easily met by the absentee herd owner, who is getting good returns from forest grazing in Teen Mauza. A question that emerges is: do grazing benefits from the Teen Mauza forest ecosystem disproportionately benefit those who are already powerful and meet the relatively demanding socio-economic access requirements of this service?

Another question pertaining to the absentee herd owner and his herders is: In what case does access by outsiders constitute unfair use? In general, grazing in the Ranpur area has been rather flexible and fuzzy. Although much of the forest is parcelled out amongst different CFM groups, they permit each other's members to graze relatively unhindered across their boundaries: there is a system of reciprocity between neighbouring communities. The only rule affecting grazing in Teen Mauza is the general rule that no fresh wood is allowed to be cut from the forest. This reciprocity has probably emerged in the context of grazing being a subsistence activity. However, with the advent of better transport and expansion of the goat market, the urban-based absentee herd owner in Teen Mauza has effectively come to use the community forest for commercial gains.

The community does not object to his use of the forest for grazing per se, as it does not generally violate community rules. There is, however, one aspect of his grazing to which the community strongly objects, namely the cutting-down of fresh branches for young goats by his herders. With about 40 young goats to be fed, this happens on quite a large scale.

Nevertheless, local residents feel they cannot forbid this practice: Some villagers even expressed that, in case there was strong opposition to and retribution against the outside herd owner, they would not feel safe anymore in the streets of the nearby town. They are afraid that he, being a part of the cultural and political elite of the town, would use his power against them. Because of the vast socio-economic differences between the community members and the outside herd-owner, the villagers assess that he must be very powerful, although they do not have any concrete experience to verify this. The outsider's power thus seems to be largely symbolic, inferred by the community through his disproportionate ownership of assets. The community's resulting fear that keeps them from taking real action against the outsider's violation of community rules, however, is very real. Overall, the arrival of the absentee herd owner – who has made good use of their forest by using his power to get away with the violation of community rules – has significantly altered the local power dynamics, resulting in a feeling of disempowerment in the community.

5.2.3. NTFP collection and sale: Cultural norms and livelihood identity

The Scheduled Tribes households of Teen Mauza collect a wide variety of NTFPs from their forest: siali leaves, honey, various kinds of fruits and green, leafy vegetables, and a variety of edible tubers, mushrooms and medicinal plants. Only a small fraction of this, both in quantity and variety, is collected by General Caste community members (see Table 4). The latter user group use income derived non-forest-based livelihood activities to buy forest goods, mostly edible tubers from Akhupadar.

Other than for bamboo extraction, there are no explicit rules controlling access to NTFPs such as mushrooms or siali leaves. Also, compared to grazing there are very few access barriers for NTFP use: no start-up capital is required, and one can invest as much labour as one wishes. Nevertheless, as we saw in Section 5.1.3, there are major differences in the use level of this ecosystem service. The question is: why?

The main difference in benefits among those who collect NTFPs is the difference between low-level subsistence use and significant, subsidiary livelihood sale. The Scheduled Tribes people of Akhupadar are the only residents of Teen Mauza who sell forest products to earn subsidiary income, besides rice cultivation which is their main source of sustenance and income. With several hours of siali leave collection per week alone, the average household earns a supplementary income of about 7500 Indian rupees annually (compared to an annual minimum-wage income of around 54000). Also, Siali is the only commercial forest product that is solely collected and processed by women to generate separate income for themselves.

In Akhupadar, the collection of NTFPs in general is overwhelmingly a women's activity, while in the non-ST villages, hardly any women collect NTFPs. This can be explained by the fact that in Hindu caste society, women generally do not engage in livelihood activities beyond the domestic sphere. In the tribal society, however, women are on a much more equal footing with men (see Maharatna, 1998; Mitra, 2008). Hence, these women can engage in the collection, processing and sale of NTFPs, without social stigma.

In the ability to benefit from NTFPs from the forest, the ability to sell forest produce is the most important difference between Scheduled Tribes and non-ST community members. In the process of social control, the very transaction of money in exchange for forest produce, thereby becoming financially dependent on it, appears to consolidate livelihood identity. Those who are selling forest produce are seen as tribal people, who are therefore forest-dependent and 'backward' in the eyes of people of different castes. Consequently, the forest-dependent Scheduled Tribes people rank lower in the social hierarchy than the non-ST community members. This reflects the wider pattern in India where cultural norms and social stigma strongly determine livelihood specialization, or caste occupation (Joseph et al., 2010) and thus also influence access to natural resources.

The position of the Scheduled Tribes people in Teen Mauza is ambiguous. On the one hand, they are able to make good use of its provisioning ecosystem services and are materially quite well-off (none of the ST households was assessed to be in the poorest wealth stratum, see Table 1). On the other hand, reliance on NTFPs confirms their lower status in the social hierarchy of Teen Mauza. However, although some General Caste households of Teen Mauza are very poor, landless and desperately need extra income, social values and stigmas associated with caste prevent them from making use of the forest's ecosystem services in the same way that the Scheduled Tribe households do.

6. Discussion

The case study results clearly illustrate that the benefits from communally managed forests are unevenly distributed among community members and other users of the forest. The variation is determined by individual livelihood choices, resource-specific needs, access (basic and complementary), as well exclusionary social practices, power and social status, cultural identities and ongoing 'micro-political' processes. Clearly, not all variations in the magnitude of benefits derived can be seen as inequitable or unfair. But given that, in a community forest, ecosystem benefits come at a cost (labour for protection), there are also clear instances where those who benefit do not pay any costs, especially the powerful

herd owner who is based outside the village. Besides, there is absolute exclusion of needy groups (from both protection and benefits). An aggregate figure for benefits derived from the forest by the entire set of users would hide information on these inequities and their underlying processes.

The diverse range of situations observed in the Teen Mauza case study cannot be explained by a single theoretical perspective. This is brought out through our use of a multi-dimensional approach, employing multiple explanatory theories. Indeed, our investigation points to the need to not only allow for theoretical approaches that use either agent-focused or structural explanations, but also for dynamic interaction between both explanatory frames (see e.g. Arts, 2012). On the one hand, use of the forest is clearly being shaped by agent-based, individual livelihood choices (e.g., whether to become a full-time grazier or not) and private asset ownership (whether one has the money to invest in goats to begin with, or to hire herders for grazing). On the other hand, structural factors such as caste hierarchy and livelihood identities play a role in determining who can or cannot access a certain resource. In Teen Mauza, cultural identity (tied to caste identity, but not necessarily socio-economic status) shapes and is shaped by individual preferences as well as notions of what an acceptable livelihood may be. This makes livelihood identity both a structural and agency-driven force.

Some households may not make use of the NTFP resource because of culturally-enforced, caste-based livelihood identities. This cultural aspect of ecosystem services distribution does not feature prominently in much of the natural resource use literature (with a few notable exceptions: see Crane, 2010). It also reinforces Milgroom's et al. (2014) argument that micro-scale distributional processes of ecosystem services are obscured by the macro- or meso-scale at which most studies of natural resource distribution are conducted.

At an analytical level, some of the distributional dynamics of resource use in Teen Mauza are situated beyond the ambit of conventional political economy and ecology. It appears that in case of near-equal assets and access, but clear differences in resource use, which in Teen Mauza is the case pertaining to NTFP distribution, access runs short as an informing theory. As in this case, material barriers to access do not play a decisive role (NTFPs are accessible if people have interest to harvest them), symbolic barriers in the form of cultural norms, ordinarily submerged under larger inequities and political ecological struggle, emerge as important factors in ecosystem services distribution. We thus found that while ecosystem service use obviously has direct material consequences for the user (more calories or saleable goods), it can also have important symbolic implications in terms of social status or taboo, adding a layer of complexity to understanding incentives and barriers to being able to benefit from ecosystem services.

Our study shows that local forest-dependent communities can best be seen as an assembly of subcultures (Scheduled Tribes people, rice farmers, graziers, wage labourers, Scheduled Castes basket-makers), all with distinct livelihood practices, social institutions, values, identities and interrelationships (see Crane, 2010; Staddon, 2009) as well as socio-historical backgrounds and specific settlement histories. This also highlights the importance of historical analysis in resource distribution. As in Teen Mauza, the bamboo artisans arrived after the first protection committee had been formed, their exclusion is part of a larger conflict between the original forest protectors and those who arrived later to the community. The latter implies also that notions of social exclusion and casteism are not simply imposed by wider discriminatory societal structures, but are at least co-determined by local history (Biersack, 2006; Tsing, 2005).

Stepping back from the questions of distribution and inequity, this study also empirically underlines the point (made conceptually

elsewhere: see Lele et al. 2013) that ecosystem 'services' do not automatically flow from ecosystems to human beings, but are largely co-produced through human labour, capital and technologies. A purely ecological characterisation of the Teen Mauza forest cannot tell us anything about the type and magnitude of services it actually provides or can provide, since these only emerge in particular livelihood and institutional contexts. Taking a step further, the Teen Mauza forest is itself largely a product of livelihood and institutional practices, making a 'purely' ecological characterisation impossible. Knowing the general pattern of forest dependency in a particular region is inadequate at describing how benefits are produced and distributed, as the actual flow depends upon so many micro-level practices and situations. Our case study thus shows that the links between ecosystems and human well-being can be better understood using integrated approaches, such as that of social-ecological systems research (see Berkes and Folke, 1998; Folke et al., 2005, Holling 2001).

We are aware that drawing attention to access mechanisms and other social processes that result in inequitable gains from natural resources is the bread and butter of much of the political ecology literature. Our contribution here, however, lies primarily in bringing this perspective to bear upon the ecosystem services literature (which has been devoid of social distribution) to demonstrate that outcomes can even differ across various ecosystem services in the same ecosystems and communities. At the same time, we have demonstrated that the processes through which such differences occur are not always political or structurally driven.

In addition, our findings verify the usefulness of Fisher et al.'s (2013) novel framework for ecosystem services assessment, especially the important role of agents' individual characteristics, such as entitlements, endowments, capitals and assets, and preferences in access to and control over natural resources. However, our analysis goes beyond their framework, by drawing attention to factors such as livelihood identities and the role of cultural norms/social control⁹.

7. Conclusion

In India alone, there are approximately 200 million forest-dependent people (Khare et al. 2000). This one case study is not meant to be representative of India's forest-dependent communities, let alone for forest landscapes beyond India. The aim of this paper is not to generalize, but to empirically illustrate the principle that ecosystem services distribution is a function of context-dependent social dynamics. In this final section, we outline the theoretical and methodological implications for the field of ecosystem services research, where such distributional processes are by and large invisible due to the scale of aggregation at which research is generally conducted.

To conclude, our case study findings point out important theoretical and methodological implications for the field of ecosystem services research, especially pertaining to its aggregate nature and the underlying social processes it so overlooks, and subsequently to the ecosystem management this engenders, suggesting the field to take a more process-oriented, context-specific, and integrated approach.

First, aggregated studies do not obtain insight into the processes of social distribution and exclusion and thus are unable to gain insight into, let alone address, issues of inequity pertaining to ecosystem use. This also means that such research, oblivious of real processes, implicitly uses assumptions to conceptualize the

⁹ Although livelihood identities are to some extent comparable to preferences, they possess much more structural elements as well, reinforced by social control: if one does not adhere, he/she will be treated differently in the community.

relationships between people and nature. Our findings suggest that there is a need to empirically scrutinize such standard assumptions, for instance, that safeguarding certain combinations of ecosystem services will automatically lead to poverty alleviation. Notably, in Teen Mauza the poorest are not the most forest-dependent.

Second, this study implies that the benefits from ecosystems are seldom equally distributed, with the more well-endowed actors (especially wealthy urban actors in the global economy) being better able to benefit, even without contributing to forest protection, while some people are not at all able to derive well-being from certain ecosystem services. We argue that equity, which we see as an integral aspect of human well-being and development, should be on the research agenda of ecosystem services researchers. These should start paying attention to how supposedly neutral (changes in) ecosystem services' provisioning in fact can reinforce existing inequities.

Third, generic, aggregated assessments of ecosystem-based well-being often result in top-down, one-size-fits-all ecosystem management interventions in the international environmental policy arena (Adger et al., 2001), e.g. environmental cost-benefit analysis, PES and REDD+. These assessments are rooted in a discourse that Adger et al. (2001) coin the global environmental management debate, which is characterised by “a technocentric worldview by which blueprints based on international policy interventions can solve global environmental dilemmas”. However, as the authors argue, such generalistic management interventions are often locally not appropriate, and may even be counter-productive (ibid.).

Following on these findings, we call on ecosystem services research to adopt an approach that focuses more on localized social processes of benefit obtainment, which will help overcome its shortcomings and blind spots. This paper shows that the social distribution of ecosystem services cannot be explained by mono-causal approaches and requires more nuanced conceptualisation and methodology. Our study and Fisher et al.'s (2013) framework represent the first steps in fostering much-needed inter-disciplinary research collaborations in ecosystem services research between ecologists, economists and social scientists, integrating access theory, political ecological, qualitative sociological, cultural identity, and social-ecological systems approaches within the ongoing inquiry.

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