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How does governance mediate links between ecosystem services and poverty alleviation? Results from a systematic mapping and thematic synthesis of literature

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Abstract

Many efforts to improve the sustainable management of renewable natural resources in low- and middle-income countries seek to achieve 'win-win' outcomes – improved ecosystem health and improved livelihoods. Yet achieving such win-win outcomes is challenging, since many variables affect the potential for synergies. These variables include the quality and performance of governance. We conducted a systematic mapping of the literature and a thematic synthesis to identify how governance mediates relationships between ecosystem services and poverty alleviation. The systematic mapping focused on identifying which components of governance are studied and how much attention each geographic region and natural resource has received. We found that the literature is 'clumped', with some governance components, geographic areas and sectors studied well, and others poorly. The thematic synthesis drew on 191 papers and found very little literature that looked at the three areas of governance, ecosystem health/services and poverty alleviation/livelihoods together in detail, with little evidence of interdisciplinary investigation. Much of the research instead focuses on either governance itself or governance and livelihoods or governance and ecosystem health/services. Three key analytical themes were identified in response to the research question, which are that: locally owned and inclusive governance increases the potential for ecosystem services to deliver on improved livelihoods; there are often multiple governance structures and systems in place making causality difficult to trace, though such multiplicity creates opportunities for improved governance, ecosystem health and livelihoods as well as challenges; and, appropriate and adequate incentives are needed for governance to mediate positive links between ecosystem services and poverty alleviation.

Introduction

The twin goals of environmental protection and poverty alleviation have been enshrined in many policy initiatives, from international agreements such as the United Nations Sustainable Development Goals (SDGs), to national climate and development strategies, and corporate pledges. Pursuit of both environmental protection and poverty alleviation recognises that there is the potential for synergies between the two, but that there are numerous factors that enable or constrain the potential for synergies to be achieved (DFID et al., 2002). These factors centre on people having access to and control over ecosystem services (Fisher et al., 2014), reflecting the centrality of governance in DFID et al.'s (2002) contribution to the World Summit on Sustainable Development in *Linking Poverty Reduction and Environmental Management*. Governance has a central role in mediating links as it provides the setting in which rules, norms and decisions are determined, which in turn influence the form and degree of access and control (Campese, 2016). Within the context of renewable natural resources, such as forests, fisheries and grazing land, much is known about what is needed for effective and sustainable governance (see, for example, Ostrom, 1990), but less is understood about how governance mediates links between sustainable use of these resources and poverty alleviation.

This paper addresses this gap. It draws on a project supported by the UK Ecosystem Services for Poverty Alleviation (ESPA) programme which reviewed nine years of ESPA-funded research, aimed to situate these findings within broader academic literature and identify lessons learned about how governance mediates links between ecosystems services and poverty alleviation. To achieve this, we undertook a systematic mapping of relevant literature and a qualitative thematic synthesis. Systematic mapping reveals the overall size and range of literature addressing the topic (James et al., 2016), while thematic synthesis enables identification of analytical themes that address the research question (Thomas and Harden, 2008). While these methods help uncover the range and content of existing research, they are distinct from systematic reviews and meta-analyses that test more narrowly defined hypotheses. We deemed this more flexible and inclusive approach to be most

appropriate for the very broad and complex nature of the question of how governance enables or constrains the contribution of ecosystem services to poverty alleviation.

Our analysis sits within an already substantial field of related 'literature reviews' that attempt to identify factors enabling or constraining the potential for governance arrangements to contribute to improved sustainability of renewable natural resources or improved livelihoods or both. These include reviews that are specific to a type of natural resource, with the majority related to forests. Much of this literature focuses on community forest management (Baynes et al., 2015; Bowler et al., 2012), followed by protected areas and forests (see Macura et al., 2015; Oldekop et al., 2016). There are fewer reviews on fisheries and even fewer on other natural resources or specific regions (e.g., Galvin et al. (2018) on community-based conservation in Africa). Such reviews have drawn on data from a wide range of methods, from satellite remote sensing and censuses on community-based structures (e.g., Oldekop et al., 2019), systematic reviews (e.g., d'Armengol et al., 2018; Galvin et al., 2018; Mizrahi et al., 2019), systematic mapping of literature (e.g., Macura et al., 2015), realist synthesis (e.g., McLain et al., 2018), meta-analysis (e.g., Whitehouse & Fowler, 2018) and Qualitative Comparative Analysis (see Arts & de Koning (2017) and Baynes et al. (2015) on community forest management). These reviews have different objectives and scopes and do not all examine different types of governance systems and both ecological and livelihood outcomes.

What these reviews, syntheses and analyses have consistently found, however, is that governance systems have mixed results in terms of social and ecological outcomes (Arts & de Koning, 2017; Baynes et al., 2015; Galvin et al., 2018) and that there are many factors that are necessary for success which can vary over time and between locations (Agrawal et al., 2018; Baynes et al., 2015; Mizrahi et al., 2019). Several key factors are identified by multiple reviews, such as the need for supportive policies and legislation (Agrawal et al., 2018; d'Armengol et al., 2018) and the need for ongoing government support (Baynes et al., 2015; Whitehouse & Fowler, 2018). The lack of data available to inform such

reviews is consistently lamented and the need for more evaluation of governance approaches and outcomes is stressed (Bowler et al., 2012; d'Armengol et al., 2018; Evans et al., 2011).

Much of the focus of existing reviews on natural resource governance and outcomes is on what outcomes can be attributed to specific governance systems within particular sectors. There is some attention to process indicators, that is, factors that contribute to the performance and legitimacy of systems, such as participation and accountability. This study is unique, however, in applying systematic mapping and thematic synthesis across a wide range of sectors and governance types to identify the range of research that examines relationships between all three dimensions of governance, ecosystem health and poverty alleviation. The article contributes to knowledge by providing a review of governance across natural resources and all types of governance systems, in order to address the critical question of how governance can enable or constrain how ecosystem services can help alleviate poverty. Deeper understanding of how governance can mediate positive synergies between ecosystem health and poverty alleviation is essential for progress towards the SDGs and in delivering on equitable and inclusive restoration of ecosystems, as sought within the UN Decade on Ecosystem Restoration, 2021-2030. The Strategy for the Decade recognises the role of governance at multiple levels in delivering on restored ecosystems and the need for governance to be appropriate and inclusive (UNEP and FAO, 2020).

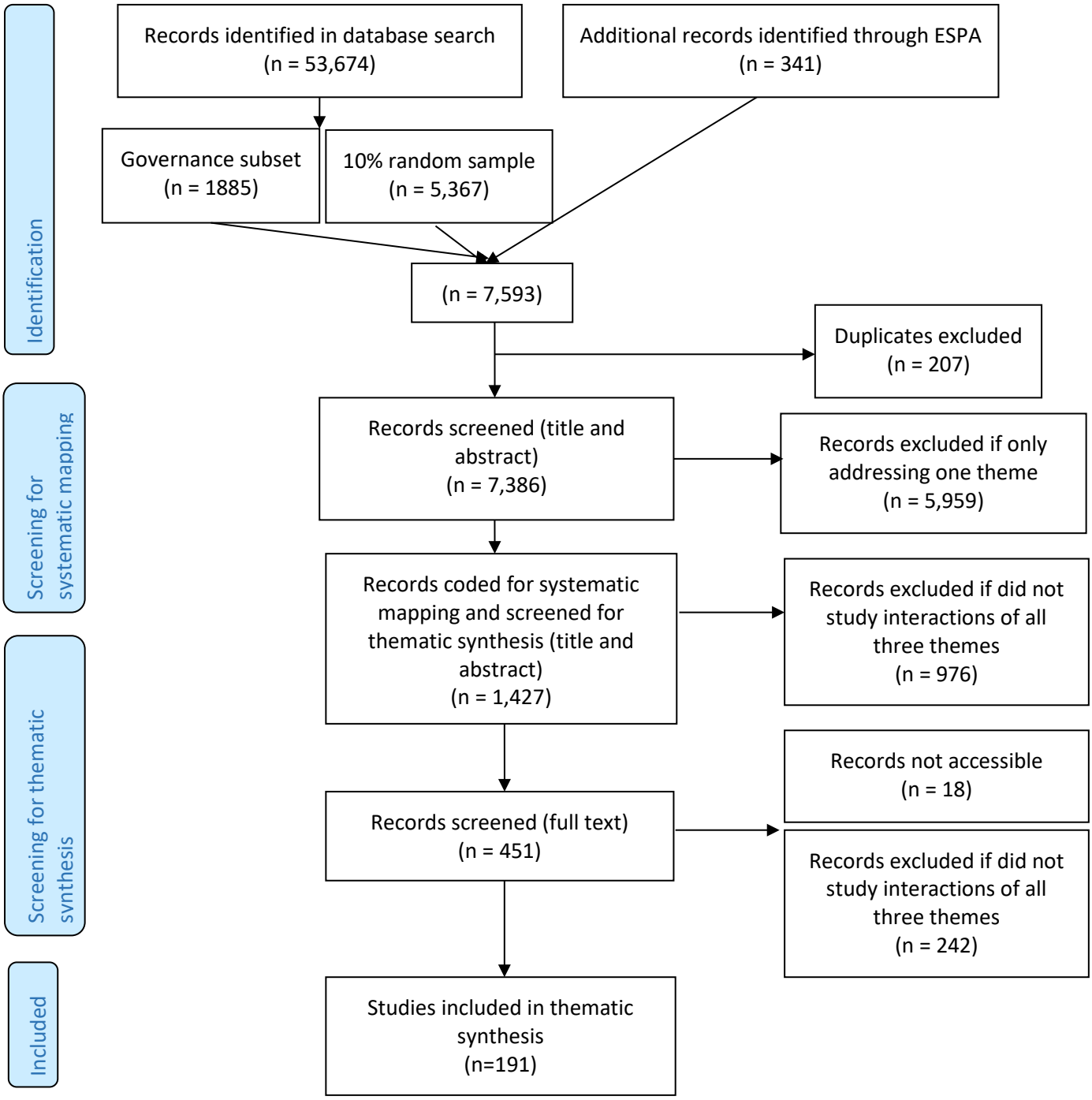
Details on the methods used in the research are set out in the following section, after which the main findings from the systematic mapping are described and evaluated, followed by the findings of the thematic synthesis.

Methods

Two methods were used in this research. The first was a systematic mapping of the literature and the second a thematic synthesis. The aim of the systematic mapping was to identify the main themes of

research related to the topic of governance, ecosystem health and poverty alleviation. The thematic synthesis identified the most relevant papers of the systematic mapping and involved thematic coding to facilitate the identification of analytical themes that address the research question (Thomas and Harden, 2008). Figure 1 provides an overview of the process.

Figure 1 **Systematic mapping and thematic synthesis process**



The combination of systematic mapping and thematic synthesis were found to be more appropriate to the question being asked and the nature of the available evidence than a systematic review. A systematic review has been defined as "an evidence synthesis method that aims to answer a specific question as precisely as possible in an unbiased way" while systematic mapping "collates, describes and catalogues available evidence (e.g. primary,secondary, quantitative or qualitative) relating to a topic of interest" (James et al., 2016, p. 3). In general, systematic maps are more appropriate for broad questions while systematic reviews focus on narrower questions. Given the nature of the question addressed, seeking qualitative evidence, it was concluded that systematic mapping and a thematic synthesis following Thomas and Harden (2008) were appropriate and justifiable.

Systematic Mapping

The systematic mapping began by developing a protocol to answer the question set out in the introduction, 'how does governance mediate links between ecosystem services and poverty alleviation?' The protocol was presented at a consultation workshop in May 2017, attended by 17 academics, policy-makers and practitioners working in natural resource governance in an international development context. Feedback was sought on the protocol and changes were made to the search approach and search terms. Prior to the consultation workshop, an initial search via the Web of Science had generated 23,462 results. Searches in Web of Science and Scopus were initially undertaken, however it was found that both search engines returned 'false positives', where articles appeared in the results even though the search terms were not present in the title, abstract or keywords. For example, some appeared because the address of the institution included the term 'forest'. Scopus returned more false-positives than Web of Science. Given the large number of articles in the preliminary sample and the limited resources available for the review, the final search was only conducted using the Web of Science. The search was also limited to terms in English due to limitations of time and funding. The search was limited to peer-reviewed journal articles and book chapters (conference papers were excluded) as a proxy for quality. During the consultative workshop, the list

of search terms was shared with the group of experts for their feedback on keywords that were missing. This led to an extensive revision of the search terms and a subsequent search on 25 May 2017 which resulted in 53,674 articles. The search string used for the final search is included in Appendix 1.

There are several points to make regarding the search string used. To inform the discussion at the consultative workshop on the draft search terms, a review of literature on natural resource governance, ecosystem services and poverty alleviation was drafted and presented (Nunan, 2017). In this review, it was noted that the term 'governance' is contested and is not always used in practice. Other terms may be used such as decision-making and institutions. In developing the search string it was therefore decided that articles that address governance but do not use the term governance (or govern or governing) would be included. The following definition of natural resource governance was used to inform the development of the part of the search string that focused on governance:

> …natural resource governance can be understood as the norms, institutions, and processes that determine how power and responsibilities over natural resources are exercised, how decisions are taken and how citizens – including women, men, youth, indigenous peoples and local communities – secure access to, participate in, and are impacted by the management of natural resources.
>
> Campese (2016, p. 7)

Whilst it was challenging in conducting the coding to distinguish between governance and management, this definition proved to be a useful benchmark. The detailed coding on governance shown in Appendix 1 was also referred to in distinguishing between management and governance at this sorting stage when needed. Likewise for the terms 'ecosystem services' and 'poverty alleviation', there are multiple terms used that have similar meaning and intention. In relation to 'ecosystem services', within 'sectoral' literature it is more likely that terms such as forests, non-timber forest

products, fisheries and grazing land are used. This reflects limited adoption within forest and fisheries management, for example, of an ecosystem-based framing, suggesting that sectoral approaches dominate and subsequently sectoral terms also prevail over an 'ecosystem services' framing (Alexander & Haward, 2019; MacDicken et al., 2015). Therefore the search string reflects the diversity of terms used that refer to ecosystem services of relevance to governance and to contributing to poverty alleviation. Finally, in addition to poverty alleviation, search terms such as livelihoods and wellbeing were used to reflect different perspectives on the purpose of win-win endeavours. The term wellbeing was given emphasis in the Millennium Ecosystem Assessment and livelihoods have been linked specifically to natural capital and sustainability in the sustainable livelihoods approach (Scoones, 2015).

The titles and abstracts of the 53,674 articles were entered into EPPI Reviewer, software designed to facilitate reviews including systematic mapping, systematic reviews and meta-analyses. Due to limited time and funding available, we were not able to screen the entire set of 53,674 papers. Of those articles entered, include/exclude sorting was therefore applied to a) all articles that included the term 'governance' which resulted in 1885 papers, b) a random sample of 10% of the 53,674 articles, taken using the 'random allocation' function of EPPI Reviewer, as a means to include papers that do not necessarily use the term governance but are indeed relevant to understanding governance, and c) all articles that were listed as results of the ESPA programme (341 papers) due to the increased likelihood that they would be relevant. There was some overlap in these categories such that 203 papers in the 10% sample were also 'governance' papers and 38 ESPA-funded papers were also 'governance' papers. As a result, the total number of papers screened for include/exclude was 7386 papers for the systematic mapping, including those that used the word 'governance' in the title/abstract and all ESPA papers. This screening resulted in inclusion of 1427 papers in the systematic mapping; of those 67% were 'governance' papers, 8% were ESPA papers with some overlap between the samples (see Figure S1.1 in Supplementary File 1).

The title and abstract of the 1427 paper abstracts and titles were then read and coded using codes from a literature review and the search strings, which had been consulted on during the consultation workshop. The broad categories of the coding were: governance, poverty, natural resource sectors, frameworks, theory, geography and methods. The detailed coding is set out in Appendix 1. The results of this exercise are set out within the section on systematic mapping below.

Thematic synthesis

Thematic synthesis is an approach that can be used to synthesise qualitative research, involving the translation of concepts from one study to another through coding, ensuring consistency of interpretation, and using the themes from the outputs to answer the research question (Snilstveit et al., 2012; Thomas and Harden, 2008). The process involves three steps of "coding of text, developing descriptive themes and generating analytical themes" (Snilstveit et al., 2012, p. 421). DeSantis and Ugarriza (2012, p. 362) define a theme as an "abstract entity that brings meaning and identity to a recurrent experience and its variant manifestations". They go on to explain that "a theme captures and unifies the nature or basis of the experience into a meaningful whole" (DeSantis and Ugarriza, 2012, p. 362).

Using the themes from the outputs to answer the research question involves 'going beyond' the findings of the individual studies to bring them together at a higher level of abstraction, reflecting on their implications for the research question. This requires iterative sharing of interpretation within a team of experts, as provided within the team of authors of this paper. As Thomas and Harden (2008, p.7) observe, "this stage of a qualitative synthesis is the most difficult to describe and is, potentially, the most controversial, since it is dependent on the judgement and insights of the reviewers".

In undertaking the thematic synthesis, the title and abstract of the 1427 outputs were further screened on the basis of whether they showed potential for evidence in relation to demonstrating or explaining linkages between governance, ecosystem services and poverty alleviation. This screening resulted in a set of papers which were categorised as 'Central', i.e. they were coded as addressing something about all three dimensions. This resulted in a set of 451 papers, including 368 'governance' papers and 27 ESPA papers, 9 of which were in the 'governance' set.

The vast majority of these papers were then downloaded and read for a further sift of yes/no based on the same inclusion criteria used for the abstracts, that is they had to address the interactions of governance, ecosystem health and poverty alleviation. 18 were excluded as the full text could not be accessed. The further sifting resulted in 191 papers for the thematic synthesis. For each output, the governance system or approach in place was recorded and coded and the main findings were identified within the three components of the question: governance, ecosystem health and poverty alleviation. Descriptive themes were identified from the findings under each component, as shown in Appendix 2. These descriptive themes were further synthesised by reflecting on them in relation to the theoretical framework provided by the research question, resulting in three analytical themes. For each of these analytical themes a narrative of the findings is developed, as presented in the findings section, telling the 'story' found in the data (Macura et al., 2019) and reflecting a narrative rather than a statistical synthesis approach (Snilstveit et al., 2012). Major and Savin-Baden (2010, p. 97) advise that the synthesis narrative should be "punctuated with data…in the form of rich, thick description" whilst keeping to synthesese of the findings rather than reporting on individual studies. Each analytical theme is therefore illustrated by examples which were selected to explain the theme or point to and reflect the range of sectors and geographical locations covered in the review.

Findings

Systematic mapping: thematic, sector and geographic trends in the literature

The systematic mapping revealed some important trends in the literature. The term 'governance' itself was often not used in outputs. Instead, titles and abstracts spoke of specific aspects of governance (e.g., participation, institutions), forms of governance (e.g., community-based), or governance instruments (e.g., 34% of papers focused on PES schemes). When the term governance was used, the abstract often did not provide details on which aspects of governance were studied (31% of papers) or how governance was understood.

The literature was found to be "clumped" with some governance components (Figure 2), sectors (Figure 3) and geographical areas well-studied (Figure 4), while others were poorly studied. Forests dominated the literature (35%) while relatively few outputs were found in relation to wetlands (3%). Seventy percent of papers were about instruments (e.g., PES, REDD+ and certification schemes) whereas relatively few focused on governance principles (8%) or rules (8%). The most well studied region was sub-Saharan Africa (24%) with very little written about Australia/Oceania (1%) or the Middle East (1%). Many mentioned ecosystem services without specifying which aspect and talked generally about "poverty" and "livelihoods" without defining in the abstract how those were investigated or measured. A detailed breakdown of the coding results according to the search origin (governance, ESPA and the broader random sample) can be found in Supplementary File 1, where it is reported that the 'governance' and ESPA samples of papers followed the pattern of the broader sample reported here.

Figure 2 **Number of papers addressing particular governance themes**
(note: some papers address more than one theme)

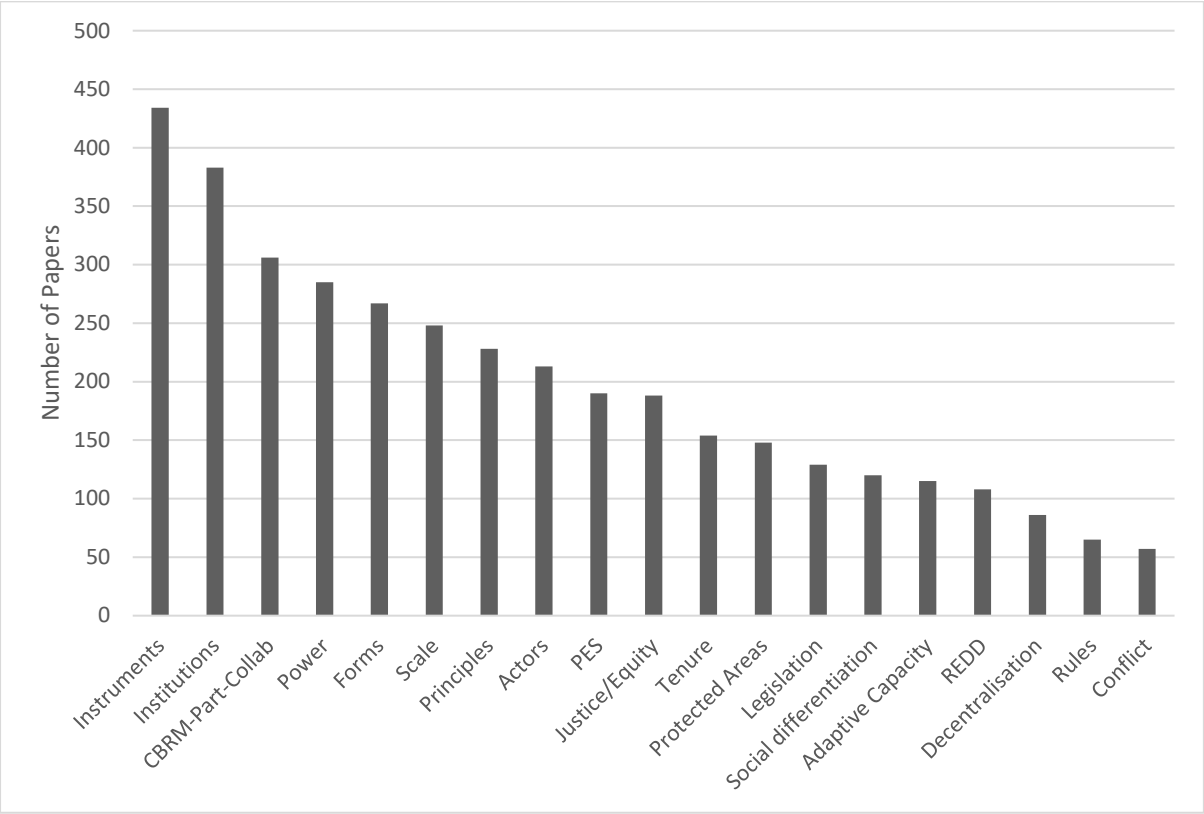


Figure 3 **Number of papers addressing particular sectors**
(note: some papers address more than one sector)

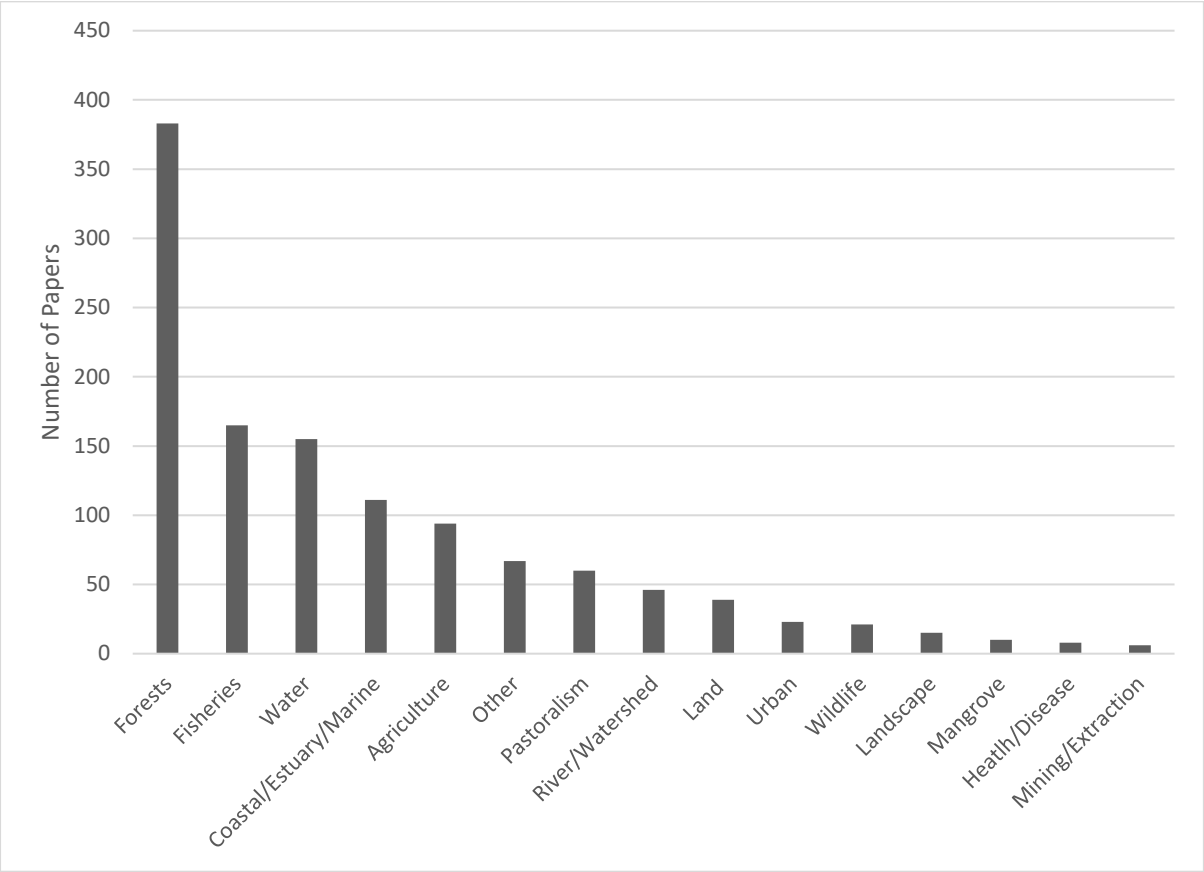
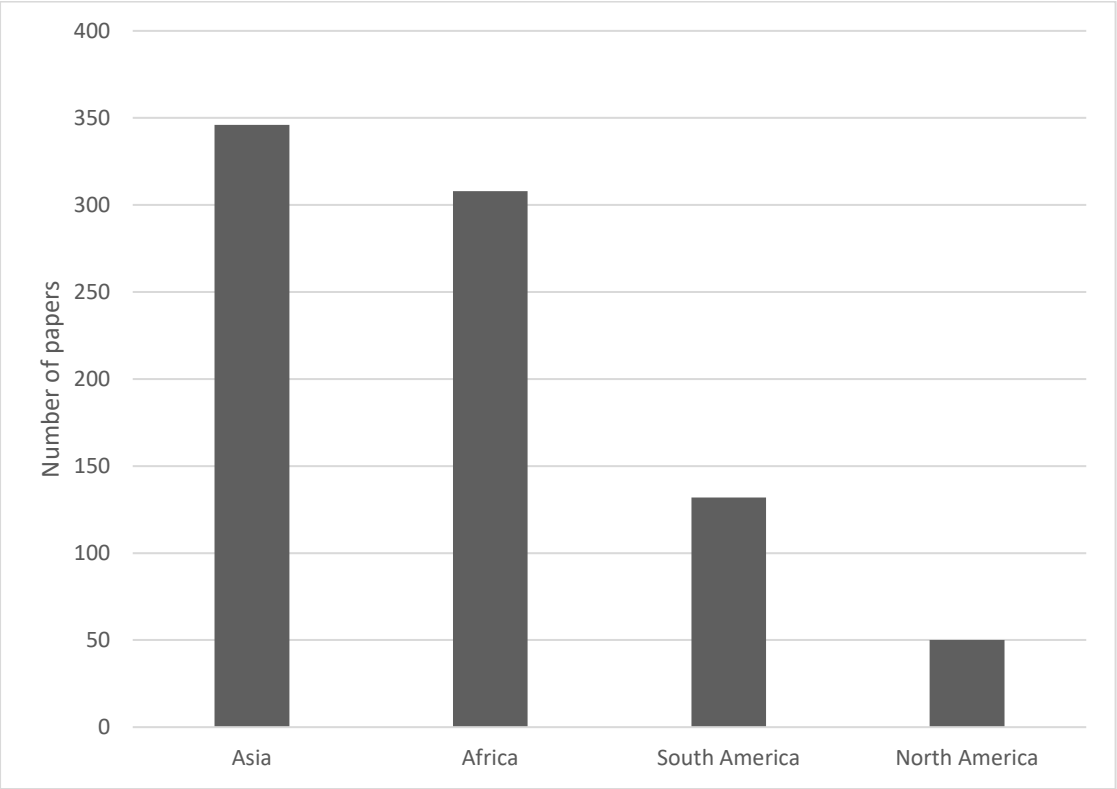


Figure 4 **Number of papers addressing particular regions**
(note: some papers address more than one region)



For sub-Saharan Africa, there were more papers that focused on institutions and instruments whereas for South America, there was more focus on power than in the other regions. In South Asia, institutions and community-based management were more dominant which reflects a high concentration of papers on community forestry in Nepal. For East Asia and Southeast Asia, there was a greater concentration on instruments and PES in particular.

Papers on the forestry sector showed a focus on instruments (PES, REDD+ and certification). Interestingly, almost half of the papers that referred to tenure were about forests. The literature on fisheries focused more on instruments and questions of scale and actors, whilst studies on water focused more on institutions and instruments.

The term 'livelihoods' was the most commonly used poverty-related term with a grouping of articles that spoke to livelihoods and institutions. For papers that addressed instruments, they also included measures of income/assets and benefits/payments. Community-based management papers tended to refer to livelihoods without providing specific details of how that term was being used in the abstract.

Many of the papers were clearly relevant to two of the dimensions under consideration. For example, they spoke to the impacts of community-based forest management (governance component) on local livelihoods (poverty measure) but did not necessarily address the impacts of the management on ecosystem services. Others looked at biodiversity (ecosystem services) in national parks (governance component). Very few clearly described research on all three components in the same study. Those that appeared to do so (based on screening of the title and abstract) were labelled 'Central' and were included in the thematic synthesis.

Thematic synthesis: How governance mediates the relationships between ecosystem services and poverty alleviation

This section presents the findings from the thematic synthesis of the 191 'central' outputs. Table 1 sets out the percentage of outputs categorised under each type of governance regime. The category 'community-based management' includes collaborative forms of governance, generally where resource users collaborate with government in managing a resource, such as in fisheries co-management and joint forest management, as well as arrangements where communities manage resources more independently. There may in practice be overlaps between these governance regimes and cases where multiple resource regimes exist. The categorisation serves the purpose of identifying the main governance focus of the outputs reviewed.

Table 1 Governance systems in 'central' papers

Governance system	**Percentage of outputs (n=191)**
Community-based management (including co-management)	32%
PES/REDD/market-based conservation	19%
Forest governance general	12%
Protected areas (terrestrial and marine)	12%
Commons	4%
Customary	4%
Other (e.g., watershed management, river basin management, multi-level governance)	17%

As seen in Table 1, the majority of outputs focused on community-based management approaches whereas there were relatively few that focused on commons or customary arrangements. This is not to say that these arrangements are not widely found but that they may not have been researched to the same extent as community-based management approaches in terms of delivering on both ecological and livelihood outcomes.

Table 2 provides the percentages of outputs focusing on different types of natural resources. The percentages reflect the dominance of papers on forests in the systematic mapping (35% of outputs) and similar percentages for fisheries (9% compared to 12% of outputs in the systematic mapping) and pastoralism (4% compared to 5%).

Table 2 Type of natural resource in 'Central' papers

Type of natural resource	Percentage of outputs (n=191)
Forests	46%
Fisheries	9%
Pastureland/rangeland	4%
Wildlife	4%
Coastal/marine	9%
Irrigation	2%
Watershed	6%
Multiple	5%
Other	15%

As described in the methods section, the synthesis involved 'going beyond' the findings of the studies reviewed to identify analytical themes that address the question 'how does governance mediate the relationships between ecosystem services and poverty alleviation?' These analytical themes are:

1. Governance that is locally owned and inclusive increases the potential for ecosystem services to deliver on improved livelihoods.
2. There are generally multiple governance structures and systems in place in any institutional setting and these interact and adapt over time in response to preferences and power dynamics.
3. Governance systems rarely offer appropriate and adequate incentives to deliver on poverty alleviation through ecosystem services.

Each analytical theme was informed by reflecting on a series of descriptive themes, as shown in Table 3. Supplementary File 2 provides the numbers of articles coded against each descriptive theme and

the reference to each article, as given in Supplementary File 1. Caution is advised in interpreting the number of articles coded for each descriptive theme as no weighting is inferred given the qualitative focus of the analysis. The numbers and references to articles are included in Supplementary File 2 for transparency of method. The count numbers are not used as data given the narrative data approach of the synthesis and 'third order' interpretation of descriptive themes into analytical themes (Thomas and Harden, 2008). The descriptive themes form the basis of the elaboration of each analytical theme in the sub-sections below.

Table 3 Descriptive and analytical themes

Analytical theme	Descriptive themes
1. Governance that is locally owned and inclusive increases the potential for ecosystem services to deliver on improved livelihoods.	1.1 Customary institutions linked to local ownership and inclusivity 1.2 Governance often not genuinely inclusive in practice 1.3 Insufficient power sharing 1.4 Elite capture present 1.5 Inadequate local ownership associated with negative consequences for ecosystem health 1.6 Locally managed resources often provide greater livelihood benefits
2. There are generally multiple governance structures and systems in place in any institutional setting and these interact and adapt over time in response to preferences and power dynamics.	2.1 Multiple institutions exist within a governance landscape 2.2 Local institutions interact with new externally-initiated institutions 2.3 Power influences institutions 2.4 Coordination between structures and institutions is often lacking
3 Governance systems rarely offer appropriate and adequate incentives to deliver on poverty alleviation through ecosystem services.	3.1 Governance systems not designed and implemented with sufficient incentives to deliver on livelihood benefits and be sustained over time 3.2 Incentives/compensation from conservation associated with species richness 3.3 Incentives/compensation for participation in governance and conservation of ecosystems often inadequate

Analytical themes

1) *Governance that is locally owned and inclusive increases the potential for ecosystem services to deliver on improved livelihoods*

There is consistency across the governance types that local ownership (meaning that decisions can be made by local people, not distant bureaucracies or elites, with participation in initiation) and inclusivity (meaning that the ability to influence decisions is not limited to a narrow group of people) of the arrangements increases the potential for ecosystem services to deliver on improved livelihoods. Evidence for local ownership is particularly found within customary systems and within some examples of community-based management, where space and measures are in place leading to empowerment of communities, resulting in a sense of ownership of the resource and genuine voice in decision-making. However, many factors constrain the potential to develop a sense of ownership, particularly beyond a few actors who may capture the benefits resulting from particular forms of governance. These factors include power dynamics and norms within communities that make participation by some actors difficult. This may be manifested in people not being willing to speak up in meetings, certain people not being elected onto committees or some people, often women, not having the time to participate in governance systems. Beyond communities, governments are often reluctant to share power over decision-making and rule enforcement in a meaningful way, presenting a further constraint on developing local ownership and inclusivity.

Local ownership is generally greater within customary institutions since these were formed, and are sustained, by resource users themselves. An example of customary institutions delivering on improved ecosystem health and livelihoods is given in Sheppard et al. (2010), which documents the socioeconomic and ecological results of ten years of community-governed environmental management in Wechiau, in northern Ghana, bordering Burkina Faso. The Wechiau Community Hippo Sanctuary was founded in 1998 by the Paramount Chief of the Wechiau Traditional Area, together

with sub-chiefs and other leaders. The initiative for the formation of a community-managed sanctuary sprang from resistance to the intended formation of a government-run reserve. There was then external influence but local ownership in terms of establishing a governance approach that was locally appropriate. The reserve aligned with existing taboos and myths associated with hippopotami and created a governance system that included representation from the multiple ethnic groups settled in the area. The sanctuary has brought in revenue through ecotourism employment and a shea nut cooperative, has also benefited from donor funding, and evaluation of the project reported on improved access to water, schools, lighting and health care (Sheppard et al., 2010). Whilst the initiative faces challenges in maintaining these positive outcomes, it provides an example of local ownership, and of an initiative led by and building on existing customary institutions.

A further example of positive outcomes associated with customary institutions is reported on by Patenaude and Lewis (2014). They compared the impacts of four prominent resource management systems on ecosystem services and on poverty alleviation to inform REDD+ planning in Tanzania. The four systems were: Community Based Forest Management (CBFM), Joint Forest Management (JFM), Wildlife Management Areas (WMAs) and *ngitili* enclosures, a traditional land husbandry technique practised by some Sukuma pastoralists. Their analysis draws on data collected through participant observation, workshops and a review of relevant literature. From the analysis, they concluded that *ngitili* and CBFM were most successful in terms of outcomes for ecosystem health and poverty alleviation, which they attributed to decisions on management being made at the local level, bringing perceptions of equity and legitimacy amongst community members.

Gongbuzeren et al. (2016) found within pastoralist communities in China that customary institutions can co-exist alongside newly introduced mechanisms, in this case a grazing quota system, suggesting that market-based systems do not have to replace customary arrangements but can be embedded in existing systems. They found positive results from this arrangement, observing that the “community-

based grazing quota system can retain the benefits of community tenure and facilitate more equitable use of rangelands by individual community members" (Gongbuzeren et al., 2016, p. 294). A further example of co-existence of customary institutions with other governance systems is given by McLeod et al. (2009), who found that traditional marine management, known as *sasi* in eastern Indonesia, benefits from being supported by formal government structures and legislation.

However, customary institutions have at times been marginalised and dismantled by government decision and action, including as a result of new institutions being introduced. Akamani et al. (2015) provide an example of this in Ghana, where the traditional authorities were not given formal recognition in forest management in the implementation of community forest management, contributing to a weakening of their role and erosion of social norms.

The literature identifies a number of challenges related to participation of marginalised stakeholders, and capture of new governance arrangements by elite members of communities. Elite capture reduces the wider sense of ownership by community members and result~~s~~ in more exclusion than inclusion. Factors such as gender, wealth and ethnicity affect the potential to participate effectively in many contexts. Several sources provided evidence of elite capture in community forest and other governance programmes in Nepal, where people of higher caste and greater wealth dominated committees (Adhikari & Di Falco, 2009; Agrawal & Gupta, 2005). This led to the exclusion of lower caste and poorer community members and rules that tended to benefit richer rather than poorer community members.

However, Adhikari & Di Falco (2009) also found that if people from lower caste households attended village meetings over time, the probability of them being elected onto the committee increases. This suggests that elite capture can be challenged over time through perseverance. It can also be challenged through external agencies supporting the emergence of community-based governance

structures and systems over time, thereby enabling people who may otherwise be marginalised to participate and be heard (Persha & Andersson, 2014).

In addition to elites often capturing community-based governance structures, more marginalised people may be unable or reluctant to participate due to the high opportunity and transport costs associated with participation (Adhikari, Kingi et al., 2016). There are few examples in the literature of how such barriers – elite capture and costs of participation – can be overcome to enable effective and equitable participation in community-based management. Banjade and Ojha (2005) do, however, provide an example of a pilot initiative that sought to address such a situation. They report on the testing of a deliberative process with a Community Forest User Group (CFUG) in Nepal which had not been meeting due to the distance between communities, which meant that it was too far to travel for some members and women outside the area needed permission to travel beyond their own community. The intervention involved the convening of more decentralised, local meetings, which focused on involving women and lower caste members, with the meetings facilitated by NGOs. The intervention resulted in greater participation of women and lower caste people in CFUGs and a greater sense of ownership. The article provides a rare example of how challenges related to inclusion of women and marginalised community members, in this case due to caste, can be overcome.

Beyond intracommunity dynamics, governments often fail to assist in the development of a sense of ownership through community-based governance by holding onto substantial power, offering very little in the way of power-sharing. In the Philippines, for example, Baynes et al. (2016) found that little power had been devolved from central government to local government staff and then from that level to community forest groups and from community forest groups to local people. Without further devolution of power, they claim that “community forestry is likely to fail” (Baynes et al., 2016, p. 175).

These examples demonstrate that a sense of local ownership and inclusivity are essential for enabling ecosystem services to contribute to poverty alleviation but such ownership and inclusivity cannot be assumed to result from the implementation of community-based approaches. Existing power dynamics, elite capture, constraints on participation resulting from opportunity costs and social norms and limited power sharing by government limit the potential for developing ownership and inclusivity. Local ownership can, however, be facilitated through encouraging initiation of governance systems by communities, by recognising and building on customary systems and by making deliberate and appropriate effort to enable people who may otherwise struggle to participate to be effectively involved, and for that involvement to be maintained over time.

2) Multiple governance structures and systems interact and adapt

There are generally multiple governance structures and systems in place in any institutional setting and these interact and adapt over time in response to preferences and power dynamics. As Ingram et al. (2015, p. 59) observe "multiple governance arrangements are a reality". This multiplicity of arrangements, for example, state-centred management, with nominal power devolved to community groups and customary norms and rules operating, can be positive for enabling ecosystem services to deliver on poverty alleviation as people navigate through and utilise a range of institutions to access resources and secure rights. However, it can also be problematic; for example, measures to increase the participation of, and benefits to, women from community-based management may be countered by customary norms and practices.

In their analysis of the governance of different forest product value chains, Ingram et al. (2015) compared combinations of governance systems, such as project-based, statutory and market-led systems. They found evidence that when these value-chain interventions built on customary knowledge and rules, they were more likely to deliver on 'win-win' outcomes of improved livelihoods and forest conservation. Ingram et al. (2015) also observe that the arrangements had restricted

access, and therefore benefits, to certain groups of people, whether based on gender or ethnicity and so had not generated win-win outcomes for all.

Identifying links between governance approaches and ecosystem and livelihood outcomes is therefore made challenging by the existence of multiple forms of, and dimensions to, governance at any one time and place. This multiplicity results from there being a wide range of bureaucratic and socially-embedded institutions, within and beyond those created for natural resource management, that impact how people access and benefit from natural resources (Cleaver et al., 2013). The overlapping of local government structures, customary systems and community-based and collaborative structures initiated by specific government ministries or departments, such as water, forests, fisheries or wildlife management, together create a form of 'legal pluralism'. Many of these overlaps occur at multiple administrative levels, such as village, sub-district, district and national levels, and interact with, and are influenced by, institutions, structures and decisions existing and made at other levels and scales, including international.

Given this multiplicity of institutions, actors and governance systems, it is challenging to isolate the decisions and influence of one system or component and determine their contribution to outcomes. The situation is further complicated by the dynamic nature of interactions between institutions, resulting in constantly changing structures, practice and outcomes over time. One framing for describing and analysing how institutions interact and with what outcomes is 'institutional bricolage', which de Koning (2014) drew on to examine the introduction of community forestry in the Amazon. She found examples of new structures being rejected by existing institutions, new and/or existing institutions being altered as a result of their interaction, and pieces of existing and introduced institutions forming new arrangements. The interaction between existing and newly introduced institutions means that although new institutions are often implemented in the same form at scale,

for example a nationwide policy on community forest management or fisheries co-management, differences will emerge over time within and between structures, practices and outcomes.

Although there are many examples of decentralised and participatory forms of governance, such as community-based natural resource management (CBNRM), many rules and regulations regarding the governance system and how resources can be used still derive from government. There may be little scope for the users of a resource to develop or modify rules and regulations. In the case of community forestry in Tanzania, Strauch et al. (2016) found that formal rules and regulations derived largely from central government, resulting in a lack of awareness about the rules and regulations and a lack of cultural relevance, which affected willingness to comply. The top-down nature of community-based approaches limits the scope for these approaches to be locally-specific and responsive, which may contribute to the generally limited ability to contribute to improved livelihoods and ecosystem health.

Given this multiplicity of actors, levels and institutions in a governance landscape, there are inevitably challenges for coordination of decision-making and practice, with implications for the potential to deliver on improved ecosystem health and livelihoods. A lack of coordination arises from poor inter-sectoral integration (Hagos et al., 2011) and can result in greater bureaucracy associated with the multiple structures and systems (Katani & Babili, 2012). Inadequate coordination can also arise from there being multiple and competing claims of ownership over resources. Girma and Beyene (2015) report on competing claims over forest resources between local people and the state in Ethiopia, with local forest users not recognising state ownership, resulting in an uncoordinated approach to management and potentially to conflict between actors. Marfo et al. (2012) also observe competing claims over tree tenure, this time in Ghana, with the multiple legal regimes (state and customary) offering different levels of authority and control to different actors.

3) *Governance systems rarely offer appropriate and adequate incentives to deliver on poverty alleviation through ecosystem services*

Literature addressing different governance systems consistently highlights the inadequacy of incentives to encourage pro-conservation behaviour by people expected to play a role in governing natural resources. The lack of incentives particularly comes in the form of limited, or no, increase in income resulting from conservation. Several sources concluded that income and employment generation improvements had not been realised. For example, Acharya et al. (2015) observed that forest certification in Nepal had not delivered on higher income, though it had improved record keeping, monitoring forest management and building networks among stakeholders. Similarly in Nepal, Karki (2013) found that whilst not all households experienced improved livelihoods as a result of conservation initiatives, they recognised and appreciated wider societal benefits resulting from conservation. Karki (2013, p. 998) also reported that whether a household experiences livelihood improvements depended on a number of factors, such as "the availability of resources, the characteristics of conservation incentives, and the nature of environmental-livelihood patterns and interactions". The complexity of such factors suggests that it may be challenging to predict potential livelihood improvements for individual households. However, a common finding in the literature is the perception of wider societal or community benefits arising from community forest management, with Maharjan et al. (2009) observing that the shift of benefits from the household level to community level implies a need for a system of fair representation, that may enable active participation of all households, including the poorest.

Gross-Camp (2017) also found a lack of improvement in livelihoods associated with community forest management in Tanzania, but found that despite this, there was widespread support within the community for the management system. She attributes this to growing awareness of the rationale for forest management and appreciation of greater control over access to the forest, as well as of recognition by the state and other villages of their efforts. Gross-Camp (2017) also observes the long-

term external support from NGOs, in turn often supported by donor funding or funding from international NGOs, which assisted communities in overcoming significant bureaucratic hurdles in applying for registration.

The evidence for communities appreciating a sense of ownership and control over forest resources resulting from community forest management can be emphasised and further strengthened in policy and programme support. Recognition of motivational factors beyond income generation and financial reward appears to be critical in developing effective management systems, with such factors reflecting "local people's sense of place belonging and cultural identity, social cohesiveness, and desire to achieve control over and access to natural resources" (Ruiz-Mallén et al., 2015, p.11). However, Ruiz-Mallén et al. (2015) caution that motivations for engaging with conservation will change over time, suggesting a need to review incentives and policies.

A further challenge to realisation of win-win outcomes and adequate incentives for participation in governance systems is the prioritisation of conservation. Instead of benefiting through poverty alleviation or improved livelihoods, poorer people often bear the cost of conservation (Bluwstein et al., 2016). Examples include exclusion from protected areas, where access to land for agriculture and grazing has been lost (Garrity et al., 2002; Moyo et al., 2016). Where there is compensation associated with conservation, notably through PES schemes, the system for the distribution of benefits does not always result in sufficient compensation for individuals to be motivated to comply with rules and participate effectively (Krause & Loft, 2013). Sommerville et al. (2010) also found in Madagascar that PES payments did not incentivise compliance because of their small size and because they were distributed to the community rather than individuals or households. Instead, they found fear of being caught in illegal practice led to a positive change in behaviour, with that fear resulting from monitoring. In another example in China, Tuanmu et al. (2016) found that social norms and networks

assisted in groups of households taking on the monitoring role and improving compliance as part of a PES scheme.

Perceptions of equality and fairness have also been found to affect attitudes to and compliance with environmental protection or conservation initiatives. Several papers observed how some conservation initiatives, including PES schemes, had not been informed by, or responded to, social structures and politics (Keane et al., 2016). Rodríguez de Francisco et al. (2013, p. 1229) conclude that PES schemes are not "neutral initiatives based on economic logic and rational-technical intervention" but are instead "configured by vested interests, with the potential to exacerbate social differences within communities, reproduce inequalities in access to resources and environmental services, and undermine existing livelihoods and practices". Failing to reflect on, or be informed by, social difference, can, as observed earlier, lead to elite capture and hence affect the degree to which such schemes are seen as legitimate and have the capacity to deliver on equitable and sustainable outcomes. As well as needing to be informed by inequalities, Fabinyi et al. (2015) make a case for fisheries governance to address *perceived inequalities* as without such action, motivation to act on fisheries decline will not be generated.

Given challenges associated with many governance systems in delivering on improved livelihoods, it has been argued that governments have a role to play in shaping markets for environmental services so that there is greater potential for more equitable outcomes (Landell-Mills, 2002). Markets on their own cannot be relied on to deliver outcomes that reach poorer members of communities. Instead, governments must intervene to help markets deliver on incentives and rewards through assigning forest property rights, strengthening capacity of communities to participate in forest service markets such as schemes to promote carbon sequestration and watershed management, and provide access to finance (Landell-Mills, 2002).

Over-emphasis, or perhaps sole emphasis, on conservation can have other implications. Adhikari, Ojha et al. (2016) highlight how in Nepal the focus on conservation rather than recognition and prioritisation of food security presents a lost opportunity to improve food security, particularly for the poor. They identify several factors that contribute to this situation: the centralized control of forest management despite the implementation of community forest management, the emphasis given to forest conservation, the lack of integration and coordination between forest and agriculture policies and lack of support given to scaling up and strengthening innovation in utilising food from forest ecosystems. These factors reflect the sector-led approach of forest management and challenges associated with limited coordination and cooperation across government departments and ministries.

A further example of disincentives for participation in resource governance, despite the implementation of community management, is found in cases where only low quality forest is made available for community forest management (Gritten et al., 2015). Anderson et al. (2015) refer to this phenomenon as 'managing leftovers'. They draw on the experience of community forestry in Cameroon, Kenya and Nepal and conclude that local communities are often left with access only to resources and activities of limited economic value, such as non-timber forest products, seedling production and bee keeping. Through the process of implementing community forest management, few additional rights and responsibilities may in practice be transferred, limiting benefits and incentives. The quality or condition of a natural resource may impact on the incentives for engagement in governance institutions, as was found by Aburto et al. (2014) in Chile, where a decline in fisheries resources led to the governance system being abandoned.

Discussion

The results of the systematic mapping and thematic synthesis highlight the tendency within research towards clumping, with dominance of papers on forests over fisheries, and instruments and institutions over adaptive capacity. This may reflect the scale and importance of these resources for

livelihoods, but given the dominance of certain sectors and instruments, this does suggest that caution should be taken in applying lessons across sectors, instruments and geographical areas.

In response to the research question 'how does governance mediate links between ecosystem services and poverty alleviation?', the thematic systhesis led to the identification of three analytical themes. Discussion on the first analytical theme of local ownership and inclusivity highlighted the importance of building on existing institutions and enabling more effective and appropriate participation, leading to positive ecological and livelihood outcomes, as has also been found specifically in the context of protected areas (Oldekop et al., 2016). However, the extent and nature of power sharing with government also needs to be considered. Too often governments cling onto power and decision-making in key areas. This gives communities little scope for decision-making and influence over how natural resources are used and managed, as corroborated in an FAO study of forest tenure arrangements in 23 countries (Aggrawal et al., 2021). Without further devolution of power, local ownership will not be adequately developed. Devolution of power would be insufficient on its own; inclusivity is also important and would be threatened by elite capture and gendered norms that limit participation of, and benefits to, women (Adhikari et al., 2014).

In addition to understanding and building on existing systems and rules, deliberate effort is needed to enable appropriate participation of all stakeholders. Discussion on the first theme noted the limited evidence in the sampled literature on how challenges to participation in resource management could be overcome. The example given in Banjade and Ojha (2005) of using smaller, more local meetings, facilitated by an NGO, can be learnt from. For example, existing women's groups, such as savings and credit groups, could be used to bring women into community-based governance systems more consistently and effectively. NGOs, or other external actors, can facilitate the establishment of institutions for more decentralised governance (Gross-Camp, 2017) or support communities in

countering the tendency towards elite capture (Persha and Andersson, 2014; Banjade and Ojha, 2005), though this would require funding over a potentially considerable period of time.

Discussion on the second analytical theme noted that there can be both challenges and opportunities associated with the multiplicity of governance structures and systems for ecological and poverty outcomes. This multiplicity of structures and systems is recognised in legal pluralism, referring to the co-existence of tenure systems (Tamanaha, 2008), and in institutional bricolage, referring to how "people patch together institutions from existing social and institutional arrangements" (Hall et al., 2014, p. 168). This piecing together of formal and informal institutions can lead to new, or adapted, governance arrangements, with consequences for ecosystem and livelihood outcomes (de Koning, 2014; Nunan et al., 2015). Other literature on the multiplicity of governance structures and systems operating in a landscape have observed a lack of coordination (Nunan, 2018), with silo-ed structures characterising fragmented governance (Nunan et al., 2020), leading to poor ecological and livelihood outcomes.

Discussion on the third analytical theme highlighted that often conservation is prioritised above livelihood benefits, and that incentives for conservation or sustainable management are inadequate. The need for adequate incentives or compensation was found in a systematic review of literature on PES schemes, which sought to answer the question 'what key factors influence the environmental, poverty alleviation and "win-win" outcomes of PES?' (Ola et al., 2019). The review found that "high and sufficient payments are central to successful PES programs" and concluded that PES scheme incentives should "tackle local constraints that limit environmental conservation and poverty alleviation" and costs should be minimized (Ola et al., 2019, p. 62). In their meta-analysis of how protected areas can deliver on social and ecological benefits, Oldekop et al. (2016) concluded that protected areas were more likely to deliver on these benefits if inequalities in the distribution of

benefits were reduced and determined effort was made to maintain cultural as well as livelihood benefits.

The identification of the three analytical themes through a thematic synthesis provide insight as to how governance can enable ecosystem services to deliver on poverty alleviation but does not negate the challenge in answering the question owing to the limited evidence available that strongly links the three components. In particular, it was found in undertaking the research that there are relatively few journal articles that report on the details of ecosystem services in relation to governance and poverty alleviation. This observation supports that of previous related reviews, including: Agrawal and Benson (2011), who found that there are few studies that report on multiple outcomes and specifically on relationships between the outcomes of equity, sustainability and livelihoods; Bowler et al. (2012), who concluded that there is insufficient evaluation built into community forest management, making conclusions about outcomes difficult; d'Armengol et al. (2018), who concluded that there is insufficient attention paid to the outcomes of fisheries co-management; and, Galvin et al. (2018), who call for more attention to ecological outcomes in relation to community conservation initiatives in Africa. This observation also aligns with the conclusion of Agrawal et al. (2018) that the extent of ecological and livelihood changes cannot yet be attributed to specific forest governance interventions. This may be due to a range of factors, including the difficulties of interdisciplinary collaboration (Cairns et al., 2020) and the word limit of journal articles, as covering all three aspects in detail may require greater length than that permitted by many journals. It may also be due to the time and resources needed to undertake such multifaceted, multi-disciplinary research and the challenges of attributing aspects of ecosystem services to poverty alleviation, and to the nature and performance of governance systems.

Conclusion

The article reports on the results of a systematic mapping and thematic synthesis on the role of governance in mediating links between ecosystem services and poverty alleviation. Our choice of methodologies allowed a relatively systematic and comprehensive assessment of the available evidence from a wide range of relevant research. All papers in the search which included the term govern* were included in original selection for inclusion/exclusions as they were expected to be highly relevant. The decision to randomly sub-sample the papers was due to the impossibility of sorting through 53,674 papers within the research project timeframe. As is always the case, it is possible that relevant papers are missing from this analysis (and because grey literature was excluded, it is inevitable that relevant work in that literature is missed). However, the random sampling process avoids the biases that may be found in literature reviews, where the range of authors and disciplinary perspectives are not fully captured in relation to a given question.

The three analytical themes identified in the thematic synthesis can be considered as principles to increase the potential for governance to mediate contributions to poverty alleviation from ecosystem services. These themes are: a) a strong sense of local ownership and inclusivity; b) the co-existence of multiple governance systems and institutions enabling people to utilise different components and alter rules and systems to enable access to and benefits from ecosystem services; c) governance systems that afford equal priority to poverty alleviation as for conservation and sustainability goals. These principles, and the insights that led to them as set out in this article, can inform the pursuit of governance that is “interactive, inclusive, informed and adaptive”, seen as essential for the transformational change needed to protect and restore nature in the IPBES Global Assessment Report (IPBES, 2019, p. 40). What is needed though, is a policy environment that encourages and supports greater flexibility in forms and practice of governance.

Whilst the analytical themes can direct governance systems and new initiatives, in many aspects more detailed evidence and examples are needed. Four are noted here. Firstly, more evidence is needed in terms of what 'local ownership' looks like and how it can be facilitated, particularly for large social-ecological systems, where multiple, potentially thousands, of place-based communities are involved. A question related to this, is whether local ownership necessarily implies a form of community-based management. In their meta-analysis of the ecological and social outcomes of Protected Areas, Oldekop et al. (2016) found that co-managed PAs were more likely to be associated with greater benefits to local communities than PAs that were solely community or state-managed. Effective participation and inclusivity of local communities has been found to be essential for effective co-management (Whitehouse and Fowler, 2018), which suggests that a sense of local ownership does not imply community-based management.

Secondly, limited evidence was found on how different components of a governance landscape, including different parts and levels of government as well as community structures and the private sector, can work in a more coordinated and effective way for sustainable natural resource use and improved livelihoods. The third area of limited evidence concerns how more marginalised people at the local level can be more effectively involved in community-based and higher levels of governance given that elite capture often occurs, social norms deter participation, people have limited time and resources and there are limited incentives associated with governance systems. The limited incentives form the fourth area of insufficient evidence in terms of how more sustained and appropriate incentives or compensation could be provided through governance systems to enable effective participation and effective performance of governance systems.

If governance is to effectively strengthen relationships between ecosystem services and poverty alleviation, then poverty alleviation or similar objectives need to be explicitly pursued, rather than seen as something that will naturally result as a 'co-benefit' of community-based conservation

initiatives. Whilst evidence points to locally-relevant, owned and inclusive forms of governance having the potential to facilitate the pursuit of poverty allevation and improved ecological health, gaps in evidence remain in much of the detail of how this can be realised at scale and sustained over time.

References

Aburto, J. A., Stotz, W. B., & Cundill, G. (2014). Social-ecological collapse: turf governance in the context of highly variable resources in Chile. *Ecology and Society, 19*(1), 2. http://dx.doi.org/10.5751/ES-06145-190102

Acharya, R. P., Bhattarai, B. P., Dahal, N., Kunwar, R. M., Karki, G., & Bhattarai, H. P. (2015). Governance in community forestry in Nepal through forest certification. *International Forestry Review, 17*(1), 1-9. http://doi.org/10.1505/146554815814725077

Adhikari, B., & Di Falco, S. (2009). Social inequality, local leadership and collective action: An empirical study of forest commons. *European Journal of Development Research, 21*(2), 179–194. doi:10.1057/ejdr.2008.16

Adhikari, S., Kingi, T., & Ganesh, S. (2016). Incentives and community participation in the governance of community forests in Nepal. *Small-scale Forestry*, *15*(2), 179–197. DOI 10.1007/s11842-015-9316-8

Adhikari, J., Ojha, H., & Bhattarai, B. (2016). Edible forest? Rethinking Nepal's forest governance in the era of food insecurity. *International Forestry Review, 18*(3), 265-279. http://doi.org/10.1505/146554816819501646

Aggarwal, S., Larson, A., McDermott, C.L., Katila, P., & Giessen, L., 2021. Tenure reform for better forestry: An unfinished policy agenda. *Forest Policy and Economics, 123*, 102376-102375.

Agrawal, A., & Benson, C. (2011). Common property theory and resource governance institutions: strengthening explanations of multiple outcomes. *Environmental Conservation, 38*(02), 199-210.

Agrawal, A., & Gibson, C. C. (1999). Enchantment and disenchantment: The role of community in natural resource conservation. *World Development, 2*(4), 629–649. https://doi.org/10.1016/S0305-750X(98)00161-2

Agrawal, A., & Gupta, K. (2005). Decentralization and participation: The governance of common pool resources in Nepal's Terai. *World Development, 33*(7), 1101–1114. https://doi.org/10.1016/j.worlddev.2005.04.009

Agrawal A., Hajjar, R., Liao, C., Rasmussen, L. V., & Watkins, C. (2018). Editorial overview: Forest governance interventions for sustainability through information, incentives, and institutions. *Current Opinion in Environmental Sustainability, 32*, A1-A7. https://doi.org/10.1016/j.cosust.2018.08.002

Akamani, K., Wilson, P. I., & Hall, T. E. (2015). Barriers to collaborative forest management and implications for building the resilience of forest-dependent communities in the Ashanti region of Ghana. *Journal of Environmental Management, 151*, 11-21. https://doi.org/10.1016/j.jenvman.2014.12.006

Alexander, K. A., & Haward, M. (2019). The human side of marine ecosystem-based management (EBM): 'Sectoral interplay' as a challenge to implementing EBM. *Marine Policy, 101,* 33–38. https://doi.org/10.1016/j.marpol.2018.12.019

Anderson, J., Mehta, S., Epelu E., & Cohen, B. (2015). Managing leftovers: Does community forestry increase secure and equitable access to valuable resources for the rural poor? *Forest Policy and Economics, 58*, 47–55. https://doi.org/10.1016/j.forpol.2014.12.004

Arts, B., & de Koning, J. (2017). Community forest management: An assessment and explanation of its performance through QCA. *World Development, 96*, 315–325. https://doi.org/10.1016/j.worlddev.2017.03.014

Banjade, M. R., & Ojha, H. (2005). Facilitating deliberative governance: Innovations from Nepal's community forestry program – a case study in Karmapunya. *The Forestry Chronicle, 81*(3), 403-408. https://doi.org/10.5558/tfc81403-3

Baynes, J., Herbohn, J., & Dressler, W. (2016). Power relationships: Their effect on the governance of community forestry in the Philippines. *Land Use Policy, 54*, 169–176. https://doi.org/10.1016/j.landusepol.2016.01.008

Baynes, J., Herbohn, J., Smith, C., Fisher, R., & Bray, D. (2015). Key factors which influence the success of community forestry in developing countries. *Global Environmental Change, 35*, 226-238. https://doi.org/10.1016/j.gloenvcha.2015.09.011

Bluwstein, J., Moyo, F., & Kicheleri, R. P. (2016). Austere conservation: Understanding conflicts over resource governance in Tanzanian Wildlife Management Areas. *Conservation and Society, 14*(3), 218-231. DOI: 10.4103/0972-4923.191156

Bowler, D. E., Buyung-Ali, L. M., Healey, J. R., Jones, J. P. G., Knight, T. M., & Pullin, A. S. (2012). Does community forest management provide global environmental benefits and improve local welfare? *Frontiers in Ecology and the Environment, 10*(1), 29–36. https://doi.org/10.1890/110040

Cairns, R., Hielscher, S., & Light, A. (2020). Collaboration, creativity, confict and chaos: doing interdisciplinary sustainability research. *Sustainability Science,* online first. https://doi.org/10.1007/s11625-020-00784-z

Campese, J. (2016). *Natural Resource Governance Framework Assessment Guide: Learning for improved natural resource governance*. IUCN/CEESP NRGF Working Paper, Gland, Switzerland: IUCN and CEESP.

Cleaver, F., Franks, T., Maganga, F., & Hall, K. (2013). Institutions, security, and pastoralism: Exploring the limits of hybridity. *African Studies Review, 56*(3), 165-189. doi:10.1017/asr.2013.84

d'Armengola, L., Castillo, M. P., Ruiz-Mallén, I., & Corbera, E. (2018). A systematic review of co-managed small-scale fisheries: Social diversity and adaptive management improve outcomes. *Global Environmental Change, 52*, 212–225. https://doi.org/10.1016/j.gloenvcha.2018.07.009

de Koning, K. (2014). Unpredictable outcomes in forestry—governance institutions in practice. *Society and Natural Resources, 27*, 358–371. https://doi.org/10.1080/08941920.2013.861557

DFID, EC, UNDP, & the World Bank (2002). *Linking Poverty Reduction and Environmental Management*. Washington, D. C.: World Bank.

DeSantis, L., & Ugarriza, D. (2000). The concept of theme as used in qualitative nursing research. *Western Journal of Nursing Research, 22*, 351–372. doi:10.1177/019394590002200308

Evans, L., Cherrett, N., & Pemsl, D. (2011). Assessing the impact of fisheries co-management interventions in developing countries: A meta-analysis. *Journal of Environmental Management, 92,* 1938-1949. doi: 10.1016/j.jenvman.2011.03.010

Fabinyi, M., Foale, S., & Macintyre, M. (2015). Managing inequality or managing stocks? An ethnographic perspective on the governance of small-scale fisheries. *Fish and Fisheries, 16*(3), 471-485. https://doi.org/10.1111/faf.12069

Fisher, J. A., Patenaude, G., Giri, K., Lewis, K., Meir, P., Pinho, P., Rounsevell, M. D. A., & Williams, M. (2014). Understanding the relationships between ecosystem services and poverty alleviation: A conceptual framework. *Ecosystem Services*, *7*, 34-45. https://doi.org/10.1016/j.ecoser.2013.08.002

Galvin, K. A., Beeton, T. A., & Luizza M. W. (2018). African community-based conservation: a systematic review of social and ecological outcomes. *Ecology and Society, 23*(3), 39. https://doi.org/10.5751/ES-10217-230339

Garrity, D. P., Amoroso, V. B., Koffa, S., Catacutan, D., Buenavista, G., Fay, P., & Dar, W. (2002). Landcare on the poverty-protection interface in an Asian watershed. *Conservation Ecology, 6*(1), 12. http://www.consecol.org/vol6/iss1/art12/

Girma, W., & Beyene, F. (2015). Institutional challenges in sustainable forest management: Evidence from the Gambella Regional State of Western Ethiopia. *Journal of Sustainable Forestry, 34*(3), 233-258. https://doi.org/10.1080/10549811.2014.1003245

Gongbuzeren, Zhuang, M., & Li, W. (2016). Market-based grazing land transfers and customary institutions in the management of rangelands: Two case studies on the Qinghai-Tibetan Plateau. *Land Use Policy*, *57*, 287–295. https://doi.org/10.1016/j.landusepol.2016.05.035

Gritten, D., Greijmans, M., Lewis, S. R., Sokchea, T., Atkinson, J., Quang, T. N., Poudyal, B., Chapagain, B., Sapkota, L. M., Mohns, B., & Paudel, N. S. (2015). An uneven playing field: Regulatory barriers to communities making a living from the timber from their forests–Examples from Cambodia, Nepal and Vietnam. *Forests, 6*, 3433-3451. https://doi.org/10.3390/f6103433

Gross-Camp, N. (2017). Tanzania's community forests: their impact on human well-being and persistence in spite of the lack of benefit. *Ecology and Society, 22*(1), 37. https://doi.org/10.5751/ES-09124-220137

Hagos, F., Haileslassie, A., Awulachew, S. B., Mapedza, E., & Taffesse, T. (2011). Land and water institutions in the Blue Nile Basin: Setups and gaps for improved land and water management. *Review of Policy Research, 28*(2), 149 – 170. https://doi.org/10.1111/j.1541-1338.2011.00487.x

Hall, K., Cleaver, F., Franks, T., & Manganga, F. (2014). Capturing critical institutionalism: A synthesis of key themes and debates. *European Journal of Development Research, 26*(1), 71-86. doi:10.1057/ejdr.2013.48

Ingram, V., Ros-Tonen, M. A. F., & Dietz, T. (2015). A fine mess: Bricolaged forest governance in Cameroon. *International Journal of the Commons, 9(1)*, 41–64. DOI: http://doi.org/10.18352/ijc.516

Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) (2019). *Summary for Policymakers of the IPBES Global Assessment Report on Biodiversity and Ecosystem Services*. Bonn: IPBES.

James, K. L., Randall, N. P., & Haddaway, N. R. (2016). A methodology for systematic mapping in environmental sciences. *Environmental Evidence, 5*, 7. DOI 10.1186/s13750-016-0059-6

Kairu, A., Upton, C., Huxham, M., Kotut, K., Mbeche, R., & Kairo, J. (2018) From shiny shoes to muddy reality: Understanding how meso-state actors negotiate the implementation gap in participatory forest management. *Society and Natural Resources, 31*, 74-88. https://doi.org/10.1080/08941920.2017.1382628

Karki, S.T. (2013). Do protected areas and conservation incentives contribute to sustainable livelihoods? A case study of Bardia National Park, Nepal. *Journal of Environmental Management, 128*, 988-999. https://doi.org/10.1016/j.jenvman.2013.06.054

Katani, J. Z., & Babili I. H. (2012). Exploring forest governance in Tanzania. In B. Arts, S. van Bommel, M. Ros-Tonen & G. Verschoor, (Eds.), *Forest-people interfaces: Understanding community forestry and biocultural diversity* (pp. 259-275). Wageningen: Wageningen Academic Publishers.

Keane, A., Gurd, H., Kaelo, D., Said, M. Y., de Leeuw, J., Rowcliffe, J. M. & Homewood, K. (2016). Gender differentiated preferences for a community-based conservation initiative. *PLoS ONE, 11*(3), e0152432. https://doi.org/10.1371/journal.pone.0152432

Krause, T., & Loft, L. (2013). Benefit distribution and equity in Ecuador's Socio Bosque Program. *Society & Natural Resources, 26*(10), 1170-1184. https://doi.org/10.1080/08941920.2013.797529

Landell-Mills, N. (2002). Developing markets for forest environmental services: an opportunity for promoting equity while securing efficiency? *Phil. Trans. R. Soc. Lond. A 360*, 1817–1825. DOI: 10.1098/rsta.2002.1034

MacDicken, K. G., Sola, P., Hall, J. E., Sabogal, C., Tadoum, M., & de Wasseige, C. (2015). Global progress toward sustainable forest management. *Forest Ecology and Management, 352*, 47–56. https://doi.org/10.1016/j.foreco.2015.02.005

Macura, B., Secco, L., & Pullin, A. S. (2015). What evidence exists on the impact of governance type on the conservation effectiveness of forest protected areas? Knowledge base and evidence gaps. *Environmental Evidence 4*, 24. DOI 10.1186/s13750-015-0051-6

Macura, B., Suškevičs, M., Garside, R., Hannes, K., Rees, R., & Rodela, R. (2019). Systematic reviews of qualitative evidence for environmental policy and management: an overview of different methodological options. *Environmental Evidence, 8*:24. DOI: 10.1186/s13750-019-0168-0

Maharjan, M. R., Dhakal, T. R., Thapa, S. K., Schreckenberg, K., & Luttrell, C. (2009). Improving the benefits to the poor from community forestry in the Churia region of Nepal. *International Forestry Review, 11*(2), 254-267. https://doi.org/10.1505/ifor.11.2.254

Marfo, E., Acheampong, E., & Opuni-Frimpong, E. (2012). Fractured tenure, unaccountable authority, and benefit capture: Constraints to improving community benefits under climate change mitigation schemes in Ghana. *Conservation and Society, 10*(2), 161-172. DOI: 10.4103/0972-4923.97488

Major, C. H., & Savin-Baden, M. (2010). *An Introduction to Qualitative Research Synthesis: Managing the Information Explosion in Social Science Research*. Abingdon: Routledge.

McLain, R., Lawry, S., & Ojanen, M. (2018). Fisheries' property regimes and environmental outcomes: A realist synthesis review. *World Development, 102*, 213–227. https://doi.org/10.1016/j.worlddev.2017.09.016

McLeod, E., Szuster, B., & Salm, R. (2009). *Sasi* and marine conservation in Raja Ampat, Indonesia. *Coastal Management, 37*(6), 656-676. https://doi.org/10.1080/08920750903244143

Mizrahi, M., Diedrich, A., Weeks, R., & Pressey, R. L. (2019). A systematic review of the socioeconomic factors that influence how marine protected areas impact on ecosystems and livelihoods. *Society & Natural Resources, 32*(1), 4-20. https://doi.org/10.1080/08941920.2018.1489568

Moyo, F., Ijumba, J., & Lund, J. F. (2016). Failure by design? Revisiting Tanzania's flagship Wildlife Management Area Burunge. *Conservation and Society, 14*(3), 232-242. DOI: 10.4103/0972-4923.191160

Nunan, F. (2017). *GESPA Working Paper 1: Analysing Governance of Renewable Natural Resources for Delivering Ecosystem Health and Poverty Alleviation*. Governance for Ecosystem Services and Poverty Alleviation. Birmingham: International Development Department, University of Birmingham.

Nunan, F. (2018). Navigating multi-level natural resource governance: an analytical guide. *Natural Resources Forum, 42*(3), 159-171. https://doi.org/10.1111/1477-8947.12149

Nunan, F., Hara, M., & Onyango, P. (2015). Institutions and co-management in East African inland and Malawi fisheries: a critical perspective. *World Development, 70*, 203-214. https://doi.org/10.1016/j.worlddev.2015.01.009

Nunan, F., Omondi, M.A., Nchimbi, A. Y., Mangora, M. M., Kairo, J. G., Shalli, M. S., & Jiddawi, N. S. (2020). The silos of natural resource governance: implications of sector-led coastal management at the village level in Kenya and Zanzibar-Tanzania. *Conservation and Society*, *18*(2), 148-160. DOI: 10.4103/cs.cs_18_116

Oldekop, J. A., Holmes, G., Harris, W. E., & Evans, K. L. (2016). A global assessment of the social and conservation outcomes of protected areas. *Conservation Biology*, *30*(1), 133-141. https://doi.org/10.1111/cobi.12568

Ola, O., Luisa Menapace, L., Benjamin, E., Lang, H. (2019). Determinants of the environmental conservation and poverty alleviation objectives of Payments for Ecosystem Services (PES) programs. *Ecosystem Services, 35*: 52-66. https://doi.org/10.1016/j.ecoser.2018.10.011

Oldekop, J. A., Sims, K. R. E., Karna, B. K., Whittingham, M. J., & Agrawal, A. (2019). Reductions in deforestation and poverty from decentralized forest management in Nepal. *Nature Sustainability, 2,* 421-428. https://doi.org/10.1038/s41893-019-0277-3

Ostrom, E. (1990). *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge: Cambridge University Press.

Patenaude, G., & Lewis, K. (2014). The impacts of Tanzania's natural resource management programmes for ecosystem services and poverty alleviation. *International Forestry Review, 16*(4), 459-473. https://doi.org/10.1505/146554814813484077

Persha, L., & Andersson, K. (2014). Elite capture risk and mitigation in decentralized forest governance regimes. *Global Environmental Change, 24*, 265–276. https://doi.org/10.1016/j.gloenvcha.2013.12.005

Rodríguez de Francisco, J. C., Budds, J., & Boelens, R. (2013). Payment for Environmental Services and unequal resource control in Pimampiro, Ecuador. *Society & Natural Resources, 26*(10), 1217-1233. https://doi.org/10.1080/08941920.2013.825037

Ruiz-Mallén, I., Schunko, C., Corbera, E., Rös, M., & Reyes-García, V. (2015). Meanings, drivers, and motivations for community-based conservation in Latin America. *Ecology and Society, 20*, 3, 33. http://dx.doi.org/10.5751/ES-07733-200333

Scoones, I. (2015). *Sustainable livelihoods and rural development*. Rugby: Practical Action.

Sheppard, D. J., Moehrenschlager, A., McPherson, J. M., & Mason, J. J. (2010). Ten years of adaptive community-governed conservation: evaluating biodiversity protection and poverty alleviation in a West African hippopotamus reserve. *Environmental Conservation, 37*(3), 270–282. https://doi.org/10.1017/S037689291000041X

Sommerville, M., Milner-Gulland, E. J., Rahajaharison, M., & Jones, J. P. G. (2010). Impact of a Community-Based Payment for Environmental Services Intervention on Forest Use in Menabe,

Madagascar. *Conservation Biology, 24*(6), 1488–1498. https://doi.org/10.1111/j.1523-1739.2010.01526.x

Strauch, A. M., Rurai, M. T., & Almedom, A. M. (2016). Influence of forest management systems on natural resource use and provision of ecosystem services in Tanzania. *Journal of Environmental Management, 180*, 35-44. https://doi.org/10.1016/j.jenvman.2016.05.004

Tamanaha, B. Z. (2008). Understanding legal pluralism: past to present, local to global. *Sydney Law Review, 30*, 375-411.

Thomas, J., & Harden, A. (2008). Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Medical Research Methodology*, *8*:45. doi:10.1186/1471-2288-8-45

Tuanmu, M-N., Viña, A., Yang, W., Chen, X., Shortridge, A. M., & Liu, J. (2016). Effects of payments for ecosystem services on wildlife habitat recovery. *Conservation Biology, 30*(4), 827–835. 10.1111/cobi.12669

UNEP & FAO (2020). The United Nations Decade on Ecosystem Restoration Strategy. Nairobi: United Nations Envionment Programme.

Whitehouse, L. M., & Fowler, M. S. (2018). Meta-analysis reveals that fisheries co-management alters socio-economic outcomes and resource well-being. *Marine Ecology Progress Series, 600*, 127–140. 10.3354/meps12681

Appendix I Search String and Coding for Systematic Mapping

Search string

(govern* OR manag* OR decision-mak* OR "decision mak*" OR institution* OR cooperative* OR co-manage* OR stakeholder* OR participatory OR participation OR justice OR equity OR transparen* OR accountability OR capability OR power* OR legitim* OR inclusive* OR fairness OR adaptability OR rule* OR "regulations" OR regulatory OR tenure OR "land rights" OR "user rights" OR "human rights" OR "local rights" OR community?led OR community?based OR communal OR "open pool" OR "common property" OR participatory OR community near/3 management OR intersectorial OR collaborative OR "community forest*" OR policy OR policies OR "protected area*" OR "national park*" OR "marine conservation area*" OR "marine conservation zone*" OR decentrali? OR formal* OR informal* OR "adaptive capacity" OR trust OR stakeholder* OR access OR certif* OR gender OR ownership OR smallholder* OR integrated)

AND

(((disease OR vector) AND (forest* OR ecosystem* OR ecological OR landscape OR deforest*)) OR REDD OR REDD+ OR "natural resource*" OR "ecosystem service*" OR "environ mental service*" OR biodiversity OR "nontimber forest product*" OR NTFP* OR timber OR fu elwood OR wood OR carbon OR water OR fish* OR grazing OR pastoralis* OR fodder OR fres hwater OR marine OR mangrove OR shrimp OR seafood OR forest OR savanna* OR pollinat* OR landscape* OR "wildlife management" OR bushmeat OR "game animal*" OR "soil erosion" OR desertification OR "waste management")

AND

(poverty OR poor OR livelihood* OR wellbeing OR well-being OR income* OR "food security" OR welfare OR nutrition OR wealth* OR equity)

OR

"payment* for ? ecosystem services" OR "payment* for environmental services")

Coding for Systematic Mapping

Governance

a. Actors
    i. Individual
    ii. Household
    iii. Community
    iv. Government
    v. NGO
    vi. Private sector
    vii. Civil society
b. Institutions
    i. Formal
    ii. Informal
    iii. Government
    iv. Community
    v. Religious
c. Power
    i. Access
    ii. Land tenure
    iii. Common-pool
    iv. Open access resources
    v. Decentralisation
    vi. Other
d. Scale
    i. Local
    ii. Subnational

iii. National

iv. Regional

v. International

vi. Multi-level

e. Forms

i. Community-based, including CBNRM

ii. Multi-level

iii. Decentralisation

iv. Collaborative/co-management

v. Market-based

vi. Corporate Social Responsibility

f. Social differentiation

i. Gender

ii. Marginal groups

iii. Indigenous

g. Principles-Accountability

h. Principles-Participation

i. Principles-Transparency

j. Principles-Legitimacy

k. Principles-Trust

l. Adaptive capacity

i. Information sharing

ii. Adaptability

iii. Resilience

m. Justice/equity

n. Instruments

i. Tax
ii. Certification
iii. Government policy/regulation
iv. Legality verification
v. Changes to legal framework
vi. PES
vii. REDD
viii. Carbon markets
ix. Other

2. Poverty
    a. Livelihoods
    b. Wellbeing
    c. Multi-dimensional
    d. Income & assets
    e. Employment
    f. Time
    g. Health
    h. Education & skills
    i. Food security & nutrition
    j. Fuel & energy
    k. Vulnerability & resilience
    l. Property rights
    m. Water
    n. Social capital
    o. Housing
    p. Capacity/Capabilities

3. Ecosystem Services (following ES Framework)
    a. Provisioning
        i. Food
        ii. Water
        iii. Wood/fibre
        iv. Fuel
    b. Regulating
        i. Climate
            1. Carbon
        ii. Disease
        iii. Flood
        iv. Water purification
    c. Cultural
        i. Aesthetic
        ii. Spiritual
        iii. Education
        iv. Recreation
    d. Supporting
        i. Nutrients
        ii. Soil
    e. Dis-services

4. Sector
    a. Forest
    b. Fisheries

i. Marine

ii. Freshwater

c. Agriculture

d. Mining/extraction

e. Urban

f. Other

5. Frameworks

a. Social-Ecological Systems framework

b. Ecosystem Services Framework

c. Political ecology

d. Resilience

e. Sustainable livelihoods

f. Environmental Entitlements and Property rights

g. Vulnerability

h. Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)

6. Geography

a. South America

b. North America

c. Sub-Saharan Africa

d. North Africa

e. Europe

f. Middle East

g. South Asia

h. Southeast Asia

i. Other

Appendix 2 Coding for thematic synthesis

Component	Coding	Descriptive themes
Governance	Institutions • Insufficient recognition of informal institutions • Customary institutions are not always recognised or respected • Customary institutions often remain in some form over time and influence new institutions and practice • There may be multiple and complex institutions • Institutions can be reshaped, affecting governance outcomes	Customary institutions linked to local ownership and inclusivity Multiple institutions exist within a governance landscape Local institutions interact with new externally-initiated institutions
	Power • Little power shared by government with local communities • Power differentials not adequately recognised within communities • Consistent evidence of elite capture • Decentralisation enables elite capture, the degree and effect of which can be reduced through involvement of external agencies • Power relations shape institutions and their evolution	Insufficient power sharing Governance often not genuinely inclusive in practice Elite capture common Power influences institutions
	Participation • Initiatives to encourage participation of women and poor inadequate • High costs of participation in governance not recognised • More decentralised and deliberate efforts needed to encourage participation of marginalised • Non-elite may not have the skills and status for election • Underlying inequalities matter	Governance often not genuinely inclusive in practice
	Governance landscape • Need to consider other governance arrangements in design • Local context matters as PES interacts with existing institutions • The existence of multiple governance systems brings complexity and is challenging for legitimacy and accountability	Multiple institutions exist within a governance landscape Local institutions interact with new externally-initiated institutions

Component	Coding	Descriptive themes
	• Protected area governance interacts with other systems – do not operate in isolation • Often a lack of policy coordination • Historical context matters • Intersectoral integration often poor Sustaining governance over time • Challenging to sustain over time • Follow up support needed over time to maintain system, participation and awareness • Organisational capacity of communities is contributing factor in continuing conservation initiated with external support	Coordination between structures and institutions is often lacking Governance systems not designed and implemented with sufficient incentives to deliver on livelihood benefits and be sustained over time
Ecosystem health	Factors affecting ecosystem health • Original condition relevant • Mixed outcomes in terms of ecosystem health • Link between inequalities and forest conditions • Compliance affects condition Link between ecosystem health and livelihood benefits • Sustainable management is more likely to happen in locally managed forests that are large and provide diverse non-timber forest products • Diversity of livelihood benefits associated with species richness in forest commons	Inadequate local ownership associated with negative consequences for ecosystem health Locally managed resources often provide greater livelihood benefits Incentives/compensation from conservation associated with species richness
Poverty alleviation	Poverty alleviation outcomes • Customary institutions can deliver on equity • Customary institutions need to be reinvigorated to deliver on poverty alleviation • Mixed evidence in terms of poverty reduction and improved livelihoods	Customary institutions linked to local ownership and inclusivity

Component	Coding	Descriptive themes
	• Level of payment through PES schemes often not enough to incentivise or compensate – need other benefits • More evidence of empowerment rather than livelihood improvement • Income and employment generation often insignificant	Incentives/compensation for participation in governance and conservation of ecosystems often inadequate
	Conservation prioritised • Restrictions can negatively affect livelihoods • Trade-offs likely between sustainability and livelihood aims • Livelihoods and food security not prioritised compared to conservation	Incentives/compensation for participation in governance and conservation of ecosystems often inadequate
	Distribution of benefits • Benefits reach local elites • Poor tend to bear the costs of conservation • Community management tends to be given 'leftovers' (e.g. degraded forest) • Analysis of social differences can inform project design and implementation • Benefits may be mediated by elites	Elite capture common Governance often insufficiently inclusive in practice Incentives/compensation for participation in governance and conservation of ecosystems often inadequate

Supplementary file 1: How does governance mediate links between ecosystem services and poverty alleviation? Results from a systematic mapping and thematic synthesis of literature

Breakdown of sample and systematic coding analysis by sample origin

Systematic mapping sample

The figure below shows the breakdown of the coded sample of the systematic mapping by 10% sample, governance and ESPA papers. The size of the overlap between the 10% sample and governance (112 papers originated from both samples), and governance and ESPA (25 papers originated from both samples), are also shown.

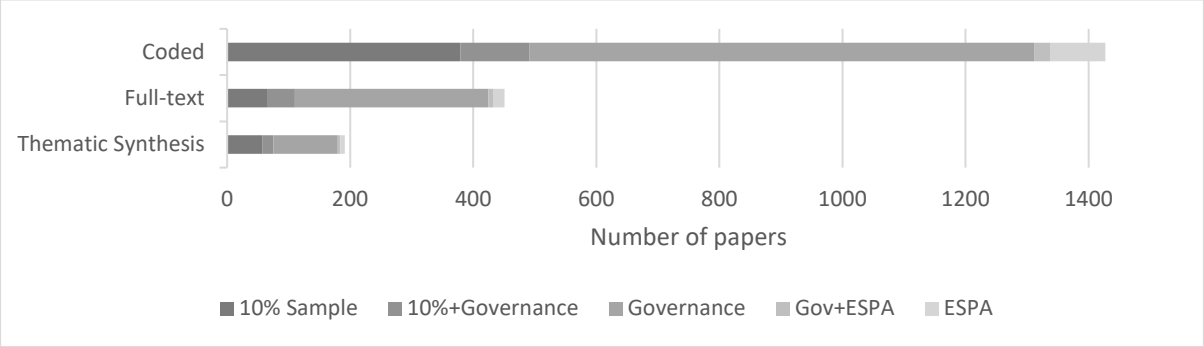


Figure S1.1 Systematic mapping sample

Results of the systematic mapping coding by sample source

'Governance' papers represented 67% of the coded papers and ESPA-funded papers represented 8% of the total sample; if these sub-groups of literature were entirely consistent with the wider pool, then 'governance' papers would constitute 67% of each category and ESPA papers would constitute 8%. In general, the 'governance' papers followed the pattern of the broader sample, (between 60-85% of most categories). However, 'governance' papers were particularly over represented in 'community-based resource management / participatory' (98%) and 'forms' (89%) and under-represented in 'social differentiation' (20%). For ESPA-funded papers, their proportional allocation to governance codes followed the pattern shown by the wider literature (constituting between 6-16% of most categories).

However, they were particularly over represented in ‘conflict’ (22%) ‘justice and equity’ (21%) and ‘principles’ (19%), and under-represented in ‘actors’ (4%) and ‘decentralisation’ (4%). For sectors, ‘governance’ papers were over-represented for ‘fisheries’ (97%) and ‘water’ (90%) while under-represented for ‘land’ (40%) and ‘health/disease’ (50%). ESPA-funded papers represented 7 of the 8 papers on ‘health/disease’ and were also over-represented in ‘mining’ (33%), ‘mangroves’ (20%) and ‘wildlife’ (20%), while under-represented in ‘forests’ (5%) and ‘fisheries’ (4%). For regions, ‘governance’ papers were over-represented for South America (95%) and North America (98%). ESPA-funded papers were under-represented for North America (2%).

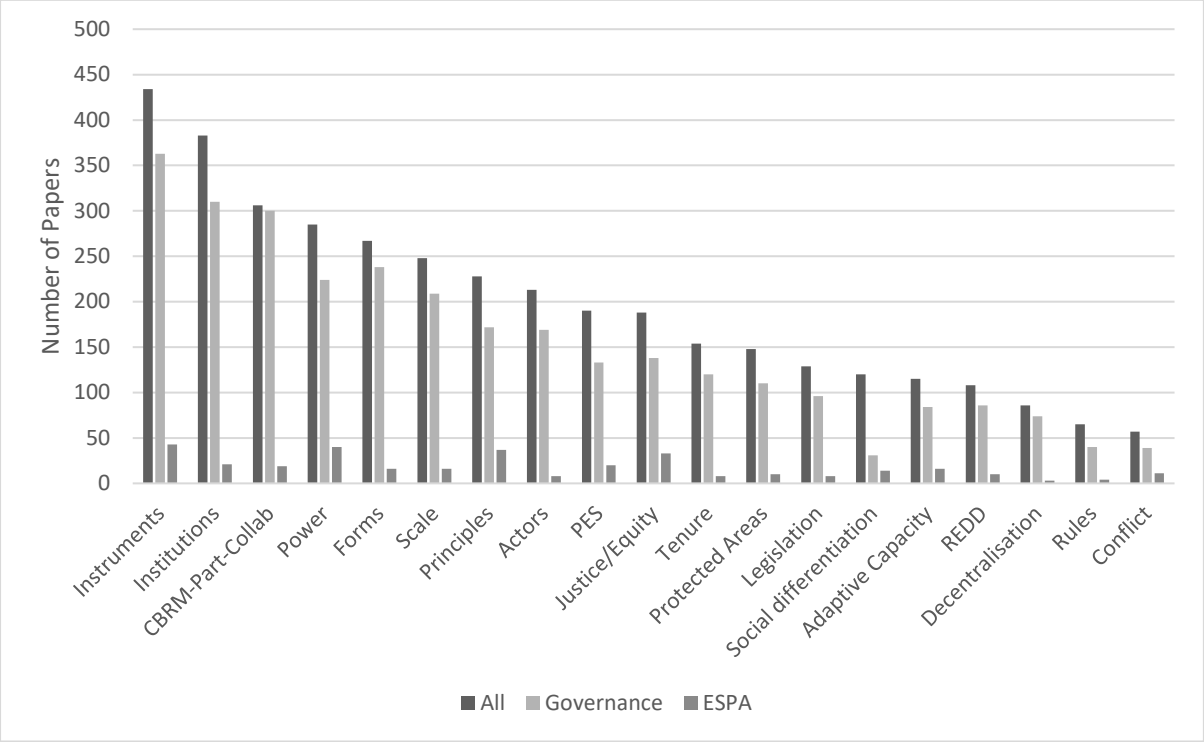


Figure S1.2 Number of papers addressing particular governance themes (note: some papers address more than one theme)

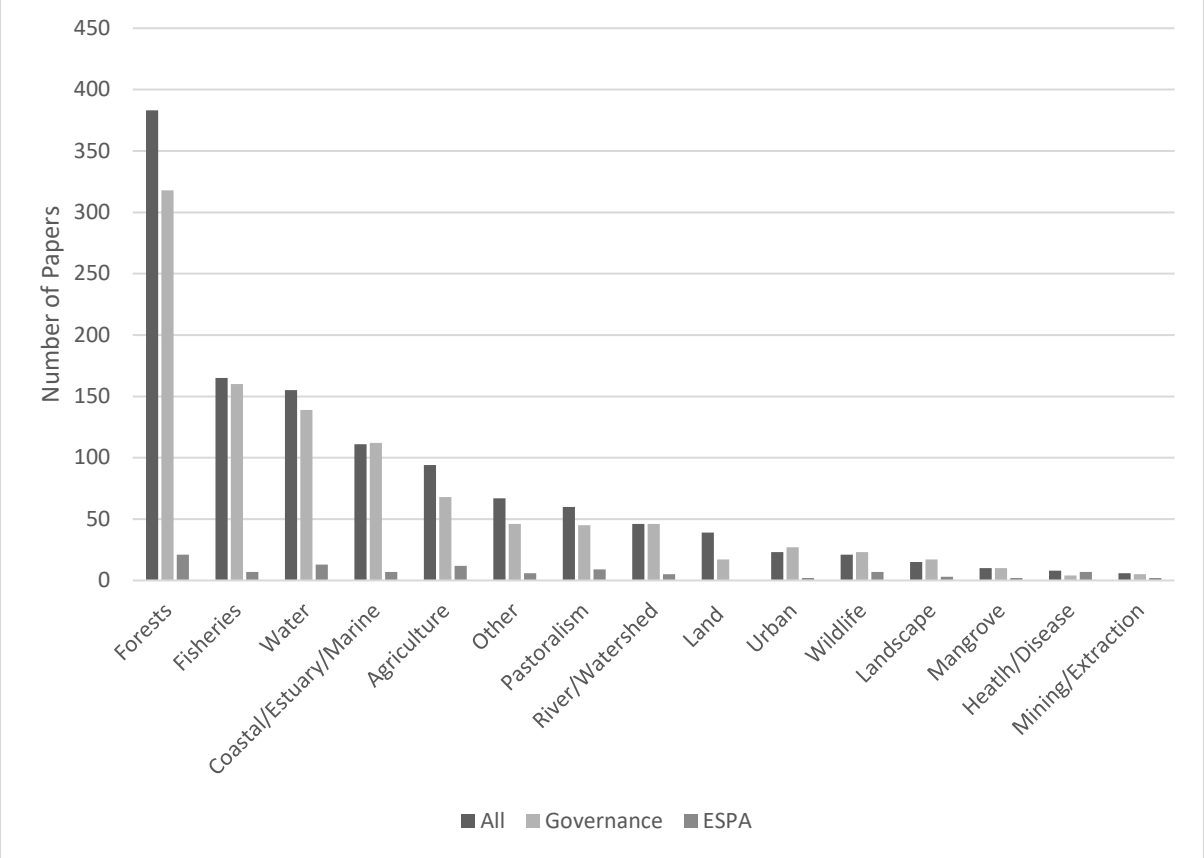


Figure S1.3 Number of papers addressing particular sectors (note: some papers address more than one sector)

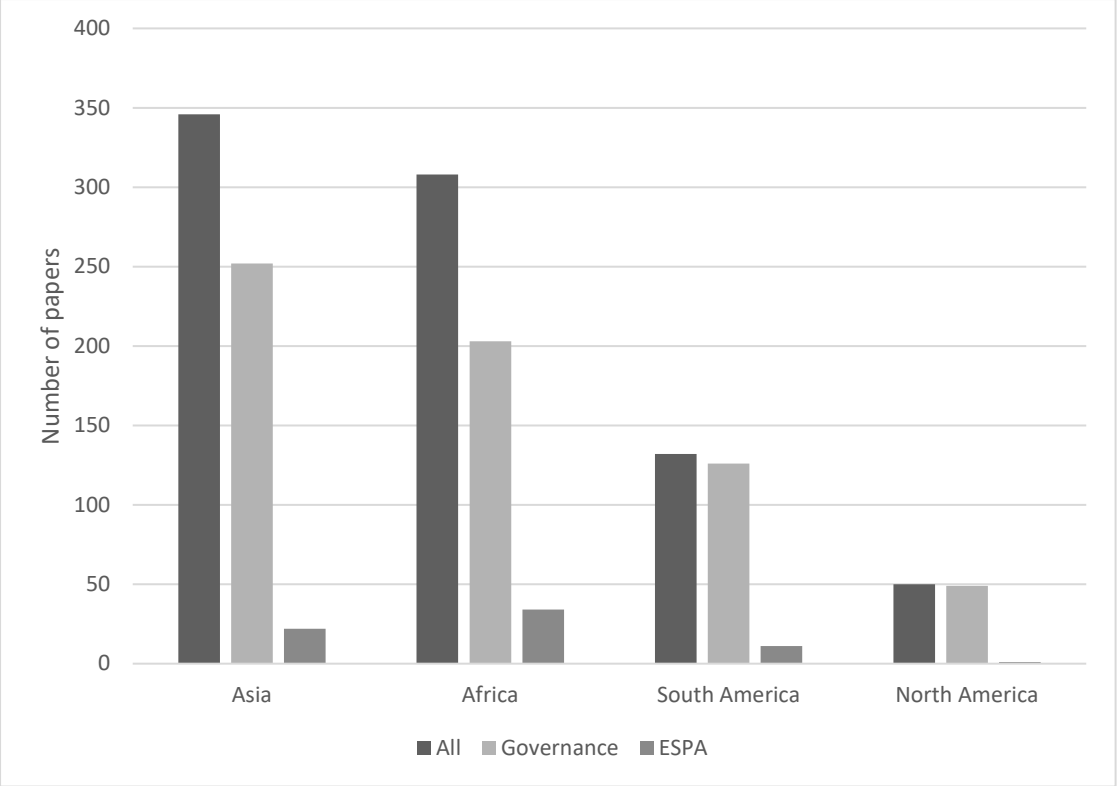


Figure S1.4 **Number of papers addressing particular regions** (note: some papers address more than one region)

Supplementary file 2: How does governance mediate links between ecosystem services and poverty alleviation? Results from a systematic mapping and thematic synthesis of literature

List of papers included in the thematic synthesis

Number	Paper
1	Aburto, J. A., Stotz, W. B., & Cundill, G. (2014). Social-ecological collapse: TURF governance in the context of highly variable resources in Chile. *Ecology and Society,* 19(1), 2. http://dx.doi.org/10.5751/ES-06145-190102
2	Acharya, R. P., Bhattarai, B. P., Dahal, N., Kunwar, R. M., Karki, G., & Bhattarai, H. P. (2015). Governance in community forestry in Nepal through forest certification, *International Forestry Review*, 17(1), 1-9. https://doi.org/10.1505/146554815814725077
3	Adams, C., Rodrigues, S. T., Calmon, M., & Kumar, C. (2016). Impacts of large-scale forest restoration on socioeconomic status and local livelihoods: what we know and do not know. *Biotropica*, 48(6), 731-744. https://doi.org/10.1111/btp.12385
4	Adhikari, B., & Di Falco, S. (2009). Social inequality, local leadership and collective action: An empirical study of forest commons. *European Journal of Development Research,* 21, 179-194. https://doi.org/10.1057/ejdr.2008.16
5	Adhikari, B., Williams, F., & Lovett, J.C. (2007). Local benefits from community forests in the middle hills of Nepal. *Forest Policy and Economics,* 9(5), 464-478. https://doi.org/10.1016/j.forpol.2005.11.002
6	Adhikari, S., Kingi, T., & Ganesh, S. (2014). Incentives for community participation in the governance and management of common property resources: the case of community forest management in Nepal. *Forest Policy and Economics*, 44, 1-9. https://doi.org/10.1016/j.forpol.2014.04.003
7	Adhikari, S., Kingi, T., & Ganesh, S. (2016). Incentives and community participation in the governance of community forests in Nepal. *Small-scale Forestry*, 15, 179-197. https://doi.org/10.1007/s11842-015-9316-8
8	Adhikari, J., Ojha, H., & Bhattarai, B. (2016). Edible forest? Rethinking Nepal's forest governance in the era of food insecurity. *International Forestry Review*, 18(3), 265-279. https://doi.org/10.1505/146554816819501646
9	Agrawal, A., & Benson, C. S. (2011). Common property theory and resource governance institutions: strengthening explanations of multiple outcomes. *Environmental Conservation*, 38(2), 199-210. https://doi.org/10.1017/S0376892910000925
10	Agrawal, A., & Chhatre, A. (2006). Explaining success on the commons: Community forest governance in the Indian Himalaya. *World Development*, 34(1), 149-166. https://doi.org/10.1016/j.worlddev.2005.07.013
11	Agrawal, A., & Gupta, K. (2005). Decentralization and participation: The governance of common pool resources in Nepal's Terai. *World Development*, 33(7), 1101-1114. https://doi.org/10.1016/j.worlddev.2005.04.009
12	Ahluwalia, M. (1997). Representing communities: The case of a community-based watershed management project in Rajasthan, India. *IDS Bulletin*, 28(4), 23-35. https://doi.org/10.1111/j.1759-5436.1997.mp28004004.x
13	Akamani, K., Wilson, P. I., & Hall, T. E. (2015). Barriers to collaborative forest management and implications for building the resilience of forest-dependent communities in the Ashanti region of Ghana. *Journal of Environmental Management*, 151, 11-21. https://doi.org/10.1016/j.jenvman.2014.12.006

14	Al Mamun, A., Brook, R. K., & Dyck, T. (2016). Multiple governance and fisheries commons: Investigating the performance of local capacities in rural Bangladesh. *International Journal of the Commons*, 10(1), 45-70. http://doi.org/10.18352/ijc.568
15	Ali, A.B., & Lee, K. Y. (1995). Chenderoh Reservoir, Malaysia: A characterization of a small-scale, multigear and multispecies artisanal fishery in the tropics. *Fisheries Research*, 23, 267-281. https://doi.org/10.1016/0165-7836(94)00351-V
16	Amin, A., & Koné, I. (2015). People and protected areas: An assessment of cost and benefits of conservation to local people in Southeastern Ivory Coast. *Society & Natural Resources*, 28(9), 925-940. https://doi.org/10.1080/08941920.2015.1014593
17	Anderson, J., Mehta, S. Epelu, E., & Cohen, B. (2015). Managing leftovers: Does community forestry increase secure and equitable access to valuable resources for the rural poor? *Forest Policy and Economics*, 58, 47-55. https://doi.org/10.1016/j.forpol.2014.12.004
18	Andersson, K., & Agrawal, A. (2011). Inequalities, institutions, and forest commons. *Global Environmental Change*, 21(3), 866-875. https://doi.org/10.1016/j.gloenvcha.2011.03.004
19	Andriamalala, G., & Gardner, C. J. (2010). The use of dina as a natural resource governance tool; lessons learned from Velondriake, south-west Madagascar. *Tropical Conservation Science*, 3(4), 447-464. https://doi.org/10.1177/194008291000300409
20	Apgar, J. M., Cohen, P. J., Ratner, B. D., De Silva, S., Buisson, M.-C., Longley, C., Bastakoti, R. C., & Mapedza, E. (2017). Identifying opportunities to improve governance of aquatic agricultural systems through participatory action research. *Ecology and Society*, 22(1), 9. https://doi.org/10.5751/ES-08929-220109
21	Araral, E. (2013). A transaction cost approach to climate adaptation: Insights from Coase, Ostrom and Williamson and evidence from the 400-year old zangjeras. *Environmental Science & Policy*, 25, 147-156. https://doi.org/10.1016/j.envsci.2012.08.005
22	Arevalo, J. (2016). Improving woodfuel governance in Burkina Faso: The experts' assessment. *Renewable and Sustainable Energy Reviews*, 57, 1398-1408. https://doi.org/10.1016/j.rser.2015.12.178
23	Armitage, D., Marschke, M., & van Tuyen, T. (2011). Early-stage transformation of coastal marine governance in Vietnam? *Marine Policy*, 35: 703–711. https://doi.org/10.1016/j.marpol.2011.02.011
24	Aswani, S., & Furusawa, T. (2007). Do marine protected areas affect human nutrition and health? A comparison between villages in Roviana, Solomon Islands. *Coastal Management*, 35(5), 545-565. https://doi.org/10.1080/08920750701593394
25	Auld, G., Renckens, S. & Cashore, B. (2015). Transnational private governance between the logics of empowerment and control. *Regulation & Governance*, 9(2), 108-124. https://doi.org/10.1111/rego.12075
26	Aziz, S. A., Clements, G. R., Rayan, D. M., & Sankar, P. (2013). Why conservationists should be concerned about natural resource legislation affecting indigenous peoples' rights: Lessons from Peninsular Malaysia. *Biodiversity Conservation*, 22, 639-656. https://doi.org/10.1007/s10531-013-0432-5
27	Babili, I. H., Mtalo, E., Kajembe, G. C., & van der Wal, H. (2015). Institutional change and institutional performance under decentralized forest management in Babati District, Tanzania. *Small-scale Forestry*, 14, 381-400. https://doi.org/10.1007/s11842-015-9294-x
28	Baerlein, T., Kasymov, U., & Zikos, D. (2015). Self-governance and sustainable Common Pool Resource management in Kyrgyzstan. *Sustainability*, 7(1), 496-521. https://doi.org/10.3390/su7010496

29	Banjade, M. R., & Ojha, H. (2005). Facilitating deliberative governance: Innovations from Nepal's community forestry program – a case study in Karmapunya. *The Forestry Chronicle*, 81(3), 403-408. https://doi.org/10.5558/tfc81403-3
30	Barsimantov, J. A. (2010). Vicious and virtuous cycles and the role of external non-government actors in community forestry in Oaxaca and Michoacán, Mexico. *Human Ecology*, 38, 49-63. https://doi.org/10.1007/s10745-009-9289-3
31	Bastakoti, R. R., & Davidsen, C. (2014). REDD+ and forest tenure security: Concerns in Nepal's community forestry, *International Journal of Sustainable Development & World Ecology*, 21(2), 168-180. https://doi.org/10.1080/13504509.2013.879542
32	Bavinck, M., & Vivekanandan, V. (2011). Conservation, conflict and the governance of fisher wellbeing: Analysis of the establishment of the Gulf of Mannar National Park and Biosphere Reserve. *Environmental Management*, 47, 593-602. https://doi.org/10.1007/s00267-010-9578-z
33	Bayliss-Smith, T., Gough, K. V., Christensen, A. E., & Kristensen, S. P. (2010). Managing Ontong Java: Social institutions for production and governance of atoll resources in Solomon Islands. *Singapore Journal of Tropical Geography*, 31, 55-69. https://doi.org/10.1111/j.1467-9493.2010.00385.x
34	Baynes, J., Herbohn, J., & Dressler, W. (2016). Power relationships: Their effect on the governance of community forestry in the Philippines. *Land Use Policy*, 54, 169-176. https://doi.org/10.1016/j.landusepol.2016.01.008
35	Beevers, M. D. (2015). Peace resources? Governing Liberia's forests in the aftermath of conflict. *International Peacekeeping*, 22(1), 26-42. https://doi.org/10.1080/13533312.2014.992568
36	Bell, A. R., Engle, N. L., & Lemos, M. C. (2011). How does diversity matter? The case of Brazilian river basin councils. *Ecology and Society*, 16(1), 42. http://www.ecologyandsociety.org/vol16/iss1/art42/
37	Bennett, N. J., & Dearden, P. (2014). Why local people do not support conservation: Community perceptions of marine protected area livelihood impacts, governance and management in Thailand. *Marine Policy*, 44, 107-116. https://doi.org/10.1016/j.marpol.2013.08.017
38	Bhattacharya, P., Pradhan, L., & Yadav, G. (2010). Joint forest management in India: Experiences of two decades. *Resources, Conservation and Recycling*, 54(8), 469-480. https://doi.org/10.1016/j.resconrec.2009.10.003
39	Bluwstein, J., Moyo, F. & Kicheleri, R. P. (2016). Austere conservation: Understanding conflicts over resource governance in Tanzanian Wildlife Management Areas. *Conservation and Society*, 14(3), 218-231. https://doi.org/10.4103/0972-4923.191156
40	Bowler, D. E., Buyung-Ali, L. M., Healey, J. R., Jones, J. P. G., Knight, T. M., & Pullin, A. S. (2012). Does community forest management provide global environmental benefits and improve local welfare? *Frontiers in Ecology and the Environment*, 10(1), 29-36. https://doi.org/10.1890/110040
41	Brondizio, E. S., Ostrom, E., & Young, O. R. (2009). Connectivity and the governance of multilevel social-ecological systems: The role of social capital. *Annual Review of Environmental Resources*, 34, 253-278. https://doi.org/10.1146/annurev.environ.020708.100707
42	Bunge-Vivier, V., & Martínez-Ballesté, A. (2017). Factors that influence the success of conservation programs in communal property areas in Mexico. *International Journal of the Commons*, 11(1), 487-507. http://doi.org/10.18352/ijc.718
43	Burivalova, Z., Hua, F., Koh, L. P., Garcia, C., & Putz, F. (2017). A critical comparison of conventional, certified, and community management of tropical forests for timber in

	terms of environmental, economic, and social variables. *Conservation Letters*, 10(1), 4-14. https://doi.org/10.1111/conl.12244
44	Camargo, C., Maldonado, J. H., Alvarado, E., Moreno-Sánchez, R., Mendoza, S., Manrique, N., Mogollón, A., Osorio, J. D., Grajales, A., & Sánchez, J. A. (2009). Community involvement in management for maintaining coral reef resilience and biodiversity in southern Caribbean marine protected areas. *Biodiversity Conservation*, 18, 935-956. https://doi.org/10.1007/s10531-008-9555-5
45	Campbell, S. J., Kartawijaya, T. Yulianto, I., Prasetia, R., & Clifton, J. (2013). Co-management approaches and incentives improve management effectiveness in the Karimunjawa National Park, Indonesia. *Marine Policy*, 41, 72-79. https://doi.org/10.1016/j.marpol.2012.12.022
46	Cardona, W. C., de Jong, W., Zuidema, P. A., & Boot, R. (2014). Diverse local regulatory responses to a new forestry regime in forest communities in the Bolivian Amazon. *Land Use Policy*, 39, 224-232. https://doi.org/10.1016/j.landusepol.2014.02.013
47	Caro-Borrero, A., Corbera, E., Neitzel, K. C., & Almeida-Lenero, L. (2015). "We are the city lungs": Payments for ecosystem services in the outskirts of Mexico City. *Land Use Policy*, 43, 138-148. https://doi.org/10.1016/j.landusepol.2014.11.008
48	Chaigneau, T., & Brown, K. (2016). Challenging the win-win discourse on conservation and development: Analyzing support for marine protected areas. *Ecology and Society*, 21(1), 36. http://dx.doi.org/10.5751/ES-08204-210136
49	Chen, C., König, H. J., Matzdorf, B., & Zhen, L. (2015). The institutional challenges of payment for ecosystem service program in China: A review of the effectiveness and implementation of Sloping Land Conversion Program. *Sustainability*, 7, 5564-5591. https://doi.org/10.3390/su7055564
50	Chen, H., & Zhu, T. (2015). The dilemma of property rights and indigenous institutional arrangements for common resources governance in China. *Land Use Policy*, 42, 800-805. https://doi.org/10.1016/j.landusepol.2014.10.008
51	Chen, H., Zhu, T., Krott, M., Calvo, J. F., Ganesh, S. P., & Makoto, I. (2013). Measurement and evaluation of livelihood assets in sustainable forest commons governance. *Land Use Policy*, 30, 908-914. https://doi.org/10.1016/j.landusepol.2012.06.009
52	Chen, H., Zhu, T., Krott, M., & Maddox, D. (2013). Community forestry management and livelihood development in northwest China: Integration of governance, project design, and community participation. *Regional Environmental Change*, 13, 67-75. https://doi.org/10.1007/s10113-012-0316-3
53	Chhatre, A., & Agrawal, A. (2009). Trade-offs and synergies between carbon storage and livelihood benefits from forest commons. *PNAS*, 106(42), 17667-17670. https://doi.org/10.1073/pnas.0905308106
54	Chowdhury, M. S. H., Koikea, M., Ranab, Md. P., & Muhammed, N. (2013). Community development through collaborative management of protected areas: Evidence from Bangladesh with a case of Rema-Kalenga Wildlife Sanctuary. *International Journal of Sustainable Development & World Ecology*, 20(1), 63-74. https://doi.org/10.1080/13504509.2012.755480
55	Cinner, J., Fuentes, M. M. P. B., & Randriamahazo, H. (2009). Exploring social resilience in Madagascar's marine protected areas. *Ecology and Society*, 14(1), 41. http://www.ecologyandsociety.org/vol14/iss1/art41/
56	Cinner, J., & Huchery, C. (2014). A comparison of social outcomes associated with different fisheries co-management institutions. *Conservation Letters*, 7(3), 224-232. https://doi.org/10.1111/conl.12057

57	Cinner, J. E., & McClanahan, T. R. (2015). A sea change on the African coast? Preliminary social and ecological outcomes of a governance transformation in Kenyan fisheries. *Global Environmental Change*, 30, 133-139. https://doi.org/10.1016/j.gloenvcha.2014.10.003
58	Clarke, P., & Jupiter, S. D. (2010). Law, custom and community-based natural resource management in Kubulau District (Fiji). *Environmental Conservation*, 37(1), 98-106. https://doi.org/10.1017/S0376892910000354
59	Cleaver, F., Franks, T., Maganga, F., & Hall, K. (2013). Institutions, security, and pastoralism: Exploring the limits of hybridity. *African Studies Review*, 56(3), 165-189. https://doi.org/10.1017/.2013.84
60	Cleaver, F., & Toner, A. (2006). The evolution of community water governance in Uchira, Tanzania: The implications for equality of access, sustainability and effectiveness. *Natural Resources Forum*, 30(3), 207-218. https://doi.org/10.1111/j.1477-8947.2006.00115.x
61	Clements, T., John, A., Nielsen, K., An, D., Tan, S., & Milner-Gulland, E. J. (2010). Payments for biodiversity conservation in the context of weak institutions: Comparison of three programs from Cambodia. *Ecological Economics*, 69(6), 1283-1291. https://doi.org/10.1016/j.ecolecon.2009.11.010
62	Cohen, P., Evans, L., & Govan, H. (2015). Community-based, co-management for governing small-scale fisheries of the Pacific: A Solomon Islands' case study. In S. Jentoft, & R. Chuenpagdee (Eds.), *Interactive Governance for Small-Scale Fisheries, MARE Publication Series* 13, 39-59. https://doi.org/10.1007/978-3-319-17034-3
63	Daur, N., Adam, Y. O., & Pretzsch, J. (2016). A historical political ecology of forest access and use in Sudan: Implications for sustainable rural livelihoods. *Land Use Policy*, 58, 95-101. https://doi.org/10.1016/j.landusepol.2016.06.016
64	De Koning, K. (2014). Unpredictable outcomes in forestry: Governance institutions in practice. *Society & Natural Resources*, 27, 358-371. https://doi.org/10.1080/08941920.2013.861557
65	Denby, K., Movik, S., Mehta, L., & van Koppen, B. (2016). The 'trickle down' of IWRM: A case study of local-level realities in the Inkomati Water Management Area, South Africa. *Water Alternatives*, 9(3), 473-492. http://www.water-alternatives.org/index.php/alldoc/articles/vol9/v9issue3/333-a9-3-6/file
66	Derkyi, M., Ros-Tonen, M. A. F., Kyereh, B., & Dietz, T. (2013). Emerging forest regimes and livelihoods in the Tano Offin Forest Reserve, Ghana: Implications for social safeguards. *Forest Policy and Economics*, 32, 49-56. https://doi.org/10.1016/j.forpol.2013.03.005
67	Dong, S., Lassoie, J., Shrestha, K. K., Yan, Z., Sharma, E., & Pariya, D. (2009). Institutional development for sustainable rangeland resource and ecosystem management in mountainous areas of northern Nepal. *Journal of Environmental Management*, 90(2), 994-1003. https://doi.org/10.1016/j.jenvman.2008.03.005
68	Dressler, W. (2014). Green governmentality and swidden decline on Palawan Island. *Transactions of the Institute of British Geographers*, 39(2), 250-264. https://doi.org/10.1111/tran.12026
69	Dressler, W., & Roth, R. (2011). The good, the bad, and the contradictory: Neoliberal conservation governance in rural Southeast Asia. *World Development*, 39(5), 851-862. https://doi.org/10.1016/j.worlddev.2010.08.016
70	Dressler, W. H., & Guieb III, E. R. (2015). Violent enclosures, violated livelihoods: Environmental and military territoriality in a Philippine frontier. *Journal of Peasant Studies*, 42(2), 323-345. https://doi.org/10.1080/03066150.2014.991718

71	Dressler, W. H., To, P. X., & Mahanty, S. (2013). How biodiversity conservation policy accelerates agrarian differentiation: The account of an upland village in Vietnam. *Conservation and Society*, 11(2), 130-143. https://doi.org/10.4103/0972-4923.115727
72	Duchelle, A. E., Cromberg, M., Gebara, M. F., Guerra, R., Melo, T., Larson, A., Cronkleton, P., Börner, J., Sills, E., Wunder, S., Bauch, S., May, P., Selaya, G., & Sunderlin, W. D. (2014). Linking forest tenure reform, environmental compliance, and incentives: Lessons from REDD+ initiatives in the Brazilian Amazon. *World Development*, 55, 53-67. https://doi.org/10.1016/j.worlddev.2013.01.014
73	Dyngeland, C., Vedeld, P., & Vatn, A. (2014). REDD+ at work? Implementing consistent REDD+ policies at local levels - A case from Kilosa District, Tanzania. *International Forestry Review*, 16(6), 549-562. https://doi.org/10.1505/146554814814095348
74	Eba'a Atyi, R., Assembe-Mvondo, S., Lescuyer, G., & Cerutti, P. (2013). Impacts of international timber procurement policies on Central Africa's forestry sector: The case of Cameroon. *Forest Policy and Economics*, 32, 40–48. https://doi.org/10.1016/j.forpol.2012.12.006
75	Elías, S. (2012). From communal forests to protected areas: The implications of tenure changes in natural resource management in Guatemala. *Conservation and Society*, 10(2), 151-160. https://doi.org/10.4103/0972-4923.97487
76	Evans, L., Cherrett, N., & Pemsl, D. (2011). Assessing the impact of fisheries co-management interventions in developing countries: A meta-analysis. *Journal of Environmental Management*, 92(8), 1938-1949. https://doi.org/10.1016/j.jenvman.2011.03.010
77	Ezzine-de-Blas, D., Börner, J., Violato-Espada, A-L., Nascimento, N., & Piketty, M-G. (2011). Forest loss and management in land reform settlements: Implications for REDD governance in the Brazilian Amazon. *Environmental Science & Policy*, 14(2), 188-200. https://doi.org/10.1016/j.envsci.2010.11.009
78	Ezzine-de-Blas, D., Dutilly, C., Lara-Pulido, J.A., Le Velly, G., & Guevara-Sanginés, A. (2016). Payments for Environmental Services in a policymix: Spatial and temporal articulation in Mexico. *PLoS ONE* 11(4), e0152514. https://doi.org/10.1371/journal.pone.0152514
79	Fabinyi, M., Foale, S., & Macintyre, M. (2015). Managing inequality or managing stocks? An ethnographic perspective on the governance of small-scale fisheries. *Fish and Fisheries*, 16(3), 471-485. https://doi.org/10.1111/faf.12069
80	Favretto, N., Luedeling, E., Stringer, L., & Dougill, A. J. (2017). Valuing ecosystem services in semi-arid rangelands through stochastic simulation. *Land Degradation & Development*, 28(1), 65-73. https://doi.org/10.1002/ldr.2590
81	Fernandez, P. R. (2007). Understanding relational politics in MPA governance in Northeastern Iloilo, Philippines. *Journal of Coastal Research*, SI 50 (Proceedings of the 9th International Coastal Symposium), 38-42. https://www.jstor.org/stable/26481552
82	Fisher, M., Cook, S., Tiemann, T., & Nickum, J. E. (2011). Institutions and organizations: The key to sustainable management of resources in river basins. *Water International*, 36(7), 846-860. https://doi.org/10.1080/02508060.2011.616774
83	Fox, H. E., Mascia, M. B., Basurto, X., Costa, A., Glew, L., Heinemann, D., Karrer, L. B., Lester, S. E., Lombana, A. V., Pomeroy, R. S., Recchia, C. A., Roberts, C. M., Sanchirico, J. N., Pet-Soede, L., & White, A. T. (2012). Reexamining the science of marine protected areas: linking knowledge to action. *Conservation Letters*, 5(1), 1-10. https://doi.org/10.1111/j.1755-263X.2011.00207.x
84	Garrity, D. P., Amoroso, V. B., Koffa, S., Catacutan, D., Buenavista, G., Fay, P., & Dar, W. (2002). Landcare on the poverty-protection interface in an Asian watershed. *Conservation Ecology*, 6(1), 12. https://www.jstor.org/stable/26271861

85	Gbedomon, R. C., Floquet, A., Mongbo, R., Kolawolé Salako, V., Fandohan, A. B., Assogbadjo, A. E., & Kakaï, R. G. (2016). Socio-economic and ecological outcomes of community based forest management: A case study from Tobé-Kpobidon forest in Benin, Western Africa. *Forest Policy and Economics*, 64, 46-55. https://doi.org/10.1016/j.forpol.2016.01.001
86	Girma, W., & Beyene, F. (2015). Institutional challenges in sustainable forest management: Evidence from the Gambella Regional State of Western Ethiopia. *Journal of Sustainable Forestry*, 34(3), 233-258. https://doi.org/10.1080/10549811.2014.1003245
87	Gongbuzeren, Zhuang, M., & Li, W. (2016). Market-based grazing land transfers and customary institutions in the management of rangelands: Two case studies on the Qinghai-Tibetan Plateau. *Land Use Policy*, 57, 287-295. https://doi.org/10.1016/j.landusepol.2016.05.035
88	Gritten, D., Greijmans, M., Lewis, S. R., Sokchea, T., Atkinson, J., Quang, T. N., Poudyal, B., Chapagain, B., Sapkota, M., Mohns, B. & Paudel, N. S. (2015). An uneven playing field: Regulatory barriers to communities making a living from the timber from their forests–Examples from Cambodia, Nepal and Vietnam. *Forests*, 6(10), 3433-3451. https://doi.org/10.3390/f6103433
89	Gross-Camp, N. (2017). Tanzania's community forests: Their impact on human well-being and persistence in spite of the lack of benefit. *Ecology and Society*, 22(1), 37. https://doi.org/10.5751/ES-09124-220137
90	Grydehøj, A., & Nurdin, N. (2016). Politics of technology in the informal governance of destructive fishing in Spermonde, Indonesia. *GeoJournal*, 81, 281-292. https://doi.org/10.1007/s10708-014-9619-x
91	Hagos, F., Haileslassie, A., Awulachew, S. B., Mapedza, E., & Taffesse, T. (2011). Land and water institutions in the Blue Nile Basin: Setups and gaps for improved land and water management. *Review of Policy Research*, 28(2), 149-170. https://doi.org/10.1111/j.1541-1338.2011.00487.x
92	Hajjar, R., Oldekop, J. A., Cronkleton, P., Etue, E., Newton, P., Russel, A. J. M., Tjajadi, J. S., Zhou, W., & Agrawal, A. (2016). The data not collected on community forestry. *Conservation Biology*, 30(6), 1357-1362. https://doi.org/10.1111/cobi.12732
93	Hayes, T., Murtinho, F., & Wolff, H. (2015). An institutional analysis of Payment for Environmental Services on collectively managed lands in Ecuador. *Ecological Economics*, 118, 81-89. https://doi.org/10.1016/j.ecolecon.2015.07.017
94	He, J., & Lang, R. (2015). Limits of state-led programs of Payment for Ecosystem Services: Field evidence from the Sloping Land Conversion Program in Southwest China. *Human Ecology*, 43, 749-758. https://doi.org/10.1007/s10745-015-9782-9
95	Hejnowicz, A. P., Raffaelli, D. G., Rudd, M. A., & White, P. C. L. (2014). Evaluating the outcomes of payments for ecosystem services programmes using a capital asset framework. *Ecosystem Services*, 9, 83-97. https://doi.org/10.1016/j.ecoser.2014.05.001
96	Heylings, P., & Bravo, M. (2017). Evaluating governance: A process for understanding how co-management is functioning, and why, in the Galapagos Marine Reserve. *Ocean & Coastal Management*, 50, 174-208. https://doi.org/10.1016/j.ocecoaman.2006.09.003
97	Hughes, Z. D., Fenichel, E. P., & Gerber, L. R. (2011). The potential impact of labor choices on the efficacy of marine conservation strategies. *PLoS ONE* 6(8), e23722. https://doi.org/10.1371/journal.pone.0023722
98	Ingram, V., Ros-Tonen, M. A. F., & Dietz, T., (2015). A fine mess: Bricolaged forest governance in Cameroon. *International Journal of the Commons*, 9(1), 41-64. http://doi.org/10.18352/ijc.516

99	Islam, K. K., & Sato, N. (2012). Participatory forestry in Bangladesh: Has it helped to increase the livelihoods of Sal forests-dependent people? *Southern Forests: a Journal of Forest Science*, 74(2), 89-101. https://doi.org/10.2989/20702620.2012.701434
100	Islam, M. M., Mohammed, E. Y., & Ali, L. (2016). Economic incentives for sustainable hilsa fishing in Bangladesh: An analysis of the legal and institutional framework. *Marine Policy*, 68, 8-22. https://doi.org/10.1016/j.marpol.2016.02.005
101	Jagger, P., Luckert, M. K., Duchelle, A. E., Lund, J. F., & Sunderlin, W. D. (2014). Tenure and forest income: Observations from a global study on forests and poverty. *World Development*, 64, S43-S55. https://doi.org/10.1016/j.worlddev.2014.03.004
102	Jones, E. V., Gray, T., Macintosh, D., & Stead, S. (2016). A comparative analysis of three marine governance systems for implementing the Convention on Biological Diversity (CBD). *Marine Policy*, 66, 30-38. https://doi.org/10.1016/j.marpol.2016.01.016
103	Jones, K. W., Holland, M. B., Naughton-Treves, L., Morales, M., Suarez, L., & Keenan, K. (2017). Forest conservation incentives and deforestation in the Ecuadorian Amazon. *Environmental Conservation*, 44(1), 56-65. https://doi.org/10.1017/S0376892916000308
104	Kalonga, S. K., & Kulindwa, K. A. (2017). Does forest certification enhance livelihood conditions? Empirical evidence from forest management in Kilwa District, Tanzania. *Forest Policy and Economics*, 74, 49-61. https://doi.org/10.1016/j.forpol.2016.11.001
105	Kamran, M. A., & Shivakoti, G. P. (2013). Design principles in tribal and settled areas spate irrigation management institutions in Punjab, Pakistan. *Asia Pacific Viewpoint*, 54(2), 206-217. https://doi.org/10.1111/apv.12020
106	Kaplowitz, M. D., Lupi, F., & Arreola, O. (2012). Local markets for payments for environmental services: Can small rural communities self-finance watershed protection? *Water Resources Management*, 26, 3689-3704. https://doi.org/10.1007/s11269-012-0097-y
107	Karki, S. T. (2013). Do protected areas and conservation incentives contribute to sustainable livelihoods? A case study of Bardia National Park, Nepal. *Journal of Environmental Management*, 128, 988-999. https://doi.org/10.1016/j.jenvman.2013.06.054
108	Katani, J. Z., & Babili, I. H. (2012). Exploring forest governance in Tanzania. In B. Arts, S. van Bommel, M. Ros-Tonen & G. Verschoor (Eds.), *Forest-people interfaces* (pp. 259-275). Wageningen Academic Publishers. https://doi.org/10.3920/978-90-8686-749-3_16
109	Keane, A., Gurd, H., Kaelo, D., Said, M. Y., de Leeuw, J., Rowcliffe, J. M., & Homewood, K. (2016). Gender differentiated preferences for a community-based conservation initiative. *PLoS ONE* 11(3), e0152432. https://doi.org/10.1371/journal.pone.0152432
110	Kellert, S. R., Mehta, J. N., Ebbin, S. A., & Lichtenfeld, L. L. (2000). Community natural resource management: Promise, rhetoric, and reality. *Society & Natural Resources*, 13(8), 705-715. https://doi.org/10.1080/089419200750035575
111	Kim, Y-S., Bae, J. S., Fisher, L. A., Latifah, S., Afifi, M., Lee, S. M., & Kim, I-A. (2016). Indonesia's forest management units: Effective intermediaries in REDD+ implementation? *Forest Policy and Economics*, 62, 69-77. https://doi.org/10.1016/j.forpol.2015.09.004
112	King, B. H. (2007). Conservation and community in the new South Africa: A case study of the Mahushe Shongwe Game Reserve. *Geoforum*, 38(1), 207-219. https://doi.org/10.1016/j.geoforum.2006.08.001
113	Kitamura, K., & Clapp, R. A. (2013). Common property protected areas: Community control in forest conservation. *Land Use Policy*, 34, 204-212. https://doi.org/10.1016/j.landusepol.2013.03.008

114	Kosoy, N., Corbera, E., & Brown, K. (2008). Participation in payments for ecosystem services: Case studies from the Lacandon rainforest, Mexico. *Geoforum*, 39(6), 2073-2083. https://doi.org/10.1016/j.geoforum.2008.08.007
115	Kovacs, E. K., Kumar, C., Agarwal, C., Adams, W. M., Hope, R. A. & Vira, B. (2016). The politics of negotiation and implementation: A reciprocal water access agreement in the Himalayan foothills, India. *Ecology and Society*, 21(2), 37. http://dx.doi.org/10.5751/ES-08462-210237
116	Krause, T., Collen, W., & Nicholas, K. A. (2013). Evaluating safeguards in a conservation incentive program: Participation, consent, and benefit sharing in indigenous communities of the Ecuadorian Amazon. *Ecology and Society*, 18(4), 1. http://dx.doi.org/10.5751/ES-05733-180401
117	Krause, T., & Loft, L. (2013). Benefit distribution and equity in Ecuador's Socio Bosque Program. *Society & Natural Resources*, 26(10), 1170-1184. https://doi.org/10.1080/08941920.2013.797529
118	Lakerveld, R. P., Lele, S., Crane, T. A., Fortuin, K. P. J., & Springate-Baginski, O. (2015). The social distribution of provisioning forest ecosystem services: Evidence and insights from Odisha, India. *Ecosystem Services*, 14, 56-66. https://doi.org/10.1016/j.ecoser.2015.04.001
119	Landell-Mills, N. (2002). Developing markets for forest environmental services: An opportunity for promoting equity while securing efficiency? *Philosophical Transactions of the Royal Society A*, 360, 1817-1825. https://doi.org/10.1098/rsta.2002.1034
120	Leimona, B., van Noordwijk, M., de Groot, R., & Leemans, R. (2015). Fairly efficient, efficiently fair: Lessons from designing and testing payment schemes for ecosystem services in Asia. *Ecosystem Services*, 12, 16-28. https://doi.org/10.1016/j.ecoser.2014.12.012
121	Lepper, C. M., & Schroenn Goebel, J. (2010). Community-based natural resource management, poverty alleviation and livelihood diversification: A case study from northern Botswana. *Development Southern Africa*, 27(5), 725-739. https://doi.org/10.1080/0376835X.2010.522834
122	Lesorogol, C. K., & Boone, R. B. (2016). Which way forward? Using simulation models and ethnography to understand changing livelihoods among Kenyan pastoralists in a "new commons". *International Journal of the Commons*, 10(2), 747-770. http://doi.org/10.18352/ijc.656
123	Lia, C., Zheng, H., Li, S., Chen, X., Li, J., Zeng, W., Liang, Y., Polasky, S., Feldman, M. W., Ruckelshaus, M., Ouyang, Z., & Daily, G. C. (2015). Impacts of conservation and human development policy across stakeholders and scales. *PNAS*, 112(24), 7396-7401. https://doi.org/10.1073/pnas.1406486112
124	Li, J., Feldman, M. W., Li, S., & Daily, G. C. (2011). Rural household income and inequality under the Sloping Land Conversion Program in western China. *PNAS*, 108(19), 7721-7726. https://doi.org/10.1073/pnas.1101018108
125	Liu, C., Lu, J., & Yin, R. (2010). An estimation of the effects of China's priority forestry programs on farmers' income. *Environmental Management*, 45, 526-540. https://doi.org/10.1007/s00267-010-9433-2
126	Locatelli, B., Rojas, V., & Salinas, Z. (2008). Impacts of payments for environmental services on local development in northern Costa Rica: A fuzzy multi-criteria analysis. *Forest Policy and Economics*, 10, 275-285. https://doi.org/10.1016/j.forpol.2007.11.007
127	Loft, L., Ngoc Le, D., Pham, T. T., Yang, A. L., Tjajadi, J. S., & Wong, G. Y. (2017). Whose equity matters? National to local equity perceptions in Vietnam's Payments for Forest Ecosystem Services Scheme. *Ecological Economics*, 135, 164-175. https://doi.org/10.1016/j.ecolecon.2017.01.016

128	Louhaichi, M., Yigezu, Y. A., Werner, J., Dashtseren, L., El-Shater, T., & Ahmed, M. (2016). Financial incentives: Possible options for sustainable rangeland management? *Journal of Environmental Management*, 180, 493-503. https://doi.org/10.1016/j.jenvman.2016.05.077
129	Lyons, K., Walters, P., & Riddell, E. (2016). The Role of faith-based organizations in environmental governance: The case of forestry in Solomon Islands. *Journal of Environmental Policy & Planning*, 18(3), 342-360. https://doi.org/10.1080/1523908X.2015.1098524
130	Madrigal-Ballestero, R., & Jurado, D. (2017). Economic incentives, perceptions and compliance with marine turtle egg harvesting regulation in Nicaragua. *Conservation and Society*, 15(1), 74-86. https://www.jstor.org/stable/26393272
131	Maharjan, M. R., Dhakal, T. R., Thapa, S. K., Schreckenberg, K., & Luttrell, C. (2009). Improving the benefits to the poor from community forestry in the Churia region of Nepal. *International Forestry Review*, 11(2), 254-267. https://doi.org/10.1505/ifor.11.2.254
132	Maliao, R. J., & Polohan, B. B. (2008). Evaluating the impacts of mangrove rehabilitation in Cogtong Bay, Philippines. *Environmental Management*, 41, 414-424. https://doi.org/10.1007/s00267-007-9021-2
133	Marambanyika, T., & Beckedah, H. (2016). The missing link between awareness and the implementation of wetland policy and legislation in communal areas of Zimbabwe. *Wetlands Ecology and Management*, 24, 545-563. https://doi.org/10.1007/s11273-016-9486-y
134	Marfo, E., Acheampong, E., & Opuni-Frimpong, E. (2012). Fractured tenure, unaccountable authority, and benefit capture: Constraints to improving community benefits under climate change mitigation schemes in Ghana. *Conservation and Society*, 10(2), 161-172. https://doi.org/10.4103/0972-4923.97488
135	Mascia, M. B., Claus, C. A., & Naidoo, R. (2010). Impacts of marine protected areas on fishing communities. *Conservation Biology*, 24(5), 1424-1429. https://doi.org/10.1111/j.1523-1739.2010.01523.x
136	Matulis, B. S. (2016). The coercive laws of competition in a neoliberal era: The case of forestry in Costa Rica. *Journal of Political Ecology*, 23(1), 279-295. https://doi.org/10.2458/v23i1.20217
137	Mazunda, J., & Shively, G. (2015). Measuring the forest and income impacts of forest user group participation under Malawi's Forest Co-management Program. *Ecological Economics*, 119, 262-273. https://doi.org/10.1016/j.ecolecon.2015.09.016
138	McLeod, E., Szuster, B., & Salm, R. (2009). *Sasi* and marine conservation in Raja Ampat, Indonesia. *Coastal Management*, 37(6), 656-676. https://doi.org/10.1080/08920750903244143
139	Miller, D. C., Minn, M., & Sinsin, B. (2015). The importance of national political context to the impacts of international conservation aid: evidence from the W National Parks of Benin and Niger. *Environmental Research Letters*, 10, 115001. https://doi.org/10.1088/1748-9326/10/11/115001
140	Moeliono, M., Thuy Pham, T., Le, N. D., Brockhaus, M., Wong, G., Kallio, M., & Nguyen, D. T. (2016). Local governance, social networks and REDD+: Lessons from swidden communities in Vietnam. *Human Ecology*, 44, 435-448. https://doi.org/10.1007/s10745-016-9839-4
141	Mohammed, A. J., & Inoue, M. (2012). Drawbacks of decentralized natural resource management: Experience from Chilimo Participatory Forest Management project, Ethiopia. *Journal of Forestry Research*, 17(1), 30-36. https://doi.org/10.1007/s10310-011-0270-9

142	Mohammed, A. J., & Inoue, M. (2017). Identifying salient forest SES attributes for sustainability: A multi-country study. *Land Use Policy*, 60, 197–205. https://doi.org/10.1016/j.landusepol.2016.10.039
143	Molina Murillo, S.A., Pérez Castillo, J. P., & Herrera Ugalde, M. E. (2014). Assessment of environmental payments on indigenous territories: The case of Cabecar-Talamanca, Costa Rica. *Ecosystem Services*, 8, 35-43. https://doi.org/10.1016/j.ecoser.2014.02.003
144	Moyo, F., Ijumba, J., & Lund, J. F. (2016). Failure by design? Revisiting Tanzania's flagship Wildlife Management Area Burunge. *Conservation & Society*, 14(3), 232-242. https://doi.org/10.4103/0972-4923.191160
145	Muawanah, U., Pomeroy, R. S. & Marlessy, C. (2012). Revisiting fish wars: Conflict and collaboration over fisheries in Indonesia. *Coastal Management*, 40(3), 279-288. https://doi.org/10.1080/08920753.2012.677633
146	Muthiga, N. A. (2009). Evaluating the effectiveness of management of the Malindi–Watamu marine protected area complex in Kenya. *Ocean & Coastal Management*, 52, 417-423. https://doi.org/10.1016/j.ocecoaman.2009.06.001
147	Mutune, J. M., & Lund, J. F. (2016). Unpacking the impacts of 'participatory' forestry policies: Evidence from Kenya. *Forest Policy and Economics*, 69, 45-52. https://doi.org/10.1016/j.forpol.2016.03.004
148	Myers, R., & Muhajir, M. (2015). Searching for justice: Rights vs 'benefits' in Bukit Baka Bukit Raya National Park, Indonesia. *Conservation and Society*, 13(4), 370-381. https://doi.org/10.4103/0972-4923.179886
149	Naidu, S. C. (2011). Access to benefits from forest commons in the Western Himalayas. *Ecological Economics*, 71, 202-210. https://doi.org/10.1016/j.ecolecon.2011.09.007
150	Nkhata, B. A., & Breen, C. M. (2010). Performance of community-based natural resource governance for the Kafue Flats (Zambia). *Environmental Conservation*, 37(3), 296-302. https://doi.org/10.1017/S0376892910000585
151	Oberlack, C., LaHaela, P., Schmerbeck, J., & Tiwari, B. K. (2015). Institutions for sustainable forest governance: Robustness, equity, and cross-level interactions in Mawlyngbna, Meghalaya, India. *International Journal of the Commons*, 9(2), 670-697. http://doi.org/10.18352/ijc.538
152	Ojha, H. R. (2014). Beyond the 'local community': The evolution of multi-scale politics in Nepal's community forestry regimes. *International Forestry Review*, 16(3), 339-353. https://doi.org/10.1505/146554814812572520
153	Ojha, H. R., Ford, R., Keenan, R. J., Race, D., Vega, D. C., Baralb, H., & Sapkota, P. (2016). Delocalizing communities: Changing forms of community engagement in natural resources governance. *World Development*, 87, 274-290. https://doi.org/10.1016/j.worlddev.2016.06.017
154	Pahl-Wostl, C., Lebel, L., Knieper, C., & Nikitina, E. (2012). From applying panaceas to mastering complexity: Toward adaptive water governance in river basins. *Environmental Science & Policy*, 23, 24-34. https://doi.org/10.1016/j.envsci.2012.07.014
155	Patenaude, G., & Lewis, K. (2014). The impacts of Tanzania's natural resource management programmes for ecosystem services and poverty alleviation. *International Forestry Review*, 16(4), 459-473. https://doi.org/10.1505/146554814813484077
156	Perreault, T. (2005). State restructuring and the scale politics of rural water governance in Bolivia. *Environment and Planning A*, 37, 263-284. https://doi.org/10.1068/a36188
157	Perreault, T. (2008). Custom and contradiction: Rural water governance and the politics of *Usos y Costumbres* in Bolivia's irrigators' movement. *Annals of the Association of American Geographers*, 98(4), 834-854. https://doi.org/10.1080/00045600802013502

158	Persha, L., & Andersson, K. (2014). Elite capture risk and mitigation in decentralized forest governance regimes. *Global Environmental Change*, 24, 265-276. https://doi.org/10.1016/j.gloenvcha.2013.12.005
159	Persha, L., Fischer, H., Chhatre, A., Agrawal, A., & Benson, C. (2010). Biodiversity conservation and livelihoods in human-dominated landscapes: Forest commons in South Asia. *Biological Conservation*, 143(12), 2918-2925. https://doi.org/10.1016/j.biocon.2010.03.003
160	Pokorny, B., Johnson, J., Medina, G., & Hoch, L. (2012). Market-based conservation of the Amazonian forests: Revisiting win–win expectations. *Geoforum*, 43(3), 387-401. https://doi.org/10.1016/j.geoforum.2010.08.002
161	Pokorny, B., & Pacheco, P. (2014). Money from and for forests: A critical reflection on the feasibility of market approaches for the conservation of Amazonian forests. *Journal of Rural Studies*, 36, 441-452. https://doi.org/10.1016/j.jrurstud.2014.09.004
162	Poudyal, M., Ramamonjisoa, B. S., Hockley, N., Rakotonarivo, O. S., Gibbons, J. M., Mandimbiniaina, R., Rasoamanana, A., & Jones, J. P. G. (2016). Can REDD+ social safeguards reach the 'right' people? Lessons from Madagascar. *Global Environmental Change*, 37, 31-42. https://doi.org/10.1016/j.gloenvcha.2016.01.004
163	Quintana, J., & Morse, S. (2005). Social interactions and resource ownership in two private protected areas of Paraguay. *Journal of Environmental Management*, 77(1), 64-78. https://doi.org/10.1016/j.jenvman.2005.02.014
164	Richmond, L., & Kotowicz, D. (2015). Equity and access in marine protected areas: The history and future of 'traditional indigenous fishing' in the Marianas Trench Marine National Monument. *Applied Geography*, 59, 117-124. https://doi.org/10.1016/j.apgeog.2014.11.007
165	Rife, A. N., Aburto-Oropeza, O., Hastings, P. A., Erisman, B., Ballantyne, F., Wielgus, J., Sala, E., & Gerber, L. (2013). Long-term effectiveness of a multi-use marine protected area on reef fish assemblages and fisheries landings. *Journal of Environmental Management*, 117, 276-283. https://doi.org/10.1016/j.jenvman.2012.12.029
166	Rodríguez-de-Francisco, J. C., & Boelens, R. (2016). PES hydrosocial territories: de-territorialization and re-patterning of water control arenas in the Andean highlands. *Water International*, 41(1), 140-156. https://doi.org/10.1080/02508060.2016.1129686
167	Rodríguez de Francisco, J. C., Budds, J., & Boelens, R. (2013). Payment for Environmental Services and unequal Rresource control in Pimampiro, Ecuador. *Society & Natural Resources*, 26(10), 1217-1233. https://doi.org/10.1080/08941920.2013.825037
168	Ros-Tonen, M. A. F., van Andel, T., Morsello, C., Otsuki, K., Rosendo, S., & Scholz, I. (2008). Forest-related partnerships in Brazilian Amazonia: There is more to sustainable forest management than reduced impact logging. *Forest Ecology and Management*, 256(7), 1482-1497. https://doi.org/10.1016/j.foreco.2008.02.044
169	Ruiz-Mallén, I., Schunko, C., Corbera, E., Rös, M., & Reyes-García, V. (2015). Meanings, drivers, and motivations for community-based conservation in Latin America. *Ecology and Society*, 20(3), 33. http://dx.doi.org/10.5751/ES-07733-200333
170	Sandbrook, C., Nelson, F., Adams, W. M., & Agrawal, A. (2010). Carbon, forests and the REDD paradox. *Oryx*, 44(3), 330-334. https://doi.org/10.1017/S0030605310000475
171	Sattler, C., Schröter, B., Jericó-Daminello, C., Sessin-Dilascio, K., Meyer, C., Matzdorf, B., Wortmann, L., de Almeida Sinisgalli, P. A., Meyer, A., & Giersch, G. (2015). Understanding governance structures in community management of ecosystems and natural resources: The Marujá case study in Brazil. *Ecosystem Services*, 16, 182-191. https://doi.org/10.1016/j.ecoser.2015.10.015

172	Sattler, C., Schröter, B., Meyer, A., Giersch, G., Meyer, C., & Matzdorf, B. (2016). Multilevel governance in community-based environmental management: A case study comparison from Latin America. *Ecology and Society*, 21(4), 24. https://doi.org/10.5751/ES-08475-210424
173	Scheba, A., & Rakotonarivo, O. S. (2016). Territorialising REDD+: Conflicts over market-based forest conservation in Lindi, Tanzania. *Land Use Policy*, 57, 625-637. https://doi.org/10.1016/j.landusepol.2016.06.028
174	Senganimalunje, T. C., Chirwa, P. W., Babalola, F. D., & Graham, M. A. (2016). Does participatory forest management program lead to efficient forest resource use and improved rural livelihoods? Experiences from Mua-Livulezi Forest Reserve, Malawi. *Agroforestry Systems*, 90, 691-710. https://doi.org/10.1007/s10457-015-9826-6
175	Sheppard, D. J., Moehrenschlager, A., Mcpherson, J. M., & Mason, J. J. (2010). Ten years of adaptive community-governed conservation: Evaluating biodiversity protection and poverty alleviation in a West African hippopotamus reserve. *Environmental Conservation*, 37(3), 270-282. https://doi.org/10.1017/S037689291000041X
176	Shumsky, S., Hickey, G. M., Johns, T., Pelletier, B., & Galaty, J. (2014). Institutional factors affecting wild edible plant (WEP) harvest and consumption in semi-arid Kenya. *Land Use Policy*, 38, 48-69. http://dx.doi.org/10.1016/j.landusepol.2013.10.014
177	Sommerville, M., Jones, J. P. G., Rahajaharison, M., & Milner-Gulland, E. J. (2010). The role of fairness and benefit distribution in community-based Payment for Environmental Services interventions: A case study from Menabe, Madagascar. *Ecological Economics*, 69(6), 1262-1271. https://doi.org/10.1016/j.ecolecon.2009.11.005
178	Sommerville, M., Milner-Gulland, E. J., Rahajaharison, M., & Jones, J. P. G. (2010). Impact of a community-based Payment for Environmental Services intervention on forest use in Menabe, Madagascar. *Conservation Biology*, 24(6), 1488-1498. https://doi.org/10.1111/j.1523-1739.2010.01526.x
179	Stapp, J. R., Lilieholm, R. J., Leahy, J., & Upadhaya, S. (2016). Linking attitudes, policy, and forest cover change in buffer zone communities of Chitwan National Park, Nepal. *Environmental Management*, 57, 1292-1303. https://doi.org/10.1007/s00267-016-0682-6
180	Stevens, S. (2013). National Parks and ICCAs in the High Himalayan Region of Nepal: Challenges and opportunities. *Conservation and Society*, 11(1), 29-45. https://doi.org/10.4103/0972-4923.110946
181	Strauch, A. M., Rurai, M. T., & Almedom, A. M. (2016). Influence of forest management systems on natural resource use and provision of ecosystem services in Tanzania. *Journal of Environmental Management*, 180, 35-44. https://doi.org/10.1016/j.jenvman.2016.05.004
182	Subedi, M. R., & Timilsina, Y. P. (2016). Evidence of user participation in community forest management in the Mid-hills of Nepal: A case of rule making and implementation. *Small-scale Forestry*, 15, 257-270. https://doi.org/10.1007/s11842-015-9321-y
183	Suhardiman, D., Wichelns, D., Lestrelin, G., & Hoanh, C. T. (2013). Payments for ecosystem services in Vietnam: Market-based incentives or state control of resources? *Ecosystem Services*, 5, 94-101. https://doi.org/10.1016/j.ecoser.2013.06.001
184	Sultana, P., & Thompson, P. M. (2007). Community based fisheries management and fisher livelihoods: Bangladesh case studies. *Human Ecology*, 35, 527-546. https://doi.org/10.1007/s10745-006-9092-3

185	Thompson, P. M. (2013). Sustainability of community-based organizations in Bangladesh. Society & Natural Resources, 26(7), 778-794. https://doi.org/10.1080/08941920.2012.723303
186	Thuy, P. T., Ha, H. M., & Campbell, B. M. (2008). Pro-poor payments for environmental services: Challenges for the government and administrative agencies in Vietnam. *Public Administration and Development*, 28(5), 363-373. https://doi.org/10.1002/pad.513
187	Tuanmu, M-N., Viña, A., Yang, W., Chen, X., Shortridge, A. M., & Liu, J. (2016). Effects of payments for ecosystem services on wildlife habitat recovery. *Conservation Biology*, 30(4), 827-835. https://doi.org/10.1111/cobi.12669
188	Turpie, J. K., Marais, C., & Blignaut, J. N. (2008). The working for water programme: Evolution of a payments for ecosystem services mechanism that addresses both poverty and ecosystem service delivery in South Africa. *Ecological Economics*, 65(4), 788-798. https://doi.org/10.1016/j.ecolecon.2007.12.024
189	Véron, R., & Fehr, G. (2011). State power and protected areas: Dynamics and contradictions of forest conservation in Madhya Pradesh, India. *Political Geography*, 30(5), 282-293. https://doi.org/10.1016/j.polgeo.2011.05.004
190	West, T. A. P. (2016). Indigenous community benefits from a de-centralized approach to REDD+ in Brazil. *Climate Policy*, 16(7), 924-939. https://doi.org/10.1080/14693062.2015.1058238
191	Zia, A., Hirsch, P., Songorwa, A., Mutekanga, D. R., O'Connor, S., McShane, T., Brosius, P., & Norton, B. (2011). Cross-scale value trade-offs in managing social-ecological systems: The politics of scale in Ruaha National Park, Tanzania. *Ecology and Society*, 16(4), 7. http://dx.doi.org/10.5751/ES-04375-160407

Supplementary file 3: How does governance mediate links between ecosystem services and poverty alleviation? Results from a systematic mapping and thematic synthesis of literature

Articles coded for each descriptive and analytical theme

Analytical theme	Descriptive themes	Total number of articles	Numbers of articles as in supplementary file
4. Governance that is locally owned and inclusive increases the potential for ecosystem services to deliver on improved livelihoods.	a. Customary institutions linked to local ownership and inclusivity	12	15, 19, 32, 56, 58, 59, 87, 138, 148, 155, 175, 180
	b. Governance often not genuinely inclusive in practice	14	7, 14, 18, 29, 50, 51, 82, 96, 102, 131, 133, 144, 148, 179
	c. Insufficient power sharing	8	34, 39, 133, 142, 144, 147, 147, 150
	d. Elite capture present	9	4, 6, 7, 11, 71, 129, 134, 142, 158
	e. Inadequate local ownership associated with negative consequences for ecosystem health	4	46, 53, 60, 144
	f. Locally managed resources often provide greater livelihood benefits	3	24, 27, 52
5. There are generally multiple governance structures and systems in place in any institutional setting and these interact and adapt over time in response to preferences and power dynamics.	a. Multiple institutions exist within a governance landscape	13	36, 93, 98, 105, 116, 134, 140, 152, 153, 168, 171, 181, 189
	b. Local institutions interact with new externally-initiated institutions	6	64, 93, 104, 116, 154, 172
	c. Power influences institutions	2	59, 90
	d. Coordination between structures and institutions is often lacking	7	44, 62, 66, 67, 91, 108, 134
6. Governance systems rarely offer appropriate and adequate incentives to deliver on poverty	a. Governance systems not designed and implemented with sufficient incentives to deliver on livelihood benefits and be sustained over time	27	5, 8, 7, 13, 16, 17, 31, 37, 38, 49, 54, 55, 57, 84, 94, 97, 99, 101, 107, 117, 118, 120, 121, 124, 125, 140, 182
	b. Incentives/compensation from conservation associated with species richness	3	27, 159, 187

alleviation through ecosystem services.	c. Incentives/compensation for participation in governance and conservation of ecosystems often inadequate	22	3, 17, 37, 54, 66, 68, 81, 84, 99, 107, 108, 109, 110, 119, 121, 125, 126, 137, 146, 174, 182, 184