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Review

Is it just conservation? A typology of Indigenous peoples' and local communities' roles in conserving biodiversity

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SUMMARY

As conservation initiatives expand in response to biodiversity loss, there remains limited understanding about what forms of governance and roles for different actors produce the best ecological outcomes. Indigenous peoples' and local communities' (IPs' and LCs') roles extend beyond participation to more equitable governance based on relative control and recognition of their values and institutions, but the relationship with conservation outcomes remains unclear. We review 648 empirical studies to develop a typology of IP and LC roles in governance and, for a subsample of 170, analyze relationships with reported ecological outcomes. The findings reveal that more equitable governance, based on equal partnership or primary control for IPs and LCs, are associated with significantly more positive ecological outcomes. This carries important implications, including for actions toward the Global Biodiversity Framework targets, suggesting a need to elevate the role of IPs and LCs to conservation leaders while respecting their rights and customary institutions.

INTRODUCTION

The role of Indigenous peoples and local communities (IPs and LCs) is widely acknowledged as important for biodiversity conservation. The involvement of IPs and LCs has often been framed as a moral obligation for conservation organizations—i.e., as the right thing to do—and, hence, included under "equitable conservation" objectives in global policies.[1] Target 3 of the Kunming-Montreal Global Biodiversity Framework, for example, aims for 30% of land and sea to be protected or conserved by 2030 through "equitably governed systems."[2] Equitable governance comprises principles such as recognizing and respecting all relevant actors' knowledge and diverse values, rights to ancestral territories, and cultural practices as well as ensuring full and effective participation in decision-making.[3,4]

The association between equity and conservation effectiveness—i.e., whether more equitable governance leads to improved conservation—remains contested, nevertheless. Conservation scholarship has increasingly hinted at a link between conservation approaches based on equity principles and favorable conservation outcomes.[5] This appears to be irrespective of the type of ecosystem, of the region, and of the nature of the intervention (e.g., payments for ecosystem services or protected areas).[6–11] Similar associations have been observed in self-determined territories.[12,13] One pathway through which greater involvement of IPs and LCs has been found to lead to better conservation outcomes is enhanced collective action, cooperation, and reduced conflicts.[14] Crucially, IPs and LCs often contribute to conservation through their value systems, expressed and applied through their intricate relationships with nature, their

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traditional ecological knowledge, and customary practices oriented toward long-term sustainability.[15]

However, conservation initiatives take many forms, including (but not limited to) protected and conserved areas, sustainable use regulations, livelihoods, tourism or development projects, incentive schemes, and education programs. Each of these can vary considerably in their design and governance arrangements, and multiple initiatives often operate at a single site. Conservation initiatives also generate varying outcomes for both IPs and LCs and nature, often involving complex tradeoffs between ecological and social success.[16] Studies seeking to assess the effectiveness of types of conservation interventions hence tend to find inconsistent patterns and commonly conclude that the outcomes depend heavily on the characteristics and quality of governance, and the varying degrees of engagement, motivation, recognition, leadership of, and collaboration with IPs and LCs at a given site.[17–24] This implies the need for enhanced attention to elucidate the influence of different types of IP and LC roles on conservation outcomes. Yet, aside from increasing numbers of individual case studies, there have been relatively few analyses exploring the relationship between different roles of IPs and LCs or measures of equitable governance and conservation effectiveness at broader scales—in part because such data are not routinely collected or available.[17,23]

Understanding the association between social equity and ecological effectiveness requires critical analysis of the nuanced range of roles played by IPs and LCs in conservation governance.[25] There is growing theorization of governance, and equitable governance specifically, as a complex set of features and interactions,[4,26,27] and some studies have explored the relationship between equity and conservation outcomes at global, regional, or multisite scales.[6,8,13] However, to date, studies have tended to include simplistic proxies for governance, basing categories on the presence or absence of participation in decision-making or to only compare extreme scenarios where IPs and LCs are either completely excluded or have a high degree of autonomy.[28] While frequently portrayed as two alternative conservation models (participatory vs. exclusionary conservation), these extremes instead form the opposite ends of a spectrum between which most conservation initiatives fall.[29] Interestingly, this middle ground, in which IPs and LCs participate in decision-making to some degree, is the most common yet least studied set. The labeling of conservation initiatives is often misleading in this regard. For example, initiatives labeled as "community-based," "co-managed" and "participatory" are assumed to represent desirable forms with high levels of local control but have been increasingly criticized for lacking genuine participation and for generating burdens for IPs and LCs.[20,24,30]

There are established frameworks and numerous case studies examining social and institutional dynamics[27,31–35] as well as tools for assessing equity at specific sites.[36–39] However, there is a lack of broader synthesis work as well as a deficiency of data types that would enable a critical assessment of governance, based on evidence from a diversity of sites, including across different ecosystems, regions, initiative types, or that would enable correlations with conservation effectiveness to be explored at a large scale.[40] Representations of governance centered only on participation also often overlook complex political dynamics and assume that IPs and LCs are merely participants in externally controlled processes.[41] Rarely is the converse situation considered where external actors participate in initiatives and decision-making led by IPs and LCs, as typically seen in autonomous Indigenous territories.

This paper attends to these knowledge gaps. Drawing on a systematic review of 648 peer-reviewed empirical case studies of site-level conservation as well as a literature review, we establish a typology of the different roles of IPs and LCs in conservation governance. For the subsample of 170 cases in which ecological outcomes are evidenced, we then apply statistical ordinal regression to identify patterns of association between the different roles played by IPs and LCs (as a proxy scale for equitable governance) and the ecological outcomes, which, in turn, indicate conservation effectiveness, reported by the published case studies. We run a similar analysis for social outcomes based on 288 cases. Additionally, we draw on our global dataset to provide illustrative examples, distinguishing among the six different roles of IPs and LCs in conservation governance, exemplifying the various ecological and social outcomes, as well as elucidating the specific dynamics influencing those outcomes.

Conceptual framing

In this section we present a review of the relevant literature as a first step toward establishing a typology of the roles of IPs and LCs in conservation governance. Characterizing these roles requires consideration of numerous concepts and factors, which we distill into three broad, interrelated themes: (1) participation quality, (2) recognition of values and knowledge systems, and (3) historically rooted power relations. We then apply the key themes arising in the theoretical literature to the set of 648 empirical studies of site-level conservation, utilizing the descriptions of governance within those case studies to iteratively refine different features into a distinguishable and applicable typology of roles of IPs and LCs in conservation governance.

Theories regarding participation in conservation governance emphasize that decision-making involves multiple actors across scales with diverse interests and power, which necessitates a critical examination of the relative influence of actors at different stages of interventions.[29,42,43] Thus, rather than adopting simplistic indicators based, for instance, on the presence or frequency of IPs' and LCs' attendance of meetings or on subjectively expressed opinions about conservation, more nuanced scrutiny of the quality of participation and governance processes is needed to shed light on the roles of IPs and LCs in conservation decisions.[44,45]

In conservation social and political science literature, governance is favored as a more holistic and political concept.[46] Here, we follow a nuanced interpretation of governance as "who decides what the objectives are, what to do to pursue them, with what means, how those decisions are taken, who holds power, authority and responsibility, and who is (or should be) held accountable."[27] That is, governance encompasses aspects of authority, power, and control across different stages of decision-making and cross-scale interactions between actors and institutions (i.e., norms and formal rules). The *quality* of governance hence relates to how effectively IPs and LCs can voice their own perspectives, their relative influence throughout different stages of a given conservation initiative, their treatment in interactions with other actors, and how power (over) is

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exercised in those processes.[47,48] High-quality governance would thus entail full and effective participation, reflecting meaningful IP and LC influence across all planning, design, implementation, and monitoring stages of conservation interventions.[49] However, this is just one aspect of *equitable* governance, which includes several other principles,[4] on which we focus below.

Low influence and poor participation may occur in situations where IPs and LCs are excluded, merely informed, treated as passive recipients of decisions made by external actors, and/or compensated for the losses they will incur.[50] Even when treated as stakeholders (rather than right holders) with some opportunities for participation, their roles may still represent weak influence in decision-making.[51] The influence of IPs and LCs is particularly crucial during the pre-intervention design stage, when decisions are made about key issues such as the location, objectives, methods, and division of rights and responsibilities.[24] More equitable collaborations involve shared roles, rights, and responsibilities between IPs and LCs and other stakeholders with relatively equal influence and control.

In much of the literature, empowering IPs and LCs is associated with devolving power and decision-making authority to local governance structures to enable responsiveness to local issues.[52–54] This involves a role for local decision-making institutions and forums within conservation governance structures or nested forms of governance.[27] In turn, this places importance on good local leadership, representation and cohesion, or clarity of local preferences and aspirations to ensure that they are effectively communicated in negotiated processes.[29,42] Higher levels of influence involve IPs and LCs having sufficient autonomy so that intervention objectives and designs can be largely locally driven and decisions made through local institutions, which, in turn, implies that IPs and LCs are merely supported by external organizations who become participants within locally led governance.[49]

The above consideration of the quality of participation focuses on procedural issues. Equity and social and environmental justice are commonly defined in terms of three dimensions, with *procedure* (i.e., how decision-making processes work) being one of those three, alongside *recognition* of rights, values, knowledge systems and identities, as well as the *distribution* of benefits, opportunities, and burdens (i.e., costs and risks).[55]

Regarding recognition, it is key to note that conservation involves multiple social groups, organizations, and perspectives. IPs and LCs hold worldviews and values regarding nature and human well-being that may differ from dominant (western) scientific knowledge systems.[56] IPs' and LCs' knowledge systems often include core relational values associated with reciprocal relationships with nature.[15,57] These knowledge systems are typically governed by customary institutions that may have existed for centuries. Within global environmental governance, IPs and LCs therefore receive specific attention not only for their cultural distinctiveness and rights to ancestral territories and to continue cultural practices but also for their knowledge systems, institutions, and active stewardship of nature.[58]

Integrating IPs and LCs into governance processes does not necessarily guarantee meaningful recognition. Conservation initiatives may impose external worldviews and values, leading to cultural and epistemic exclusion.[57,59] Attempts to assimilate or selectively integrate aspects of IPs' and LCs' knowledge systems into externally controlled interventions can also lead to cultural marginalization and epistemic injustices.[60] Collaborative or shared governance forms are more likely to respect rights and enable customary practices and IPs' and LCs' institutions to be safeguarded.[61] Recognition can be enhanced in conservation through empowerment of local leadership, building trust and intercultural understanding, weaving plural knowledge systems and coproducing knowledge, and actions such as spatial zoning to recognize territorial rights.[34]

Finally, different actors in conservation have varying capacities, resources, and levels of agency that are influenced by the past. Historical interactions have shaped current power dynamics and relationships, meaning the role of IPs and LCs cannot be evaluated solely based on the design features of current, *in situ* conservation interventions.[33,43] This can be clearly illustrated in terms of land tenure. Imagine, for example, that an Indigenous community had been displaced from its ancestral territory to a new village in the 1980s to make way for the establishment of a national park. In 2024, an eco-tourism initiative is established in the community's new village, outside the park boundaries. In such a case, equity and the quality of participation in conservation governance could not simply be assessed in terms of the Indigenous community's role in the new eco-tourism initiative. That requires a more holistic and historically rooted understanding of conservation and political actions and how they have shaped the lives, rights, culture, and perceptions of that community. The impacts on their values and knowledge systems, power dynamics, and the reproduction of histories of marginalization or misrecognition should thus also be considered.[62]

The above literature synthesis implies that characterizing the role of IPs and LCs in conservation governance involves examining participation quality, recognition of values and knowledge systems, and historical power relations. These aspects encompass both procedural and recognition dimensions of equity. The typology put forward in Table 1 takes this into account and seeks to provide a relatively clear, distinct, and practical categorization that also facilitates deeper insights into equitable governance. We note, however, that the typology cannot cover all technical principles of equitable governance; for example, the quality of dispute resolution mechanisms.

RESULTS

We first present the typology of roles of IPs and LCs in conservation governance, derived through the literature review and analysis of the full sample of 648 empirical studies of site-level conservation identified for this review. Subsequently, we analyze subsamples of cases, for which authors also report the ecological outcomes (170 cases) or social outcomes (288 cases) associated with the identified conservation interventions. We run ordinal regression analyses of those subsamples to explore the relationships between the role of IPs and LCs in governance (based on an ordinal scale of six categories) and the ecological or social outcomes reported (each categorized as positive, mixed, or negative; see below and Experimental procedures section for details).

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Table 1. Description of six ordinal types describing the role of IPs and LCs in conservation governance, an illustrative example from the sample of empirical cases for this study, and the proportion of empirical studies of each type

Typology of the role of IPs and LCs in governance	Description of varying roles of IPs and LCs, combining different dimensions of equity by type	Example case from the sample of empirical cases to illustrate distinctions between types of roles	Percentage and number of cases (n = 648)
Type 6: autonomous IPs and LCs autonomous 	• conservation initiative entirely locally led; community has territorial autonomy, direct authority over all aspects of decision-making and management • full rights respected; customary institutions, practices, knowledge systems recognized • science and conservation scientists as participants in Indigenous and local processes, helping to inform governance decisions	Hongmao et al. (2002)[63] detail how the Dai people in Xishuangbanna, a Dai autonomous region in Yunnan, southwest China, had conserved their forests for many generations. Their spirituality, a mix of polytheism and Buddhism, along with traditional knowledge and institutions underpin efforts to maintain plant diversity for numerous beliefs and uses through a network of "holy hill forests" in which hunting and cutting is prohibited and other areas where sustainable use is practiced, all through customary institutions and negligible external influence. Around 250 such holy hill forests were reportedly maintained across Xishuangbanna, with knowledge-sharing processes to pass on to youth.	7.9% (51)
Type 5: primary control IPs and LCs as knowledge holders with primary control 	• community leadership with relative autonomy and primary control, though not entirely self-determined because of external regulatory framework or legal structures that may constrain local practice in certain ways • can be delegated or devolved power from external organization or where state, NGO, or private actors have some influence over decision-making • able to apply and reinforce customary institutions and practices, with cultural identity respected, but perhaps incomplete external recognition and support, incomplete resolution of historic claims or conflicts	In Ecuador, forest restoration was initiated in 2003 through a local NGO with strong connections to the communities. The NGO's role was primarily to raise international funding to help the communities themselves to purchase, reforest, and protect the cloud forests in the watersheds within their territories. Hence, rather than being equal partners, communities were in primary control of the initiative, and decisions were made by them about their own lands through their existing local institutions and knowledge.[64]	10.6% (69)

(*Continued on next page*)

Table 1. ***Continued***

Typology of the role of IPs and LCs in governance	Description of varying roles of IPs and LCs, combining different dimensions of equity by type	Example case from the sample of empirical cases to illustrate distinctions between types of roles	Percentage and number of cases (n = 648)
Type 4: partners IPs and LCs as equal partners or co-managers 	• collaboration or shared governance with other organizations (state, private, NGO) with relatively equal overall level of influence and control • ability to negotiate and influence decision-making at all stages or primary control over substantial physical or project areas • rights respected to an extent, such as continuation of customary practice and institutions, nested within external structures, though perhaps incomplete recognition of identity, access or claims • clear efforts to reconcile historic conflicts, bridge values, cultures and knowledge systems	The NGO Junglescapes established a forest restoration project in the Lokkere Forest Reserve in Karnataka, India, in 2006. Although the NGO retained oversight and financial control, the community members selected their own local leaders to oversee restoration activities and were employed, given relative independence to implement and empowered to utilize local knowledge and effect their own long-term restoration strategies.[65] While the community's influence and inclusion were limited, the devolution of many decisions, recognition of local knowledge, and sharing of responsibilities were a departure from previous top-down forest management and clearly situate the community's role as higher than stakeholders.	19.1% (124)
Type 3: stakeholders IPs and LCs as stakeholders among many 	• some representation, partial recognition and influence, but through inclusion as one stakeholder among numerous others, not a leading or co-leading role • some opportunity to negotiate, dispute, or influence decisions • perhaps only some community members represented or influence limited to a single sub-project, such as revenue sharing, tourism • minor role for customary institutions, limited attention to past injustice • some intercultural bridging, but external knowledge systems dominant	The Sundarban Biodiversity Conservation Project was initiated in 2002 by the Bangladeshi forest department to establish forest areas around village lands to protect from flooding, provide for local needs, and, through enhanced and alternative livelihoods, reduce pressure on core conservation areas.[66] The project was intended to be implemented collectively through the local community Samaj system, but they had only a passive role and participation was instead limited to a small number of wealthier households with adequate time and resources to benefit. The top-down means of design and implementation failed to build relationships and collaboration meaning the community were not treated as partners with an equal level of influence to the state, but more as local stakeholders.	28.9% (187)

(*Continued on next page*)

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Table 1. ***Continued***

Typology of the role of IPs and LCs in governance	Description of varying roles of IPs and LCs, combining different dimensions of equity by type	Example case from the sample of empirical cases to illustrate distinctions between types of roles	Percentage and number of cases (n = 648)
Type 2: consultees IPs and LCs as recipients, to be consulted 	• beneficiaries, provided some benefits or forms of compensation but with negligible participation • no role or influence in decision making; e.g., merely informed after major decisions made • no role for customary institutions, external structures imposed • no process for intercultural exchange, external knowledge systems privileged	In Zambia, the Munyamadzi Corridor conservation and hunting Game Management Area was imposed on the valley Bisa community in 1987, overriding their centuries-old and effective local institutions and restricting use for cultivation, grazing, and resource access. A scheme for sharing hunting revenues was established to compensate, but benefits were negligible relative to the impacts imposed on their livelihoods, increased state control, and lack of opportunity to affect the decision.[67]	24.5% (159)
Type 1: excluded IPs and LCs excluded 	• no control, no discernible benefit, treated as a problem or threat to be removed, displaced or separated from biodiversity in question while having no influence or role in governance • no role for customary institutions, external structures imposed • external knowledge systems privileged, Indigenous or local knowledge marginalized	Agara Lake in Bangalore, India, had been locally managed by mango farmers and small-scale fishers for many years but was in an area of urbanization, and in 1990 the local authorities took the step of purchasing, fencing off, and managing the lake for water quality management and recreation opportunities for new residents, to the detriment of much of the biodiversity present, while excluding the former managers and their livelihood activities.[68]	9.0% (58)

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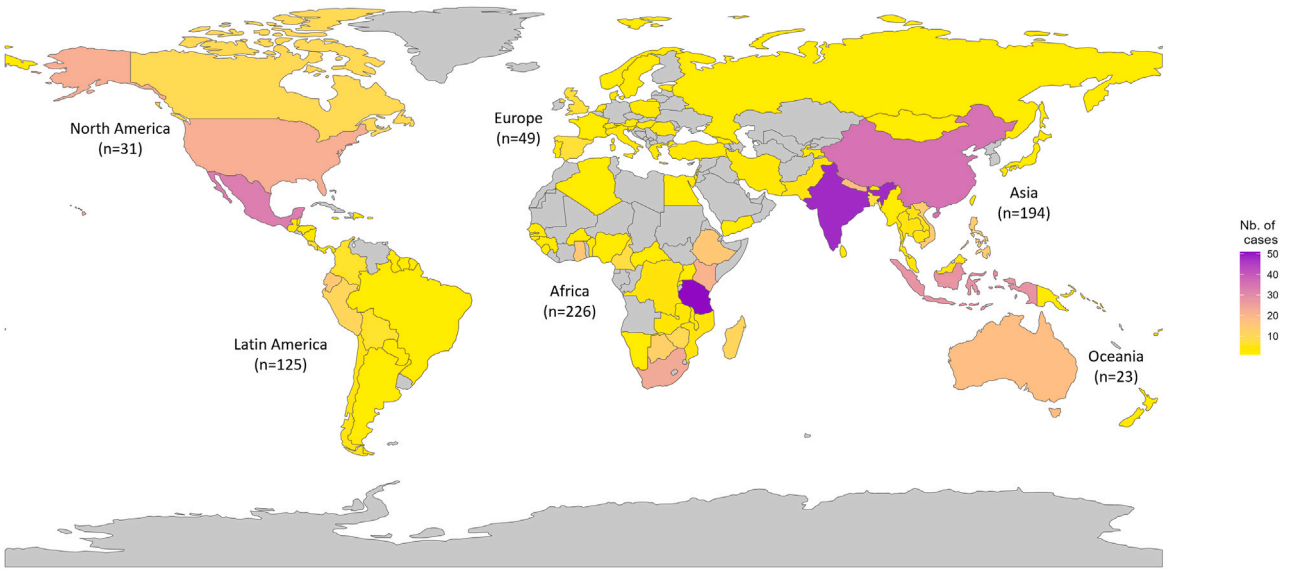

Figure 1. Global distribution of reviewed cases of site-level conservation by country (*n* = 648)

A typology of IPs' and LCs' roles in conservation governance

Our data reveal that IPs and LCs take on six types of roles in conservation governance. Building from the least participation and influence to the greatest, these roles include: type 1, the complete exclusion of IPs and LCs; type 2, IPs and LCs as recipients of benefits, compensation, or information as consultees with very minor influence; type 3, IPs and LCs as one stakeholder among many, with limited capacity to influence decisions, holding relatively little control and with limited cultural recognition; type 4, IPs and LCs as equal partners or co-managers in a negotiated sharing of power, with some role for local institutions and elements of cross-cultural collaboration; type 5, IPs and LCs as knowledge holders with primary authority and respect for local leadership and rights, though not with full autonomy or recognition as other actors or external structures may still exercise influence and authority over decision-making; and type 6, IPs and LCs as fully autonomous leaders with agency for self-determination and recognition of their values, knowledge, institutions, and rights (see Table 1 for elaboration of the key criteria associated with each type and a brief example for each from the sample of empirical cases).

The contexts of the 648 cases vary enormously, as do the governance arrangements, power dynamics, and interactions. Therefore, the cases do not adhere to all the criteria listed in Table 1 for each type of role, but the 648 reviewed cases were selected from a larger dataset of 723 because they presented sufficient detail about the governance arrangements for them to be allocated (Experimental procedures). The distribution of the 648 empirical cases between the six roles was slightly concentrated toward the two with IPs and LCs as type 3 "stakeholders" (29%) and type 2 "recipients or consultees" (25%; Table 1). The types with the lowest proportion of cases were at the two extremes, IPs and LCs as "autonomous" (type 6; 8%) and IPs and LCs "excluded" (type 1; 9%) (Table 1). It should be noted that this distribution may not be representative of global conservation practice, as it is determined by what has been studied and reported in the published literature. But given the large sample used in this synthesis, it provides a valuable indication of the range of roles of IPs and LCs and their prevalence around the world. The global sample indicates that a large share of cases were externally controlled interventions; i.e., the types with the lowest influence—excluded, consultees, and stakeholders (types 1–3, 62%)—relative to initiatives in which communities can be considered to have primary control or autonomy (types 5–6, 19%; Table 1).

The 648 cases comprised a range of intervention types, and, on average, each case involved two to three of the following types: protected and conserved areas (67.9%); livelihoods projects or tourism ventures (56.9%); species protection or sustainable use regulations (53.9%); local or Indigenous stewardship (36.7%); ecosystem restoration (15.7%); incentives, compensation, revenue sharing, or market instruments (13.6%); and education and capacity building (10.6%).

The 648 studies were published between 1991 and 2020, with 73.9% published after 2010. The conservation interventions in the dataset spanned a relatively large timescale, with 40% having been initiated between 2000 and 2019, 35% between 1980 and 1999), 9.6% between 1960 and 1979), and 4.3% prior to 1960, and 9.6% of all reported cases had been under customary governance for multiple generations, with the remaining 1.5% not providing information on the year of initiation. 27% of the cases explicitly reported that Indigenous People were either involved in or directly impacted by the conservation intervention.

The majority of the 648 cases were located in the Global South (Figure 1), with 34.9% in Africa, 29.9% in Asia, 19.3% in Latin America, and only 12.3% in Europe and North America combined. They were spread across a total of 99 countries, although some countries had a relatively large concentration of cases, such as Tanzania (*n* = 56), which has been noted to produce numerous empirical conservation studies in English.[60] India

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Table 2. Distribution (by continent) of IPs' and LCs' roles in conservation governance

	Africa	Asia	Europe	Latin America[a]	North America	Oceania[b]	Grand total
Type 6, autonomous	7%	10%	0%	12%	3%	0%	8%
Type 5, primary control	7%	9%	6%	18%	13%	30%	11%
Type 4, partners	17%	19%	18%	20%	29%	26%	19%
Type 3, stakeholders	35%	24%	27%	28%	23%	26%	29%
Type 2, consultees	25%	28%	39%	16%	23%	13%	25%
Type 1, excluded	9%	11%	10%	6%	10%	4%	9%
Total	226	194	49	125	31	23	648

[a]Including Mexico.
[b]Including Australia and New Zealand, which make up 16 of 23 cases.

had the second-highest number of cases (n = 48), followed by Mexico (n = 37) (Figure 1).

The most frequently studied ecosystem was forest and woodland (45.5%), followed by coastal and marine (15.6%, cf. Figure S1).

The proportion of cases within each of the six types of IP and LC roles in governance did not vary dramatically between continents, and there were no clear outliers (Table 2). However, the cases in Latin America exhibit a relative skew toward higher roles for IPs and LCs (Table 2), which may be reasonably expected, given the relatively higher political recognition of IPs and LCs in the region, particularly during and after the 1990s.[69]

The relationship between the different roles of IPs and LCs and reported ecological and social outcomes

Ecological outcomes were evidenced and reported explicitly in 212 cases and social outcomes in 323 of the sample of 648 studies. Of those, 42 and 35 cases, respectively, exhibited potential independence issues between author affiliation or funders and the intervention being studied. For example, if the study was funded by and/or the lead author was affiliated with the organization implementing the initiative (such as the government agency or non-governmental organization (NGO) running a protected area or a payment for environmental services program), then the case was omitted from the analysis. Studies identified as exhibiting a potential independence issue had a high propensity to report positive outcomes and a low incidence of negative outcomes. The 42 studies omitted from the ecological outcomes analysis reported positive outcomes in 62% of cases and negative outcomes in just 2%, relative to 47% and 22%, respectively, for the remaining sample of 170 cases. The 35 studies omitted from the social outcomes analysis displayed a similar pattern, 51% positive and 6% negative compared to 16% and 24%, respectively, for the remaining sample of 288 cases.

Controlling for such potential independence issues, a total of 170 cases were included in our analysis of the relationship between the role of IPs and LCs in governance and ecological outcomes and 288 cases for the analysis of social outcomes. The distribution of cases across the six categories for the role of IPs and LCs was similar between the full sample of 648 cases (Table 1) and the subsamples reporting social outcomes (n = 288; Table 3) and ecological outcomes (n = 170; Table 4; Figure S2).

Ecological outcomes were evidenced through biophysical data (22%), such as habitat cover, quality, or species trends; data on human behavior impacting biodiversity or perceptions about ecological outcomes (42%), or both (36%). Social outcomes were evidenced through (1) material social impacts only, such as to income or assets (10%); (2) material outcomes plus an additional element, such as improved social relations (56%), or (3) holistic social assessment with attention to material, social, cultural, and political outcomes (34%).

The social and ecological outcomes were coded during data extraction as positive or negative if exclusively reported as such or otherwise as mixed. Cases were categorized as mixed social outcomes if some people, within or across communities, were reported to have gained while others were impacted negatively or, for example, if people initially gained but lost out in some way over time. Mixed ecological outcomes were noted if some aspect of biodiversity, habitat quality, or a human activity directly linked to a change in biodiversity was reported to increase and another to decline.

Relationships were evident between the role of IPs and LCs in governance and both ecological and social outcomes, with relatively positive outcomes associated with the higher three types 4–6 (Tables 3 and 4; Figure 2). The cases in which IPs and LCs had primary control (type 5) or autonomy (type 6) are associated with markedly higher proportions of both positive ecological outcomes (>70% of cases; Table 3; Figure 2A) and social outcomes (>50% of cases; Table 4; Figure 2B). It is notable that 73% of the 51 cases in the "autonomous" role (type 6) involved cases describing the self-determined conservation efforts of IPs and LCs, continued over multiple generations, with no discernible year of initiation (also 55% of the 20 cases in the autonomous category for the ecological outcomes analysis, with 91% of those evidencing positive ecological outcomes).

Based on a descriptive statistical analysis of ecological outcomes (Table 2A), the relationship appears to be stepped or two-tiered, with negative and mixed outcomes associated with the three roles representing lower levels of IP and LC involvement (types 1–3), in contrast to the primarily positive ecological outcomes associated with the higher three roles (types 4–6). This raises the possibility of a pivotal distinction between governance in which IPs and LCs have a role as equal partners in (shared) conservation governance relative to being treated as one of many stakeholders. When IPs and LCs were treated as a mere stakeholder among many, afforded limited participation and influence in governance, and their customary institutions, values, and knowledge received weak recognition, the associated ecological outcomes were poor. Almost half of the cases in which IPs and LCs were treated as stakeholders were

Table 3. Ecological outcomes associated with the six types of roles of IPs and LCs in conservation governance

Type of role of IPs and LCs in governance	Sample size	Positive	Mixed	Negative
Type 6, autonomous	20	85%	5%	10%
Type 5, primary control	27	74%	26%	0%
Type 4, partners	39	64%	31%	5%
Type 3, stakeholders	40	18%	48%	35%
Type 2, consultees	36	25%	31%	44%
Type 1, excluded	8	25%	38%	38%
Total	170	47%	31%	22%

Table 4. Social outcomes associated with the six types of roles of IPs and LCs in conservation governance

	Sample size	Positive	Mixed	Negative
Type 6, autonomous	7	57%	29%	14%
Type 5, primary control	28	64%	36%	0%
Type 4, partners	62	27%	69%	3%
Type 3, stakeholders	87	8%	76%	16%
Type 2, consultees	74	1%	57%	42%
Type 1, excluded	30	0%	30%	70%
Total	288	16%	60%	24%

associated with mixed ecological outcomes, while over a third produced negative ecological outcomes, and positive outcomes were the least common finding (Figure 2A). In contrast, when IPs and LCs were seen as partners collaborating in shared governance, well over half of the reviewed studies reported positive ecological outcomes (Figure 2A).

The statistical analysis for ecological outcomes based on an ordinal regression model provides further nuanced evidence of the positive relationship between equitable governance and ecological outcomes. The data suggest statistically significant differences for each of the higher three roles of IP and LC involvement (types 4 to 6) relative to cases in which IPs and LCs were excluded (types 1–3; Table 5). In contrast, the types indicating externally controlled governance and lower IP and LC influence (i.e., IPs and LCs as consultees [type 2] or one stakeholder among many [type 3]), show no statistically significant differences to cases of IP and LC exclusion (the baseline type for statistical analysis), as all are associated with relatively poor ecological outcomes. Note that the stepped shape of the relationship (Figure 2A) needs to be interpreted with due caution because it is largely driven by the low incidence of positive ecological outcomes associated with IPs and LCs in the role of a stakeholder, out of 40 cases (a modest sample size), and the relationship could otherwise appear more linear and positive.

As regards social outcomes, a more linear positive relationship with equitable governance is suggested by the data. Negative social outcomes were relatively more prevalent in cases where IPs and LCs were excluded (type 1), with no cases recording positive social outcomes (Table 4; Figure 2B). This extreme baseline meant that all other five types of roles exhibited statistically significant differences from that baseline of exclusion. However, the difference was only significant at the 5% level when IPs and LCs held a consultee role (type 2), and social outcomes were still poor for that category (Figure 2B). Even the social outcomes associated with having a stakeholder role (type 3, the most common in the sample), were reported as positive in only 8% of those cases, despite the semblance of some level of IP and LC participation (Figure 2B). In the higher roles, from equal partnership to autonomy, more positive social outcomes were commonly reported (Figure 2B), and the degree of statistically significant difference to exclusion shown by the ordinal regression analysis duly increased (Table 6).

A selection of cases was identified from within the sample to illustrate the most commonly observed dynamics that appear to drive differences in the ecological and social outcomes associated with those cases (Figure 3). This helps to address some important questions for conservation practice, such as why treating IPs and LCs as mere stakeholders or beneficiaries to be consulted or compensated appears insufficient to help create positive ecological outcomes. It also sheds light on why governance based on partnership or equitable collaboration and increasing levels of control for IPs and LCs appear to generate such comparatively positive outcomes for both nature and people.

DISCUSSION

Our global synthesis of 648 empirical studies provides a six-level typology of the different roles of IPs and LCs in conservation governance as an indicator or "ladder" for equitable governance. Our analysis of a subsample of 170 cases reporting ecological outcomes indicates a positive relationship between equitable governance and conservation effectiveness (Figure 2). This contributes compelling evidence that the recognition of IPs' and LCs' knowledge and institutions and their relative control of decision-making are allied with the effective conservation of nature. By implication, a step change in conservation outcomes can be achieved if the most common role of IPs and LCs is elevated beyond their treatment as consultees or stakeholders with minor influence to at least equal partnership or equitable collaboration, where rights, knowledge, and institutions are respected, and more progressively by climbing the equitable governance ladder further still toward IPs and LCs having full territorial autonomy.[76] This has important implications for the types of actions required to address biodiversity loss globally, across the global network of protected and conserved areas, and beyond.

Objectives to advance the rights, roles, and contribution of IPs and LCs are increasingly articulated in key conservation policies such as the Global Biodiversity Framework,[2] though the connection to effective conservation remains contested and inadequately evidenced.[77] Many conservation interventions comprise actions and governance structures that inherently fall short of empowering IPs and LCs as decision-makers and partners. They often seek instead to offer a role with minimal participation and to manage social impacts through secondary, separate, or remedial actions and projects.[78] Our findings suggest that conservation funders and implementers should move beyond the assumption that enhancing IP and LC control and recognition compromises conservation goals and focus on enacting shifts

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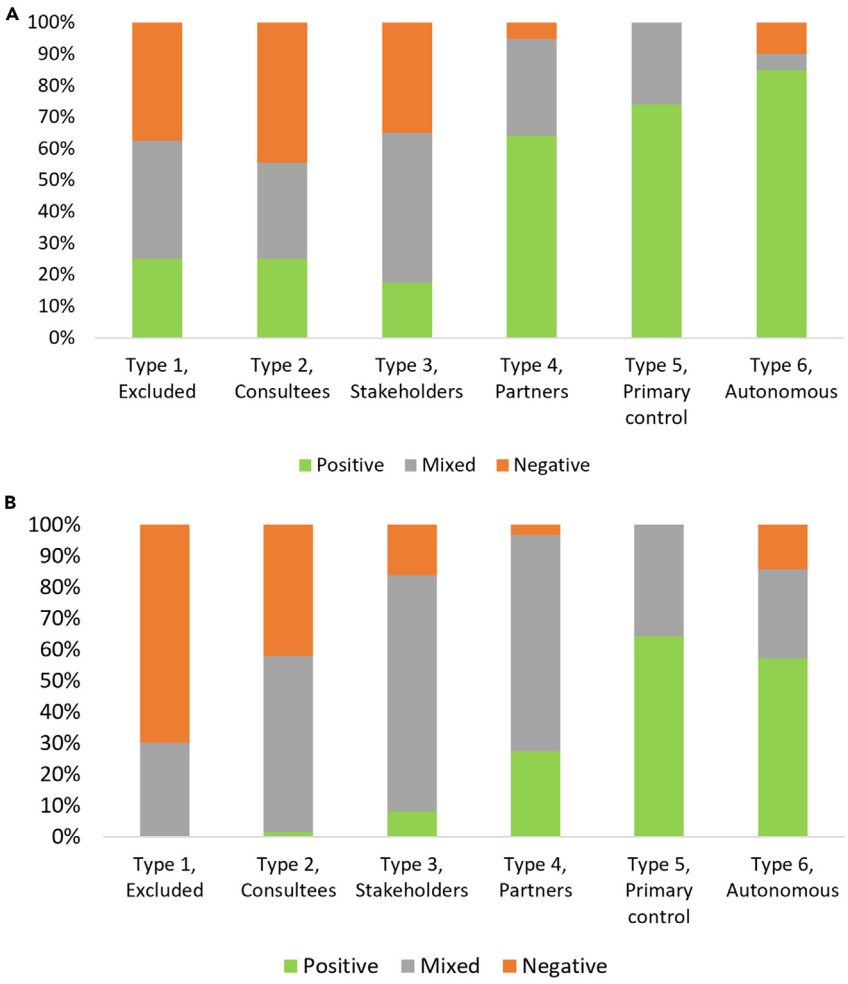

Figure 2. The ecological and social outcomes associated with six types of roles of Indigenous peoples and local communities in conservation governance

(A and B) The ecological outcomes (A) and the social outcomes (B) associated with the six types of roles of IPs and LCs in governance (170 and 288 reviewed empirical cases, respectively).

to more equitable forms of governance as a pathway to enhance the effectiveness of conservation.

The multidimensional understanding of the role of IPs and LCs, and of equitable governance, contained within our analysis makes it clear that enhancing conservation effectiveness is not straightforward or guaranteed through single actions. The results from our review do lend weight to arguments for the devolution of conservation decision-making, to put decision-making power at the level most connected to site-level management and with those most attuned to changes occurring. However, there are opportunities and barriers to enhancing equitable governance that differ across contexts.[5,52,79] For example, in locations where IP and LC values and knowledge systems, traditional institutions, and governance capacity have been heavily eroded, devolution processes are complex and no quick fix for more effective conservation.[54,80] To realize potential synergies with conservation effectiveness may require long-term strategies. Gradual, collaborative progress in multiple complementary areas of governance may be needed, not least because voids in conservation governance can lead to conflict and extractive exploitation.[81] Actions building toward more equitable governance include meaningful recognition of IP and LC values and knowledge systems, appropriate structures empowering local authority as part of nested governance, building positive relationships and supportive intercultural collaborations, and conflict resolution processes, in addition to supporting maintenance or revitalization of good local governance, cohesion, and leadership.[40,58,82,83]

The typology of roles of IPs and LCs presented in this study can promote understanding and changes in both research and practice. The scale presented of IPs' and LCs' roles in governance, or "ladder of equitable governance" in conservation, builds on existing conceptual work,[27,43,45,47,50] offering a practical and nuanced classification that can guide conservation scientists and practitioners to avoid binary or simplistic analyses of, and narratives about, participation in conservation. By synthesizing empirical evidence about links between governance, equity, and effectiveness, the analysis adds to recent advances in the understandings of the social and political dimensions of conservation science through studies on governance, rights, access, environmental justice, and political ecology.[41,84,85] It goes further than other syntheses on the topic[6,8] by establishing a broader categorization of the role of IPs and LCs in governance. Such analyses have remained scarce, and our findings offer novel insights because neither research nor conservation monitoring data routinely or consistently collect data describing the roles of IPs and LCs in governance alongside indicators of conservation effectiveness. Future studies may build on our broad and exploratory analysis by looking more critically and holistically at the multiple principles and dimensions of equity; how they feature in different interventions, forms of governance, or changes in governance; and the influence of those features on social and ecological outcomes plus their causal dynamics in different contexts.[86] Ultimately, such data on governance quality and equity should be collected for practitioner-oriented conservation monitoring systems and be available for responsive analysis.[87]

While based on a large-scale review of published empirical case studies, our analysis has limitations. First, the distribution of the sample contains biases toward the Global South, which may reflect a relative lack of studies of the social, political, and institutional dimensions of conservation in the Global North and toward anglophone countries and those popular for conservation research. The studies pertain to initiatives spread over

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Table 5. Results of ordinal regression with ecological outcomes (positive, mixed, and negative) as response variable and six types of IPs' and LCs' roles in governance as explanatory variable

Role of IPs and LCs	Estimate	SE	z value	Pr(>|z|)
Type 6, autonomous	2.89975	0.97436	2.976	0.00292 **
Type 5, primary control	2.37437	0.85960	2.762	0.00574 **
Type 4, partners	2.01754	0.81803	2.466	0.01365 *
Type 3, stakeholders	−0.03941	0.78740	−0.050	0.96008
Type 2, consultees	−0.12723	0.79887	−0.159	0.87347

*Statistical significance at the 5% level, and ** at the 1% level.
Coefficients are displayed relative to the baseline of IPs and LCs being excluded from governance.

several decades rather than solely representing contemporary forms of conservation. Additionally, characterizing equitable governance at a site and drawing relationships to conservation outcomes based on publications utilizing varied and interdisciplinary frameworks is challenging.[5] There are multiple nuances within each site and study that could not be captured in the systematic review. For example, trajectories and relative changes have an important influence on people and their values, perceptions, and behaviors, which we did not capture. However, our typology is not intended to promote simple solutions or rapid switches in governance without critical exploration of site-specific dynamics. Rather, this large-scale, broad synthesis can help to spark necessary debates and to direct attention at site and systems levels toward the status of governance and interactions and the potential for different actors to collaborate with IPs and LCs to promote equitable governance and effective conservation in a coordinated and cohesive manner.

Conclusion: Reorienting practice and monitoring toward a more equitable and effective future for conservation

Our review indicates that equitable governance must become more widely understood as the vehicle through which to enhance conservation outcomes and address biodiversity loss. This involves fully recognizing and integrating the rights, roles, and contributions of IPs and LCs in governance. These multiple facets of equitable governance must be well defined, incentivized, and targeted by funders, across organizations and governments, and in National Biodiversity Strategies and Action Plans as well as in global agreements.[77,78,88] Social justice can no longer be neglected or treated as a side issue to business-as-usual conservation, involving control by states, NGOs, and the private sector while continuing to marginalize IPs and LCs.[76,89] All people with interests in conservation should aspire to these forms of transformative change as a way to implement, achieve, and safeguard from the potential risks embodied in Global Biodiversity Framework targets such as 30 × 30.[90,91]

Our review also shows that a profound and widespread paradigm shift is required to move beyond participatory conservation as an accepted norm and toward a stronger understanding of what equitable governance entails and why it is fundamental to conservation practice. The addition of existing locally led initiatives to national and global directories of protected and conserved areas will not fulfill the need for change.[77] The transformative pathway ahead involves sites, programs,

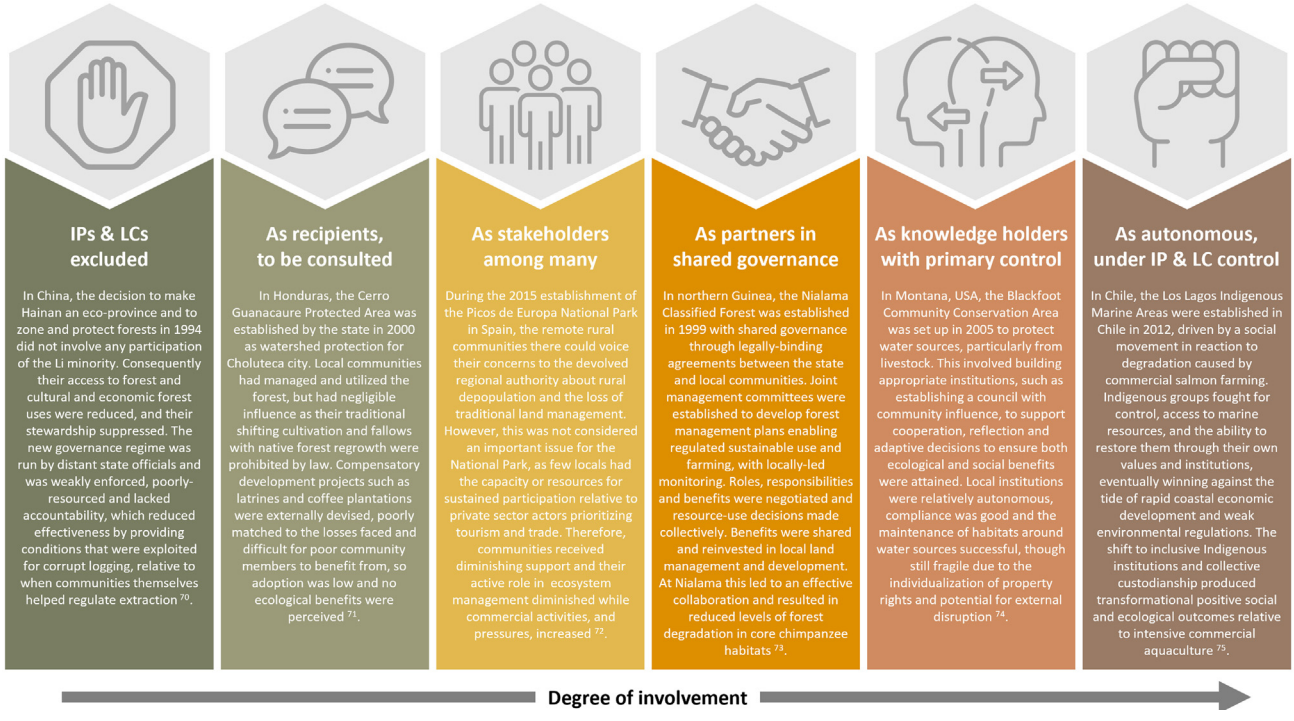

Figure 3. Case study descriptions exemplifying each of the six types of roles of Indigenous peoples and local communities in conservation governance and representing the most common combinations of social and ecological outcomes recorded for the global sample of site-level empirical studies

For more information, see Davies and Wismer[70], Gareau[71], Lopez and Pardo[72], Sunderland-Groves et al.[73], Belsky and Barton[74], and Araos et al.[75]

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Table 6. Results of ordinal regression with social outcomes (positive, mixed, and negative) as response variable and six types of IPs' and LCs' roles in governance as explanatory variable

Role of IPs and LCs	Estimate	Std.Error	z value	Pr(>|z|)
Type 6, autonomous	5.0657	0.9558	5.300	1.16e−07 ***
Type 5, primary control	5.6371	0.6504	8.667	2e−16 ***
Type 4, partners	4.0849	0.5646	7.236	4.64e−13 ***
Type 3, stakeholders	2.5384	0.4829	5.256	1.47e−07 ***
Type 2, consultees	1.1670	0.4600	2.537	0.0112 *

*Statistical significance at the 5% level, ** at the 1% level, and *** at the 0.1% level.
Coefficients are displayed relative to the baseline of IPs and LCs excluded from governance.

organizations, countries, and networks progressively climbing the ladder or moving along the spectrum of roles presented in this study so that equal and primary control, alongside meaningful recognition for IPs and LCs, become mainstream global conservation practice.[49] This urges reflection on the extent and quality of recognition and participation in processes and practices at all levels, from international to site-level conservation, and to develop consensus for enhanced, constructive roles for IPs and LCs, the specific qualities of governance to be targeted, and a shared understanding and vision of why and how such a shift can generate more effective conservation.[9,92] Essentially, efforts to decolonize conservation by addressing past conflicts and avoiding potential contemporary injustices against IPs and LCs to place those communities and representatives at the core of decision-making are likely to contribute not only to necessary moral redress but to improved long-term conservation.[93,94]

Global monitoring of conservation must include assessment of these key governance characteristics and dynamics. Currently there is a narrow focus on externally controlled interventions and on the effectiveness of management.[95] The more equitable forms of governance presented, where IPs and LCs exert primary control, do exist and are captured in our review of empirical studies but are weakly reflected in global conservation monitoring systems such as the World Database on Protected Areas.[96] The assessment of findings from a narrow range of governance types is unlikely to promote the transformational changes required in conservation practice to advance the rights, roles, and contributions of IPs and LCs. Efforts such as the "Territories of Life" or the ICCA Registry to expand inclusion[97] and instruments to advance governance and monitoring, such as the site-level assessment of governance and equity tool,[38] the Elinor tool,[39] and guidance for self-strengthening governance by IPs and LCs,[98] are making inroads, but slowly and incrementally. Such monitoring and assessment initiatives should be rapidly and vastly expanded through UN Convention on Biological Diversity decisions on monitoring, alongside commitments to enhance capacity for governance monitoring at national and subnational scales. For example, establishment of a typology for equitable governance could be used to foster discussions of where sites or organizations currently lie on such a spectrum, where they should aim to move toward, and how. Integrating a simple typology like this into monitoring systems, conservation objectives, and education and training of conservation scientists, practitioners, and policymakers (especially in the Global North) would represent a major step forward.

EXPERIMENTAL PROCEDURES

We produce a typology of six roles played by IPs and LCs in conservation governance (Table 1) by combining a review of theory and conceptual framing literature related to participation, governance, and equity in conservation and a systematic review of empirical case studies of site-level conservation governance published in English-language peer-reviewed journals. These combined forms of review enabled us to draw important insights into what factors to account for in the typology of the roles of IPs and LCs in conservation governance (described in the conceptual framing).

The pool of empirical studies was obtained through a keyword search on Web of Science, which returned 69,246 publications (Text S1). Following a pilot screening phase using 100 of these publications to test and refine a protocol, a first screening of titles and abstracts was conducted between March 2020 and March 2021 by four of the authors using the open-source machine-learning assisted software Colandr, which facilitates ordering of the sample publications by relevance.[99] In total, 11,100 publications were screened, by

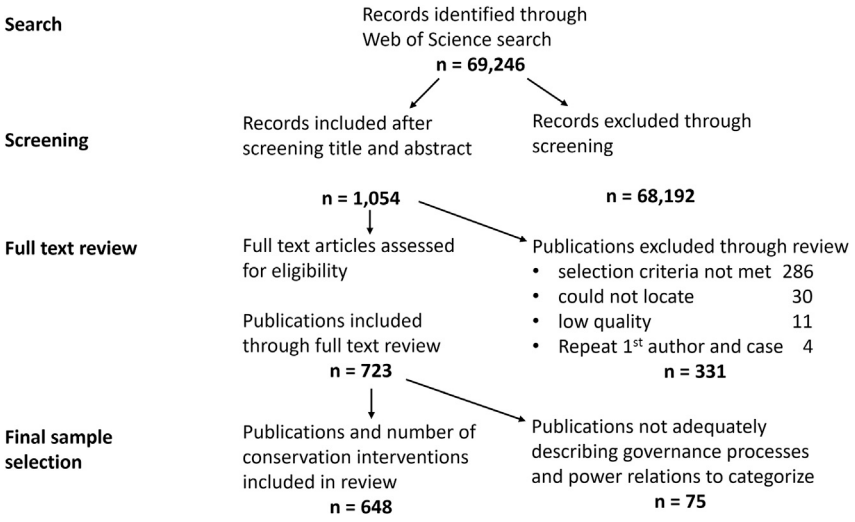

Figure 4. Flowchart of the sample selection process leading to the eventual sample size of 648 publications

which time the inclusion rate had dropped from a peak of over 18% to below 3% for the previous 1,000 screened (Figure S3). This led to a sample of 1,054 relevant publications identified for data extraction, which were further reduced to 648 through reviewing the full papers (Figure 4). Inclusion was based on the following criteria: (1) the study is about biodiversity conservation, (2) the study describes a deliberate conservation intervention, (3) the study provides empirical evidence (presenting data generated through that study) about a conservation intervention, (4) the conservation intervention takes place in a specific site through a specific actor or actors, (5) the study identifies a discernible conservation aim of the initiative being researched, (6) the study identifies a discernible conservation approach of the initiative being researched, and (7) the study describes governance processes and power dynamics sufficiently to determine the role of IPs and LCs (see Table S1 for more details regarding these criteria).

To refine the data extraction protocol and harmonize coding practices between the research team, a training session and a collective coding phase were held, with eight of the authors reviewing and debating decisions for a sample of 10 papers until all decisions and their criteria were agreed on. Thereafter, each case was coded (see Text S2 for coded variables) by a single researcher between March 2021 and March 2022, although any queries were raised and discussed with the lead author, who also checked all data for inclusion/exclusion decisions, completeness, consistency, and errors. We arrived at a typology of the roles of IPs and LCs in governance through wider literature review and then iterative coding of the roles in the case studies, as described in the conceptual framing.

The systematic sampling enabled us to identify the best available (e.g., peer reviewed) scientific evidence to analyze the associations between different roles of IPs and LCs in governance, and the social and ecological outcomes reported. The social and ecological outcomes were not reported in all 648 studies but were described in substantial subsets (212 evidencing ecological outcomes and 323 providing evidence of social outcomes). Cases identified as exhibiting a potential conflict of interest between author affiliation, funding source, and the organizations implementing the intervention being assessed were removed from this analysis due to their disproportionate tendency to present positive outcomes regardless of governance type. This resulted in a sample size for the analysis of 170 cases reporting ecological outcomes and 288 reporting social outcomes.

We applied ordinal regressions with the six types of IP and LC roles in governance as the explanatory variable and ecological and social outcomes as response variables. The outcomes were recoded from negative, mixed, or positive to 0, 1, and 2, respectively, for ordinal analysis. Analyses were conducted with the package "ordinal" and presented using the package "stargazer" in R v.4.2.1.[100]

Resource availability

Lead contact

Requests for further information should be directed to and will be fulfilled by the lead contact, Neil Dawson (neil.dawson@uea.ac.uk).

Materials availability

This study did not generate new unique materials.

Data and availability

The dataset for this study is available at Zenodo (https://doi.org/10.5281/zenodo.7688777).

SUPPLEMENTAL INFORMATION

Supplemental information can be found online at https://doi.org/10.1016/j.oneear.2024.05.001.

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AUTHOR CONTRIBUTIONS

Conceptualization, N.M.D., B.C., J.L., A.M., U.P., and P.S.; methodology, N.M.D., B.C., J.L., A.M., U.P., and P.S.; investigation, all authors; writing – original draft, N.M.D; Writing – review and editing, all authors; funding acquisition, B.C. and N.M.D.; formal analysis, J.L. and B.L.; visualization, B.L. and N.D.

DECLARATION OF INTERESTS

The authors declare no competing interests.

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