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To cite this article before publication: Louis Tanguay *et al* 2021 *Environ. Res. Lett.* in press https://doi.org/10.1088/1748-9326/ac0d79

Manuscript version: Accepted Manuscript

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Review article

Intervention levers for increasing social acceptance of conservation measures on private land: A systematic literature review and comprehensive typology

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Abstract

Private lands are increasingly targeted for ecological restoration and conservation initiatives in high-income countries. However, the fragmented nature of private land tenure, the large number of landowners and their heterogeneous profiles can pose significant challenges for conservation initiatives. This can lead to a range in landowners' attitudes toward conservation initiatives, with some initiatives being received with resistance, and others with consent and participation. Most research dealing with social outcomes of conservation or restoration initiatives on private lands addresses regionally specific case studies, but few studies have attempted to derive general trends. To fill this gap, we performed a systematic literature review of conservation measures on private lands to develop a comprehensive typology of factors influencing the acceptance of conservation initiatives on private lands. Our results show that conservation agents (typically government agencies or NGOs), despite their limited power over individual factors of private landowners, can seek to encourage both the adoption and perceptions of conservation initiatives on private land through improving institutional interactions.. We propose six recommendations to help support and design conservation programs on private lands and to identify intervention levers that may be acted upon to improve the social acceptance of such conservation initiatives.

Keywords: Social acceptability, acceptance, conservation measures, biodiversity, private lands, landowners, typology, levers

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Introduction

Conservation initiatives have been on the agenda of many organizations and governments for decades (Balmford *et al*. 2005). One of the most recurrent biodiversity conservation strategies is to establish large protected areas where land tenure allows it. However, state-managed networks of protected areas on public lands yield mixed results and are insufficient to stop the global loss of biodiversity (Tittensor *et al*. 2014; Watson *et al*. 2014; Jenkins *et al*. 2015). One of the reasons is that, in many countries, the greatest biodiversity and occurrence of endangered species are found on private lands (Knight 1999; Norton 2000; Macdonald & Feber 2015). In addition, the social complexities of implementing conservation programs on private lands can jeopardize the ability for biodiversity conservation targets to be achieved (Kamal *et al*. 2015a). For these reasons, many conservation stakeholders call for more socially inclusive conservation approaches (Tallis & Lubchenco 2014; Paloniemi *et al*. 2018).

Ensuring the success of region-wide conservation initiatives in multi-tenure settings, including private lands, is challenging (Fitzsimons & Wescott 2007; Cooke *et al*. 2012). Such initiatives, whether on public or private lands, have been received with mixed reactions from local communities, resource users and landowners (Schenk *et al*. 2007; Sattler & Nagel, 2010). But as conservation on private lands is increasingly recognized as an essential strategy for the protection of endangered species and their habitats, more inclusive and participatory approaches have been put forward to include landowners in conservation planning (Quinn & Wood 2017; Drescher & Bernner 2018). As a result, there is a renewed focus on the society-nature interface in private land conservation, which is increasingly framed as a question of social acceptance or acceptability (Pascual & Perrings 2007; Greiner 2015; Kamal *et al*. 2015a; Mitani & Lindhjem 2015; Busse & Siebert 2018).

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The themes of acceptability and acceptance have been explored in many different contexts to study social attitudes and behaviors, as thoroughly reviewed by Busse & Siebert (2018). These authors argued that definitions of acceptance and acceptability vary depending on the context, and that there is no universal definition for those terms. Based on the work of Busse & Siebert (2018) and literature from disciplines such as land use research, rural geography and biodiversity conservation (Pascual & Perrings 2007; Sattler & Nagel 2010; Greiner 2015; Mitani & Lindhjem 2015; Fournis & Fortin 2017), we define acceptance as landowners' stated approval of, participation in or willingness to adopt conservation initiatives. Acceptability is a broader concept that situates conservation initiatives, as well as the institutions which are responsible for implementing them, in relation to landowners. We define acceptability as a conservation initiative's inherent quality of being socially acceptable to individual landowners and communities.

A major issue with conservation planning on private lands is that conservation agents – the governmental or non-governmental organizations responsible for the implementation of conservation measures – seldom have the necessary resources to analyze and understand why specific measures are socially accepted while others are not. Although a growing body of literature addresses factors that influence the outcome of conservation initiatives on private lands (Rissman & Sayre 2012; Kamal *et al*. 2015b; 2015c; Wollstein & Davis 2017; Ward *et al*. 2018), most research considers specific voluntary conservation tools on private lands such as contracts or covenants (e.g. Broch & Vedel 2012; Rodriguez *et al*. 2012; Smith *et al*. 2016; Lindsey 2016; Farmer 2017) or financial incentives (e.g. Ramsdell *et al*. 2016; Torabi *et al*. 2016; Selinske *et al*. 2017; Kreye *et al*. 2018; Schuster *et al*. 2018). Few efforts have been dedicated to developing a generalized understanding of factors influencing the acceptability of conservation measures, or their acceptance by private

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landowners. And to the best of our knowledge, no previous study has presented a comprehensive typology to categorize such factors. Here, we investigate factors influencing acceptability and acceptance of biodiversity and habitat conservation measures on private land, and we explore how they can be categorized in a comprehensive manner to guide conservation agents when designing conservation initiatives. To do so, we identify factors through a systematic literature review and propose a two-layer typology, regrouped into three levels, to categorize them.

Methods

We used a combination of methods to develop a comprehensive typology. We first used PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses; Moher et al. 2009) to perform our systematic review, and then used an inductive approach to analyze the content of the selected publications. We finally undertook a thematic analysis through a reflexive approach (Braun & Clarke, 2006) by combining different methods of coding and categorization, as described below.

In our review, we considered both the social acceptability of conservation measures and their acceptance by landowners, and both terms are used to describe our findings. However, when both acceptability and acceptance are implied in our descriptions, we only use "acceptability" to lighten the text. We also include other indicators such as enrollment and participation in voluntary conservation programs as a form of acceptance expressed through landowners' behavior, which is reminiscent of Rogers' (2003) definition of acceptance (see Table 1). Furthermore, although the focus of our review is on biodiversity and habitat conservation, we often use only "conservation" to lighten the text.

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Table 1: Indicators used to assess acceptability and number of cases where they were observed.

Indicators of acceptance	Number of cases
Adoption of good land management practices	4
Adoption of good wildlife management practices	2
Attitude towards threatened species	1
Enrollment in conservation program	4
Enrollment in land management program	3
Stated acceptability of conservation initiatives	43
Stated acceptability of modifying land management practices for conservation purposes	2
Stated acceptability of public wildlife management practices	1
Success in securing support	1
Willingness to accept a smaller compensation for preserving habitats on land.	3
Willingness to conserve biodiversity on land	1

The PRISMA method

We focused our search on the social acceptability and acceptance of conservation measures and private landowners' attitudes towards them. To do so, we searched many possible strings of terms and eventually combined two substrings of terms into a cross-search to obtain optimal results, as suggested by Suskevics *et al*. (2018). We then crossed the two substrings with the expression "private land*" to narrow down the number of publications as follows:

acceptability OR acceptance OR attitude OR feeling* OR incentive* OR perception* OR stakeholder* OR stewardship*

AND

"biodiversity conservation" OR "conservation biology" OR "species conservation" OR "nature conservation" OR "protected area" OR "threatened species" OR "conservation plan*" OR "natural resource management" OR "wildlife management" OR "ecosystem management"*

AND

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"private land"*

The search was performed through Web of Science on January 28th, 2019 on the following databases: Science Citation Index Expanded; Social Sciences Citation Index and Arts, and; Humanities Citation Index. We extended our search to article titles, keywords or abstracts, and obtained 257 publications. We read all titles and abstracts and excluded publications that were not closely related to conservation efforts on private lands, resulting in a total of 97 publications (Figure 1). After reading these publications in their entirety, 26 additional publications were excluded because they were either literature reviews, did not focus on social acceptability or acceptance in a significant manner, or were simply off-topic to reach our objective. Hence, our analysis focused on 71 publications, representing 65 case studies since some cases were reported in two publications.

In all case studies, data on acceptability, attitudes and perceptions had been collected through mail, email, phone or in-person surveys, or from database analysis. The number of landowners under scrutiny in each case study varied from nine to 9 459, representing a total of 29 552 landowners taken into account in our study, with a median of 140 landowners per case (see Table S1).

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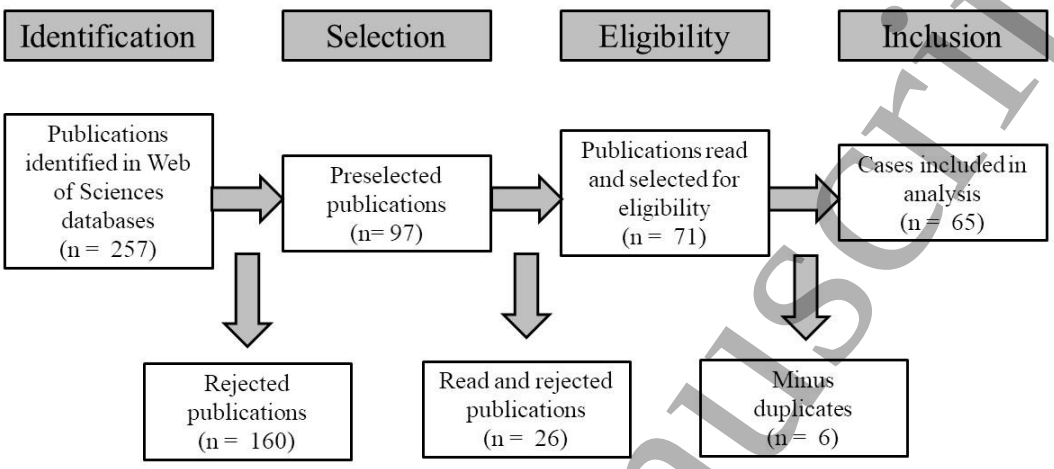

Figure 1: PRISMA flow diagram of the systematic review.

Data analysis

We approached our analysis from the point of view of conservation agents to help guide possible future conservation initiatives. For this reason, we did not tackle any topic relating to landowners' power position, or personal responsibilities or duties towards their land and community. We instead focused on topics which are accessible to interveners in the conservation sector.

Contextual information was noted for each case study. These included details about country or region, climate, land use and/or land cover, conservation measures and tools, the objective of conservation efforts, landowners' characteristics, perceptions, attitudes and behaviors, tools used to include social considerations and for social surveys, as well as any concept or typology proposed by the authors from the 71 publications (see Table S1). This step allowed us to identify, through a primarily inductive approach, the factors influencing social acceptability.

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We then determined the influence of each factor on the acceptability of conservation measures. To illustrate this influence, we considered four categories of influence on acceptability and attributed one for each factor: positive (+), negative (-), neutral (0; *i.e.*, although a factor of influence was assessed, no significant influence was observed) or mixed influence (m; *i.e.*, the authors observed both positive and negative influences for a factor, depending on landowners' attributes). When a factor was included in the description of a case without any hint on its possible influence on acceptability, the influence was designated as not available (n/a). Although these methods were inspired by previous studies (Schenk *et al*., 2007; Paloniemi & Tikka, 2008; Reimer *et al*., 2012; Ramsdell *et al*., 2016; Ejelöv & Nilsonn, 2020), the combination of a marking system, where each factor is identified as having a positive or negative influence, with a two-layer typology to classify factors of influence, is a novel approach to study acceptability of conservation measures.

Once all factors were marked for their influence, we coded them. First, we hand-coded our data, using an open coding method, as described by Strauss (1987), and based on the grounded theory originally elaborated in 1967 by Glaser and Strauss (2009). Secondly, we combined deductive and inductive approaches, using selective coding (Strauss, 1987; Strauss & Corbin, 1990) to regroup our preliminary codes into six main categories, based on the main themes found in our data and the literature. These six categories constitute the first layer of our two-layer typology (Table 2). Thirdly, for each main category, we used axial coding (Strauss, 1987; Strauss & Corbin, 1990) to regroup preliminary codes with similarities into encompassing codes. This resulted in 45 subcategories, representing the second layer of our typology (Table 2). Once our typology was in place, we counted the total number of cases reporting factors of influence in each of the six main categories, and

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each of the 45 subcategories. We also noted the number of cases reporting positive, negative, neutral or mixed influence on acceptability of conservation measures.

Table 2: The six categories of the first layer and associated subcategories (45) of the second layer of our two-layer typology (factors of influence), with a short description of how they influence landowners' (LOs) acceptance. Blue tones represent the individual mindset level; warm tones represent the individual profile level; green tones represent the institutions and interactions level.

	Typologies	Description
Values	Nature	LOs who, beyond their own land, consider nature as intrinsically valuable.
	Conservation ethic	LOs who agree with the need to conserve natural ecosystems or species.
	Conservation stewardship	LOs who, beyond a simple conservation ethic, consider themselves as stewards of conservation on their land.
	Land ethic	LOs who value their land for its intrinsic value and who see themselves as protectors of their lands, but without necessarily granting importance to conservation objectives or measures.
	Economic mindset	LOs who are interested in financial benefits that they can acquire from their lands, consider their land as an economic asset.
	Property rights	LOs who value property rights and personal freedom on their land.
	Family tradition	LOs who cherish family values, inheritance, and see their lands as a legacy.
Livelihoods	Agriculture and production	LOs who use their land mostly for agriculture, forestry, rangeland or other production purposes.
	Work status	Relates to different details about LO's work status, such as whether they are self-employed, salaried employees, retired, officials, or whether they work on their land or off-site.
	Field sports	LOs who consider themselves game hunters on their land, or are interesting in opening up their land for this activity.
	Lifestyle	LOs who mostly value their land for the enjoyment it procures, or for recreational activities.
Landowner and Household attributes	Past experiences	Relates to LOs who have had past experiences or are familiar with conservation measures, as well as to the level of satisfaction or of efficiency that they perceive from such measures.
	Education	The level of education completed by LOs within the official education system.
	Demographics	Age, gender, marital status and number of owners.
	Skills and knowledge	Relates to different kinds of skills and knowledge about land management acquired by LOs outside of the standard education system, as well as to the way LOs perceive their own knowledge.
	Land tenure length	Relates to the length of time that LOs or their family have owned their land.
	Income and wealth	Income of LOs and monetary wealth.
	Resources	Financial, time, space or labor resources that may help or prevent LOs from engaging in conservation initiatives.
	Residency	Relates to LOs who live directly on their land.
	Group membership	LOs who are officially registered as members of conservation or land management groups.

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Table 2: (continued and concluded)

	Typologies	Description
Land attributes	Property size	Surface area of private land owned by LOs.
	Ecosystems and biodiversity	How healthy the ecosystems are and how diverse the biotic communities are on the land.
	Land productivity	When production activities are present on the land, relates to the productivity of those activities.
	Geographical position	Distance of private lands from other natural areas, protected areas or urban areas.
	Eligibility of land	Whether lands are eligible to be a part of any given conservation program, or whether they are perceived as eligible by their owner.
	Threat towards the land	Whether LOs perceive some threats, real or not, towards their land in its current form.
Design and implementation of conservation measures	Financial incentives	Different types of monetary incentives provided to LOs for participating in conservation initiatives.
	Accessibility	Measures that are easy for LOs to implement on their land, either because they are compatible with LOs' purposes or perceived as easy to implement.
	Restrictions and regulation	Measures focusing on top-down regulations and restrictions of activities on LOs' properties.
	Autonomy and independence	Measures that allow LOs to take autonomous actions and decisions for reaching conservation objectives.
	Agreements or acquisitions	Proposed conservation agreements (e.g., covenants, easements, servitudes) on LO's properties, influence of contract lengths, as well as proposed purchase of properties.
	Capacity building	Measures that reinforce LOs capacity to be conservation stewards through different means such as advisors' support or technical assistance.
	Participatory approach	Measures that encourage strong participation of LOs.
	Conservation purpose	Refers to the objective of conservation measures, whether they aim at preserving specific species, restoring habitats, or enhancing connectivity.
	Benefits on land	Measures that are perceived as beneficial for the land by LOs in regard to their purpose or desire for their property.
	Flexibility	Measures that present different options to LOs or are flexible in their application.
	Recognition	Measures or programs that recognize LOs as legitimate, competent stewards on their own land.
Networking & communication	Trust	Beyond communication, cooperation, quality of interactions or perceived legitimacy, this relates to whether LOs trust conservation agents and measures proposed or not.
	Cooperation network	Relates to LOs' participation into a non-official community-based support network for land management or other.
	Information	Official information or knowledge transfer provided to LOs regarding conservation measures and programs.
	Quality of past interactions	Relates to positive interactions that LOs have had in the past with conservation agents.
	Cooperation with conservation agents	Relates to measures that necessitate cooperation between LOs and conservation agents.
	Communication	Relates to communication between conservation agents and LOs as well as communication between different LOs who could potentially become involved in conservation actions.
	Understanding	Relates to the level of understanding of conservation measures and objectives by LOs.
	Legitimacy	Whether conservation measures and conservation agents are perceived as legitimate by LOs.

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Finally, we grouped the typology into three overarching levels. These levels represent different analytical perspectives to express the reality of landowners. The first level, the "individual mindset" of landowners, explores the values of landowners of their property and of themselves, which influence their perception of conservation measures. The second level, the "individual profile" of landowners, includes all subcategories that relate to the personal profile, situation, experience and constraints of landowners. The third level, "institutions and interactions" with landowners, relates to the different conservation or community institutions with which landowners interact, the measures and actions brought about by such institutions, as well as the landowners' involvement with them.

The subjectivity involved in systematic review and coding is a well-discussed characteristic of inductive approaches and thematic analysis (Morse, 1997; Boyatzis, 1998; Braun & Clarke, 2006; Guest *et al*., 2012). Still, we considered that inductive coding was preferable to structure our two-layer typology. Alternative methods, such as the use of codebooks, can lead to vague or superficial categories, limiting in-depth analysis of the qualitative data (Morse, 1997; Braun & Clarke, 2006). Therefore, the two-layer typology developed here should be used as a guideline for interested researchers and conservation agents, open for rearrangement and contextual modification.

Results

The majority of the 71 articles were published between 2010 and 2020 (Figure 2a). The 65 case studies were distributed across 15 countries, mostly high-income countries, with a large proportion of the cases located in temperate climates (Table S1), and mostly in agricultural or naturally forested areas (Figure 2b).

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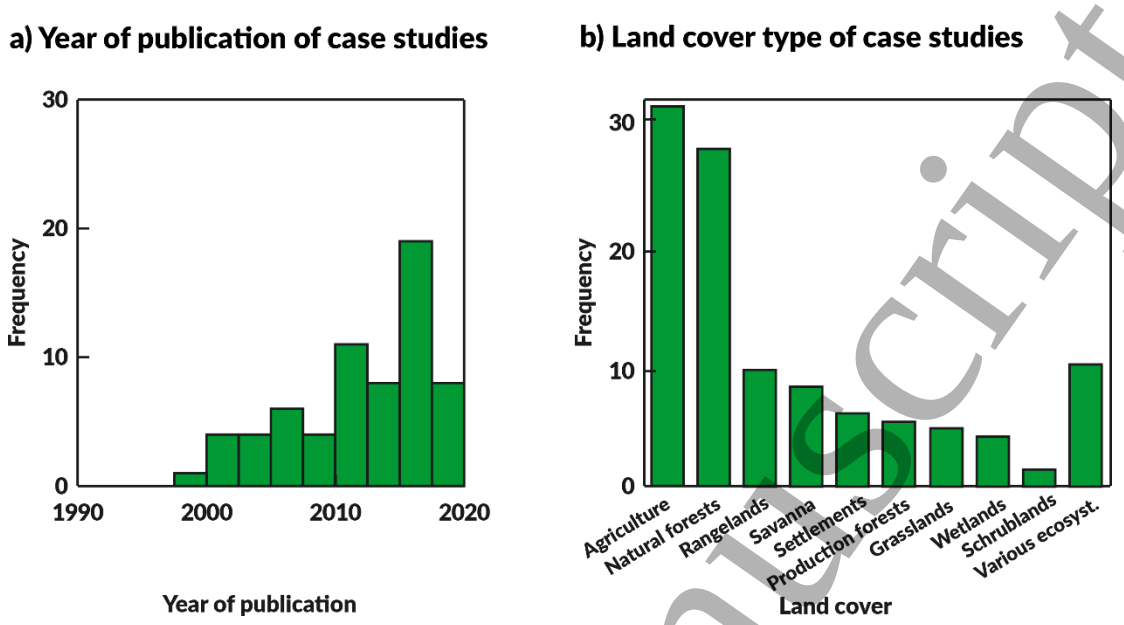

Figure 2: Distribution of case studies per a) year of publication and b) land cover.

Level 1: Individual mindset

Category 1: Values

Out of the 65 case studies, 43 reported one or more factors associated with landowners' personal values (Table S1; Figure 3). Among the seven subcategories, *conservation ethic* and *valuing nature* were the most reported values (Figure 3, and see Table 2 for a short description of each subcategory), and both had significant positive influence on acceptability. The same held true for landowners who endorsed *conservation stewardship* on their land, had a strong *land ethic* and valued *family tradition*, or in other words, the patrimonial value of their land. *Financial interests* and a strong value of *property rights* mostly showed negative influence on acceptability or acceptance but were not frequently reported (Figure 3).

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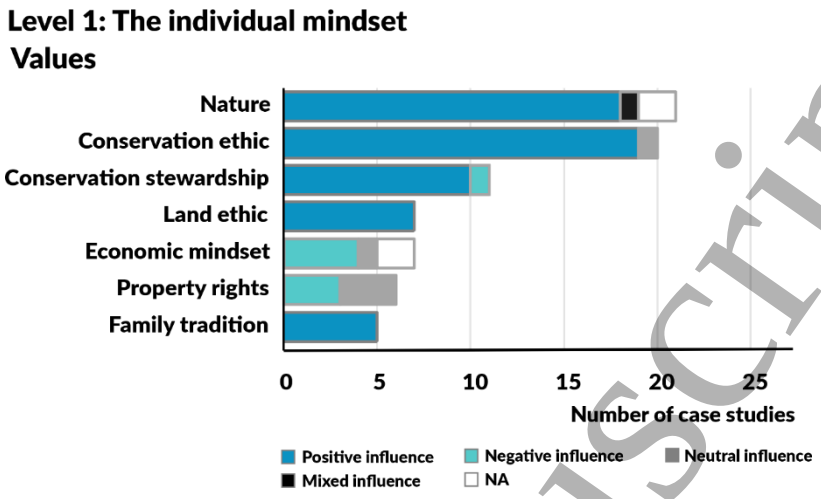

Figure 3: Number of cases reporting factors of influence categorized within Values, per subcategory (Level 1: Individual mindset). Number of case studies = 65.

Level 2: Individual profile

Category 2: Livelihoods

A total of 28 cases described factors of influence related to landowners' livelihoods (Table S1; Figure 4). Among the four sub-categories, *agricultural livelihoods* and livelihoods associated with *other production activities*, such as livestock farming or forestry, were the topics most frequently addressed and were mostly related to lower acceptability (Figure 4a). *Field sports*, or when a private land was used as a hunting ground, tended to be associated with higher acceptability of conservation initiatives. The *work status* of landowners showed no strong influence on acceptability, but landowners with a lesser dependence on their land for their livelihood, or with off-site occupations, tended to be more willing to accept conservation measures (Figure 4a, Table S1).

Category 3: Landowner and household attributes

Factors categorized as general attributes of landowners and their household were observed in 37 cases out of 65 (Table S1; Figure 4b). *Past experiences* of owners with conservation

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measures were the most reported factors, usually showing a positive influence on acceptability (Figure 4b). The *education level* of landowners also positively influenced the acceptability of conservation measures, as did their *skills and knowledge*, *income and wealth*, as well as their subscription to a land management *group membership*. *Demographics*, which regrouped various factors with somewhat divergent influences, were responsible for either negative or mixed influence on acceptability. The negative influence was mostly associated with the age of landowners, where older landowners were less inclined to accept conservation measures (Figure 4b; Table S1). Personal *resources* available to landowners led to lower acceptability as well because the literature reported instances where the lack of resources, mostly financial resources or time, had a negative influence on acceptability.

Category 4: Land attributes

Twenty-nine cases reported factors linked to land attributes (Table S1; Figure 4c). *Property size*, followed by the state of *ecosystems and biodiversity* on owners' lands, were the most discussed, but no clear trend emerged regarding their influence on acceptability (Figure 4c). *Land productivity* generally had a negative influence on acceptability, but the perceived *eligibility of land*, implying whether landowners believed that their lands were eligible for conservation programs – regardless of whether they were actually eligible – had a clear positive influence on enrollment in conservation programs (Figure 4c, Table S1).

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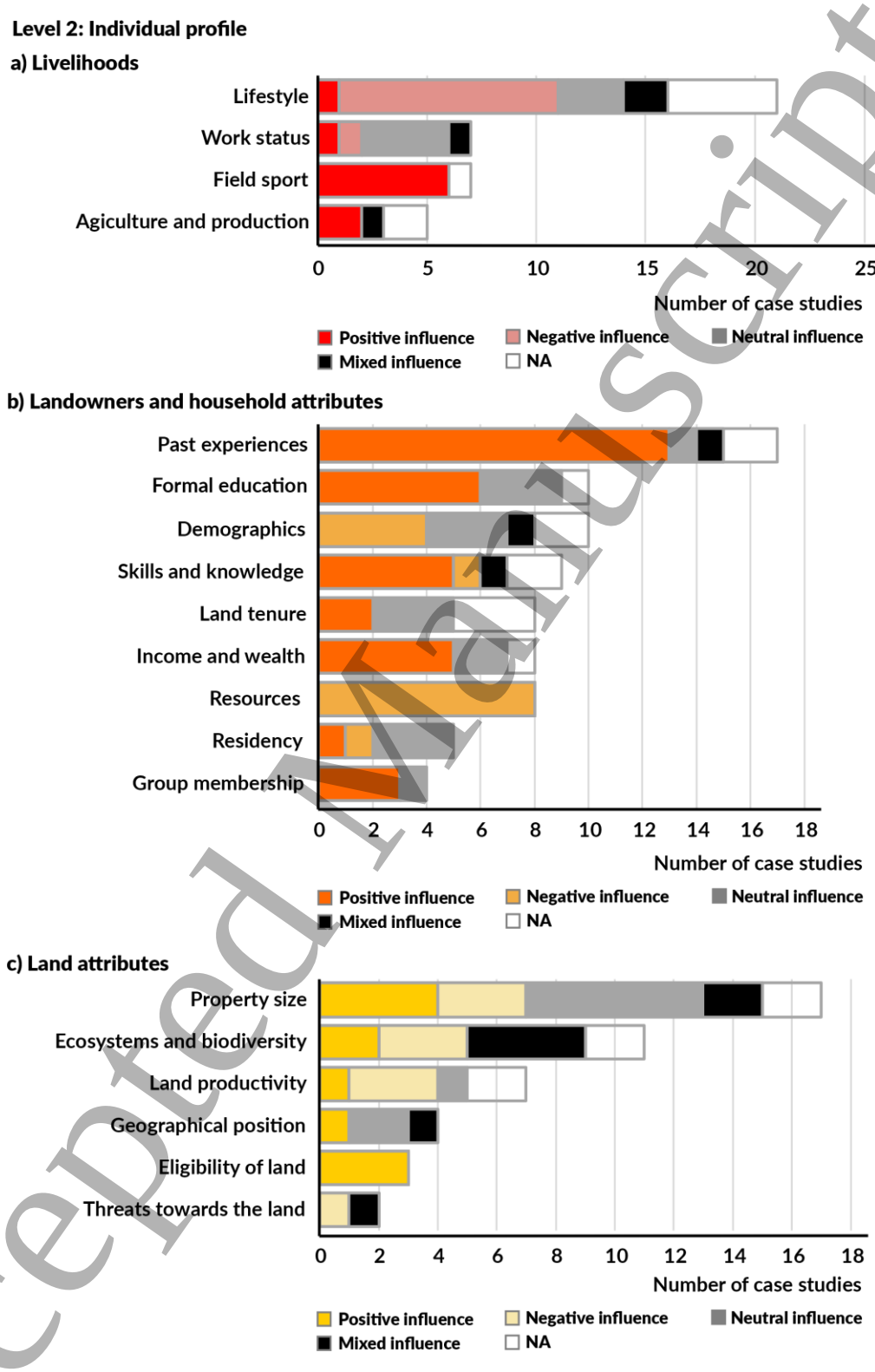

Figure 4: Number of cases reporting factors of influence categorized within a) Livelihoods; b) Landowner and household attributes, and; c) Land attributes, per subcategory (Level 2: Individual profile). Number of case studies = 65.

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Level 3: Institutions and interactions

Category 5: Design and implementation of conservation measures

The factors of influence that captured how conservation measures were designed or implemented were the most common, with 53 cases (Table S1; Figure 5a). Among the 11 subcategories, *financial incentives* were reported most often, exerting a positive influence on the acceptability of conservation measures (Figure 5a). In the cases studied, financial incentives for conservation were mostly offered through tax relief, payments for conservation, and general financial assistance (see Table S1). The *accessibility* of conservation actions and measures, or in other words the ease with which such actions could be implemented by landowners, was the second most common subcategory, positively influencing social acceptability (Figure 5a). The compatibility of conservation programs with current land use, followed by program simplicity (*i.e.*, light administrative processes), were the main reasons for landowners to consider conservation actions as easy to implement (Table S1). *Autonomy and independence* of landowners in conservation programs, *capacity building* (mostly through technical assistance, assistance with management and planning, or management tools and equipment), *participatory approaches*, *benefits on land* brought about by conservation actions, *flexibility* of conservation programs, and the *recognition* of landowners' good stewardship by conservation agents all had a positive influence on social acceptability of conservation measures. However, *restrictions and regulations* regarding land uses were generally perceived negatively by landowners, thus exerting a negative influence on acceptability (Figure 5a). *Conservation agreements* or land acquisition for conservation had a somewhat mixed influence on acceptability. Measures leading to the sale or lease of land through

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contracts or procurement, as well as the duration of fixed-term leasing agreements, were more sensitive issues for landowners with a mostly negative influence on acceptability (Table S1).

Category 6: Networking and communication

A total of 41 cases discussed factors related to networking and communication (Table S1). *Trust* in conservation agents and *cooperation networks* within rural communities – which included the quality of social learning and sharing – were the two most widely addressed subcategories, closely followed by the level and quality of *information* received by landowners from conservation agents, and the quality of *past interactions* between conservation agents and landowners (Figure 5b). All four aforementioned subcategories were positively associated with acceptability of conservation measures by landowners. The same held true for positive and frequent *communication* between landowners and conservation agents, good *understanding* of conservation measures and their purpose by landowners, as well as perceived *legitimacy* of conservation measures or agents (Figure 5b). However, cases describing examples of *cooperation* between landowners and conservation agents showed mostly a negative influence on acceptability. Negative perceptions were reported when conservation agents were associated with the government, with whom landowners may be reluctant to cooperate. But cooperation with local non-government conservation agents tended to have a more positive influence on acceptance (Table S1).

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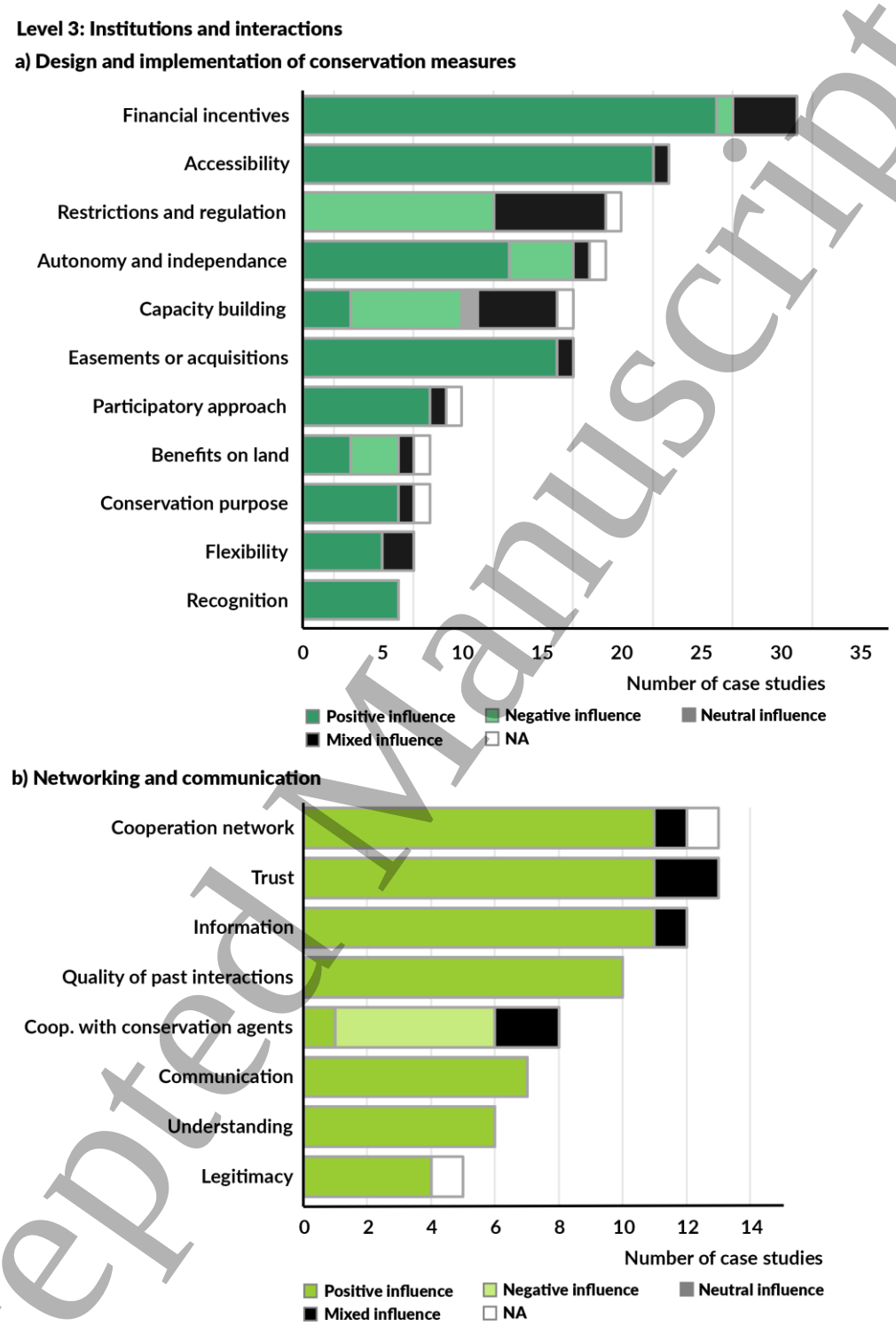

Figure 5: Number of cases reporting factors of influence categorized within a) Design and implementation of conservation measures, and; b) Networking & communication, per subcategory (Level 3: Institutions and interactions). Number of case studies = 65.

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Discussion

This study proposes a unique cross-sectoral approach for exploring the social acceptability of biodiversity and habitat conservation on private land, beyond specific sectors such as agriculture or forestry. Our study enabled the identification of factors that can influence conservation on both natural and production-oriented private land, despite major distinctions in the use and management of these lands. Moreover, our synthesis integrates a vast array of approaches, devices, and modes of intervention to promote conservation on private land, which provides a transversal perspective that goes beyond current debates that focus largely on payment for ecosystem services and financial incentives for conservation on private land. We demonstrate that the acceptability of conservation on private land goes well beyond financial incentives and also includes the landowner's individual mindset, personal conditions as well as the design of conservation programs. As such, strictly focusing on financial incentives may miss the underlying social institutions and landowners' representations that may influence, or even ultimately determine, the outcome of conservation initiatives on private land.

Recommendations for designing and implementing conservation measures

The two-layer typology proposed in this article described 45 subcategories of factors influencing the acceptability of conservation measures and their acceptance by private landowners, all comprised within six greater categories and three broad overarching levels. This process allowed us to highlight which categories or subcategories of factors are the most accessible for conservation agents to leverage conservation interventions and ensure their social acceptability.

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We propose a scheme (Figure 6) representing possible intervention levers that can be used by conservation agents to create a snowball effect and increase social acceptability of conservation measures on private land through influencing multiple factors. Subcategories of factors can be classified as: intervention levers if they can be part of conservation planning; accessible factors if they can be influenced by conservation agents' initiatives in the short or medium term; or inaccessible factors if they are unlikely to be influenced solely by conservation initiatives. This classification is based on our understanding of each subcategory of factors, acquired through the construction of our typology. Figure 6 presents intervention levers and accessible factors in potential chains of influences. It is not meant to be a comprehensive overview of all possible interactions among factors, but rather focuses on the effect of intervention levers on other factors. By using our scheme along with our results, we summarized our findings into six recommendations.

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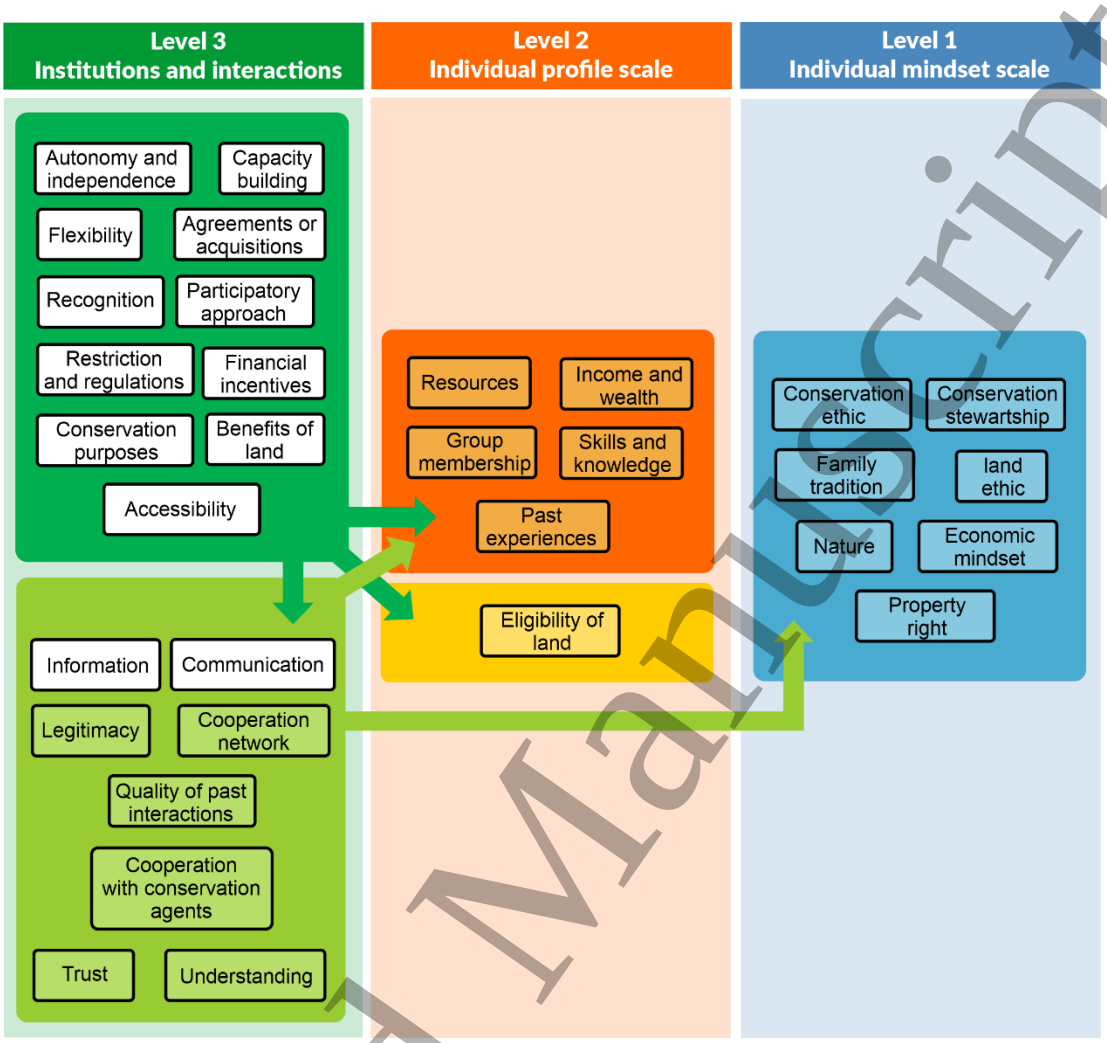

Figure 6: Possible "intervention levers" (white text boxes) and chains of influence on other factors to enhance social acceptability of conservation measures. The three levels, the six categories (color coded) and the "accessible factors" (colored text boxes) are represented. "Inaccessible factors" are not included in the figure.

1. *Focused interventions for multi-level effects*

One of the most notable findings in our analysis is that all intervention levers are comprised within the institutions and interaction level (Figure 6). These levers can influence factors in the individual mindset level but can only affect a few of the factors comprised in the individual profile level. Many factors in this level are related to personal conditions (*e.g.*, age, education, personal situation) or to land attributes (*e.g.*, geographical position, size,

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etc.) and are less likely to be influenced in the short or medium term. Nonetheless, these factors must be considered to evaluate the chance of success for any conservation measure. However, not all subcategories created in this review must be acted upon for effective conservation actions. We assert that conservation programs and their acceptability have a higher chance of success if they can influence prominent factors in each of the three levels presented in this study, hence triggering potential pathways of influence, such as those presented as examples in Figure 6. These factors must be understood and considered to best ensure conservation agents implement appropriate actions.

2. Positive experiences

One of the most likely subcategories to be influenced within the individual profile level is *past experiences* (Figure 6). Most decisions made to implement conservation actions, in terms of favored measures and quality of interactions between conservation agents and landowners, influence factors in this subcategory. As observed in our review, landowners will be more willing to accept conservation measures if they perceive programs as efficient or satisfactory, without seeing them as a threat to their livelihoods (Kammin *et al*., 2009; Moon *et al*., 2012; Moon, 2013; DeAngelo & Nielsen-Pincus, 2017; Lute *et al*., 2018). Landowners will also tend to show greater acceptance of conservation measures if they can feel related to conservation agents (*e.g*., Ramsdell *et al*., 2016). Therefore, conservation agents should ideally be local, non-governmental entities rather than governmental agencies, as landowners are often reluctant to work with the latter (*e.g*., Wagner *et al*., 2007a; 2007b). Furthermore, as landowners who have previously had negative experiences and interactions with conservation agents tend to be reluctant to try and renew such experiences, ensuring positive interactions and adopting conservation

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measures with higher chances of being socially accepted are of the upmost importance if conservation agents are to influence factors in the individual profile level.

3. Communication is key

Effective communication, clear information and a good understanding of conservation measures are other key elements to build trust and thus develop greater acceptance among landowners (*e.g.*, Cousins *et al*., 2010). This result supports the views of Gutrich *et al.* (2005) who studied the use of interdisciplinary science-based models for the co-management of ecosystems. The authors emphasised that trust, communication, transparent information and consideration of all stakeholders were crucial to ensure adequate management.

Appropriate information and communication could, in turn, increase the skills and knowledge of landowners, the perceived legitimacy of conservation agents, landowners' appreciation of conservation programs, and reduce the fear of regulation or even the need for it, leading to increased acceptability (Paloniemi & Tikka, 2008; Paloniemi & Vainio, 2011; Rissman & Sayre, 2012; Torabi *et al*., 2016; Kreye *et al*., 2017; Figure 6). Based on our results, all factors related to communication and knowledge can influence acceptance positively, which is also supported by the review from Kabii and Horwitz (2006) on landowners' motivation for participating in covenant programs.

Most importantly, communication and trust are key elements because they can allow conservation agents to exert some influence on landowners' values, which are comprised within the individual mindset level. Appropriate communication and increased trust can help enhance strong conservation and land ethics and stewardship, encourage great family tradition and support landowners who value nature, which are all essential values to

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observe to increase the likelihood of conservation measures being accepted (*e.g.*, Cooke & Corbo-Perkins, 2018).

4. The "right" measure for the "right" landowner

Conservation measures have greater chances of being socially accepted if they focus on providing benefits to the landowners and if constraints are eliminated or reduced. Capacity building of landowners through technical assistance for land management, or procurement of equipment and tools (*e.g.*, Selinske *et al*., 2015; 2017), purposes that bring tangible benefits to the land (*e.g.*, Jacobson, 2002), and financial incentives and assistance (*e.g.*, Wollstein & Davis, 2017) can all bring benefits to the landowners. Our literature review found this was especially true for landowners who depend on their land as an important source of income, such as those who are invested in agriculture or forestry (e.g., Kammin *et al*., 2009). But it was less important for landowners with strong conservation ethics (*e.g.*, Pellin & Ranieri, 2009).

Management and conservation approaches that are easy to implement (*e.g.*, Rissman & Sayre, 2012) such as actions that are compatible with current management practices and are not resource intensive, highly flexible conservation measures, participatory approaches that increase autonomy without leaving the cost of conservation solely on the shoulders of landowners (*e.g.*, Sorice *et al*., 2013b), and recognition of landowners' good stewardship can help eliminate or reduce constraints and improve acceptability of measures (*e.g.*, Prado *et al*., 2018). In their review of financial incentives and their importance for conservation on private lands, Innes & Frisvolt (2009, p. 505) mention that stewardship recognition could be encouraged through "policies that reward self-reporting of species on private lands". Such landowner-oriented approaches were also found to be preferred among U.S.

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landowners, as reported by Parkhurst and Shogren (2003) in their review of eight incentive mechanisms for conserving habitats.

In all cases where landowners were asked for their preferences, capacity building in conservation programs was always preferred to financial assistance, independently of landowners' values (Wilcove & Lee, 2004; Pellin & Ranieri, 2009; Pasquini et al., 2010a; 2010b; Van Hecken & Bastiaensen, 2010; Ramsdell *et al*., 2016; DeAngelo & Nielsen-Pincus, 2017; Kreye *et al*., 2018). This preference for capacity building is especially important for decision-makers who could misinterpret the popularity of financial incentives in the literature as a sign of their importance for successful conservation measures. In our review, financial incentives for conservation was the most widely studied subcategory, with a total of 31 cases out of 65 discussing it. However, as financial incentives are the most discussed methods in the literature, this is not necessarily a reflection of their efficacy in conservation measures.

5. Foreseeing potential conflicts

Several factors are negatively associated with social acceptability. Most of them are related to economic production, and restrictions or fear of restrictions imposed on such activities (*e.g.*, Stickler *et al*., 1999; Raedeke *et al*., 2001; Kreye *et al*., 2017). Landowners who are invested in production livelihoods and economically dependent on their land - hence those who generally spend a considerable amount of time working on their land - were more likely to perceive conservation measures and regulation as threats to their land or livelihoods (*e.g*., Kammin *et al*., 2009; Moon *et al*., 2012; Moon, 2013). This fear of being restricted by conservation measures might explain why some subcategories, such as an economic mindset, valuing property rights, and regulation and restrictions, had significant

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negative influences on acceptability in our review. Such a result was also found to be true by Kabii and Horwitz (2006), as well as Innes & Frisvolt (2009) in their respective review of landowners' motivations for conservation participation, and of financial incentives on private land. Cooperation with conservation agents, or the perspective of establishing such cooperation, also led to lower acceptance since conservation agents are often state officials and thus representatives of the authority in the eyes of landowners. It is thus essential that to successfully implement conservation efforts, conservation agents are aware of these caveats and are able to find ways to attenuate or carefully face potential conflicts that could arise in such sensitive contexts.

6. Collaboration among instances

Some factors are classified as inaccessible because initiatives based strictly in the conservation sector would not likely be able to affect these factors. However, many programs could in fact influence such factors to enhance the likelihood of conservation initiatives being accepted. For example, programs promoting more sustainable agricultural or agroforestry systems and new employment opportunities, among others, are all within the reach of conservation agents if they collaborate with other governmental or non-governmental agencies to promote long-term integrated programs that could improve both landowners' conditions and biodiversity conservation. Such potential collaborations fall outside the scope of the present study but should be further explored by both researchers and conservation agents.

Limitations and gaps

Our review introduced a bias towards high-income countries which we did not foresee, with only two cases located in developing countries and ten in emerging countries, out of

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65 cases. Thus, all interpretations and conclusions drawn from our analysis resulted from high-income countries and should be used accordingly. Our two-layer typology is thus suitable for high-income countries, and to some point for emerging countries that show similar dynamics, at least when involving wealthy landowners. But our typology should be used with caution for developing countries for which more research is required to explore whether such a typology is relevant and appropriate.

Choosing to approach our review through the point of view of conservation agents, in order to guide future conservation initiatives, leaves some knowledge gaps that would need to be explored further. For instance, it could be relevant to use a similar approach through the lens of landowners to explore topics such as landowners' power position, or personal responsibilities or duties towards their land and community. Furthermore, it would be useful to be able to compare similar studies carried out through different points of view to identify points of convergence and divergence among factors of influence.

It would also be necessary to explore, in future research, how our typology can be applied in different contexts and using different perspectives. Above, we recommended that future research should explore the relevance of the typology in the context of low-income countries. However, a better knowledge of factors influencing social acceptability of conservation measures might also help support research in different disciplines, outside of biodiversity conservation. For instance, this contribution, while adopting a more pragmatic approach from a practitioner's point of view, could complement the use of encompassing frameworks associated to New Institutional Economics (i.e. Bloomington School) such as Oström's foundational Socio-ecological systems framework (Oström & McGinnis 2014) and Institutional Analysis and Development Framework (Oström, 2007). The same

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knowledge could also improve the understanding of social-ecological dynamics within social-ecological system representations, such as Schlüter's SE-AS framework (Schlüter, 2019), or for social-ecological system development through landscape approaches (McNeely & Scherr, 2001).

Finally, although our focus is on social acceptability of conservation measures on private land, conservation agents must remain aware of the multi-faceted aspects of conservation initiatives. Acceptability is one such aspect, but there are other important criteria such as cost-efficiency, fairness, effectiveness, feasibility and long-term results (See Doremus, 2003). It is therefore necessary for conservation agents to take these other criteria into account in order to find an acceptable equilibrium between them. Our typology framework and results help in shedding light on how to approach one such criteria, namely, social acceptability.

Conclusion

In this paper, we reviewed 71 publications representing 65 case studies where conservation efforts were deployed on private lands and landowners' acceptance of conservation measures was studied. To draw generalities, we elaborated a two-layer typology to extrapolate general trends illustrating social acceptability of conservation measures. We found that, from case to case, many factors are comparable and similarly affect acceptability (see Figures 3, 4 and 5). From these generalities, we extracted six recommendations to increase social acceptability of conservation measures. Although some factors of influence related to the individual profile level cannot be influenced by conservation agents, these agents can still act on the individual mindset at the institutional level to develop conservation programs and measures that are more likely to be accepted

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by landowners. Our findings illustrate how comprehensive, flexible and transparent conservation tools, promoted through a participatory approach, can improve the acceptability of conservation measures and motivate landowners to become conservation stewards on their land. Such conclusions, together with the intervention levers for conservation action proposed in Figure 6, could eventually result in informative guidelines for conservation planning on private lands.

Acknowledgments

We would like to thank the Quebec Ministry of Forests, Wildlife and Parks (MFFP), the Research Chair on Social Issues in Conservation (CESCO; Chaire de recherche sur les enjeux sociaux de la conservation), as well as the Quebec Center for Biodiversity Science (QCBS), a strategic research network funded by the Fonds de recherche du Québec – Nature et technologies (FRQNT), for their financial support which allowed us to plan, carry out and complete the research project described in the present article.

Data availability statement

Any data that support the findings of this study are included within the article and supplementary file.

References

Balmford, A., Bennun, L., Brink, B.T., Cooper, D., Côte, I.M., Crane, P., Dobson, A., Dudley, N., Dutton, I., Green, R.E., Gregory, R.D., Harrison, J., Kennedy, E.T., Kremen, C., Leader-Williams, N., Lovejoy, T.E., Mace, G., May, R., Mayaux, P., Morling, P., Phillips, J., Redford, K., Ricketts, T.H., Rodríguez, J.P., Sanjayan, M., Schei, P.J., van Jaarsveld, A.S., Walther, B.A., 2005. Ecology: The Convention on Biological Diversity's 2010 target. Science 307, 212–213. https://doi.org/10.1126/science.1106281

Accepted Manuscript

Bontrager, A., Kretser, H., Leong, K., Connelly, N., 2017. Conservation Opportunity and Risk Mapping for Carnivores Using Landowner Survey Data from the Greater Yellowstone Ecosystem. The Professional Geographer 69, 225–238. https://doi.org/10.1080/00330124.2016.1208101

Boyatzis, R.E., 1998. Transforming Qualitative Information. Sage Publications, Inc.

Braun, V., Clarke, V., 2006. Using thematic analysis in psychology. Qualitative Research in Psychology 3, 77–101.

Broch, S.W., Vedel, S.E., 2012. Using Choice Experiments to Investigate the Policy Relevance of Heterogeneity in Farmer Agri-Environmental Contract Preferences. Environ Resource Econ 51, 561–581. https://doi.org/10.1007/s10640-011-9512-8

Brook, A., Zint, M., De Young, R., 2003. Landowners' Responses to an Endangered Species Act Listing and Implications for Encouraging Conservation. Conservation Biology 17, 1638–1649.

Busse, M., Siebert, R., 2018. Acceptance studies in the field of land use—A critical and systematic review to advance the conceptualization of acceptance and acceptability. Land Use Policy 76, 235–245. https://doi.org/10.1016/j.landusepol.2018.05.016

Chambers, S.N., Baldwin, R.F., Baldwin, E.D., Bridges, W.C., Fouch, N., 2017. Social and spatial relationships driving landowner attitudes towards aquatic conservation in a Piedmont-Blue Ridge landscape. Heliyon 3, e00288. https://doi.org/10.1016/j.heliyon.2017.e00288

Comerford, E., 2014. Understanding why landholders choose to participate or withdraw from conservation programs: A case study from a Queensland conservation auction. Journal of Environmental Management 141, 169–176. https://doi.org/10.1016/j.jenvman.2014.01.049

Cooke, B., Corbo-Perkins, G., 2018. Co-opting and resisting market based instruments for private land conservation. Land Use Policy 70, 172–181. https://doi.org/10.1016/j.landusepol.2017.10.027

Cooke, B., Langford, W.T., Gordon, A., Bekessy, S., 2012. Social context and the role of collaborative policy making for private land conservation. Journal of Environmental Planning and Management 55, 469–485. https://doi.org/10.1080/09640568.2011.608549

Cousins, J., Sadler, J., Evans, J., 2010. The Challenge of Regulating Private Wildlife Ranches for Conservation in South Africa. Ecology and Society 15. https://doi.org/10.5751/ES-03349-150228

Daley, S.S., Cobb, D.T., Bromley, P.T., Sorenson, C.E., 2004. Landowner Attitudes regarding Wildlife Management on Private Land in North Carolina. The Wildlife Society Bulletin (1973-2006) 32, 209–219.

DeAngelo, M., Nielsen-Pincus, M., 2017. Choosing the Right Policy Tools to Encourage Watershed Stewardship through the Study of Attitude. Society & Natural Resources 30, 1328–1342. https://doi.org/10.1080/08941920.2017.1347973

Accepted Manuscript

Doremus, H., 2003. A policy portfolio approach to biodiversity protection on private lands. Environmental Science & Policy, Protecting Nature on Private Land - From Conflicts to Agreements 6, 217–232. https://doi.org/10.1016/S1462-9011(03)00036-4

Drescher, M., Brenner, J., 2018. The practice and promise of private land conservation. Ecology and Society 23. https://doi.org/10.5751/ES-10020-230203

Drescher, M., Warriner, G., Farmer, J., Larson, B., 2017. Private landowners and environmental conservation: a case study of social-psychological determinants of conservation program participation in Ontario. Ecology and Society 22. https://doi.org/10.5751/ES-09118-220144

Ejelöv, E., Nilsson, A., 2020. Individual Factors Influencing Acceptability for Environmental Policies: A Review and Research Agenda. Sustainability 12, 1–14.

Farmer, J.R., Ma, Z., Drescher, M., Knackmuhs, E.G., Dickinson, S.L., 2017. Private Landowners, Voluntary Conservation Programs, and Implementation of Conservation Friendly Land Management Practices. Conservation Letters 10, 58–66. https://doi.org/10.1111/conl.12241

Ferranto, S., Huntsinger, L., Getz, C., Lahiff, M., Stewart, W., Nakamura, G., Kelly, M., 2013. Management Without Borders? A Survey of Landowner Practices and Attitudes toward Cross-Boundary Cooperation. Society & Natural Resources 26, 1082–1100. https://doi.org/10.1080/08941920.2013.779343

Fitzsimons, J.A., Wescott, G., 2007. Perceptions and attitudes of land managers in multi-tenure reserve networks and the implications for conservation. Journal of Environmental Management 84, 38–48. https://doi.org/10.1016/j.jenvman.2006.05.009

Fournis, Y., Fortin, M.-J., 2017. From social 'acceptance' to social 'acceptability' of wind energy projects: towards a territorial perspective. Journal of Environmental Planning and Management 60, 1–21. https://doi.org/10.1080/09640568.2015.1133406

Glaser, B.G., Strauss, A.L., 2009. The discovery of grounded theory: strategies for qualitative research, 4th edition. ed. Aldine, New Brunswick.

Greiner, R., 2016. Factors influencing farmers' participation in contractual biodiversity conservation: a choice experiment with northern Australian pastoralists. Australian Journal of Agricultural and Resource Economics 60, 1–21. https://doi.org/10.1111/1467-8489.12098

Greiner, R., 2015. Motivations and attitudes influence farmers' willingness to participate in biodiversity conservation contracts. Agricultural Systems 137, 154–165.

Guest, G., MacQueen, K.M., Namey, E.E., 2012. Applied Thematic Analysis. SAGE Publications.

Gutrich, J., Donovan, D., Finucane, M., Focht, W., Hitzhusen, F., Manopimoke, S., McCauley, D., Norton, B., Sabatier, P., Salzman, J., Sasmitawidjaja, V., 2005. Science in the public process of ecosystem management: lessons from Hawaii, Southeast Asia,

Accepted Manuscript

Africa and the US Mainland. Journal of Environmental Management 76, 197–209. https://doi.org/10.1016/j.jenvman.2005.01.015

Iftekhar, M.S., Tisdell, J.G., Gilfedder, L., 2014. Private lands for biodiversity conservation: Review of conservation covenanting programs in Tasmania, Australia. Biological Conservation 169, 176–184. https://doi.org/10.1016/j.biocon.2013.10.013

Innes, R., Frisvold, G., 2009. The Economics of Endangered Species. Annu. Rev. Resour. Econ. 1, 485–512. https://doi.org/10.1146/annurev.resource.050708.144207

JACOBSON, M.G., 2002. Factors Affecting Private Forest Landowner Interest in Ecosystem Management: Linking Spatial and Survey Data. Environmental Management 30, 577–583. https://doi.org/10.1007/s00267-002-2605-y

Jansujwicz, J.S., Calhoun, A.J.K., Leahy, J.E., Lilieholm, R.J., 2013. Using Mixed Methods to Develop a Frame-Based Private Landowner Typology. Society & Natural Resources 26, 945–961. https://doi.org/10.1080/08941920.2012.729294

Jenkins, C.N., Van Houtan, K.S., Pimm, S.L., Sexton, J.O., 2015. US protected lands mismatch biodiversity priorities. Proceedings of the National Academy of Sciences of the United States of America 112, 5081–5086. https://doi.org/10.1073/pnas.1418034112

Jokinen, M., Hujala, T., Paloniemi, R., Vainio, A., 2018. Private landowners and protected species: What sort of noncompliance should we be worried about? Global Ecology and Conservation 15, e00407. https://doi.org/10.1016/j.gecco.2018.e00407

Kabii, T., Horwitz, P., 2006. A review of landholder motivations and determinants for participation in conservation covenanting programmes. Environmental Conservation 33, 11–20. https://doi.org/10.1017/S0376892906002761

Kamal, S., Grodzinska-Jurczak, M., 2014. Should conservation of biodiversity involve private land? A Q methodological study in Poland to assess stakeholders' attitude. Biodivers Conserv 23, 2689–2704. https://doi.org/10.1007/s10531-014-0744-0

Kamal, S., Grodzińska-Jurczak, M., Brown, G., 2015a. Conservation on private land: a review of global strategies with a proposed classification system. Journal of Environmental Planning and Management 58, 576–597. https://doi.org/10.1080/09640568.2013.875463

Kamal, S., Grodzinska-Jurczak, M., Kaszynska, A.P., 2015b. Challenges and opportunities in biodiversity conservation on private land: an institutional perspective from Central Europe and North America. Biodivers Conserv 24, 1271–1292. https://doi.org/10.1007/s10531-014-0857-5

Kamal, S., Kocór, M., Grodzińska-Jurczak, M., 2015c. Conservation opportunity in biodiversity conservation on regulated private lands: Factors influencing landowners' attitude. Environmental Science & Policy 54, 287–296. https://doi.org/10.1016/j.envsci.2015.07.023

Kammin, L.A., Hubert, P.D., Warner, R.E., Mankin, P.C., 2009. Private Lands Programs and Lessons Learned in Illinois. The Journal of Wildlife Management 73, 973–979.

Accepted Manuscript

Kline, J.D., Alig, R.J., Johnson, R.L., 2000. Forest owner incentives to protect riparian habitat. Ecological Economics 33, 29–43. https://doi.org/10.1016/S0921-8009(99)00116-0

KNIGHT, A.T., COWLING, R.M., DIFFORD, M., CAMPBELL, B.M., 2010. Mapping Human and Social Dimensions of Conservation Opportunity for the Scheduling of Conservation Action on Private Land. Conservation Biology 24, 1348–1358.

Knight, R.L., 1999. Private Lands: The Neglected Geography. Conservation Biology 13, 223–224. https://doi.org/10.1046/j.1523-1739.1999.013002223.x

Kovács, E., Fabók, V., Kalóczkai, Á., Hansen, H.P., 2016. Towards understanding and resolving the conflict related to the Eastern Imperial Eagle (Aquila heliaca) conservation with participatory management planning. Land Use Policy 54, 158–168. https://doi.org/10.1016/j.landusepol.2016.02.011

Kreye, M.M., Adams, D.C., Ober, H.K., 2018. Protecting Imperiled Wildlife Species on Private Lands: Forest Owner Values and Response to Government Interventions. Ecological Economics 149, 254–264. https://doi.org/10.1016/j.ecolecon.2018.03.016

Kreye, M.M., Pienaar, E.F., Soto, JoséR., Adams, D.C., 2017. Creating Voluntary Payment Programs: Effective Program Design and Rancher's Willingness to Conserve Florida Panther Habitat. Land Economics 93, 459–480. https://doi.org/10.3368/le.93.3.459

López, M., Arbeláez, F., 2016. Nature conservation on private land: Natural Reserves of Civil Society in Valle del Cauca 35, 17–48.

Lute, M.L., Gillespie, C.R., Martin, D.R., Fontaine, J.J., 2018. Landowner and Practitioner Perspectives on Private Land Conservation Programs. Society & Natural Resources 31, 218–231. https://doi.org/10.1080/08941920.2017.1376139

MacDonald, D.W., Feber, R. (Eds.), 2015. Wildlife Conservation on Farmland: Two volume set. Oxford University Press, Oxford, New York.

Mäntymaa, E., Juutinen, A., Mönkkönen, M., Svento, R., 2009. Participation and compensation claims in voluntary forest conservation: A case of privately owned forests in Finland. Forest Policy and Economics 11, 498–507. https://doi.org/10.1016/j.forpol.2009.05.007

Matta, J., Alavalapati, J., Tanner, G., 2007. A framework for developing marked-based policies to further biodiversity on non-industrial private forests (NIPF). Forest Policy and Economics, Economic perspectives and analyses of multiple forest values and sustainable forest management 9, 779–788. https://doi.org/10.1016/j.forpol.2006.03.008

Matta, J.R., Alavalapati, J.R.R., Mercer, D.E., 2009. Incentives for Biodiversity Conservation beyond the Best Management Practices: Are Forestland Owners Interested? Land Economics 85, 132–143.

McNeely, J.A., Scherr, S.J., 2001. Common ground, commun future. How Ecoagriculture can help feed the world and save wild biodiversity. IUCN-Future Harvest, Washington, DC.

Accepted Manuscript

Metcalf, A.L., Metcalf, E.C., Khumalo, K., Gude, J., Kujala, Q., Lewis, M.S., 2017. Public Wildlife Management on Private Lands: Reciprocity, Population Status, and Stakeholders' Normative Beliefs. Human Dimensions of Wildlife 22, 564–582. https://doi.org/10.1080/10871209.2017.1372534

Mitani, Y., Lindhjem, H., 2015. Forest Owners' Participation in Voluntary Biodiversity Conservation: What Does It Take to Forgo Forestry for Eternity? Land Economics 91, 235–251. https://doi.org/10.3368/le.91.2.235

Moher, D., Liberati, A., Tetzlaff, J., Altman, D.G., Group, T.P., 2009. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLOS Medicine 6, e1000097. https://doi.org/10.1371/journal.pmed.1000097

Moon, K., Cocklin, C., 2011. Participation in biodiversity conservation: Motivations and barriers of Australian landholders. Journal of rural studies 27, 331–342. https://doi.org/10.1016/j.jrurstud.2011.04.001

Moon, K., Marshall, N., Cocklin, C., 2012. Personal circumstances and social characteristics as determinants of landholder participation in biodiversity conservation programs. Journal of Environmental Management 113, 292–300. https://doi.org/10.1016/j.jenvman.2012.09.003

Morse, J.M., 1997. "Perfectly Healthy, but Dead": The Myth of Inter-Rater Reliability: Qualitative Health Research 7, 445–447. https://doi.org/10.1177/104973239700700401

Nielsen, A.S.E., Jacobsen, J.B., Strange, N., 2018. Landowner participation in forest conservation programs: A revealed approach using register, spatial and contract data. Journal of Forest Economics 30, 1–12. https://doi.org/10.1016/j.jfe.2017.10.003

Norton, D.A., 2000. Editorial: Conservation Biology and Private Land: Shifting the Focus. Conservation Biology 14, 1221–1223.

Oldfield, T.E.E., Smith, R.J., Harrop, S.R., Leader-Williams, N., 2003. Field sports and conservation in the United Kingdom. Nature 423, 531–533. https://doi.org/10.1038/nature01678

Olive, A., 2016. It is just not fair: the Endangered Species Act in the United States and Ontario. http://dx.doi.org/10.5751/ES-08627-210313

Olive, A., McCune, J.L., 2017. Wonder, ignorance, and resistance: Landowners and the stewardship of endangered species. Journal of Rural Studies 49, 13–22. https://doi.org/10.1016/j.jrurstud.2016.11.014

Ostrom, E., 2007. A diagnostic approach for going beyond panaceas. Proceedings of the National Academy of Sciences 104, 15181–15187. https://doi.org/10.1073/pnas.0702288104

McGinnis, M. D., & Ostrom, E. (2014). Social-ecological system framework: initial changes and continuing challenges. *Ecology and society*, *19*(2).

Accepted Manuscript

Paloniemi, R., Hujala, T., Rantala, S., Harlio, A., Salomaa, A., Primmer, E., Pynnönen, S., Arponen, A., 2018. Integrating Social and Ecological Knowledge for Targeting Voluntary Biodiversity Conservation. Conservation Letters 11, e12340. https://doi.org/10.1111/conl.12340

Paloniemi, R., Tikka, P.M., 2008. Ecological and social aspects of biodiversity conservation on private lands. Environmental Science & Policy 11, 336–346. https://doi.org/10.1016/j.envsci.2007.11.001

Paloniemi, R., Vainio, A., 2011. Legitimacy and empowerment: combining two conceptual approaches for explaining forest owners' willingness to cooperate in nature conservation. Journal of Integrative Environmental Sciences 8, 123–138. https://doi.org/10.1080/1943815X.2011.576682

Parkhurst, G.M., Shogren, J.F., 2003. Evaluating Incentive Mechanisms for Conserving Habitat. Natural Resources Journal 43, 1093–1150.

Parkhurst, G.M., Shogren, J.F., Bastian, C., Kivi, P., Donner, J., Smith, R.B.W., 2002. Agglomeration bonus: an incentive mechanism to reunite fragmented habitat for biodiversity conservation. Ecological Economics 41, 305–328. https://doi.org/10.1016/S0921-8009(02)00036-8

Pascual, U., Perrings, C., 2007. Developing incentives and economic mechanisms for in situ biodiversity conservation in agricultural landscapes. Agriculture, Ecosystems and Environment 121, 256–268. https://doi.org/10.1016/j.agee.2006.12.025

Pasquini, L., Cowling, R.M., Twyman, C., Wainwright, J., 2010a. Devising Appropriate Policies and Instruments in Support of Private Conservation Areas: Lessons Learned from the Klein Karoo, South Africa. Conservation Biology 24, 470–478.

Pasquini, L., Twyman, C., Wainwright, J., 2010b. Toward a Conceptual Framework for Blending Social and Biophysical Attributes in Conservation Planning: A Case-Study of Privately-Conserved Lands. Environmental Management 46, 659–670. https://doi.org/10.1007/s00267-010-9548-5

Pellin, A., Ranieri, V.E.L., 2009. Motivations for the establishment of PNHRs and analysis of the incentives for their creationand management in Mato Grosso do Sul. Natureza & conservaç~ao 7, 164–173.

Prado, J.A., Puszka, H., Forman, A., Cooke, B., Fitzsimons, J.A., 2018. Trends and values of 'Land for Wildlife' programs for private land conservation. Ecological Management & Restoration 19, 136–146. https://doi.org/10.1111/emr.12308

Pujadas, A., Castillo, A., 2007. Social Participation in Conservation Efforts: A Case Study of a Biosphere Reserve on Private Lands in Mexico. Society & Natural Resources 20, 57–72. https://doi.org/10.1080/08941920600981371

Quinn, J., Wood, J., 2017. Application of a coupled human natural system framework to organize and frame challenges and opportunities for biodiversity conservation on private lands. Ecology and Society 22. https://doi.org/10.5751/ES-09132-220139

Accepted Manuscript

Raedeke, A.H., Nilon, C.H., Rikoon, J.S., 2001a. Factors Affecting Landowner Participation in Ecosystem Management: A Case Study in South-Central Missouri. Wildlife Society Bulletin (1973-2006) 29, 195–206.

Raedeke, A.H., Rikoon, J.S., Nilon, C.H., 2001b. Ecosystem Management and Landowner Concern About Regulations: A Case Study in the Missouri Ozarks. Society & Natural Resources 14, 741–759. https://doi.org/10.1080/089419201753210576

Ramsdell, C.P., Sorice, M.G., Dwyer, A.M., 2016. Using financial incentives to motivate conservation of an at-risk species on private lands. Environmental Conservation 43, 34–44. https://doi.org/10.1017/S0376892915000302

Raymond, L., Olive, A., 2008. Landowner Beliefs Regarding Biodiversity Protection on Private Property: An Indiana Case Study. Society & Natural Resources 21, 483–497. https://doi.org/10.1080/08941920801905203

Reimer, A.P., Weinkauf, D.K., Prokopy, L.S., 2012. The influence of perceptions of practice characteristics: An examination of agricultural best management practice adoption in two Indiana watersheds. Journal of Rural Studies 28, 118–128. https://doi.org/10.1016/j.jrurstud.2011.09.005

Rissman, A.R., Sayre, N.F., 2012. Conservation Outcomes and Social Relations: A Comparative Study of Private Ranchland Conservation Easements. Society & Natural Resources 25, 523–538. https://doi.org/10.1080/08941920.2011.580419

Rodriguez, S.L., Peterson, M.N., Cubbage, F.W., Sills, E.O., Bondell, H.D., 2012. Private Landowner Interest in Market-Based Incentive Programs for Endangered Species Habitat Conservation. Wildlife Society Bulletin (2011-) 36, 469–476.

Rogers, E.M., 2003. Diffusion of Innovations, 5th Edition. Simon and Schuster.

Sattler, C., Nagel, U.J., 2010. Factors affecting farmers' acceptance of conservation measures—A case study from north-eastern Germany. Land Use Policy 27, 70–77.

Schenk, A., Hunziker, M., Kienast, F., 2007. Factors influencing the acceptance of nature conservation measures—A qualitative study in Switzerland. Journal of Environmental Management 83, 66–79. https://doi.org/10.1016/j.jenvman.2006.01.010

Schlüter, M., Haider, L., Lade, S., Lindkvist, E., Martin, R., Orach, K., Wijermans, N., Folke, C., 2019. Capturing emergent phenomena in social-ecological systems: an analytical framework. Ecology and Society 24. https://doi.org/10.5751/ES-11012-240311

Schuster, R., Law, E.A., Rodewald, A.D., Martin, T.G., Wilson, K.A., Watts, M., Possingham, H.P., Arcese, P., 2018. Tax Shifting and Incentives for Biodiversity Conservation on Private Lands. Conservation Letters 11, e12377. https://doi.org/10.1111/conl.12377

Selinske, M., Cooke, B., Torabi, N., Hardy, M., Knight, A., Bekessy, S., 2017. Locating financial incentives among diverse motivations for long-term private land conservation. Ecology and Society 22. https://doi.org/10.5751/ES-09148-220207

Accepted Manuscript

Selinske, M.J., Coetzee, J., Purnell, K., Knight, A.T., 2015. Understanding the Motivations, Satisfaction, and Retention of Landowners in Private Land Conservation Programs. Conservation Letters 8, 282–289. https://doi.org/10.1111/conl.12154

Sinthumule, N.I., 2017. Resistance against Conservation at the South African Section of Greater Mapungubwe (Trans)frontier. AFSP 52, 53–77.

Sliwinski, M., Burbach, M., Powell, L., Schacht, W., 2018. Factors influencing ranchers' intentions to manage for vegetation heterogeneity and promote cross-boundary management in the northern Great Plains. Ecology and Society 23. https://doi.org/10.5751/ES-10660-230445

Smith, F., Smillie, K., Fitzsimons, J., Lindsay, B., Wells, G., Marles, V., Hutchinson, J., O'Hara, B., Perrigo, T., Atkison, I., 2016. Reforms required to the Australian tax system to improve biodiversity conservation on private land. Environmental and Planning Law Journal 33, 443–450.

Sorice, M.G., Haider, W., Conner, J.R., Ditton, R.B., 2011. Incentive Structure of and Private Landowner Participation in an Endangered Species Conservation Program. Conservation Biology 25, 587–596.

Sorice, M.G., Oh, C.-O., Gartner, T., Snieckus, M., Johnson, R., Donlan, C.J., 2013. Increasing participation in incentive programs for biodiversity conservation. Ecological Applications 23, 1146–1155.

Stickler, C.M., Nepstad, D.C., Azevedo, A.A., McGrath, D.G., 2013. Defending public interests in private lands: compliance, costs and potential environmental consequences of the Brazilian Forest Code in Mato Grosso. Philosophical Transactions: Biological Sciences 368, 1–13.

Strauss, A., Corbin, J.M., 1990. Basics of qualitative research: Grounded theory procedures and techniques, Basics of qualitative research: Grounded theory procedures and techniques. Sage Publications, Inc, Thousand Oaks, CA, US.

Strauss, A.L., 1987. Qualitative Analysis for Social Scientists. Cambridge University Press, Cambridge. https://doi.org/10.1017/CBO9780511557842

Suškevičs, M., Hahn, T., Rodela, R., Macura, B., Pahl-Wostl, C., 2018. Learning for social-ecological change: a qualitative review of outcomes across empirical literature in natural resource management. Journal of Environmental Planning and Management 61, 1085–1112. https://doi.org/10.1080/09640568.2017.1339594

Tallis, H., Lubchenco, J., 2014. Working together: A call for inclusive conservation. Nature 515, 27–28. https://doi.org/10.1038/515027a

Thorbjarnarson, J., Velasco, A., 1999. Economic Incentives for Management of Venezuelan Caiman. Conservation Biology 13, 397–406.

Tittensor, D.P., Walpole, M., Hill, S.L.L., Boyce, D.G., Britten, G.L., Burgess, N.D., Butchart, S.H.M., Leadley, P.W., Regan, E.C., Alkemade, R., Baumung, R., Bellard, C., Bouwman, L., Bowles-Newark, N.J., Chenery, A.M., Cheung, W.W.L., Christensen, V., Cooper, H.D., Crowther, A.R., Dixon, M.J.R., Galli, A., Gaveau, V.,

Accepted Manuscript

Gregory, R.D., Gutierrez, N.L., Hirsch, T.L., Höft, R., Januchowski-Hartley, S.R., Karmann, M., Krug, C.B., Leverington, F.J., Loh, J., Lojenga, R.K., Malsch, K., Marques, A., Morgan, D.H.W., Mumby, P.J., Newbold, T., Noonan-Mooney, K., Pagad, S.N., Parks, B.C., Pereira, H.M., Robertson, T., Rondinini, C., Santini, L., Scharlemann, J.P.W., Schindler, S., Sumaila, U.R., Teh, L.S.L., van Kolck, J., Visconti, P., Ye, Y., 2014. A mid-term analysis of progress toward international biodiversity targets. Science 346, 241–244. https://doi.org/10.1126/science.1257484

Torabi, N., Mata, L., Gordon, A., Garrard, G., Wescott, W., Dettmann, P., Bekessy, S.A., 2016. The money or the trees: What drives landholders' participation in biodiverse carbon plantings? Global Ecology and Conservation 7, 1–11. https://doi.org/10.1016/j.gecco.2016.03.008

Troy, A.R., Strong, A.M., Bosworth, S.C., Donovan, T.M., Buckley, N.J., Wilson, M.L., 2005. Attitudes of Vermont Dairy Farmers regarding Adoption of Management Practices for Grassland Songbirds. Wildlife Society Bulletin (1973-2006) 33, 528–538.

Van Hecken, G., Bastiaensen, J., 2010. Payments for Ecosystem Services in Nicaragua: Do Market-based Approaches Work? Development and Change 41, 421–444. https://doi.org/10.1111/j.1467-7660.2010.01644.x

Wagner, M., Kaiser, R., Kreuter, U., Wilkins, N., 2007. Managing the Commons Texas Style: Wildlife Management and Ground-Water Associations on Private Lands1. JAWRA Journal of the American Water Resources Association 43, 698–711. https://doi.org/10.1111/j.1752-1688.2007.00056.x

Wagner, M.W., Kreuter, U.P., Kaiser, R.A., Wilkins, R.N., 2007. Collective Action and Social Capital of Wildlife Management Associations. The Journal of Wildlife Management 71, 1729–1738.

Ward, L.K., Green, G.T., Izlar, R.L., 2018. Family Forest Landowners and the Endangered Species Act: Assessing Potential Incentive Programs. j for 116, 529–538. https://doi.org/10.1093/jofore/fvy048

Watson, J.E.M., Dudley, N., Segan, D.B., Hockings, M., 2014. The performance and potential of protected areas. Nature 515, 67–73. https://doi.org/10.1038/nature13947

Wilcove, D.S., Lee, J., 2004. Using Economic and Regulatory Incentives to Restore Endangered Species: Lessons Learned from Three New Programs. Conservation Biology 18, 639–645.

Willcox, A.S., Giuliano, W.M., 2011. Cattle Rancher and Conservation Agency Personnel Perceptions of Wildlife Management and Assistance Programs in Alabama, Florida, Georgia, and Mississippi. Wildlife Society Bulletin (2011-) 35, 59–68.

Wollstein, K., Davis, E.J., 2017. A "Hammer Held Over their Heads": Voluntary Conservation Spurred by the Prospect of Regulatory Enforcement in Oregon. Human–Wildlife Interactions 11.

Accepted Manuscript

Zorondo-Rodríguez, F., Reyes-García, V., Simonetti, J.A., 2014. Conservation of biodiversity in private lands: are Chilean landowners willing to keep threatened species in their lands? Rev. Chil. de Hist. Nat. 87, 4. https://doi.org/10.1186/0717-6317-87-4

Accepted Manuscript