

## REVIEW

# Coupling property rights with responsibilities to improve conservation outcomes across land and seascapes

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## Abstract

Protecting biodiversity in the face of contemporary conservation challenges requires actions across all land and sea tenures. In seeking improved conservation outcomes across these tenures, we undertook a multidisciplinary review of the property law, conservation and environmental ethics literature. Our review revealed three major threats of property rights to conservation: a focus on tangible goods at the expense of intangible services, a focus on the plot rather than the land or seascape and a focus on rights over responsibilities. Our analysis reveals that overcoming these threats requires a blending of the construct of property with both ecological principles *and* social values. To this end, we offer a practical, solutions-focused approach that seeks to determine who has a responsibility, to whom they owe that responsibility and how that responsibility can be ascribed. This approach couples specific property rights with defined responsibilities owed to resource systems to support current and future beneficiaries. A formal recognition of the responsibilities that accompany rights can set the baseline of what society should be able to expect from rights-holders. From this baseline, policy instruments can be more appropriately applied, supporting landholders in their responsibilities and where necessary, providing compensation for activities that extend *beyond* their responsibilities.

## KEYWORDS

duties, ecosystem services, spatial scale, stewardship, temporal scale

## 1 | INTRODUCTION

As the conservation community seeks to curb global declines in biodiversity and improve ecosystem function, an important focus has been how to navigate the various pathways to achieve these objectives within different property rights regimes (e.g., Essington et al., 2012; Mandel et al., 2009; Robinson et al., 2018). These path-

ways are sought because conservation is not an activity isolated to public protected areas (Ferraro & Kiss, 2002; Rands et al., 2010). Rather, to protect Earth's biodiversity, conservation actions are required across all tenures, including private, public, open and common property rights regimes across land and seascapes in their entirety (Schlager & Ostrom, 1992; Sikor, He, & Lestrelin, 2017).

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Property rights regimes generally comprise the ‘bundling’ of a collection of rights that are intended to support a rights-holder to *develop* or *access* land or waters (Ostrom & Hess, 2000). Typically the ‘bundle’ includes rights to exclude others from the property, and to use, manage or withdraw benefits from that property (Ostrom & Hess, 2000). Property rights also seek to impose *responsibilities* (i.e., a moral duty, Mathevet, Bousquet, Larrère, & Larrère, 2018) on those with rights (e.g., landholders, license holders) to account for the effects of their actions both within and beyond the boundaries of their property (Mathevet et al., 2018; Robinson et al., 2018; Schlager & Ostrom, 1992; Sikor et al., 2017).

Despite the benefits that can arise from property rights regimes (see, Libecap, 2009), an increasing number of authors argue that, as an institution, they are failing to serve the public interest in protecting ecosystem function (e.g., Bromley, 1990; Libecap, 2009; Lockie, 2013; Slaev & Collier, 2018). For example, landholders often have rights to clear native vegetation on their property to create commercial profitability in land. Exercise of these rights across large geographic scales, however, can fail to take account of the cumulative effects of activities on individual properties, resulting in widespread land and water degradation, biodiversity loss and anthropogenic climate change (e.g., Bartel & Graham, 2016; Nery, Sadler, White, & Polyakov, 2019). These ecological consequences arise primarily due to the inability of property rights regimes to protect both ecosystem goods *and* services (e.g., Chan, Satterfield, & Goldstein, 2012; Lant, Ruhl, & Kraft, 2008); to account for the interconnectedness of social-ecological systems (e.g., Cooke & Moon, 2015; Freyfogle, 2001); and to balance rights with responsibilities (e.g., Guth, 2008; Rissman, 2013; Tomas, 2011).

In seeking improved conservation outcomes across land and seascapes, we undertook a multidisciplinary review of the conservation, environmental ethics and property law literature in pursuit of two main aims. The first aim was to characterise the main threats of property rights regimes to biodiversity, and ecosystem function more broadly. The second aim was to identify the ways in which property rights could be reconstructed to improve their capacity to support biodiversity and ecological function. The challenge here was to blend the construct of property with both ecological principles *and* social values (e.g., environmental stewardship) (Goldstein, 2004). We sought to contribute to resolving ongoing challenges of such blending, and to build upon valuable existing analyses of property regimes (e.g., Arnold, 2011; Bromley & Hodge, 1990; Burdon, 2014; Freyfogle, 2007; Schrijver, 1997). Specifically, we offer an approach that seeks to resolve problems associated with identifying beneficiaries of distinct goods or services from land and seascapes across various spatial and tempo-

ral scales. We do so by examining the ways in which we can ascribe responsibility and how we might define responsibility as a moral duty towards the resource system itself.

Our analysis is framed predominantly within common law systems of property rights regimes embedded in Western societies, reflecting our areas of expertise. Rather than being overly prescriptive in defining the specific tenures to which our analysis applies, we instead consider our analysis relevant to rights regimes characterised by three broad features (see, Section 2). First, the property rights apply to a discrete area of land or sea. Second, the property rights are not expressly coupled with correlative responsibilities. Third, property rights largely apply to tangible goods but not intangible services.

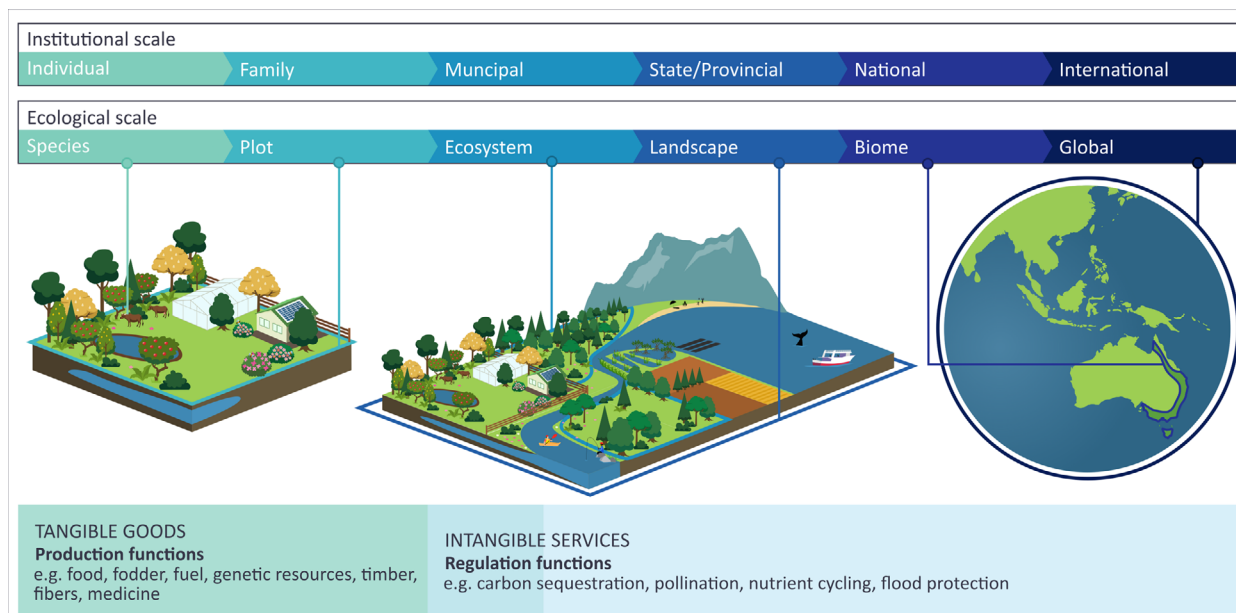
## 2 | THE PROBLEMS WITH PROPERTY RIGHTS

In this section, we explain three dominant ways in which property rights have evolved to threaten biodiversity and ecosystem function: a focus on tangible goods at the expense of intangible services, a focus on the plot rather than the land or seascape and a focus on rights over responsibilities.

### 2.1 | A focus on tangible goods at the expense of intangible services

The first major threat relates to how property rights have been constructed to provide for the protection of (tangible) ecosystem goods, yet largely fail to account for (intangible) ecosystem services (Kahui & Cullinane, 2019; Kosoy & Corbera, 2010; Lant et al., 2008). The result is an unequal distribution in the provision of goods and services across spatial scales. For example, tangible goods are marketable (e.g., crops, livestock and fish stocks) and thus fare better than intangible services that are non-marketable (e.g., wild foods, freshwater and capture fisheries), particularly regulating services, such as air quality, natural hazard regulation, water purification and pollination (e.g., Lockie, 2013; Swinton, Lupi, Robertson, & Hamilton, 2007). As noted by Leopold (1949, p. 214), ‘a system of conservation based solely on economic self-interest is hopelessly lopsided. It tends to ignore, and thus eventually eliminate, many elements in the land community that lack commercial value, but that are (as far as we know) essential to its healthy functioning’. Unequal distributions in the provision of goods and services arise of because of their distinct natures.

Goods can be harvested, produced or consumed by resource users (e.g., fishers, loggers and consumers)



**FIGURE 1** The provision of tangible goods and intangible services in relation to ecological and institutional spatial scales (list of production and regulation functions adapted from Hein et al., 2006)

(McGinnis & Ostrom, 2014). Goods are tangible and discrete and include food, raw materials and medicinal resources (Daily et al., 1997; de Groot, Wilson, & Boumans, 2002; Hein, van Koppen, de Groot, & van Ierland, 2006) and are predominantly provided by production functions from the species to the ecosystem scale (Nelson, Wood, Koo, & Polasky, 2011) (Figure 1). The discrete physical units that arise from production functions can therefore be separated from the resource system. They can be owned and stored for future use (Tallis & Polasky, 2011).

Most services, on the other hand, are intangible and non-discrete; they generally cannot be owned, stored or consumed, nor can they be produced in advance (Daily et al., 1997; MA, 2003). Consequently, such services are not exclusive or transferable, nor can they attract the benefits of being traded in the market (Goldstein, 1998). As such, services are typically not subject to property rights regimes (de Groot et al., 2002; Hein et al., 2006) (although we recognise that some exceptions do exist, e.g., Boydell, Sheehan, & Prior, 2009; Christensen, Duncan, Phillips, & O'Connor, 2013).

Ultimately then, this 'open access' nature of services makes them difficult to capture within property law (Lant et al., 2008; Libecap, 2008). The open access nature of services could in fact be defined by the *absence* of a regulating regime, leaving the benefits available to anyone, but also unprotected. As a result, it can be said individuals have both a *privilege* to access but *no rights or responsibilities* regarding use rates and maintenance (Bromley, 1989). In other words, 'with privilege I am free to do as I wish, since the other party has no rights' (Bromley, 1989,

p. 871), contributing to a 'cultural blindness' to the consequences that arise from the operationalisation of the construct of property across land and seascapes (Graham, 2012). Thus few, if any, legally recognised rights, interests or privileges exist to be protected or prohibited with respect to services (see also, Feeny, Berkes, McCay, & Acheson, 1990; Hardin, 1968; Rose, 1986). Rose (1986) has argued for the application of a specific type of property right in such instances, which recognises 'inherently public property'. Such an approach would provide the protection of property rights while maintaining the 'access to all' nature of services, accounting for contexts in which the highest value use of certain spaces, goods or services is achieved only when they are accessible to the public at large.

Another reason that services are not subject to property rights regimes is the scale at which they are provided (Figure 1). Services tend to be provided by regulatory ecosystem functions (Chan et al., 2012). These functions are typically contained at ecosystem to land or seascape scales, but can extend to global scales, such as climate regulation and migratory species-related functions (Lugo, 2007; Tallis & Polasky, 2011) (Figure 1). Property rights regimes and other legal mechanisms tend to be restricted geographically to the sovereign states that create them. Even *within* jurisdictions, property laws are generally agnostic to biophysical characteristics like catchments and biomes, resulting in a 'scale mismatch' between the unit of 'property' and the unit of a functioning ecosystem (Cumming, Cumming, & Redman, 2006). Opportunities to individualise costs and benefits associated with these regulatory functions are limited because of the range of spatial, including

jurisdictional, boundaries these services traverse (Cooke & Moon, 2015).

The nature of services, combined with the limiting structure of property rights, therefore create the *motivation* to value and protect only the resources that yield goods, while simultaneously eroding services (Guth, 2008). This approach is, of course, economically rational, but only because of the broader failure of the law to value the complete land or seascape and its importance to humans and non-human species (Guth, 2008). Rights-holders are not directly compensated for services provided by the resource units over which they hold rights, and so without financial incentive to ensure their provision, such services can be vulnerable to degradation from overexploitation, or simply a failure to implement conservation measures (Lant et al., 2008, Ostrom, 1990). An example of this vulnerability comes from harvesting activities within disturbed (e.g., fire affected) forests. Tangible goods (i.e., logs) can be removed despite evidence of the detrimental effects of such activities on the services provided by these systems, which have been found to be particularly important to protect after large scale disturbances (Thorn et al., 2018).

## 2.2 | A focus on the plot rather than the land or seascape

The second, and related, major threat is concerned with the focus of property rights on the individual plot (i.e., a 'unit' of land or sea that is established with regard to individual aspiration, where one unit is legally no different to another) and the relations between people regarding that plot, rather than the land or seascape (i.e., an integral unit within a broader functioning ecosystem) (Cooke & Moon, 2015; Cumming et al., 2006; Graham, 2020). Through this framing, property rights have generally treated each rights-holder and their actions as distinct from one another, or as Graham (2012) describes, 'dephysicalised'. Limited recognition is provided for the social and ecological relationships between rights-holders, as 'bundles of owners' who represent 'diverse public, state, community and individual interests' (Rissman, 2013, p. 223), and more broadly, non-rights-holders (Geisler, 2000). In essence, the dominant framing of rights reduces 'property' to a mere 'standardised' set of rights and entitlements, ignoring the importance of location and context. Rights are thus divorced from any sense of belonging to a social or ecological community (Arnold, 2011). As Graham (2020) observes, this framing enables 'landholders to disown the adverse consequences of their proprietorship', facilitating 'a powerful cultural fantasy' regarding the adverse effects of property rights. Ultimately,

the law is limited in its capacity to accommodate the interconnectedness of social-ecological systems.

Because property law systems do not recognise most intangible services, except in limited contexts (e.g., carbon in vegetation or riparian access rights) (Lant et al., 2008), they are not capable of protecting different parts of a connected ecosystem. So too, the rights of (groups of) individuals to derive benefits from different parts of the system on which they depend might not be protected (Burdon, 2014; Davis, 2020; Goldstein, 1998; Goldstein, 2004). For example, filling in a wetland on private property can affect every rights-holder in proximity to that wetland, as well as non-property rights-holders deriving local benefits provided by the wetland, such as wildlife and improved water quality. This failing of the legal system of property rights, which focuses on protection of individual rights at the plot scale, can lead to disruption, degradation or loss of services that are necessary for ecosystem function at the land and seascape scale (Davis, 2020, Goldstein, 2004). The failing can create 'shadow lands' (i.e., the disowned 'externalities' of nice places) that arise from the assertion of individualistic property rights (Graham, 2020).

Practically, the inefficiencies of property rights law has meant that current interpretations and applications generally understate, or fail to account for, the interconnectedness and mutual dependencies of ecosystem functions between units of property (e.g., Arnold, 2011; Sikor et al., 2017). These inefficiencies also typically tend to disregard the value of 'place-based knowledge' (Graham, 2020). In other words, an isolated act of conservation within a property unit can be artificial because it does not account for the flow of goods and services both from and onto, individual property units (Eagle, 2013; Freyfogle, 2003; Goldstein, 1998). The result is a fragmentation of the costs and benefits that arise from conservation actions across a land or seascape.

## 2.3 | A focus on rights at the expense of responsibilities

The third major threat of current constructions of property rights relates to the dominant focus on rights, at the expense of responsibilities (see also, Burdon, 2014). That is, property has typically been constructed as a 'bundle of rights', including rights to use the resources associated with the property (e.g., arable land); to lawfully exclude others from accessing the land (e.g., by erecting fencing); to alienate or assign an interest in the land to another person (e.g., either wholly in a transfer of title, or for a set period in a lease); and to secure another benefit (e.g., the loan of money against the value of the property). The metaphor of a 'bundle' is meant to *displace* any notion that



property is the physical ‘thing’ (e.g., the actual unit of land or sea), and to convey that property represents a grouping of relationships that the rights-holder benefits from, and which all other people will respect and honour in relation to that property. Contemporary applications of ‘rights’, as explored below, pay little to no attention to responsibilities and the resultant societal sharing of interests in property (Arnold, 2011). Property rights can therefore fail to recognise other rights-holders’, or indeed the public’s, ecological interest in property (Guth, 2008), leading to three main challenges.

First, the bundle construct has been applied in a way that implies absolute ‘ownership’ or dominion (Rissman, 2013). For example, within the conservation literature we can find reference to ‘landowners’ and land ‘ownership’ (e.g., Gooden & Grenyer, 2019; Paloniemi et al., 2018; Schötter & Santos, 2019). Yet, property rights only represent ‘legal title’, which is *not* the same as ownership (Goldstein, 1998), because ‘real’ property (i.e., land) is a claim to a stream of benefits running into the future, not ownership of an object *per se* (Bromley, 2008; Rodgers, 2009). The problem with confusing rights such as possession (i.e., the right to exclude) with ‘ownership’ is that it implies more absolute control over land and sea than is inferred by property rights, rather than its original purpose of demarcating a person’s claim (Rose, 1985). An exaggeration of the scope of rights in this way diminishes the complexity and interconnectedness of the systems and, importantly, the relationships in which those resources exist and persist (Lees, 2018; Rodgers, 2017; Waldron, 1985). That is, a failure to differentiate between ‘property rights’ and ‘ownership’ can generate a deception that ‘this is mine and I shall do with it as I please’ (Bromley, 2008, p. 1080).

Second, and relatedly, the construct of a ‘bundle of rights’ can create the illusion that the private, public, open and common natures of property are spatially distinct – which is not the case. In fact, all property is a mix of these characteristics, whereby multiple actors can have competing ‘bundles’ in relation to the same unit of land or sea (Arnold, 2011). This feature of property rights can result in inequalities and conflict with respect to the rights and responsibilities of different rights-holders (Adams & Moon, 2013). For example, a landholder can make a commitment to conserving biodiversity by establishing a legally binding conservation covenant against their property right. They can seek to enforce these responsibilities on future landholders (via assignment) when the covenant is in perpetuity. Where the inequality arises then, is when the covenant does not apply to other actors who can have different rights in that *same* location. For example, an actor might have rights to access and withdraw subsurface minerals on that parcel of land (or sea), and can exercise their rights in a way that effectively extinguishes

the covenant (e.g., Ostrom, 1990). Similar arguments are made in relation to the notion of permanent sovereignty over natural resources within an international law context (e.g., Schrijver, 1997).

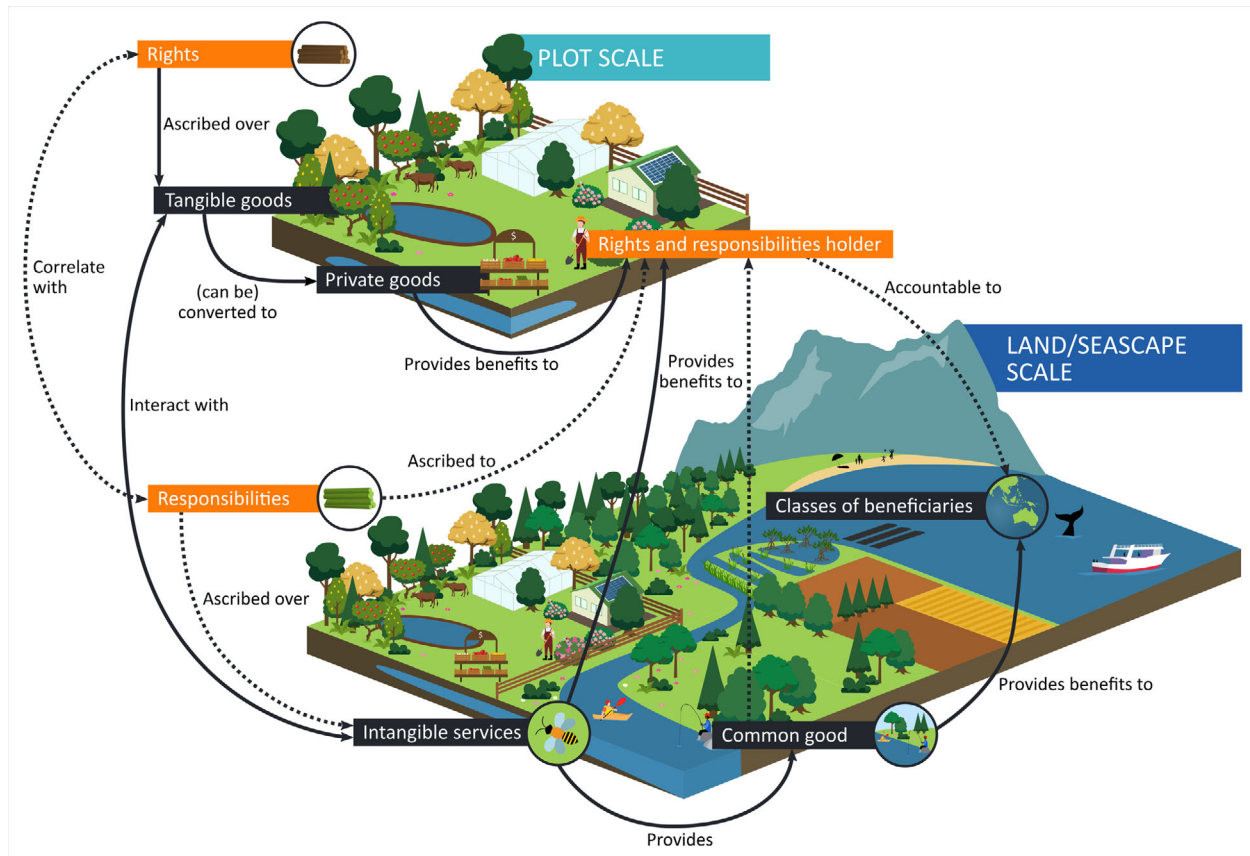
Third, the establishment of property rights results in the arbitrary compartmentalisation of ecosystems and the services they provide. This compartmentalisation is largely a social process, which fragments rights and responsibilities and reorganises them around the individual (see, Adams & Moon, 2013 for further discussion). These social processes are imperfect in establishing (complementary) relationships between rights and responsibilities (Freyfogle, 2001), particularly in the context of the land and seascape, as discussed above. For example, rights-holders are capable of externalising detrimental effects of their decisions onto each other, with little recourse for those experiencing those effects (Demsetz, 1967; Sikor et al., 2017; Slaev & Collier, 2018).

The case of dryland salinity serves as useful example here. In Australia, dryland salinity has resulted from excessive forest removal for agricultural development. The removal of deep-rooted vegetation has caused regional water tables to rise, mobilising salt deposits to the surface across a *region*, yet not necessarily on the property where trees have been removed (e.g., Nery et al., 2019). Having responsibility only for one’s own parcel, farmers across Australia engaged in what was a collective large-scale clearance of land in the pursuit of agricultural development, encouraged by government land releases, cheap land prices and subsidies (Pannell, 2005). The result has been widespread degradation of land quality from salinity, despite each landholder acting lawfully to make ‘improvements’ on their land through conversion to agriculture (Nery et al., 2019; Pannell, 2005; Quiggin, 1986).

### 3 | THE OPPORTUNITIES FOR PROPERTY RIGHTS

In the previous section we articulated three main, and enduring, problems associated with current constructions of property rights in relation to biodiversity conservation: a focus on goods, the plot and rights. Drawing on published examples, we sought to demonstrate how an emphasis on these aspects of property contributes to the degradation of ecosystems and biodiversity loss. In this section, we turn our attention to the opportunities available to improve conservation policy and practice through property rights regimes.

Our approach requires determining *who* has a responsibility, *to whom* they owe that responsibility and *how* that responsibility can be ascribed (Figure 2). Here, we are talking about ‘relational responsibility’ – ‘to make people liable



**FIGURE 2** Defining the relationships between rights and responsibilities of the 'rights and responsibilities holder' (denoted by orange boxes) and the beneficiaries of goods and services within property regimes at the plot and land and seascapes scales. Relationships are represented with solid line (well-recognised or institutionalised) and dotted lines (less, or not, recognised and institutionalised)

or accountable' (Mathevet et al., 2018, p. 615). Plumwood (2008, p. 147) captures it thus:

'An important part of the environmental project can then be reformulated as a place principle of environmental justice, an injunction to cherish and care for your places, but without in the process destroying or degrading any other places, where "other places" includes other human places, but also other species' places. This accountability requirement is a different project, and much more politically and environmentally demanding project, than that of cherishing one's own special place of dwelling. It is a project whose realisation, I would argue, is basically incompatible with market regimes based on the production of anonymous commodities from remote and unaccountable places. A practice that requires a multiple place consciousness can help to counter dematerialisation and remoteness'.

Our approach can be broadly conceptualised as combining the 'brown sticks of rights' in the bundle with the 'green sticks of responsibilities', the latter of which are dependent on the individual nature of property, and 'therefore planted firmly in the ground' (Goldstein, 1998, p. 411) (Figure 2). Responsibilities are important to clar-

ify because 'stricter definition of individual obligations and stronger links between benefits and responsibilities are essential' in managing and conserving resources (Slaev & Collier, 2018, p. 62). The idea of taking responsibility for the remote consequences of action performed on one plot will clearly require 'strong institutional and community networking arrangements' (Plumwood, 2008, p. 148). In seeking stricter definitions and stronger links, we map out the relationships between property rights, the threat of those rights to ecosystems and beneficiaries, the specific responsibilities that could be ascribed to reduce defined threats and the mechanisms currently available for such ascription. This approach reveals workable solutions to many of the ongoing challenges faced in the conservation domain, and importantly, which could be resolved with existing policy mechanisms.

We want to acknowledge at the outset of this section the important roles that rights-holders can, and often do, play as ecosystem managers, achieving outcomes for the protection of ecosystems. For example, a resource manager's knowledge of their land or waters, (generally) long-term outlook and day-to-day decision-making capacity can deliver positive and widespread ecological benefits.

Arguably, many of these benefits could never be delivered by governments alone (Debby & Dick, 2012). We hope that what we offer below supports the capacity of right-holders, and indeed governments, in these endeavours.

### 3.1 | Identify responsibilities – who?

The first step is to identify *who* has a responsibility. Responsibility can be of: (a) an individual, as a rights-holder or caretaker or (b) a collective, as rights-holders, a society or a nation state. Identifying who has a responsibility is a critical first step in connecting the *demand* for services from beneficiaries with their *supply* from those in control of the services (Tallis & Polasky, 2009). We define beneficiaries as *current and future generations, non-human species and ecosystems themselves that benefit, directly or indirectly, from the goods and services provided by ecosystems*.

Typically, beneficiaries have limited opportunities within the law to protect and secure the benefits ecosystems provide to them and their community (Lant et al., 2008; Ruhl, Kraft, & Lant, 2007). This situation is well described by Bromley (1989): ‘If a party is not able to change the legal entitlements that define it with respect to others, then that party has no power and the other party has immunity’. In other words, beneficiaries are often disempowered. Identifying who has a responsibility for goods and service provision is therefore an important step towards empowering beneficiaries. Empowerment is a relational construct, describing relations between individuals and groups where an uneven distribution of power or control exists. Beneficiaries can become more empowered when there exists a practical basis (see below) to support enforcement of the responsibilities, directly or by proxy, owed to beneficiaries at the time of threat to the resource system (Brown Weiss, 1990; Meyer, 2020).

O’Connor, Christensen, and Duncan (2009) have proposed a framework, in relation to the common law Torrens title system, which is applied within a number of jurisdictions (e.g., Australia, Canada, New Zealand, Ireland, Malaysia, United States and Philippines). The system recognises that property rights are accompanied by responsibilities towards the environment. The system seeks to ensure sustainable management of land by using enforceable statutory rights, obligations and restrictions on land through a broader and more systematic use of land registry records that enable a ‘parcel-by-parcel’ approach. In other words, property-specific legal obligations of the landholder (e.g., as reflected in statutes and planning schemes) are registered or notified on the title (e.g., in relation to water courses/bodies), and are binding on future title-holders, similar to a covenant (e.g., Selinske et al., 2019). Christensen, O’Connor, Duncan, and Phillips (2012) and Chris-

tensen et al. (2013) have argued that environmental responsibilities registered on the title of land enable a clear and efficient means of acknowledging an enduring obligation to beneficiaries. For instance, carbon sequestration agreements can be registered on title, as a distinct legal interest affecting that land and binding future title holders to fulfil the agreement. Bell and Christensen (2009) have noted a need to use the title system to at least recognise and make clear the statutory obligations that already apply to rights-holders on a plot by plot basis.

### 3.2 | Define responsibilities – to whom?

The second step is to determine *to whom* responsibility is owed. Responsibility can be owed to: (a) the rights or license-holder of a property or resource (individual; current generation); or (b) a more inclusive society, future generations (collective) or non-human species and ecosystems (e.g., Worrell & Appleby, 2000).

We suggest that the most effective method in defining responsibility as a moral duty of the rights-holders (individuals and collectives) is to the resource system itself (i.e., the ecosystem). This approach contrasts with assigning responsibility for a specific good or service to a particular (group of) person(s), species or entities. This proposition provides a simple yet important addition to the dominant construct of property rights and responds to calls in the literature for solutions to the ‘tragedy of ecosystem services’ (e.g., Lant et al., 2008). It aims to resolve problems associated with identifying beneficiaries of distinct goods or services, such as: problems relating to the spatial scales over which benefits need to be distributed (e.g., Bagstad et al., 2014; Naidoo & Ricketts, 2006); the nature of the benefit (Fisher, Turner, & Morling, 2009); the different values (e.g., economic, cultural) that people assign to benefits (e.g., Naidoo & Ricketts, 2006); and overlapping jurisdictional boundaries (Daily et al., 2009; Meidinger, 1999, p. 26; Fischer, 2018). The approach further assists with resolving the ongoing need to develop methods for ‘identifying who benefits from ecosystem services, and where and when those who benefit live relative to the lands and waters in question’ (Daily et al., 2009; Pagiola, Arcenas, & Platais, 2005, p. 26).

Defining responsibilities is important in re-orienting property rights back towards the common good (Commoner, 2020). While property rights were developed to secure an individual’s investment in land or property (e.g., labour) so the benefits of that investment could be realised by that individual (e.g., crops, animals, fibre) (see, Grecksch & Holzhausen, 2017), their *main* aim was to promote the common good. The common good ‘was not merely what the consensus of society’s individual

members wished but a substantive conception of the moral good that transcended individual interests' (Alexander, 1997, p. 29). As such, any use of property that might have been considered reasonable when it began could be considered harmful in the future if it conflicted with social values, surrounding future land and water uses or other circumstances (Freyfogle, 2003). Property rights are therefore only legitimate insofar as they attain the objective of delivering the common good (Freyfogle, 2006; Huffman, 1998). Once *to whom or what* responsibility is owed has been defined, it becomes possible to ascribe responsibility through formal mechanisms.

### 3.3 | Ascribe responsibilities – how?

The third step is to ascribe responsibility in a way that complements the rights held in the property bundle. Schrijver (1997, p. 307) rightly notes that too often 'the nature of the obligation, the subjects concerned and their mutual relationship cannot be clearly identified [...] terms as "duties", "obligations" or "commitments" are often used to denote the weaker form of indebtedness associated with framework treaties, codes of conduct, non-mandatory resolutions and the like'. The goal of ascribing responsibility therefore should be to achieve a balance whereby exercising a right is appropriately constrained by a clearly defined responsibility to avoid threats to the resource system. Simply put, rights-holders' lawful actions should not cause damage to ecosystems (see, Barritt, 2014). Here we focus on four main rights in the 'bundle', explaining the threat they pose to ecosystems, how a complementary responsibility (i.e., a correlative duty) could be ascribed and what mechanisms might be available to do so (Table 1).

The first right – to exclude others from accessing a property – disempowers beneficiaries (i.e., non-title-holding individuals) from undertaking actions on that property. This right becomes problematic when actions undertaken on a property pose a threat to the function of ecosystems at the land and seascape scale. An example would be failing to maintain riparian vegetation for bank stability upstream in a water course, with implications for downstream water quality (Dutcher, Finley, Luloff, & Johnson, 2004). To some degree, the common law tort of nuisance may be effective for one rights-holder to take *direct* action against another for unreasonably interfering with their enjoyment of *their* land, however, this mechanism is limited and has been criticised for being too property-centric (Hylton, 2001). This common law principle, however, demonstrates the logic of requiring a complementary responsibility ascribed to the rights-holder to require them to account for the effects of their actions on the land and seascape scale.

**TABLE 1** Summary of four dominant property rights that can conflict with broad conservation objectives. Each property right is defined; threats of the right are identified that correspond with the main limitations of property rights (Section 2); a complementary responsibility is identified; and an illustration of a policy instrument that could be used to ascribe responsibility

Property right	Threat of right	Responsibility (correlative duty)	Policy instrument to ascribe responsibility
Exclusive possession: the right to exclude others from access	Focus on the plot (e.g., fragmentation)	Responsibility of rights-holder to the resource system to account for the land and seascape scale	Statutory duties
Use: the right to exploit, develop, manage	Focus on tangible goods (e.g., can lead to degradation of ecosystem function through disruption to services)	Responsibility of rights-holder to the resource system to account for intangible services	Statutory duties Planning schemes
Assignment: the right to transfer title	Focus on the right (e.g., treating the plot as a tangible commodity, ability to give up or abandon land/sea to which damage has been caused)	Responsibility of rights-holder to the resource system to account for (future) rights-holders and beneficiaries	Polluter Pays Principle
Security (the right to secure an alternative benefit stream as a burden on the property, e.g., a mortgage)	Focus on the right (e.g., outsourcing a right, ceding a level of control over the property, exploiting right to pay a loan)	Shared responsibility of rights-holder (i.e., mortgagee) and lender to ensure that the terms of the mortgage recognise the responsibilities the rights-holder owes in respect of that property	Equator Principles for environmentally responsible lending or ethical banking for environmentally friendly depositing



One possible mechanism to ascribe this responsibility is a statutory duty through legislation. For example, in Victoria, Australia, the *Catchment and Land Protection Act 1994* ascribes responsibility to landholders to take all reasonable steps to eradicate regionally prohibited weeds, prevent growth and spread of regionally controlled weeds and prevent the spread of pest animals on their land. Since the State cannot impinge on the landholder's right of exclusive possession by accessing the land and managing the problem itself, the landholder must accept their responsibility as a correlative duty to their right of exclusion possession. In other words, if no one else is permitted on the property to undertake an action, then the rights-holder must undertake that action themselves.

The second right – to use (exploit), develop or manage the resources of one's property – is perhaps the most problematic property right in the bundle. This right can result in pitting the desire to obtain tangible goods – primarily in the form of commodities – directly against the protection of intangible services. Obvious examples abound where the right to tangible goods is at odds with maintaining intangible services, such as forestry (i.e., trees), mining (e.g., coal) and broadacre cropping, where the effects of activities on intangible services (e.g., rainfall reliability, groundwater flow, surface water flow) only become apparent at regional and biome scales (Pielke et al., 2007). In instances such as water accessibility, the right of use that allows the rights-holder to exploit goods without a complementary responsibility to protect 'surface water flow' as a service could in time be critical in diminishing the ability to enjoy the right to use itself. A complementary responsibility must account for the effects of resource use and extraction on the provision of services.

One possible mechanism to ascribe this responsibility is an enhanced planning scheme that sufficiently accounts for ecosystem function at the land and seascape. Planning schemes could offer an approach that recognises intrinsic differences between resource units that the property law system current presumes as homogenous (i.e., as nothing more than a series of polygons). Planning schemes are capable of ascribing responsibilities and limitations on rights-holders, such as protection of ecological features in the landscape (e.g., vegetation) and prohibition of defined resource uses (e.g., farming activities, mining of sand and stone) to preserve defined regulatory ecosystem functions that occur over multiple property boundaries. For example, Wilkinson, Saarne, Peterson, and Colding (2013) identified an increase of ecosystem service considerations in strategic planning schemes over time in Stockholm and Melbourne. They found that categorising ecosystem characteristics at appropriate spatial scales provided opportunities to support comprehensive decision-making that takes account of defined services. These planning

processes were also capable of highlighting those ecosystem services that were not captured within different policy and legislative regimes at the local and regional scale, opening up pathways for their future inclusion. Another mechanism could include cross-boundary farming, which involves individual title with collective ownership and management (Muenstermann, 2009), such as the Tilbuster Commons in Australia (Brunckhorst & Coop, 2003).

The third right – to assign one's interest in property to another – brings with it the peril that the rights-holder can transfer any harm caused to that property through their mismanagement. Assignment has long been identified as problematic because the resource unit is treated as a tangible commodity that can be damaged and discarded (i.e., sold on) (Leopold, 1949; McGregor, 1999). Here, the goal of ascribing responsibility is to recognise the role a defined resource unit currently plays within its social-ecological setting and will continue to do so into the future. Thus, the ascription of responsibility here is intended to secure ecosystem functions for future beneficiaries.

One means of ascribing responsibility could be to broaden the 'polluter pays principle', enshrined in many environment protection legislative schemes, to also protect intangible services as part of a property right (Blumm & Guthrie, 2012). The principle starts with prohibiting conduct that causes harm to the environment, such as contaminating the soil or groundwater through the excessive use of chemicals. The person(s) responsible for polluting the environment, even after assignment of title (i.e., selling the polluted property to another), remains responsible and liable for the abatement and containment of that harm (e.g., Article 191(2) of the *Treaty on the Functioning of the European Union* and the *Environmental Liability Directive* 2004/35/EC). Other ways of achieving protection of the property unit include requiring bonds or financial assurance for the protection of the unit, at least in relation to more potentially harmful activities, such as mining (Malone & Winslow, 2018). Statutory versions of the polluter pays principle could be recognised as the manifestation of the responsibility not to do harm to one's property that is already an inherent 'stick' making up the bundle of property rights (Goldstein 1998).

The fourth right is the right to secure an alternative benefit stream as a burden on the property (e.g., a mortgage). Through this mechanism, the rights-holder forfeits some agency over the property unit to support the goals of the lender to repay the loan. Lenders, in turn, are beholden to shareholders and depositors, to whom they owe fiduciary (i.e., legal obligation to act in the best interest of another) and regulatory duties. The right to secure against property inheres a potential conflict of interest where lenders effectively co-modify property, which can result in the liquidation of the services within. With no direct connection to the

property, the prospect of adverse outcomes for the resource unit, and consequently the land and seascape, increases without due accountability (Folke et al., 2019; Jouffray, Crona, Wassénus, Bebbington, & Scholtens, 2019).

The threat from the 'right to secure' (against property) is problematic because of the absence of pathways to ascribe responsibility *beyond* the rights-holder. The lender's dominant, if not sole, interest is a return of the investment loaned to the rights-holder against the security of property (or at least to secure a lucrative fee income from administering the privilege). Often, but not always, the lender's interest is to augment the rights-holder's capacity to obtain tangible goods from the property (e.g., increased farm mechanisation through equipment finance), with insufficient protection against the effects of the rights-holder's action on the resource system itself. A complementary responsibility must be ascribed to the *lender* to restrain them from imposing conditions or expectations on the rights-holder that cause detrimental resource exploitation.

One mechanism to ascribe this responsibility has emerged through the Equator Principles, which represents a market-based solution for holding financial institutions to account, environmentally, on their lending practices (e.g., Addison, Bull, & Milner-Gulland, 2019). The Equator Principles guide environmentally and socially responsible lending practices in project financing. Marco (2010) has argued for improving enforceability of the Principles through the creation of third-party interests in projects to hold borrowers to account. More recently, the United Nations Environmental Programme Finance Initiatives *Principles for Responsible Banking* will seek to hold lending institutions generally to account through analysis of their environmental impact, target setting and reporting (UNEP, 2019). Certainly, ascribing responsibilities beyond the rights-holder is an important consideration that requires more attention (e.g., Addison et al. 2020; Nash et al., 2020; Smith et al., 2020).

Here, we have demonstrated the need to determine *who* has a responsibility, *to whom* they owe that responsibility and *how* that responsibility can be ascribed. We have shown that mechanisms are already available to support these approaches, which align with the original intention of property rights to serve and protect the common good. Progression in this direction has the potential to deliver effective conservation outcomes in both the short to medium, and thus long, term.

## 4 | CONCLUSION

Property rights should be constructed as 'social relationships' rather than 'individual rights', recognising that *rather* than a 'bundle of rights', property is a 'web of inter-

ests' (Arnold, 2011; Goldstein, 2004). Our ecological knowledge has advanced, contributing to the development and evolution of environmental ethics. It is time that property rights regimes formally acknowledged and accounted for ecological principles and environmental ethics that seek to conserve species and ecosystems.

Existing systems of ascribing responsibility exist and provide an effective means of rebalancing the costs and benefits to ecosystems that arise from the enjoyment of property rights. Importantly, a formal recognition of the responsibilities that accompany rights can set the baseline of what society should be able to expect from rights-holders. From this baseline, policy instruments can be more appropriately applied, supporting landholders in their responsibilities (e.g., via two-directional knowledge exchange and collaboration) and, where necessary, providing compensation for activities that extend *beyond* their responsibilities (e.g., economic instruments).

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## CONFLICT OF INTEREST

The authors declare no conflict of interest.

## AUTHOR CONTRIBUTIONS

Katie Moon and Dru Marsh conceived of and developed the paper; Katie Moon led the writing of the manuscript. Dru Marsh provided clarification on legal aspects. Chris Cvitanovic provided conceptual guidance. All authors contributed to the writing and graphic design and gave final approval.

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