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Conservation on private land: a review of global strategies with a proposed classification system

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With parks and protected areas insufficient to sustain global biodiversity, the role of private land in biodiversity conservation is becoming increasingly significant. This paper reviews global voluntary and involuntary strategies for private land conservation. Involuntary strategies can achieve effective conservation outcomes, but often lack social acceptability. In contrast, voluntary strategies enjoy greater social acceptance but may not achieve sufficient uptake to have meaningful conservation objectives. Based on the review, we propose a classification system for private land conservation as a complement to the International Union for Conservation of Nature's (IUCN's) classification of global protected areas. The classification system provides a framework for identifying and describing conservation strategies on private land on the dimension of tenure and security. It also identifies opportunities and vulnerabilities in achieving conservation on private land while emphasising the need for systematic data collection similar to IUCN's efforts for protected areas.

Keywords: private land; conservation strategies; protected areas; classification system

1. Introduction: the importance of conservation on private land

Globally, biodiversity conservation has relied heavily on protected areas to halt its loss and safeguard the existence of its components into the future. Protected areas, identified on the basis of the endangerment, distinctiveness and utility of the natural components they contain, are the functional units of *in situ* large-scale conservation and have an important role in promoting nature conservation (Bishop *et al.* 2004; Naro-Maciel, Sterling, and Rao 2008; Gibbs, Hunter Jr, and Sterling 2009). Historically, they consisted of public land, or sometimes a combination of public and private land, but often the private land was converted to public land by purchase or acquisition. However, protected areas (whether public or a combination of both public and private land) cannot be considered as sufficient measures for conservation as they contain a small fraction of the global biodiversity, occupy only 13.9% of the total global land area, are susceptible to human degradation, can be downgraded in their protection and, finally, their effectiveness in isolation is questionable (Chape *et al.* 2003; Naughton-Treves, Holland, and Brandon 2005; Emerton, Bishop, and Thomas 2006; Stolton, Mansourian, and Dudley 2010; Mascia and Pailler 2011; Mora and Sale 2011).

A more holistic approach to conservation requires looking beyond the 'closed' box model of protected areas as the only solution to conservation, as it is not possible to

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convert every tract of land with conservation value into a formally recognised protected area (Figgis 2004). Instead, conservation strategies should aim for a bioregional model that conserves landscapes irrespective of ownership.

Within the scope of this paper, conservation on private land refers to land under private ownership of individuals, families or other non-public entities within an administrative protected area, or otherwise informally reserved or managed for nature conservation purposes. Although it is unlikely that private land can meet all conservation needs, it can substantially contribute to increasing protected habitat and species, and maintaining connectivity (Clough 2000; Smith, Phillips, and Doret 2006). For example, 73.8% of total land within national parks in Great Britain is privately owned; 45% of Costa Rica's Biological Reserves lie in private hands; and a minimum of 14 million hectares of private land in Southern Africa is involved in some form of wildlife management (Chacon 2005; Krug 2001; NPA UK 2011). Therefore, more attention should be directed towards biodiversity-rich land that is under private ownership, in addition to the formally recognised protected areas (Knight 1999; Kirby 2003; Tikka and Kauppi 2003; Mayer and Tikka 2006; Paloniemi and Tikka 2008).

However, integrating private land into conservation planning and management is complicated by the nature of landownership and the complex social and economic traits that are interrelated with its current use (Mascia 2003; Tikka and Kauppi 2003; Knight, Cowling, and Campbell 2006; Paloniemi and Tikka 2008; Raymond and Brown 2011). Since biodiversity exhibits public good characteristics, there is little incentive for conservation at an individual level which traditionally led to government involvement (Clough 2000; Doran 2003). However, top-down approaches to biodiversity conservation on private land have had negative repercussions, with landowners expressing their unwillingness to participate in conservation strategies that provide no benefits for them (Grodzińska-Jurczak and Cent 2011; Grodzińska-Jurczak *et al.* 2012). Knight and Cowling (2007) and Knight *et al.* (2010) emphasised that while defining areas of conservation priority depends primarily on ecological knowledge and understanding, implementation of conservation actions is a function of conservation opportunity such as stakeholders' willingness and capacity to participate.

As a result, strategies related to nature conservation on private land are being explored globally from legal prescriptions to financial incentives and participatory site selection approaches (Doremus 2003; Frank and Muller 2003; Paloniemi and Tikka 2008). However, except for developed countries where formal efforts for conservation on private land began relatively early (e.g. the USA, UK and Australia), most countries lack an adequate system with legal and government support to promote private land conservation (Figgis 2004). In addition, while protected areas have an international classification system developed by the IUCN in 1978 (modified in 1994) based on six categories ranging from strict nature protection to areas managed for sustainable resource use, private land conservation lacks a similar system of classification (Phillips 2004). With the broader goal of understanding the role of external strategies to promote private land conservation, this paper addresses two primary objectives:

- Describe the role and effectiveness of prominent external strategies used to promote conservation on private land;
- Develop a novel typology and classification scheme which parallels the IUCN protected areas system that relates the important dimension of conservation security to strategies used for conservation on private land.

2. External interventions to promote conservation on private land

The existing spectrum of nature conservation policy options on private lands is very broad, ranging from regulatory prohibitions and government acquisition to direct incentives for private action and public consultations in decision making on conservation policy (Ostermann 1998; Doremus 2003; Mieners and Parker 2004; Young *et al.* 2005; Mayer and Tikka 2006; Kauneckis and York 2009). While some of the conservation strategies have specific biodiversity protection goals, others work more on broader conservation objectives, with biodiversity conservation being a secondary objective. To be inclusive, both types of strategies are considered in this paper. The focus of this paper is not to provide a detailed account of various strategies used in private land conservation as it already exists in literature such as Doremus (2003), George (2002) and Paloniemi and Tikka (2008); rather, the goal is to highlight the differing nature of these strategies in terms of their security, owner's participation and tenure. Most existing options are either involuntary (the decision to participate in conservation strategies does not reside with the landowner), voluntary (a landowner pro-actively decides to participate in conservation strategies) or a combination of both. Conservation success will probably be determined as much by the context and scale of the external intervention and by coordination of conservation activities across properties as by the chosen strategy. Figure 1 summarises the categories of conservation strategies discussed in this paper.

2.1. Involuntary strategies

Involuntary approaches to integrate private land into conservation include prescriptions or prohibitions by government agencies or authorities that provide for minimal participation

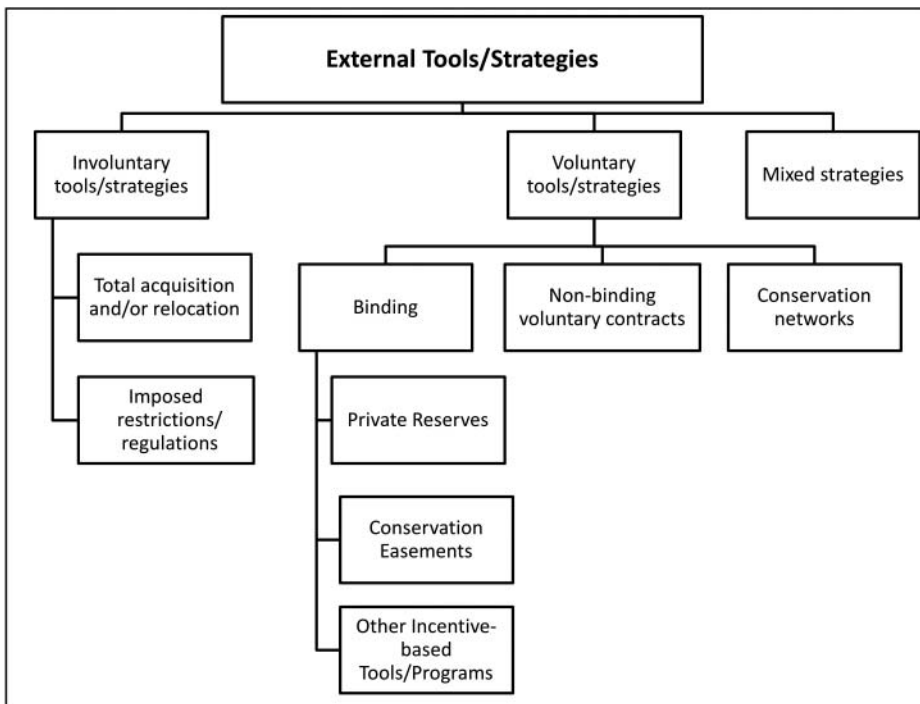


Figure 1. Types of external strategies used for conservation on private land.

from landowners in the decision-making process or in management of the private land being conserved.

2.1.1. *Total acquisition and/or compulsory displacement*

One of the earliest strategies used for converting private land into protected areas was compulsory acquisition of the land by the government, as witnessed during the establishment of the first few protected areas in the world (Stroup 1997; Polasky and Doremus 1998). While this practice has decreased in developed countries, in some developing countries such as those in South Asia and Eastern and Central Africa, this method is still prevalent (Adams and McShane 1996; Neuman 1998; Doremus 2003; Karnath 2005; Cernea 2005; Rangarajan and Shahbuddin 2006; Schmidt-Soltau and Brockington 2007). This strategy is based on the assumption that the relationship between human use and biodiversity is linearly negative, and human use of biological resources can only harm biodiversity (Eriksen 1999; Rangarajan and Shahbuddin 2006).

Relocation of people for the protection of nature and wildlife is a recurrent action in nature conservation, especially when there is perceived conflict between traditional inhabitants and the protection of nature (Brockington 2004). There is, however, increasing effort to meet the interests of the different stakeholder groups. Examples of such efforts include recognition of Indigenous Protected Areas in Australia, The Scheduled Tribe and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006 of India, and resettlement through incentive programmes in countries of Eastern Africa (Cernea 2005; Figgis 2004; MoEF 2006; Schmidt-Soltau and Brockington 2007; Bhullar 2008; Springate-Baginski *et al.* 2009).

2.1.2. *Imposed restrictions/regulations*

Another form of involuntary conservation is when private land is legally prescribed as a protected area or part of protected area, often without substantive consultation with the landowner. Authorities can also impose restrictions on land use and developmental activities that are believed to have a negative impact on the ecosystem/species or for conservation of a habitat. Although this strategy is less drastic and intrusive than resettlement, it confronts property rights and challenges autonomous use of the land. This is especially true of private land situated within strict protected areas such as national parks where regulations and restrictions imposed over the public land extend to the private land as well (ELI 2003; Mayer and Tikka 2006; Grodzińska-Jurczak and Cent 2011; Grodzińska-Jurczak *et al.* 2012). The government has the option of acquiring the land, but with limited budgets authorities usually prefer to use this model where private land situated within protected areas is subjected to similar restrictions as those on public land (ELI 2003).

Imposed restrictions unaccompanied by compensation, easements or contracts are rare in developed countries today, although they exist at a smaller scale in the form of local land-use regulations such as zoning or specific regulations such as those of the Habitat Conservation Plan in USA. This practice is more prevalent in 'countries in transition' as well as developing countries due to its cost effectiveness; some governments lack the financial capacity to purchase all the private land within protected areas, or to provide compensation schemes to landowners (ELI 2003; Scroter-Schlaak and Blumentarth 2011).

2.2. Voluntary tools/strategies

There is a diverse array of voluntary strategies to conserve biodiversity on private land that are context-specific but adaptable to different sites or regions. Voluntariness is when the decision to implement a conservation action on private land lies with the landowner. Although the mechanisms and incentives for action may be supported by government or other agencies, the decision to get involved in such conservation action is made by the landowner.

Sometimes large, private conservation organisations purchase private land to either set aside and self-manage, or to donate to government agencies for conservation purposes, as has been witnessed in many countries of Latin America, North America, Australia and Africa (ELI 2003; Figgis, Humann, and Looker 2005; Armsworth *et al.* 2006; Cowell and Williams 2006; ENS 2010; Pasquini *et al.* 2011). Such activities are usually undertaken by organisations that have biodiversity conservation as one of its primary goals and they often secure significantly large tracts of lands. Hence, land under such non-government organisations (NGOs) can be considered to be well protected both spatially and temporally. While acknowledging the important role that NGOs play in promoting conservation on private land that merits a discussion on its own on their significant contribution, this paper will focus more on the strategies available for individual private landowners to engage in conservation while maintaining ownership.

2.2.1. Formal and informal private reserves

Within the context of this paper, private reserves are defined as land under private ownership that has been set aside for the protection of nature and its components through legal or other effective means for personal or public benefits (Figgis 2004; Chacon 2005). It includes private wildlife reserves for the protection of biodiversity as well as private game reserves or ranches, where game or trophy hunting within predefined, sustainable limits is permitted. The status of such protected areas can be either formal (legal status bestowed by government authorities based on ecological and technical criteria) or informal (no legal status and functions on the commitment of the landowner to conserve), depending on the provisions available in the country. Ownership of such reserves could also be under NGOs that purchased the land for biodiversity conservation but, as mentioned earlier in this paper, we refrain from a detailed discussion on this topic and instead concentrate on individual landowners. Private reserves vary in size, land tenure, land use, management regime, the type of habitat protected and the objectives for formation (Krug 2001; Langholz and Krug 2005). This form of sanctioned conservation is especially advantageous when a country's land tenure laws do not recognise conservation as a land use (ELI 2003; Ramutsindela 2004).

Private reserves and game reserves, whether owned individually or in partnership with investors, are most popular in countries with rich mega-fauna which generates direct income through activities such as eco-tourism and safaris, wildlife viewing and game hunting. They offer significant potential to promote conservation on private land when other conservation options are not viable because the economic benefits are directly linked to conservation and maintenance of wildlife habitats (Lindsey *et al.* 2006). The tradition of private reserves for game management has been quite common in the African continent in countries such as Namibia, South Africa, Kenya, Zimbabwe and Tanzania and they continue to gain popularity (Krug 2001; Langholz and Lassoie 2001; Ramutsindela 2004; Sims-Castley *et al.* 2005). There are approximately 150 (or 2% of

total land area) game reserves in Namibia and close to 1000 (or 5.6% of total land area) in South Africa (Krug 2001). Similarly, Brazil has 429 registered private reserves, and in Central America, a total of 2900 landowners are now protecting 509,000 hectares of land in formal private reserves (ELI 2003; Chacon 2005). In Australia, private reserves have been formally established as Private Wildlife Sanctuaries and Private Protected Areas, primarily owned by larger private companies and supported by the National Reserve System programme (Figgis 2004). However, other forms of government support in the country are also provided for smaller ‘off reserves’ and ‘landscape reserves’ (Binning and Feilman 2000; Figgis, Humann, and Looker 2005). A similar private initiative in the UK under the National Nature Reserves programme allows for private land to be declared protected with the approval from statutory conservation bodies, although these reserves are more common to larger private organisations than individuals (Reid 2011).

2.2.2. Conservation easements/restrictions/covenants

Compared to the other strategies used to promote conservation on private land, use of conservation easements is relatively new but it has become one of the most popular strategies used now. With involuntary approaches increasingly considered intrusive, expensive and generating conflict over property rights, easements offer a more effective and less expensive tool (Main 1999; Gattuso 2008). A conservation easement, in its most basic form, is a voluntary but legally binding agreement between a landowner (or a grantor) and an organisation such as a land trust or a government agency (or a grantee) in which the landowner relinquishes some rights over the land to protect the natural landscape in exchange for economic benefits through the sale of developmental rights and tax relief (Bernstein and Mitchell 2005; Gattuso 2008; TNC 2011; Yonavjak and Gartner 2011). Land trusts are non-profit organisations that undertake or assist in conservation easement acquisitions (LTA 2010). Restrictions on land use are usually in perpetuity and applicable even when the ownership of the land changes through sale or inheritance (Clough 2000; Figgis 2004). Easements have been developed for agricultural lands, private forests and land with historical, cultural or scenic values (TNC 2011). The economic benefits to the landowner from placing land under a conservation easement derives from a reduction in property value which reduces the landowner’s tax burden and/or the sale of development rights on that property, which sometimes comes close to the value of the land itself. Restricting developmental activities on private land lowers the value of the land and this difference in value (before and after the easement was formulated) generates the tax relief (Bernstein and Mitchell 2005; Figgis, Humann, and Looker 2005; TNC 2011). In addition, depending on the country, conservation easements may be eligible for an income tax deduction if they are considered a charitable donation. For example, farmers and ranchers in the US were eligible for a tax deduction for up to 100% of the value of the land (50% for non-farmers) under the Food and Energy Security Act of 2007 (USDA-ERS 2008).

The use of conservation easements or covenants began in the 1950s in the US, and they are now being used in countries across Latin America, Africa, the UK and Australia (Leva 2002; Gattuso 2008; Fishburn *et al.* 2009). Particularly in the US where 85% of the federally listed endangered species occur on private land, this approach assumes an important role for biodiversity conservation (Rissman *et al.* 2007; Stein *et al.* 2010). Yonavjak and Gartner (2011) reported that conservation easements cover more than 30 million acres in the US. Strongly related to conservation easements is the exponential growth in the number of land trusts in the US, from 1263 in 2000 to 1699 in 2010

(Gattuso 2008). According to the 2010 census of USA's Land Trust Alliance, land trusts together control about 19.2 million hectares (or 3.5% of total private land in the US), with 2.3% under national land trusts and 1.2% conserved by state and local land trusts. The Nature Conservancy, the largest national land trust, accounts for 37% of the total land owned by land trusts in the country, with approximately 13% of this land in the form of conservation easements (LTA 2010; TNC 2011).

Although a detailed discussion on conservation easements is beyond the scope of this paper, it is important to acknowledge its significance in addressing economic and conservation needs together, and the degree to which easements could bridge the needs of nature conservation and the landowner.

2.2.3. *Other incentive-based actions (conservation contracts/programmes)*

Another closely related approach is to use incentives that make it attractive for landowners to apply conservation measures voluntarily. For incentive based programmes to be effective, it is imperative to have well-defined conservation goals that are both ecologically sound and acceptable to landowners. Such programmes or contracts typically provide economic incentives for activities that enhance or restore the quality of the land, or otherwise limit activities that have negative impacts on the state of biodiversity (George 2002; Doremus 2003; Mayer and Tikka 2006).

The type and number of voluntary programmes are large and diverse, with perhaps the largest number of examples coming from the US. Many states have different incentive programmes that use cost sharing, technical assistance through conservation contracts (an agreement between landowner and government for conservation actions that the landholder will undertake in exchange for a payment from government), or rewards for conservation initiatives that target specific species or habitat such as agricultural lands, wetlands and private forests (Clough 2000; Doremus 2003; Mayer and Tikka 2006). Some examples of these programmes include the Private Dedication Program in Kentucky, the Landowner of the Year Program in Colorado, the Indiana Classified Forests Act, the Wildlife Habitat Contracts in California and The Pheasant Habitat Improvement Program in Colorado. George (2002) and Doremus (2003) provided a detailed account of these state-level programmes in the US.

In addition to state-specific programmes in the US, there are several national incentive and cost-share programmes such as the Department of Agriculture's Wildlife Habitat Incentives Program, The Wetlands Reserve Program (WRP), The Grassland Reserve Program (GRP), The Healthy Forests Reserve Program (HFRP) and The Conservation Reserve Program (CRP) (USDA 2011). The CRP is particularly innovative in that it provides for the retirement of marginal agricultural land by offering compensation to private landholders that divert land from agricultural production to biodiversity conservation (Clough 2000; USDA 2011). Similar examples exist in the European context, where several regional and national programmes are based on the incentive model. The Agri-Environment Scheme (AES) under the Common Agricultural Policy (CAP) of the EU is the most well-known and widely implemented programme. AES pays approximately £400 million (or US\$628 million) a year to farmers and land managers and covers 66% of England's agricultural land (Natural England 2009). It supports programmes that offer compensatory payments for the voluntary provision of environmental services on farmland by landowners such as maintenance of native species on farmland, and the management of hedgerows and water regimes (Said and Thoyer 2009). The amount and nature of compensation depends on the type of environment-

friendly practices adopted or the foregone benefits because of the conservation measures. Other examples from Europe include Finland's Natural Values Trading Program, Germany and Portugal's fiscal transfer tools, Austria's Natural Forests Reserve Program and Sweden's Nature Conservation Agreements (Frank and Muller 2003; DGARD 2005; Mayer and Tikka 2006; Swedish EPA 2007; Paloniemi and Tikka 2008; Ring, 2008).

Forest certification is also an incentive programme in that it provides an opportunity for private foresters to undergo formal assessment according to predefined sustainable standards in return for better market prices for harvested forest products such as timber. While several forest certification programmes are available in the US such as the American Tree Farm System, the Forest Stewardship Council and the Sustainable Forest Initiative, this mechanism of using market demand to promote sustainable use of resources is also being adopted in other countries such as Britain, Australia, several EU member states, and several countries in Latin America such as Brazil (Imaflora, Société Generale de Surveillance's Qualifier Program) and Chile (Crawford 2006; May 2006; Cubbage *et al.* 2009; AFS 2011; FSC 2011; PEFC 2012).

2.2.4. *Voluntary non-binding conservation activity*

The external approaches discussed thus far create binding or formal obligations for the landowner, but there is growing interest among landowners (especially in developed countries) to conserve their land based on growing awareness of the benefits of nature conservation such as increasing the 'attractiveness' of their land to support activities such as eco/agro-tourism. Participation in a programme is not binding, allowing participants to disengage at any time. Because the programme does not offer financial incentives, minimal financial resources are required from the government (Stoneham *et al.* 2000). However, it also requires landowners' environmental awareness and willingness or capacity to participate. For example, in Australia, Land for Wildlife is a voluntary programme that attracts landholders convinced of the value of conservation who then seek advice and expertise to maintain their property for conservation. Conservation development, practised in the US as well as some countries in Latin America, is another example of voluntary initiative which combines land development with functional protection of natural resources (Milder 2007). It is a form of controlled land use, where development of an area is balanced by designing it sustainably in order to have open spaces, or protected farmlands and other wildlife habitats.

2.2.5. *Conservation Networks*

The increasing awareness and growing interest of landowners to integrate conservation with economic values has led to the formation of several associations/networks/organisations of landowners that share information and resources on conservation options. Although such associations are not directly responsible for implementation of conservation strategies, they play an important role through information dissemination that bridges the gap between private landowners and implementing agencies. The Private Landowner Network and the Cooperative Conservation America in the US are examples of such networks; Australia has the Conservation Management Networks while the European Landowners Organization and National Ecological Network (now a part of the Pan European Network of Protected Nature Areas (PEEN)) serve a similar purpose in the European context at a regional and national level (Figgis, Humann, and Looker 2005; PLN 2006; CCA 2007; ELO 2010; COE 2011).

2.3. Mixed strategies

Sometimes the traditional approach of top-down prescription is combined with one or more voluntary bottom-up strategies to achieve conservation outcomes. This often occurs in public protected areas that contain patches of private land and so they may be the only viable option of land use due to other development restrictions already imposed by governments.

Examples of mixed strategies include Transfer of Development Rights (TDRs) and mitigation banking. TDRs are complex market-based instruments that are undertaken by local governments to promote the transfer of development rights (thereby 'selling' the particular right) from ecologically sensitive areas (sending areas) to areas with higher development potential (receiving areas) (Daniels 1998; Johnston and Madison 1997). Often, the incentive for landowners to convert their land into a 'sending area' is because it is already recognised by the government for its conservation value and therefore it has limited economic viability for the owner based on the restrictions already in place. Mitigation banking, primarily used to restore, enhance or preserve wetlands, is another example. It runs on a credit system that offsets adverse impacts of developmental projects on similar ecosystems (EPA 2012).

Covering different types of mixed strategies is beyond the scope of this paper due to the diversity of such strategies based on context and scale. However, it is important to recognise their potential in conservation because they seek to balance top-down and bottom-up approaches that target both collective and individual interests.

3. A proposed system for classifying conservation on private land

Private land in conservation is increasingly significant with human demographic and development pressure limiting the amount of land available for designation as protected areas. The impetus for developing a classification system for protected areas by the IUCN was to monitor and record the growing global protected areas network for conservation in a systematic way by categorising them based on their management objectives (Bishop *et al.* 2004; Phillips 2004; IUCN 2012). Thus far, private lands under different forms of conservation strategies (whether involuntary or voluntary) have no clear distinction in terms of the extent and duration of conservation security they provide. The proposed classification system is a pragmatic one that seeks to provide a platform on which to describe, understand and possibly evaluate private lands. It can also act as a tool for planning protected area systems and wider bioregional conservation planning; encourage governments and managers of private protected areas to develop coordinated systems that are tailored to national and local circumstances; and provide a framework for the collection, handling and dissemination of data about private protected areas.

The framework for assigning the attributes to each class addresses the following:

- (1) *Conservation security*: the extent of enforceable protection provided.
- (2) *Permanence of protection*: time duration of the conservation security.
- (3) *Property rights*: rights surrendered (and retained) by the landowner.
- (4) *Management purpose*: intent of management actions or interventions.

These functional attributes will reflect the reasons behind protecting a site, the intended object/characteristic being protected, and how it affects the landowner in his use of the land. The system we propose classifies conservation strategies into categories that

approximate the degree of regulatory protection as in case of the IUCN classification, but is more explicit about the level of conservation security. Further, it takes into account the distribution of property rights and the purpose of management.

Property rights have been conceptualised as being a bundle of rights similar to a 'bundle of sticks' where each 'stick' represents one right associated with the property. It is possible to divest some rights while retaining others (Schlager and Ostrom 1992; Rissman 2013). The broader groups of rights associated with a private property are: (1) right to use and possess (includes access, management and extraction rights); (2) right to exclude; and (3) right to transfer (or alienate). Schlager and Ostrom (1992) defined the specific rights as follows:

- *Management*: the right to be able to regulate development or other changes on the land;
- *Withdrawal*: the right to extract resources from the land;
- *Access*: the right to physically access the land;
- *Exclusion*: the right to physically exclude outsiders from accessing the land;
- *Alienation*: the right to sell or lease the land, along with the other rights associated with it (management, exclusion, access, exclusion).

The management purpose and conservation security are co-dependent and together they determine the management actions. The management purposes have been developed by taking into consideration the Australian Land Use and Management Classification System (ALUM) that takes into account both public and private lands, and classifies based on generality, level of intervention, prime use and hierarchical structure (ALUM 2010). We classified the management regimes into the following broader categories based on the use of the land after a conservation strategy is implemented:

- Nature conservation: land is primarily for conservation purposes, essentially of natural ecosystems that are already present;
- Managed resource protection: land is restricted to protect specific natural resources or ecosystem through active management or interventions;
- Management co-existing with production: land is primarily used for production and sustainable consumption, while considering ecological dimension of such actions;
- Production and resource use: land is for production and consumption and natural environment (if protected) is an unintentional secondary benefit.

A brief description of limitations is provided with each conservation strategy. The proposed six classes show rough progression from high and formal conservation security for a long duration (or perpetuity) to decreased security and informality in implementation. The classes are described in [Table 1](#).

Categories I (a) and I (b) restrict development and provide conservation benefits for a long period of time, if not in perpetuity. Category I(a) includes private land that has been purchased (with title) from, or donated by individual landowners to conservation-oriented organisations for the protection of biodiversity. Assuming that the management purpose behind the purchase of the land was for conservation benefits, which is typical of large international NGOs working for biodiversity conservation, this form of protection is considered to be highly secure and the new owner bears all the property rights. Category I(b) includes private land protected through easements (without title) that exist in perpetuity. Based on the terms of the easement, the owner usually surrenders rights

Table 1. Proposed typology for classifying private land involved in biodiversity conservation.

Category	Characteristics	Permanence of protection	Property rights surrendered	Management purpose	Key variables influencing biodiversity conservation outcomes	Specific examples
Category I(a): Ownership by private conservation organisations	Land and title held by organisation (NGOs, land trusts), conservation effectiveness determined by management activities, self-monitoring of conservation activities	Land protected in perpetuity (unless sold to another party without core conservation motives)	None	Nature conservation	Primary motivations and principles of the organisation, management activities undertaken	The Nature Conservancy in the US owns 6 million hectares of private land (TNC 2011)
Category I(b): Conservation easements on private land	Land and title retained by the landowner, legally binding and incentive based contract, restricts development, voluntary, monitoring by easement holder or third party	Land protected perpetuity (unless specifically stated in the easement clause)	Withdrawal Management (as dictated by the easement) Exclusion (if mentioned in the easement)	Nature conservation/ Management co-existing with production	Content and duration of the easement, capacity to monitor and enforce easement clauses	Conservation easements in the US (LTA 2010; USDA 2011)
Category II: Regulated private properties	Land and title retained by the landowner, legally binding, restrictive and non-voluntary, monitoring by external party (often government agencies)	Long term (as long as the legislation exists) and sometimes in perpetuity	Withdrawal Management	Nature conservation/ Managed resource protection	Substantive content of statutory or regulatory restrictions, enforcement capacity of the implementing agency	Natura 2000 in EU (Hiedenpää 2002; Ostermann 1998), Forest (Conservation) Act, 1980 in India (NBA 2012)

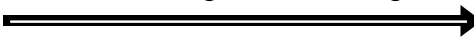


(continued)

Table 1. (Continued).

Category	Characteristics	Permanence of protection	Property rights surrendered	Management purpose	Key variables influencing biodiversity conservation outcomes	Specific examples
Category III: Contracted conservation	Legally binding, incentive based, often contains specific management activities to promote conservation, monitoring by contracting party, penalty for breach of contract	Usually short term in duration (usually 1–10 years) but renewable	Withdrawal Management (partially)	Managed resource protection	Type of management activities undertaken, primary objective of the contract, monitoring of compliance	Conservation Reserve Program and Wetland Reserve Program in USA (USDA-ERS 2008), Agri-environment scheme in EU (Grodzińska-Jurczak et al. 2012)
Category IV: Sanctioned or certified conservation programme	Non-binding, voluntary participation, monitoring by sanctioning party or certifying organisation	Tenure dependent on individual cases, quick termination possible	Withdrawal (partially)	Management co-existing with production	Public willingness to pay conservation premium, public trust in certification standards	Game reserves in Africa (Krug 2001; Langholz and Lassote 2001), Forest certification programmes (FSC 2011)
Category V: Active voluntary conservation	Non-binding, exists primarily because of strong conservation ethic of landowner, flexible, no monitoring, may or may not involve external financial support	No obligation in tenure length, quick termination possible	None	Management co-existing with production	Landowners' attitudes, values and motivations, social norms, landowner efficacy	Conservation Buyers programme of The Nature Conservancy in USA (TNC 2011), Land for Wildlife in Australia (Figgis 2004)
Category VI: Inactive conservation	Non-binding, conservation benefits derived from current capacity of the land	None	None	Production and resource use	Continuation versus changes in current use of the land, public education, environmental awareness and outreach	Private land under no specific conservation action

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over withdrawal (although agricultural activity may be allowed in some easements), management that involves permanent development, and exclusion (if dictated in the easement), while maintaining access and alienation rights. Private land under this category targets biodiversity conservation (if stated in the conditions of the easement) by attaching development restrictions to the land and hence the management purpose is the same as Category I(a). Lands under Category I(a) that are owned and managed by NGOs depend on the integrity and capacity of the organisation to achieve conservation outcomes and are still theoretically vulnerable to poor land management practices or divestment by the NGO which may not be legally actionable by third parties. In theory, Category I(b) easements are legally enforceable if the landowner fails to abide by the terms of the easement.

Although conservation easements have been one of the most popular instruments to engage landowners, their effectiveness in achieving actual conservation outcomes is subject to debate. Taking the US as an example, less than 2% of private family forest owners have entered land into easements, which is significant because 82.6% of the forested land in the Eastern states and 31.1% of forested land in the Western states is under private ownership (USDA: FS-696 2000; Ma *et al.* 2012). Similarly, agricultural land (grazing, forest-use land, cropland, farm roads) represents 51.8% of the total land area of the country, yet less than 1% has been placed in conservation easements (Lubowski *et al.* 2002; NIFA 2009). Moreover, the monitoring of land post easement becomes difficult, especially if a single trust holds a large number of easements. There is also a significant increase in the number of local and national land trusts and this has generated speculation over the role of land trusts as unbiased agencies or mediators for the government to convert private land into public. Gattuso (2008) provided an in-depth critique of the use of conservation easements as profit making ventures by land trusts. In addition, as Byron, Holland, and Schuele (2001) and the Joint Committee on Taxation US (JCT 2005) highlighted, the primary benefit from conservation easements are tax benefits that appear to drive the process, which means protection of land for its intrinsic conservation value may not be the main goal for landowners. Further, tax deductions require that the local or national governments are affluent enough to bear the loss of revenue from taxes, which makes this tool challenging to implement in developing countries that struggle to support basic social services through revenues.

Category II includes private land where developmental activity or other land use changes have been legally restricted through legislation and prescribed policies. This category includes two types of private land: private holdings inside protected areas (such as national parks, or in case of Europe – Natura 2000 sites on private land) where the regulations of the protected area extend to private land; and second, private land whose usage is restricted by government through legislation, or legally enforceable land use plans. In such cases, the landowner surrenders specific withdrawal and management rights, but involuntarily and hence acceptance may be lower. The management purpose could be broader nature conservation or targeted resource management. For example, the Endangered Species Act in the US legally protects endangered species and its associated habitat irrespective of whether these occur on public or private land.

Governmental policies that use involuntary controls over land use are becoming less preferable (Harrop 1999). The effectiveness of restrictive policies depend significantly on the general awareness among people about the importance of biodiversity conservation since direct benefits to the landowners are often not obvious (Hesselink *et al.* 2007; CBD 2009; Laycock *et al.* 2009).

Category III includes environmental contractual obligations often administered through government programmes designed to promote conservation outcomes through better land/water management. Because these programmes are generally of a fixed term (e.g. 10 years) and subject to continuing government appropriations, they are less secure than Categories I and II. Based on the terms dictated by the specific programme, the landowner relinquishes his right of withdrawal and/or management. The main purpose is to manage targeted natural resources and this often includes safeguarding or promoting overall biodiversity as its primary or secondary objective. This category includes conservation contracts on private land administered through programmes such as the Agri- Environmental Scheme of EU and the US Department of Agriculture's Wetlands Reserve Program.

Category IV includes lands that implement voluntary conservation activities, but the activities are recognised, sanctioned or certified by an external body. Most of the rights are retained by the landowner, including extraction, but the extraction of resources must remain within defined limits to achieve external recognition. Conservation outcomes appear less secure than the previous categories because the length of landowner engagement with the game reserve activity or certification programme is not prescribed and can be withdrawn without significant penalties for the landowner.

Game reserves and private forest management certification programmes are the leading examples. According to Figgis (2004), however, the long-term sustainability of such non-binding conservation practices is uncertain because the land could be sold or inherited by those not interested in continuing the reserves. Further, in the case of game reserves and certified forests, the main incentive for conservation might itself get corrupted due to unsustainable harvesting (Deere 2011).

The impetus behind forest certification is to promote sustainable harvesting of forests in developing countries suffering from accelerated deforestation. However, certification has been observed to be more popular in developed regions such as North America and Europe (Cashore *et al.* 2005; May 2006). In 2006, FAO estimated that 7% of the world's forests had been certified, almost all on private land. Challenges in certification include the cost of certification and generating consumer awareness about the added value of certified products (Hartsfield and Ostermeier 2003; Anderson and Hansen 2004; Archer, Kozak, and Balsillie 2005).

Category V includes private land that is voluntarily managed to conserve a landscape or specific natural resource, without any specific economic or financial incentives, and hence all rights related to the property are retained by the owner. The landowners undertake such measures because of their awareness and/or passion for nature, or when the conservation measures they have already been taking in the past entail no significant cost. Thus the purpose of managing such land is to protect the relatively natural environment that can co-exist with production or current land use. Intentional, voluntary wildlife conservation without incentives is rare, but the advantage of this type of conservation is that because it attracts people predisposed to conservation, the implementation cost is minimal and is a powerful motivation, once established. However, because management for conservation outcomes rests purely on the motivation of the landowner, there is no security in the continuance of conservation activities in the absence of formal agreements (Stoneham *et al.* 2000). In addition, records on the proportion of land under this category would be difficult to maintain, unless there are special regulations or schemes from governing authorities (such as the Land for Wildlife programme of Australia) that require declaration or registration of such parcels of land.

Finally, Category VI includes 'undeveloped' private land, that is, land that has conservation potential but does not have any active conservation strategy or management for conservation. The potential biodiversity benefits from these lands derive from the inherent or latent features of the land rather than any conscious activity on the part of the landowner. For biodiversity conservation on private land to be more effective in the future, a primary objective should be to identify land in this category with significant biodiversity potential, both in terms of ecological priority and landowner opportunity, and make conservation of this land more explicit and secure. Generating awareness among landowners through environmental education would play a significant role in addition to the other strategies discussed in this paper.

4. Challenges and opportunities

Unlike the IUCN categories of protected areas, private protected areas have emerged mostly as a result of endeavours that are individualistic and targeted at the micro-scale. Therefore, the purpose of the proposed classification system is also to provide insights into the gaps that need to be filled before private protected areas can be unified by a classification system. We summarise the main challenges and possible opportunities in implementing such a classification system.

Data collection: The primary challenge is that basic information on the acreage of private land involved in conservation at a national level is rare and more specific information on the amount of private land devoted to conservation at local and regional levels is lacking in most countries. However, some conservation strategies (Categories Ia, Ib, III and IV) require obligatory record keeping and/or monitoring and therefore access to such information will be relatively easier than for the other categories where there is no formal monitoring. It is imperative to create a basic database, starting from local level and scaling up, on the acreage of private land involved in conservation, which, in turn, will involve addressing the issue of combining all data sources, as mentioned below.

Collation of data: Even for the categories where data are available, the main hindrance lies in the scale of such data, which is usually available only at a local level, and in collating the information from different sources (such as NGOs, environmental agencies, land trusts). Therefore, there needs to be a unifying body/agency that would manage and monitor the collation of data. This is only possible when national legislations recognise and reflect private protected areas, and this leads us to the next challenge mentioned below.

Adoption into national strategies: Management and monitoring of protected areas under the IUCN categories is possible because of the presence of an over-arching body (the IUCN) that defines the standards, and the coherence between national environmental policies that support this classification system, thus making it possible to reflect the categories at a national or local level. National environmental databases on protected areas allow for combining local data into national data, while UNEP-WCMC (World Conservation Monitoring Committee) and IUCN's WCPA (World Commission on Protected Areas) in turn provide regional and global assessments such as the World Database on Protected Areas (WDPA). The assessment of private protected areas will require similar initiatives, and therefore categories of private protected areas need to be recognised and reflected in a country's environmental policy as an accepted form of protected area, much like the IUCN categories.

Monitoring conservation status: In order to receive recognition and policy support, the classification system for private land conservation will need to prove its value to

biodiversity conservation over time. Related to this issue is the coordination of conservation activities across properties. Fragmented and isolated conservation actions on private land are less likely to produce strong conservation impacts. This means monitoring the conservation status of private lands involved in conservation. Thus far, no systematic monitoring of the different categories at a national level exists, although there is monitoring of specific strategies (such as those in Categories Ib, III and IV) at a local level. To have coherent data, the criteria for conservation status should be tracked at both national and site levels. Conservation targets (species, ecosystems, landscapes) can be prioritised based on the immediacy of threat to persistence. Site level criteria should represent conditions and indicators which can be measured or described in a standardised way within the individual locality. Although it is not possible to be very specific across individual cases (e.g. two tracts of land that are being tied under conservation easements), but it is possible to have broader criteria and indicators that can be coherent across sites. For this there needs to be collaboration among the different agencies responsible for implementing these strategies. The national level criteria should sum up those used on the site level within the overall criteria for conservation status.

The availability of such information and the coordination of actions would help to address the important research question about the relationship between conservation security, identified through various categories of conservation on private land, and the degree to which biodiversity is actually conserved on such land.

5. Conclusions

This paper reviews conservation strategies and proposes a typology based on an underlying dimension of conservation security. Each category has been defined in terms of its characteristics and the variables that ensure biodiversity conservation. These variables can also be adopted as key features of future conservation policies and actions that focus on successful implementation of conservation strategies on private land. The vast majority of private lands (Category VI) are insecure for conservation and unlikely to produce significant conservation outcomes except by chance. Therefore efforts to promote conservation on private land will need to focus on moving land under Category VI to any of the other categories with higher conservation security through educational efforts along with other strategies presented herein.

Private lands possess different levels of ecological value for biodiversity conservation as well as conservation opportunity based on landowners' capacity and acceptance. Private land with high ecological value as well as high landowner acceptance of conservation goals will require minimal intervention to move this land into Categories I–V; however, lands with high ecological value but low acceptance of conservation goals by landowners will require some incentives to make conservation more attractive and plausible (Byron, Holland, and Schuele 2001; Knight *et al.* 2010; Raymond and Brown 2011).

Securing conservation outcomes on private land can be achieved through a variety of strategies described herein, but the most secure categories will bear the highest social cost. Identifying the socio-ecological context of private land conservation and explicitly including conservation opportunity as a guiding principle can reduce the cost of private land conservation and increase conservation security. Achieving greater conservation security for Category VI lands can be furthered by recognising that private land with current high conservation value in this category is probably not due to chance, but rather is a result of environmentally-friendly land

management practices that reflect some landowner understanding of the importance of sustainable land use. Securing longer-term conservation commitments from these landowners should be a priority.

When public goods such as wildlife occur on private properties, it is almost impossible to manage such common resources without treading on some of the private property rights. Property rights surrendered and retained by the landowner highlights the social and economic costs of conservation on that land. Where the landowner has voluntarily agreed to surrender some of his rights, the particular strategy (and the benefits it provides) represents the conservation cost for protecting that land. Property rights also seem to have a relation with the conservation security provided by the categories. From our classification table, we observe that the extent of conservation security on private land is inversely proportional to the property rights retained by the landowner, that is, more rights from the 'bundle of rights' retained by the landowner equates to less conservation security.

In the practice of biodiversity conservation, more attention has been devoted to conserving the patches of protected areas and corridors linking them than the matrix of private lands that surround these lands. This is understandable given the challenges of private land conservation. However, ecologists and biologists recognise the importance of private land in biodiversity conservation and have expressed this by identifying specific private lands as areas of conservation importance. The Natura 2000 site delineation in Europe is a good example.

David Brower, a well-known environmental leader, once said, "All of our environmental victories are temporary, and all of our defeats are permanent" (Mark 2013). So it is with conservation on private land. The proposed classification of private land conservation serves to highlight the limited, insecure and tenuous nature of conservation gains made to date. To advance conservation on private land, we consider it vitally important to account for not only the extent of conservation on private land but also the security of the land that is conserved. Identifying private land conservation opportunities that intersect ecological priority areas is a pragmatic pathway to increasing the benefit of conservation on private land.

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