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COMMENT

Increasing strict protection through protected areas on Brazilian private lands

A key strategy to reduce habitat loss and fragmentation involves the establishment of protected areas (PAs). Currently *c*. 13% of the global land area lies within PAs (Jenkins & Joppa 2009) with a wide range of management objectives. The World Conservation Union's (IUCN) categories I–IV (hereafter termed strict protection) are areas for indirect use (Dudley 2008), being arguably more efficient in achieving the specific goal of conserving biodiversity. Worldwide, only 6% of land is subject to strict protection (Jenkins & Joppa 2009), and one strategy to increase this is stimulating the establishment of PAs with a regime of strict protection in private lands (WRI/IUCN/UNEP [World Resources Institute/ International Union for Conservation of Nature and Natural Resources/ United Nations Environment Programme] 1992). However private PAs differ among countries in their long-term security, and general guidance on them still has to be developed (Dudley *et al.* 2010). Private PAs form an important constituent of the Brazilian national PA system (Portuguese acronym SNUC [Sistema Nacional de Unidades de Conservação da Natureza]), which is one of the largest PA systems in the world. The creation of a system of private PAs in Brazil may act as a useful model for extending PA systems internationally.

Within the SNUC, Private Natural Heritage Reserves (Portuguese acronym RPPN [Reserva Particular do Patrimônio Natural]) are areas established on private lands, recorded in perpetuity, having all ownership rights maintained, that only permit scientific research and visitation for tourism or educational purposes (Brasil 2000). There is a financial incentive for landowners to establish RPPNs through the waiving of rural property taxes (Brasil 1996).

PAs worldwide can be classified into IUCN categories according to their primary objectives (Dudley *et al.* 2008). The assignment of an IUCN category to a PA is the responsibility of the relevant national government and a voluntary process, thus not all PAs are assigned to an IUCN category (S. Kenney, personal communication 2012). Brazil has not yet formally assigned an IUCN category to RPPNs, but they equate to IUCN category IV (Rylands & Brandon 2005; Silva 2005). Category IV (habitat/species management) areas are set aside for the protection of particular species and/or habitats (IUCN 1994). Such areas are generally small, and therefore management of species or habitat is needed in order to sustain major ecological processes (Dudley 2008; Dudley *et al.* 2010). Similarly, RPPNs are recorded in perpetuity, their use is restricted, and they are often created to protect a particular species and/or habitat. Public/governmental strict protection schemes tend to protect large areas, while RPPNs generally protect small fragments that are important for landscape connectivity (Mittermeier *et al.* 2005). This is well illustrated by the highly fragmented Brazilian Atlantic Forest, where the Golden Lion Tamarin Project has rescued *Leontopithecus rosalia* from the brink of extinction. The Project protects the largest populations of the species in two public strict protection areas, and uses RPPNs created for that purpose in the surrounding fragments to manage metapopulations (Rambaldi *et al.* 2005). RPPNs are thus a vital part of the Brazilian SNUC network and increasingly popular in Brazil, partially because they are easily created at the landowner's initiative (either at an individual, corporate or institutional level), do not have a cost to government and may result in better protection than federal and state PAs (Mittermeier *et al.* 2005).

The widely used World Database on PAs (WDPA), compiled from data provided by individual governments, currently lists only five RPPNs, however there are 593 RPPNs in Brazil at the federal level (ICMBio [Instituto Chico Mendes de Conservação da Biodiversidade] 2012). Should the Brazilian government formally assign RPPNs to IUCN category IV, the land area in Brazil officially subject to strict protection would increase by *c*. 700 000 ha (Brazil 2010; ICMBio 2012). The existence of RPPNs becomes increasingly important when considering specific biomes, such as the Pantanal, where federal RPPNs alone more than double the area under strict protection (ICMBio 2012). The WDPA is the only global PA database, and has been used for a variety of scientific studies and key international reports (Dudley *et al.* 2010). Given Brazil's continental size, the Brazilian government's failure to assign an IUCN category for RPPNs, and thus their virtual absence from the WDPA, unrecorded RPPNs potentially distort quantification of the land area in Brazil subject to strict protection. Although many small PAs have never been listed in the WDPA (Dudley *et al.* 2010), IUCN guidelines clearly place RPPNs in IUCN category IV. A list of existing RPPNs, including digital maps in standard geographic information system (GIS) format, is readily available from Brazilian government websites, making their future inclusion in the WDPA relatively easy.

Previous studies have demonstrated the importance of private PAs for the representativeness of terrestrial ecosystems (for example Von Hase *et al.* 2010; Pliscoff & Fuentes-Castillo 2011), and many events worldwide have given special attention to private PAs, such as the 2003 IUCN World Parks Congress and the 2004 Convention on Biological Diversity

Conference of Parties 7 (Langholz & Krug 2004). Brazilian private PA legislation is probably the most comprehensive in Latin America (Swift *et al.* 2004) and provides sound ecological, policy and economic principles that may be applied by decision makers worldwide. These include:

(1) the creation of legal instruments capable of establishing private PAs, as opposed to informal protection (see Goriup 2005);
(2) the requirement that PAs are managed in perpetuity (Dudley 2008);
(3) a preference for indirect land use over direct use (see Goriup 2005);
(4) the creation of private PAs that complement and extend public protection efforts, as opposed to being precursors to government protection (Langholz & Krug 2004; Swift *et al.* 2004; Von Hase *et al.* 2010);
(5) the creation of supportive governmental incentives, such as tax relief, compensation and payment for ecological services (Chacon 2005);
(6) a preference for small private PAs, that contribute towards landscape connectivity, and act as biological corridors, stepping stones and/or buffer zones between and around public PAs (Swift *et al.* 2004); and
(7) stronger protection for private PAs than public PAs, because private PAs are generally smaller and have greater management presence (Swift *et al.* 2004).

RPPNs in Brazil demonstrate the importance of PAs on private lands and, long-term, may be used as an internationally applicable model for increasing land area under strict protection worldwide. Implementation of similar schemes may be particularly valuable in tropical countries, where public PAs alone are unlikely to protect biodiversity.

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RENATO CROUZEILLES*, MARIANA M. VALE, RUI CERQUEIRA AND CARLOS E. V. GRELLE
Laboratório de Vertebrados, Departamento de Ecologia, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil
**Correspondence: M Renato Crouzeilles*
e-mail: renatocrouzeilles@gmail.com