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Legislative correlates of the size and number of protected areas in Canadian jurisdictions

Shawn J. Leroux [a,*], Chris Brimacombe [b], Shahira Khair [b], Jamie Benidickson [c], C. Scott Findlay [b,d,e]

[a] Department of Biology, Memorial University of Newfoundland, 232 Elizabeth ave., St. John's A1B 3X9, NL, Canada
[b] Department of Biology, University of Ottawa, 30 Marie Curie, Ottawa K1N 6N5, ON, Canada
[c] Faculty of Law, University of Ottawa, 57 Louis Pasteur St., Ottawa K1N 6N5, ON, Canada
[d] Institute of the Environment, University of Ottawa, 1 Stewart Street, Ottawa K1N 6N5, ON, Canada
[e] Institute for Science, Society and Policy, University of Ottawa, 55 Laurier Ave East, Ottawa K1N 6N5, ON, Canada

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ABSTRACT

Protected area legislation provides the statutory authority for the establishment and management of protected areas. Yet few studies have investigated the relationship between protected area legislation and those attributes of protected areas that are likely to affect their success in achieving biodiversity conservation objectives. Here we investigate the association between the size and number of protected areas within Canadian provincial, territorial and federal jurisdictions and provisions of the corresponding legislation using a Before–After/Control–Impact design. We found that jurisdictions with legislation that includes explicit provisions for donations in cash or in-kind and many types of stakeholder involvement had, on average, larger (1.01× to 29.0×) protected areas after versus before legislation enactment, compared to those without such provisions. Jurisdictions with legislation that includes provisions for protected area co-management with local or aboriginal/indigenous communities also had, on average, a higher rate of park establishment after (0.17–23.7 protected areas/year) versus before (0.17–6.34 protected areas/year) legislation enactment, compared to those without such provisions (0.09–5.00 protected areas/year; 0.21–5.30 protected areas/year after and before respectively). Similar patterns were detected for jurisdictions with legislation that includes provisions for operating and/or capital cost recovery. Our results suggest that legislative provisions that facilitate stakeholder participation and cost recovery may contribute to the establishment of more and larger protected areas. As signatories to the Convention on Biological Diversity attempt to expand protected area networks, they should consider including provisions concerning stakeholder involvement and cost recovery into protected areas legislation.

1. Introduction

Protected areas are an important vehicle for biodiversity conservation at a range of geographical scales (Chape et al., 2005; Dudley, 2008; Bertzky et al., 2012). Signatory nations to the Convention on Biological Diversity (CBD) must report on their progress in establishing terrestrial and marine protected areas as part of their efforts to reduce biodiversity loss (UNEP, 1992). The most recent CBD protected area targets call for the global protection of 17% of terrestrial and inland waters and 10% of marine and coastal areas (COP 10, 2010), which represents a substantial increase from the current global protection levels of 12.5% of land area and 3% of ocean area (Watson et al., 2014).

Legislative tools are believed to be important for protected area effectiveness (Dearden et al., 2005). Unsurprisingly then, the CBD encourages signatory nations to enact protected area legislation as part of their commitment to biodiversity conservation (UNEP, 1992). Some examples of protected area legislation include the Canada National Parks Act (Government of Canada, 2000), the Swedish Environmental Code (Government of Sweden, 2000), and the Ugandan Wildlife Act (Government of Uganda, 1996). As protected area legislation provides the legal authority for protected areas establishment and management, their success in meeting conservation goals is likely to depend upon the statutory provisions of the legislation (Dearden et al., 2005).

Here we investigate the relationship between the provisions of federal, provincial and territorial protected area legislation in Canada and the size and number of Canadian protected areas. We selected the size and number of protected areas as attributes of interest because (a) information on protected area size and number is readily available for all jurisdictions; and (b) there is substantial evidence that the ability of protected area networks to conserve biodiversity depends on both these attributes. For example, it has been argued that larger protected areas are better able to provide long-term persistence for the full complement of species and landscape-scale ecological processes (Peres,

* Corresponding author.
E-mail addresses: sleroux@mun.ca (S.J. Leroux), cbrim077@uottawa.ca (C. Brimacombe), skhair@uottawa.ca (S. Khair), Jamie.Benidickson@uOttawa.ca (J. Benidickson), findlay@uottawa.ca (C.S. Findlay).

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2005; Bradshaw et al., 2009; Cantú-Salazar and Gaston, 2010; but see Coetzee et al., 2014). An analysis of 14 national parks in Western North America showed that mammal extinction rates declined with increasing park size (Newmark, 1995). More recent analyses have shown that conservation outcomes correlate positively with the size of marine protected areas (Edgar et al., 2014). Also, a global analysis showed that nations with more protected areas tended to have fewer bird, mammal, and plant species at risk of extinction (McKinney, 2002).

Although management costs per km^2 may decrease with the size of protected areas (Balmford et al., 2003; Bruner et al., 2004), we expect the absolute cost of maintenance and management to increase with size and number of protected areas (Bruner et al., 2004). Consequently, the ability to recoup capital and operational costs may influence the size and number of protected areas that can be established. Similarly, we expect that protected area legislation that enables greater stakeholder involvement in protected area planning, establishment or management will facilitate the establishment of larger and more protected areas. This may be particularly true in countries, such as Canada, where indigenous communities own or (co)manage substantial territory.

Here we investigate the association between protected area size and number and legislative provisions that pertain to (1) operating and/or capital costs recovery; and (2) opportunities for stakeholder involvement in planning and management. For our purposes, we define stakeholders as any member of the public or local communities, including aboriginal or indigenous peoples, non-governmental organizations, other levels of government (e.g. municipal) and landowners.

2. Materials and methods

2.1. Protected area legislation survey

In 2006 the International Union for the Conservation of Nature (IUCN) Commission on Environmental Law (CEL) and the World Commission on Protected Areas (WCPA) established a Task Force on Protected Areas Law and Policy, which focused on analyzing existing governance in protected areas and providing advice on improving governance models (Task Force Protected Areas, 2008). As part of the task force activities, in 2009 the IUCN Academy of Environmental Law designed a global survey of legislative instruments for protected areas establishment and management. The survey included 16 sections and 69 questions that evaluated the extent to which statutory provisions address a range of issues, including protected areas establishment, governance, management and administration; scientific involvement; enforcement; and financing (see Appendix A for the complete survey). The goal of the survey was to identify provisions that, in conjunction with the IUCN protected areas management categories (Dudley, 2008), increase the chances of achieving protected area conservation objectives.

Our original goal was to explore the association between the size and number of Canadian protected areas in different jurisdictions and legislative provisions concerned with (a) cost recovery (b) stakeholder involvement; and (c) establishment of buffers around or corridors between protected areas. Consequently, we used a subset of survey questions pertaining to these issues (Table 1).

We focused on protected areas for which statutory authority derives from the Canada National Parks Act or the principal provincial or territorial protected area legislation in each province or territory (Table 2). In cases where the statute has undergone substantive amendments since coming into force (e.g. the case of the National Parks Act in 2000), we used the latest version of the statute. Several Canadian provinces and territories have multiple pieces of legislation that apply to different categories of protected areas. For example, planning and management of protected areas on public lands in Newfoundland and Labrador is, in principle, subject to provisions of the Provincial Parks Act, the Wilderness and Ecological Reserves Act, the Lands Act or the Wildlife Act. We consulted government officials for jurisdictions where we were unsure about the principal protected area legislation.

Information extraction from the final set of statutes proceeded in two steps. First, as part of a directed studies course, two senior undergraduate students independently extracted survey question data from each statute, with responses to survey questions being compared among the two raters. Second, each statute was subsequently reviewed by at least one of the study authors with expertise and knowledge in protected areas legislation both within Canada and worldwide, and compared to the two undergraduate evaluator responses. In the case of any discrepancies, the third evaluation was considered the correct interpretation. Survey questionnaires were completed for protected area legislation for 10 provinces, 3 territories, and national parks.

2.2. Protected area data

We used the Conservation Areas Reporting and Tracking System's protected areas database that includes 4090 protected areas and is the

Table 1
Questions relating to funding, stakeholder involvement, and buffers and corridors from the survey of protected area (PA) legislation (Appendix A). Levels of response are listed in parenthesis with Y = yes, N = no, D = duty, E = enabling, NE = none.

Legal question code used in figures	Question
Funding	
F1	Does the instrument include provisions for forfeiture or cost recovery (e.g. pollution clean-up or restoration of damaged ecosystems)? (Y/N)
F2	Does the instrument include provisions to collect entrance/user fees from transient vehicles? (Y/N)
F3	Does the instrument include provisions for the PA or PA agency to accept donations in cash or in-kind? (Y/N)
F4	Does the instrument include provisions to collect general entrance fees from PA visitors? (Y/N)
Stakeholder involvement	
C1	In what capacity does the instrument provide for public involvement or input for establishment of PAs? (D/E/NE)
C2	In what capacity does the instrument provide for public involvement or input for management of PAs? (D/E/NE)
C3	In the instrument, is public consultation with local stakeholders explicitly identified for the designation or establishment of PAs? (Y/N)
C4a	Does the instrument make provisions for PA establishment on land owned by indigenous or local communities? (Y/N)
C4b	Does the instrument make provisions for PA establishment on land owned by another level of government (e.g. regional, municipal, etc.)? (Y/N)
C5	Does the instrument provide for co-management with other levels of government? (Y/N)
C6	Does the instrument provide for co-management with non-governmental organizations? (Y/N)
C7	Does the instrument provide for co-management with local communities? (Y/N)
C8	Does the instrument provide for co-management with aboriginal/indigenous communities? (Y/N)
C4c	Are there provisions related to the establishment by the government of PAs on land that is not government owned? (Y/N)
Buffers and corridors	
S1 — not used	Does the instrument explicitly make reference to the creation or management of corridors connecting individual PAs? (Y/N)
S2 — not used	Does the instrument explicitly make reference to the creation or management of buffer zones around PAs? (Y/N)