



Data Sources and Methods for the Protected Areas Indicators

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1 Introduction

The Protected Areas indicators (<http://www.ec.gc.ca/indicateurs-indicateurs/default.asp?lang=en&n=478A1D3D-1>) are part of the Canadian Environmental Sustainability Indicators (CESI) program (<http://www.ec.gc.ca/indicateurs-indicateurs/default.asp?lang=En&n=47F48106-1>), which provides data and information to track Canada's performance on key environmental sustainability issues. This indicator is also used to measure progress towards the goals and targets of the Federal Sustainable Development Strategy (<http://www.ec.gc.ca/dd-sd/default.asp?lang=En&n=CD30F295-1>).

2 Description and rationale of the Protected Areas indicators

2.1 Description

The Protected Areas indicators report the amount and proportion of Canada's terrestrial and marine area that is recognized as protected under the international definition of a protected area as "a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values".¹ Land and/or water access, use and activities are restricted, permanently or temporarily, primarily for the purpose of conserving biodiversity and ecosystem function, regardless of proprietary designation or governance type (e.g., park, conservation area, wildlife reserve).

Three Protected Areas indicators are included. A national summary is provided by the Canada's Protected Areas indicator. Geographic breakdowns are provided by two indicators: the Protected Areas, by Province and Territory indicator; and the Protected Areas, by Ecological Region indicator.

2.2 Rationale

The extent of the area of protected land and water is a measure of human response to the loss of biodiversity and natural habitat. As the amount of protected area in Canada increases, more natural landscapes are withdrawn from direct human development stresses, thereby preserving ecosystem services and contributing to biodiversity conservation. Although the results can be linked to the International Union for Conservation of Nature (IUCN) standards for protected area definition and management goals, they do not provide information on the degree to which the areas are ecologically intact and protected from the impact of human activities. For information on the health of ecosystems in national parks, please refer to Ecological Integrity of National Parks (<http://www.ec.gc.ca/indicateurs-indicateurs/default.asp?lang=en&n=CDE1612B-1>). Many countries use protected areas as the core of their programs to preserve biodiversity, ecosystems and ecological services.

The Parties to the Convention on Biological Diversity (<http://www.cbd.int/>), among them Canada, set an aspirational target to protect at least 17% of terrestrial areas² and inland waters, and at

¹ Dudley N (editor) (2013) Guidelines for Applying Protected Area Management Categories including IUCN WCPA best practice guidance on recognising protected areas and assigning management categories and governance types. IUCN: Gland, Switzerland, section 2. Retrieved on 8 May, 2014. Available from: http://www.iucn.org/knowledge/publications_doc/publications/?uPubsID=4935.

² "Terrestrial" as used here includes both land and freshwater areas.

least 10% of marine areas, by 2020. This is one of 20 targets collectively known as the Aichi Targets established in October 2010. The protected area target supersedes the previous Convention target, set in 2004, of having 10% of each ecological region protected by 2010.

2.3 Recent changes to the indicator

The quality and completeness of protected areas data have continued to improve. Current estimates are the best available and should not be compared with those reported in previous years.

The area of Canada's marine territory used as a baseline has been revised. The new baseline area extends to the limit of Canada's Exclusive Economic Zone (EEZ). In previous reports, the baseline included areas of the extended continental shelf; in extended shelf areas, nations have sovereign rights over the sea bed and subsoil but not the water column. If extended shelf areas are included, Canada is currently protecting about 0.7% of its ocean estate. Reporting using EEZ limits also increases consistency with other national and international protected areas reports.

The ecozone breakdown uses an updated ecozone framework, seamlessly incorporating marine ecozones. The updated framework, completed by the Canadian Council on Ecological Areas (CCEA) in 2014, has been approved by all provinces and territories, and incorporates new information obtained since the 1996 version. It replaces the Ecozones+ provisional framework used by the Ecosystem Status and Trends Report in 2010.

3 Data

3.1 Data source

Protected areas

For Canada, except Quebec: CCEA Conservation Areas Reporting and Tracking System (CARTS) (<http://www.ccea.org/tools-resources/carts/>). Data current as of 31 December, 2013.

For Quebec: Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques (MDDELCC) Registre des aires protégées au Québec (RAPO) (http://www.mddelcc.gouv.qc.ca/biodiversite/aires_protegees/registre/) (in French only). Data current as of 31 December, 2013.

Jurisdictional areas

For Canada, except Quebec: Natural Resources Canada (2009) Canada Centre for Remote Sensing. Areas are estimated using the Atlas of Canada 1,000,000 National Frameworks Data, Administrative Boundaries (<http://geogratis.gc.ca/api/en/nrcan-rncan/ess-sst/0d2b6f01-fe48-521f-aa7c-a177613c56dd.html>).

For Quebec: Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques.

Marine areas: Fisheries and Oceans Canada (2013) Departmental analysis based on Atlas of Canada 1,000,000 National Frameworks Data, Administrative Boundaries.

Ecozones

Canadian Council on Ecological Areas (2014) Canada Ecozones V5b.

National boundaries

Natural Resources Canada (2009) Atlas of Canada 1,000,000 National Frameworks Data, Administrative Boundaries (<http://geogratis.gc.ca/api/en/nrcan-rncan/ess-sst/0d2b6f01-fe48-521f-aa7c-a177613c56dd.html>).

3.2 Spatial coverage

Coverage is national.

3.3 Temporal coverage

Both the CCEA and MDDELCC datasets are current to 31 December, 2013. Temporal coverage is 1876 to 2013.

A few protected areas do not currently have a recorded date of protection. Sites with an unknown protection date are treated as pre-1990 when reporting total areas, or are removed from consideration when reporting change over time. Protection dates continue to be incorporated into the database.

3.4 Data completeness

The data include all areas under the direct administrative control of each jurisdiction and recognized as protected with an IUCN designation. Some private lands, areas preserved by environmental non-governmental organizations (ENGOS) or Aboriginal communities, municipal parks, and other conservation areas are included. Data on additional non-governmental areas are included when jurisdictions have assumed the responsibility of recognizing those areas and providing data to the CCEA.

4 Methods

Federal, provincial and territorial departments and agencies have submitted geospatial and ancillary data for protected areas under their administrative control to the CCEA. These data contributors will be referred to here as jurisdictions. Data on areas controlled by non-governmental organizations, such as the Nature Conservancy of Canada and Ducks Unlimited Canada, are included in cases where a jurisdiction has recognized and categorized those areas. Work is ongoing to capture and incorporate data on additional privately held protected areas.

These data are housed in the CARTS and are used to compile the protected areas indicator for all of Canada except Quebec. Data for Quebec are taken from the RAPQ³ database at the MDDELCC and were acquired directly from the ministry for this analysis. MDDELCC also provided an area total corrected for overlaps.

Data submitted include the name of the protected area, its geospatial location, boundaries (when available), official area in hectares (ha), biome (terrestrial/marine), IUCN category, managing jurisdiction, and protection date, among other information.

In cases where the same attribute information does not apply to the entire protected area, the protected area is divided into zones for reporting. For example, a single protected area that

³ Quebec's *Natural Heritage Conservation Act* (R.S.Q., c. C-61.01), articles 5 and 6, governs the registry. Available from: http://www2.publicationsduquebec.gouv.qc.ca/dynamicSearch/telecharge.php?type=2&file=/C_61_01/C61_01_A.htm.

crosses a provincial border is divided into zones corresponding to the different provinces. Similarly, a protected area that is later expanded is treated as several zones, each with its own protection date. Terrestrial and marine sections are treated as separate zones; freshwater is included in the terrestrial zone. Ancillary data are maintained independently for each zone. Protected areas that are undivided are treated as a single zone.

Canada's Protected Areas indicator

The official areas of all terrestrial zones outside Quebec in the CCEA CARTS database were summed, and the total terrestrial protected area of Quebec (which is overlap-corrected) was added. The grand total was divided by the total terrestrial area of Canada to determine the proportion protected.

The official areas of all marine zones outside Quebec in the CCEA CARTS database were summed and the total marine protected area of Quebec (which is overlap-corrected) was added. The grand total was divided by the total area of Canada's marine territory, which includes the territorial sea and Exclusive Economic Zone, to determine the proportion protected.

The area protected under federal jurisdiction is the sum of areas protected by Parks Canada, Environment Canada, Fisheries and Oceans Canada, Agriculture and Agri-Food Canada, Aboriginal Affairs and Northern Development Canada, and the National Capital Commission.

To generate trend information, an estimate was made of the total protected area in each year since 1990. For each biome, using the reported protection date, the official area was summed for all zones with a protection date in the year of interest or earlier (i.e., for 1990, this is the total official area of all zones with a protection date of 1990 or earlier). The same procedure was followed for the CCEA CARTS and MDDELCC RAPOQ databases; no correction was made for overlaps. Zones with an unknown protection date (0.26% of total protected area) were deemed to be pre-1990.

Rates of change were calculated by dividing the difference in area (i.e., later minus earlier) by the total area protected in the earlier year. Areas with an unknown protection date were excluded from this calculation.

In keeping with general practice, protected areas assigned to IUCN categories IA, IB, II, III or IV were considered to be "strictly protected". See the Canadian Guidebook for the Application of IUCN Protected Areas Categories, 2008 (<http://www.ccea.org/publication-18-canadian-guidebook-for-the-application-of-iucn-protected-area-categories-2008/>) for details on the application of international standards in Canada. It is important to note that the IUCN categories are based on management objectives, rather than degree or quality of protection.

Protected Areas, by Province and Territory indicator

CCEA CARTS contains information on the province or territory to which a protected area belongs.

For each province except Quebec, the official areas of all protected terrestrial zones in that province were summed and divided by the total land and freshwater area of the province. Territories were treated in the same way.

For Quebec, the total terrestrial protected area was provided by MDDELCC and divided by the official terrestrial area of Quebec, also provided by MDDELCC. Note that MDDELCC undertakes an analysis that corrects for overlaps (e.g., areas managed by multiple jurisdictions that would otherwise be counted twice).

Overlaps can be accounted for in Quebec but not for the national total and other provinces and territories. As a result, there is a small difference between the national indicator for 2013 and the sum of the regions. The difference between the two indicators is less than 0.2%.

Protected Areas, by Ecological Region indicator

CESI has used a recent update to the Ecological Framework of Canada's ecozones to reflect new information and include aquatic ecozones.

The CCEA CARTS and MDDELCC RAPQ databases do not contain information on ecological regions. To generate an estimate of protected area within each ecozone, a geospatial analysis with the ecozone framework was made in the following manner:

1. For each database, the polygon area of each zone was calculated (this is distinct from the official area, as polygon boundaries are approximate).
2. Zones were intersected with ecozone boundaries in such a way as to divide protected area zones into subzones based on the ecozones.
3. The proportional areas of the subzones relative to the original polygon were calculated (i.e., each zone was divided into subzones such that the sum of the subzone proportional areas was 1).
4. The official area of each zone was allocated to its subzones based on the proportional area.
5. The allocated official area was summed for each ecozone.
6. Totals for each ecozone were summed across the two databases.

In other words, a hypothetical protected area with an official area of 100 ha and a boundary polygon that falls 60% into the Taiga Shield and 40% into the Boreal Shield would be divided into subzones of 60 ha and 40 ha in the respective zones.

The total area of each ecozone was calculated from its geospatial boundaries. The total area protected per ecozone was divided by the total area of the ecozone to generate a percentage protected.

In nature, ecozones do not have sharp boundaries. In addition, coastlines are mapped differently at the national scale than at the scale of individual protected areas. Due to the uncertainty of such boundaries, results should be seen as general estimates rather than precise measurements. This is particularly true for marine ecozones, because a high proportion of marine protected areas are coastal.

5 Caveats and limitations

Responsibility for source data accuracy and completeness lies with the jurisdictions. The CCEA provides data standards and guidance, including a procedures manual. The reported official area is generally more reliable than the geospatial boundary data, and has therefore been used for analysis whenever possible. No account has been taken of overlaps, with these exceptions: Quebec contributions towards the national total; Quebec provincial terrestrial protected area; and Quebec portions of the breakdown by IUCN category.

Data quality and completeness continue to improve as additional information is collected, mapping is updated, and additional protected areas are recognized and captured in the databases. The indicator represents the best estimate available at the time of production of the indicator.

Management of areas in the Community Pastures Program (Agriculture and Agri-Food Canada) is being transferred to provinces or other jurisdictions; at present, these continue to be managed federally and are included in federal protected areas.

Areas that are no longer recognized as protected are not captured in the trend analysis, as these areas are not included in the database.

Complex boundaries such as coastlines and ecological regions must be generalized for mapping purposes. All geographical analysis is approximate to some degree.

The CCEA reports a summary from CARTS (<http://www.ccea.org/tools-resources/carts/carts-reports/>), which differs slightly from the results reported here. The CCEA uses official territorial extent from each province and territory; CESI uses official territorial extent from the Atlas of Canada (with the exception of Quebec). The CCEA also reflects decisions made by provinces regarding their recognition of areas under the Community Pastures Program: Saskatchewan recognizes these areas as protected, while Alberta and Manitoba do not. If comparing these websites, care should be taken to note any differences in the date-stamp of the underlying data and the methods of analysis.

6 References and further reading

6.1 References

CCEA Secretariat (2008) Canadian Guidebook for the Application of IUCN Protected Area Categories 2008. CCEA Occasional Paper No. 18. Canadian Council on Ecological Areas, Ottawa, ON. 66 pp.

Dudley N (editor) (2013) Guidelines for Applying Protected Area Management Categories including IUCN WCPA best practice guidance on recognising protected areas and assigning management categories and governance types. IUCN: Gland, Switzerland. Retrieved on 8 May, 2014. Available from: http://www.iucn.org/knowledge/publications_doc/publications/?uPubsID=4935.

6.2 Further reading

Canadian Council on Ecological Areas (<http://www.ccea.org/>)

Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques (MDDELCC), Quebec - Protected Areas (http://www.mddelcc.gouv.qc.ca/biodiversite/aires_protegees/index-en)

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