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Canada's Freshwater Quality in a Global Context Indicator

Data Sources and Methods

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Canada

1. Introduction

This report is released under the Canadian Environmental Sustainability Indicators (CESI) initiative. Each indicator reported under CESI has an associated "data sources and methods" report to provide technical detail and other background to facilitate interpretation of each indicator or allow others to conduct further analysis using the CESI data and methods as a starting point.

This report addresses the underlying methods and data for the Canada's Freshwater Quality in a Global Context indicator as published on the CESI website (www.ec.gc.ca/indicateurs-indicators/).

2. How the measure is calculated

The water quality indicator developed for Yale and Columbia universities' Environmental Performance Index (EPI) is a proximity-to-target composite of freshwater quality for lakes and rivers adjusted for monitoring stations' density in each country. It has a possible maximum score of 100.

Calculated using the Canadian Council of Ministers of the Environment's Water Quality Index, five water quality parameters were chosen for inclusion in the 2010 EPI: dissolved oxygen, pH, conductivity, total nitrogen and total phosphorus. The parameters included in the WQI were chosen because they are good indicators of common water quality problems (eutrophication, salinization, acidification, and organic pollution) and because they are commonly reported to international agencies, such as the UNEP GEMS/Water Programme and the European Environment Agency. Table 1 shows the guidelines used to calculate the EPI.

Table 1. Summary of targets for water quality parameters included in Environmental Performance Water Quality Index. Table adapted from Carr and Rickwood 2008.

Parameter	Target	Details	References
Dissolved oxygen	6 mg L^{-1}	DO must not be less than target when average water temperatures are >20°C	CCME 1999 ANZECC 1992
	9.5 mg L^{-1}	DO must not be less than target when average water temperatures are ≤20 °C	CCME 1999
pH	6.5 – 9	pH must fall within target range	CCME 1999 US EPA 2006 ANZECC 1992 EEA 2006 WHO 2004
Conductivity	500 µS cm^{-1}	Conductivity must not exceed target	Weber-Scannell and Duffy 2007 Chapman 1996 Peterka 1972 LeBlond and Duffy 2001 Sorensen et al. 1977 Derry et al. 2003 ANZECC 1992
Total Nitrogen	1 mg L^{-1}	Total nitrogen must not exceed target	Nurnberg 1996 Wetzel 2001 Dodds et al. 1998
Total Phosphorus	0.05 mg L^{-1}	Total phosphorus must not exceed target	OECD 1982 Wetzel 2001 Nurnberg 1996 Waikato Regional Council NZ (1999 – 2007) UNEP GEMS/Water 2006 Dodds et al. 1998

The countries selected for comparison with Canada were the G8 group of leading industrial countries in the world (France, Germany, Italy, the United Kingdom, the United States, Japan, Canada and Russia), Australia and Sweden. Australia was included as it has a similar population, population density, and territorial extent to Canada. Sweden was included because its climate is similar to Canada's.

3. Caveats and limitations

Data from 53 freshwater quality monitoring stations were used to calculate the Canadian score.

Calculation of the EPI was based on the most recent data available at the time of the analysis for each country. Data up to 2006 was used to calculate the EPI for Canada.

Caution is needed when considering the EPI water quality results because it is extremely challenging to develop assessments of environmental quality at the international level based on comparable and sufficient data collection.

4. Data source(s)

The EPI WQI was calculated using data from the following databases:

- United Nations' Global Environmental Monitoring System (GEMS) Water Programme for the Environmental Performance Index, 2009. www.gemswater.org/index.html
- European Environment Agency's Waterbase, 2009. www.eea.europa.eu/data-and-maps/tags#c5=all&c0=5&b_start=0&c9=waterbase

For more information

Environmental Performance Index
epi.yale.edu/WaterQuality

5. Reference

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