

Terrestrial Ecozones

Abstract

Ecozones are broad ecological zones on the earth's surface and cover a large range of ecosystems such as temperate forest, mountain ranges, grassland, taiga, arctic tundra, extensive river systems, coastline and farmlands. Each ecozone has its own climate, relief, soil, fauna and flora and distinct human activities. In Canada, there are 20 ecozones, consisting of 15 terrestrial and 5 marine units.

Canada has defined a hierarchical system of ecosystems. At a simple level there are 20 ecozones, consisting of 15 terrestrial and 5 marine units. The terrestrial part of Canada is further subdivided into 53 ecoprovinces and 194 ecoregions. Regardless of the level in the hierarchy, each unit is distinguished from others by its unique mosaic of plants, wildlife, climate, landforms and human activities.

Brief Descriptions of Canada's 15 Terrestrial Ecozones

Forests of Canada cover in total about nine ecozones. The vegetation that covers each of them is briefly described below.

Arctic Cordillera: Located in the extreme north of Canada, this region is composed of a vast mountain chain with glacial sceneries. In fact, ice and rock dominate 75% of the Arctic Cordillera. The extreme cold, high winds, and the lack of soil make the area devoid of plants and animals. The variations in daylight over the course of the year are considerable.

Northern Arctic: This ecozone encompasses most of the arctic islands. The landscape consists of low rolling plains covered by permanent frozen ground (permafrost) and by glacial rock debris. The vegetation is generally sparse and stunted. Daylight variations over the course of a year are considerable.

Southern Arctic: This ecozone is bounded to the south by the treeline, a broad ecological division between the taiga forest and the treeless arctic tundra. The terrain is undulated with many lakes and ponds that have been formed by the melting glaciers of the last glaciation. Permafrost covers the whole ecozone. The summers are short, cool and moist. The winters are long and extremely cold. Total annual precipitation is less than 250 millimetres in the western part of the ecozone and there is rarely more than 500 millimetres in the eastern part. Low precipitation and extremely low winter temperatures stunt tree growth in this ecozone.

Taiga Plain: The relief of this ecozone consists of broad lowlands and plateaus. Its climate is characterized by short and cool summers followed by long and cold

winters. The ground is covered by snow and ice for six to eight months each year. The northern taiga forest covers this ecozone.

Taiga Shield: The relief of this ecozone is composed of massive rolling hills, formed by the rock of the Canadian Shield. Summers are short and cool and winters long and cold. The snow covers the ground for six to eight months a year. Precipitation is low to moderate. Low temperatures, a short growing season, thin acidic soils, permafrost and frequent forest fires result in an open stunted forest dominated by a few highly adaptable tree species.

Taiga Cordillera: The terrain of this ecozone consists of a series of ridges and narrow valleys. The climate is cold and humid with long winters, and short and cool summers. Snow covers the ground more than six months a year, and the soil is permanently frozen. Four main vegetation zones are found in this ecozone: alpine tundra zone, subalpine transition zone, montane zone (characterized by spruce-lichen woodlands and flat benches of lodgepole pine), and finally, spruce-feathermoss forests zone with riverside communities of balsam poplar, willow, and alder.

Hudson Plains: The Hudson Plains are characterized by a flat and poorly drained terrain covered by vast wetlands. Permafrost and ground ice keep the soil impermeable promoting the development of wetlands. Vegetation is similar to the arctic tundra and to a larger degree the taiga transitional forests. Trees here are few and far between.

Boreal Plains: The relief of this ecozone consists of low-lying valleys and plains. Summers are short and warm, winters long and cold. The annual precipitation is greater than the evaporation resulting in surplus moisture. Timber covers 84% of the Boreal Plains and most of the ecozone is associated with the boreal forest.

Boreal Shield: This ecozone is covered with a multitude of lakes and contains about 10% of all Canada's freshwater. The land is well irrigated. The terrain is a massive rolling plain of ancient bedrock. The climate is continental with long cold winters and short warm summers. Precipitation is abundant. Boreal forest, mixed with innumerable bogs, marshes and other wetlands, covers this ecozone.

Boreal Cordillera: This ecozone encompasses the northern Rocky Mountains with massifs and plateaus. The climate is a subalpine type with long and cold winters and short and cool summers. Higher in altitude, above the treeline, climatic conditions are alpine type and high-elevation areas, which are covered with ice and permanent snow. Lower elevations are generally forested by White Spruce and Subalpine Fir. Upper elevations are dominated by deciduous stunted shrubs.

Pacific Maritime: Bordering the Pacific Ocean, the high summits of the Coastal Mountain chain dominate the area. In this ecozone, there are different kinds of environment: large fjords dissect the coast, glaciers cover the high summits, rocky coastal plains alternate with beaches, and heavy rainfall, combined with year-round

mild temperatures, support the vitality of temperate rain forest located on the lower lands of the area.

Montane Cordillera: Most of the ecozone is rugged and mountainous. In the north, plains are prevalent and extend out as intermountain valleys towards the southern half of the ecozone. There are several kinds of ecosystem: alpine tundra, dense conifer forests, dry sagebrush and grasslands. Winters are cool and wet; summers are warm and dry.

Prairies: The relief of the Prairies is generally subdued. Its low-lying valleys and plains are sloping eastward. Farmland dominates. However, a water deficit characterizes the area because the annual precipitation is extremely variable and considerably lower than other parts of Canada. High winds also accelerate evaporation. Few deciduous trees and shrubs grow in the ecozone except in the eastern regions, in urban areas, along waterways and locations at upper elevations.

Atlantic Maritime: This ecozone is located at the northeast end of the Appalachian Mountain chain and consists of highlands, peninsulas and islands. The Atlantic Ocean creates a moderate, cool, and moist maritime climate. Winters are long and mild, the summers are cool. Seventy-six percent of the ecozone surface area is covered with forests.

Mixedwood Plains: This ecozone has abundant freshwater resources, including four of the Great Lakes - Superior, Huron, Erie, and Ontario - and the St. Lawrence River from Kingston, Ontario to Quebec City. The climate is characterized by relatively warm summers and cool winters moderated by surrounding water bodies. Its relief is nearly level with gently rolling plains but broke up by striking physical features which are the Monteregian Hills. This ecozone is the most populated and the most productive of Canada. Agriculture is performed on the richest and most fertile soils. Forest exploitation and recreational activities are pursued in the northern part of the ecozone where the soil is less suitable for crops.

Definitions of underlined terms

Ecoprovince: A part of an ecozone characterized by major assemblages of structural or surface forms, faunal realms and vegetation, hydrological, soil and climatic zones. (Source: Wiken, E. B. Environment Canada, Lands Directorate, 1986)

Ecoregion: Part of an ecoprovince characterized by ecological reactions particular to climate, soil, flora, fauna, water, etc. (Source: Wiken, E. B. Environment Canada, Lands Directorate, 1986)

Ecosystem: 1) A functional system which includes the organisms of a natural community together with their environment; ecosystems can be viewed as encompassing large and small areas.
2) An integrated and stable association of living and non-living resources functioning

within a defined physical location. The term may be applied to a unit as large as the entire ecosphere. More often, it is applied to some smaller division. (Source: Government of Canada Climate Change Site, Glossary of Climate Change Terms)

Ecozone: An area of the earth's surface that represents a large ecological zone and has characteristic landforms and climate.

Fjord: Deep and narrow glacial valley invaded by sea water after the retreat of the glacier.

Intermountain valley: Valley situated between or surrounded by mountains, mountain ranges or mountainous regions. (Source: Glossary of Geology. Robert L. Bates and Julia A. Jackson, Editors, American Geological Institute, 1987)

Massif: The dominant, central mass of a mountain ridge that is more or less defined by longitudinal or transverse valleys. (Source: A Dictionary of Mining, Mineral, and Related Terms / Compiled and Edited by Paul W. Thrush and the staff of the U.S. Bureau of Mines).

Permafrost: A layer of permanently frozen soil and rock. The active layer of permafrost refers to that portion of the ground that freezes in winter and thaws in summer; this layer is usually less than one metre in depth. (Source: Government of Canada Climate Change Site, Glossary of Climate Change Terms)

Plateau: An extensive area of relatively flat land in an area of high relief. (Source: The Encyclopaedic Dictionary of Physical Geography, edited by Andrew Goudie et al. Blackwell Reference Ltd. Oxford, 1985.)

Map Sources

Terrestrial Ecozones

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References

Canada. Natural Resources Canada. The State of Canada's Forests 2001-2002. Ottawa.

Hebert, P.D.N. 2000. Canada's Aquatic Environments. Habitats - Wetlands. Guelph, Ontario: University of Guelph. <http://www.aquatic.uoguelph.ca/wetlands/chregion.htm>

McKenney, Dan and Kathy Campbell. 2002. Getting into the Zone - What does Canada's new plant hardiness zones map really mean? Frontline, Forestry Research Applications, Technical notes no 103, Canadian Forest Service, Sault Ste. Marie. (Available in PDF only) <http://cfs.nrcan.gc.ca/forestresearch/subjects/landscape>

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Related Web sites (1999 – 2009)

Federal Government

Agriculture and Agri-Food Canada. Canadian Soil Information System. The National Soil DataBase. Plant Hardiness Zones in Canada
<http://sis.agr.gc.ca/cansis/nsdb/climate/hardiness/intro.html>
The Plant Hardiness Zones map outlines the different zones in Canada where various types of trees, shrubs and flowers will most likely survive. It is based on the average climatic conditions of each area.

Agriculture and Agri-Food Canada. Canadian Soil Information System. The National Soil DataBase. Soil Landscapes of Canada.
<http://sis.agr.gc.ca/cansis/nsdb/slc/intro.html>
The Canadian Land Resource Network has created a series of GIS coverages that show the major characteristics of soil and land for the whole country. Soil Landscapes of Canada were compiled at a scale of 1:1 million, and information is organized according to a uniform national set of soil and landscape criteria based on permanent natural attributes.

Canadian Environmental Assessment Agency
<http://www.ceaa.gc.ca/>
The Canadian Environmental Assessment Agency is an independent federal body, accountable to Parliament through the Minister of the Environment. The Agency works to provide Canadians with high-quality environmental assessments that contribute to informed decision making, in support of sustainable development.

Environment Canada. Canadian Wildlife Service. Québec Region. Conservation Atlas of Wetlands in the St. Lawrence Valley.
http://www.qc.ec.gc.ca/faune/AtlasTerresHumides/html/terres_humides_plan_e.html
The main purpose of the Conservation Atlas of Wetlands is to develop a portrait of the wetlands of the St. Lawrence Valley using innovative mapping methods in order to favor bird conservation by helping land managers to make decisions about land use and bird habitat conservation.

Environment Canada. Freshwater Website. The Nature of Water. Wetlands
http://www.ec.gc.ca/water/en/nature/wetlan/e_wetlan.htm

Environment Canada. State of the Environment Infobase

<http://www.ec.gc.ca/soer-ree/>

The State of the Environment (SOE) Infobase was originally developed in 1996 as an interactive and convenient mechanism for presenting a number of environmental reporting products and tools, including The State of Canada's Environment 1996 and Canada's National Environmental Indicators Series 2003.

Environment Canada. State of the Environment Infobase. Ecozones of Canada

<http://www.ec.gc.ca/soer-ree/english/ecozones.cfm>

This site introduces Canada's ecozones and the general concepts of ecological classification.

Natural Resources Canada. Canada Centre for Remote Sensing. Research and Development. Applications. Forestry

http://www.ccrs.nrcan.gc.ca/ccrs/rd/apps/forest/forest_e.html

Incorporating satellite data, hyperspectral, and polarimetric data with GIS, scientists at CCRS are working collaboratively to monitor Canada's forests, including their health, biodiversity, growth and yield, rate of harvest and regeneration, fire management, blow-down, and the impact of insects and disease.

Natural Resources Canada. Canada Centre for Remote Sensing. Tour Canada from Space

http://www.ccrs.nrcan.gc.ca/ccrs/learn/tour/tour_e.html

Natural Resources Canada. Canadian Forest Service. Great Lakes Forestry Centre. Canada's Plant Hardiness Site

<http://planthardiness.gc.ca/index.pl?&lang=en>

Canada's plant hardiness map provides insights about what can grow where. It combines information about a variety of climatic conditions across the entire country to produce a single general map.

Natural Resources Canada. Canadian Forest Service. Laurentian Forestry Centre. The ECOLEAP Project

<http://cfs.nrcan.gc.ca/subsite/ecoleap>

ECOLEAP is a multidisciplinary project which goal is to identify the effects of environmental factors (temperature, fertility, etc.) on physiological processes (photosynthesis, respiration, etc.) and to link those factors to forest productivity.

Natural Resources Canada. Canadian Forest Service. Pacific Forestry Centre. Canada's Forests

http://www.pfc.cfs.nrcan.gc.ca/canforest/index_e.html

An Overview of Canada's Forests and Forest Industry.

Natural Resources Canada. Canadian Forest Service. Pacific Forestry Centre. Canada's National Forest Inventory

http://www.pfc.cfs.nrcan.gc.ca/monitoring/inventory/index_e.html

This site presents authoritative national statements on the distribution and structure of Canada's forests.

Natural Resources Canada. Canadian Forest Service. The State of Canada's Forests
<http://cfs.nrcan.gc.ca/>

Provincial/Territorial Government

Government of Manitoba. State of the Environment Report for Manitoba, 1997. The Prairie Ecozone : Focus on Sustainable Development

http://www.gov.mb.ca/conservation/annual-report/soe-reports/soe97/soe97_2.html

Manitoba's prairie ecozone today is an ecosystem reconstructed by human activity. Fertile soils that once sustained vast, mixed grassland and tall-grass prairie now support a three-billion-dollar agriculture industry, one of Manitoba's most vital economic sectors.

Other

Canadian Wildlife Federation

<http://www.cwf-fcf.org/fr/index.html>

CWF is dedicated to fostering awareness and appreciation of our natural world.

University of Guelph. Canada's Aquatic Environments. Wetlands

<http://www.aquatic.uoguelph.ca/wetlands/wetlandframes.htm>

Canada's Aquatic Environments was produced by the CyberNatural Software Group at the University of Guelph.

The Ramsar Convention on Wetlands

http://www.ramsar.org/cda/ramsar/display/main/main.jsp?zn=ramsar&cp=1_4000_1___

The Convention on Wetlands, signed in Ramsar, Iran, in 1971, is an intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.

Inter-agency

Canadian Council of Forest Ministers. National Forestry Database Program.

Compendium of Canadian Forestry Statistics

<http://nfdp.ccfm.org/>

The Compendium of Canadian Forestry Statistics is a selection of statistical data from the National Forestry Database (NFD) published annually. It presents detailed data for the period between 1990 and 2001 as well as key historical data gathered previously from other surveys.

