

NATURAL VALUES:

Linking the Environment to the Economy

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SOIL

Natural Values: Linking the Environment to the Economy was developed by Ducks Unlimited Canada (DUC) to improve the environmental and economic understanding of natural systems. In Canada, policy, legislation and regulation efforts must accelerate to protect our important resources. To view other installments in this series, visit www.ducks.ca/conserves/wetland_values/conserves.html



ALMOST EVERY TERRESTRIAL ORGANISM ON THE PLANET NEEDS SOIL. Historically, soil has been an integral part of human health and prosperity; entire civilizations have prospered and faltered because of the health of their soil. Here in Canada, despite the value of this resource, soil is being degraded across the country by practices such as deforestation, vegetation removal, poor cultivation practices, and overgrazing. As a result, soil salinization, acidification, and erosion are problems facing many regions of Canada. The consequences of reduced soil quality are wide-ranging and include negative impacts on agricultural productivity, water quality, and ecosystem health. And once healthy soil is lost it is not easily replaced. Canada's Prairie soils took over 10,000 years to form. Yet, more than half of the organic matter in these soils has been lost over the last century.

In Prairie Canada, erosion has reduced the agricultural productivity of soil by ten to 15 per cent. ⁴

Environmental Values

- Soil **reduces greenhouse gases** in the atmosphere by storing carbon, thus playing a crucial role in the carbon cycle that moderates our climate. Soil stores 1.8 times more carbon than vegetation does.
- Soil provides habitat for a multitude of organisms including soil crustaceans, mites, worms, bacteria and termites, and contributes to **ecosystem biodiversity**.
- Soil helps **moderate the effects of water** on the landscape. Enough precipitation falls each year to cover the entire planet in one metre of water. Soil soaks this water up and slowly releases it to plant roots, aquifers, and surface streams. Without soil, water would immediately run off of land and cause flooding.
- Soil **stores and delivers nutrients** to plants and crops.
- Soil **decomposes dead organic matter and wastes** and replenishes the nutrient stores necessary for plant growth. Soil organisms produce antibiotics that render the toxins and pathogens present in waste and organic matter harmless.
- Soil provides **physical support for plants and crops** by protecting seeds during germination and providing structural support and nourishment during growth.



Economic Values

When soil decreases in quantity and quality there is a financial cost incurred to replace the lost ecological goods and services it provides, such as:

- ① Increased costs for fertility in agricultural production
- ② Decreased property value
- ③ Decreased quality of drinking water and food
- ④ Increased water treatment costs
- ⑤ Increased illness and health care costs
- ⑥ Increased costs to manage watercourses and estuaries
- ⑦ Losses to fishery resources
- ⑧ Decreased revenues from tourism activities associated with healthy ecosystems

Maintaining and improving soil quality will provide economic benefits in the form of increased productivity, more efficient use of nutrients and pesticides, improvement in water and air quality and the reduction of greenhouse gases.

– Agriculture and Agri-Food Canada, 2004¹

DUC Recommends That:

- **Canadians** educate themselves on the importance of soil and the ecological goods and services it provides. Become active with a conservation organization.
- **Educators** recognize and incorporate the environmental and economic values of soil into their science, social studies, geography, and economics curricula.
- **Non-governmental organizations** fund and deliver programs that conserve and restore soil.
- **Governments** fund soil research and programming; develop policies and legislation to protect our soil; provide incentives for those who protect soil.
- **Agricultural producer groups** provide information on soil conservation practices to producers and assist them in adopting these practices.

What's Next? Fact Sheet 4: The Atmosphere

Important Links

- www.ducks.ca/conserve/wetland_values/conserve.html
- www.ducks.ca/aboutduc/news/archives/2004/041115.html

Endnotes

- 1 Agriculture and Agri-Food Canada. 2004. *Beneficial practices which conserve soil quality*. Accessed December 2005 at: http://www.agr.gc.ca/pfra/land/practices_e.htm
- 2 Anielski, M. and S. Wilson. 2005. *Counting Canada's natural capital: Assessing the real value of Canada's boreal ecosystems*. Published by the Canadian Boreal Initiative and The Pembina Institute. 78 pp.
- 3 Agriculture and Agri-Food Canada. 2003. *Prairie soils: The case for conservation*. Accessed December 2005 at: http://www.agr.gc.ca/pfra/pub/prairiesoils_e.htm
- 4 Olewiler, N. 2004. *The Value of Natural Capital in Settled Areas of Canada*. Published by Ducks Unlimited Canada and the Nature Conservancy of Canada. 36 pp.
- 5 Environment Canada and PEI Government. 1998. *Best management practices: Soil conservation for potato production*. Accessed December 2005 at: <http://www.gov.pe.ca/af/agweb/index.php3?number=71740&lang=E>

The Value of Soil in Canada

The value of the net carbon sequestered by the forest biomass and soil of Canada's boreal forests is estimated to be worth \$1.9 billion/year.²

Soil erosion reduces the annual profits of agricultural producers by \$12 per cropped hectare. Each year, soil erosion on the Prairies decreases the profits of crop production by an additional \$6 million.³

In Canada's Prairies, nitrogen losses that occur when organic matter is lost from the soil costs farmers over \$70 million/year.³

The value of carbon sequestered by grassland soils in the Upper Assiniboine River Delta of Manitoba and Saskatchewan has been estimated at \$19.60/ha/year.⁴

Soil erosion results in increased sediment in our water. The cost of removing sediment from municipal water in southern Ontario has been estimated to be between \$9.34 and \$28.02/tonne of sediment.⁴

In P.E.I., the cost of nutrient losses in soils can be as high as \$70/ha/year.⁵



Ducks Unlimited Canada
CANADA'S CONSERVATION COMPANY