

Agricultural Water Consumption/Irrigation

Abstract

Irrigation is the provision of water to crops beyond what is provided by local rainfall. Irrigation is a vital part of agriculture in certain areas of Canada like the southern Prairies and the interior of British Columbia. The amount of water that needs to be withdrawn for irrigation varies annually. It depends on winter precipitation, and weather and soil moisture during the growing season. Irrigation can have both positive and negative effects on the environment.

Location of Irrigation

Dry regions in the southern Prairies and in the interior of British Columbia have severe moisture deficits at some time during most summers. Dry areas are also more prone to long-term drought conditions as well. These areas (especially southernmost Alberta) hold most of the one million hectares of irrigated cropland in Canada. The map clearly shows this pattern. Data on the map is data compiled for the 1996 Census of Agriculture.

Figure 1 shows that Alberta accounts for 60% of the total irrigated area. The relatively large figures for Ontario and Quebec reflect the use of irrigation for certain areas of high-value crops (such as fruits and vegetables).

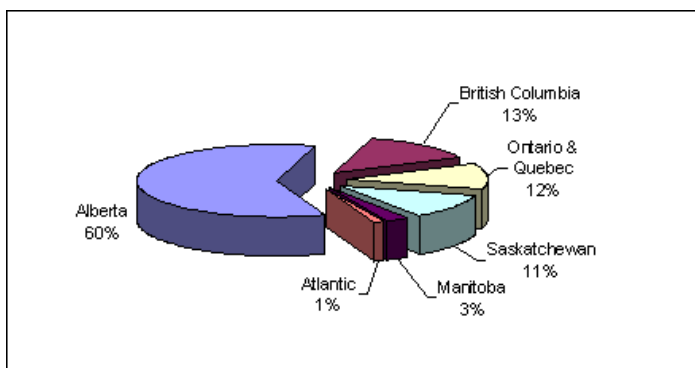


Figure 1. Distribution of Irrigated Land in Canada (late 1990s)

Source: Canada. Agriculture and Agri-Food Canada. Research Branch. 2000. The Health of Our Water: Toward Sustainable Agriculture in Canada. Ottawa. 2000.

Irrigation often makes agriculture possible where it would not otherwise exist. The on-going benefits to irrigation include:

- increased stability of production
- giving the potential for production of a wider range of high-value crops
- allowing intensification of production

Irrigation Systems

The peak design flow rate of an irrigation system varies according to climate, crops, and soil conditions. The amount of water that needs to be withdrawn for irrigation varies annually; it depends mainly on two factors:

- winter precipitation
- weather and soil moisture conditions during the growing season

In areas such as southwestern Saskatchewan, spring runoff determines the amount of water available for irrigation during the following summer. Temperature, the amount and timing of rainfall, wind, and evaporation all influence the need for supplemental water for optimum plant growth.

Water use for larger irrigation projects is often licensed by the province in which they are located, as a means of controlling total withdrawals from a water source and minimizing the potential for conflicts among users. The license stipulates the maximum volume of water that can be withdrawn in a year. The licensed amount is often considerably greater than that withdrawn in an average year.

The expansion of irrigated area depends on both soil characteristics and a secure supply of water of suitable quality. Some provinces require irrigators to undertake a soil water compatibility study before approving irrigation plans.

To limit competition with other water users, irrigators, private industry, governments, and researchers have cooperated to introduce greater efficiencies in the way irrigation water is stored, conveyed, and applied in the field. For example:

- Irrigation headworks, main canals, and whole distribution systems are renovated to minimize water loss.
- Irrigators are encouraged to switch from less-efficient gravity systems to more-efficient sprinkler systems or to highly efficient drip or trickle systems.
- Some irrigators are converting saline land back to dryland. ("Salinization" is the accumulation of salts in the land as water evaporates from it; "dryland farming" has farming practices adapt to low rainfall by leaving some land fallow in some years).
- Governments and industry are conducting research and demonstration projects to develop refinements to irrigation systems that are more energy efficient while more effectively irrigating crops.

- Water meters are being used at the district and farm levels to measure water use and to charge for water based on consumption.

Environmental Concerns of Irrigation

Irrigation can have both positive and negative effects on the environment. Potential positive environmental benefits are:

- Impoundments and canals can provide increased fish habitat and greater recreational opportunities.
- Brush and weeds along canals can provide cover and nesting habitat.

Potential negative environmental effects include:

- Reservoir construction can cause flooding of forest and riparian habitat (habitat along the riverbank).
- Flooding can destroy historic sites.
- Water-level fluctuation can destroy the habitat waterfowl other water-dependent creatures.
- Alteration of the rate of flow, and the quantity and quality of water can affect downstream water uses.
- Sediment can build up behind reservoirs.
- As pesticides and fertilizers are used in greater quantities on irrigated land as opposed to use on dryland farming, there is an increased risk of contamination of groundwater and streams.
- An increased risk of salinization of water in some areas where salts present in subsoil.

Map Sources

Irrigation in the Prairies, 1996

Statistics Canada data for 1986, 1991 and 1996.

Percentage of the Total Irrigated Lands in 1996

Statistics Canada data for 1986, 1991 and 1996.

References

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Related Web sites (1999 – 2009)

Federal Government

Environment Canada. Freshwater Web Site

<http://www.ec.gc.ca/eau-water/>

This web site gives access to the nature of water, water policy and legislation, the management of water, water and culture, and informational resources and services.

Environment Canada. Quebec Region. The St. Lawrence Centre

<http://www.universadecouvrir.gc.ca/page/index.php?l=e&p=86>

The St. Lawrence Centre studies the ecosystems of the St. Lawrence River and conduct research programs with the aim of better understanding how these ecosystems function, and maintaining knowledge of the St. Lawrence River up to date.

Environment Canada. The National Water Research Institute

<http://www.ec.gc.ca/inre-nwri/>

The National Water Research Institute (NWRI) is Canada's largest freshwater research establishment. NWRI conducts a comprehensive program of research and development in the aquatic sciences, in partnership with the Canadian and international science communities.

Fisheries and Oceans Canada. Canadian Hydrographic Service (CHS)

<http://www.dfo-mpo.gc.ca/regions/central/science/chs-shc/index-eng.htm>

The CHS is responsible for charting Canada's 243,792 kilometres of coastline (the longest of any country in the world) and 6.55 million square kilometres of continental

shelf and territorial waters (the second largest in the world) and an extensive system of inland waterways.

Other

University of Guelph. Canada's Aquatic Environments

<http://www.aquatic.uoguelph.ca/index.htm>

This site, at the University of Guelph, gives information on lakes, rivers, wetland regions and aquatic animals and plants.

Inter-agency

International Joint Commission

<http://www.ijc.org/>

The International Joint Commission is an independent binational organization established by the Boundary Waters Treaty of 1909. Its purpose is to help prevent and resolve disputes relating to the use and quality of boundary waters and to advise Canada and the United States on related questions.

