Bonnefield

FARMLAND *for* FARMING

Sustainable Water Management

A Case Study on Alberta's Irrigation Districts

In This Article

- Water is an essential input for agriculture, and an increasingly important theme in the global investment community.
- Despite an abundance of renewable water resources, Canada accesses those resources in supporting agricultural activities far less than the U.S. and other major agricultural exporters.
- Thanks to advantageous climate conditions, most Canadian farming regions do not require irrigation for successful crop production, whereas many regions of the U.S. rely heavily on irrigation.
- Alberta has long been a unique case study in the use of sustainable irrigation districts.
- Efficient, effective irrigation is a driver of farmland value over time, and farmland irrigation has proven to be a significantly positive contributor to Alberta's provincial GDP.
- Bonnefield has significant investments in irrigated Albertan farmland and water rights, and has also invested in further capital improvements of irrigation infrastructure.
- As Canada's leading agriculture-focused alternative asset manager, Bonnefield is well-positioned to take advantage of the ample opportunity that exists to continue the improvement and expansion of irrigation infrastructure in Alberta, along with a number of other provinces in which we invest.

Water and Farmland: Two Interconnected, Finite Resources

Over the past two decades, global population growth and climate change have driven increased demand for water and resulted in a decline in the amount of freshwater per person by more than 20%[1]. Investors are increasingly monitoring the uses of water in their portfolios, along with the reputational, financial, operational, and regulatory risks associated with institutional water exposure. Several notable money managers have publicly discussed how water-related considerations factor into their investment processes; for example, Morgan Stanley has adopted water scarcity as a standalone input in their multi-asset investment process[2].

Water, while a finite commodity, cannot be purchased through institutional-scale investment vehicles in most regions. As such, investors interested in integrating water into their investment strategies have had to search for investment proxies in other assets, such as water utilities, water technology and farmland. With agricultural irrigation accounting for roughly 70% of global freshwater withdrawals[3], it stands that cropland can serve as a proxy for water exposure within an investment portfolio given the significance of water as an input in crop production.

Reliable access to renewable fresh water has been a central feature of investing in Canadian farmland since Bonnefield's inception over a decade ago. Canada benefits from abundant, usable natural freshwater sources, well-developed irrigation infrastructure, and a strong regulatory climate. Bonnefield believes that investing in farmland with the capacity for efficient and sustainable irrigation represents a compelling opportunity for investors to hedge their portfolios against global water shortage risks.

Canada's Water Resources in a Global Context

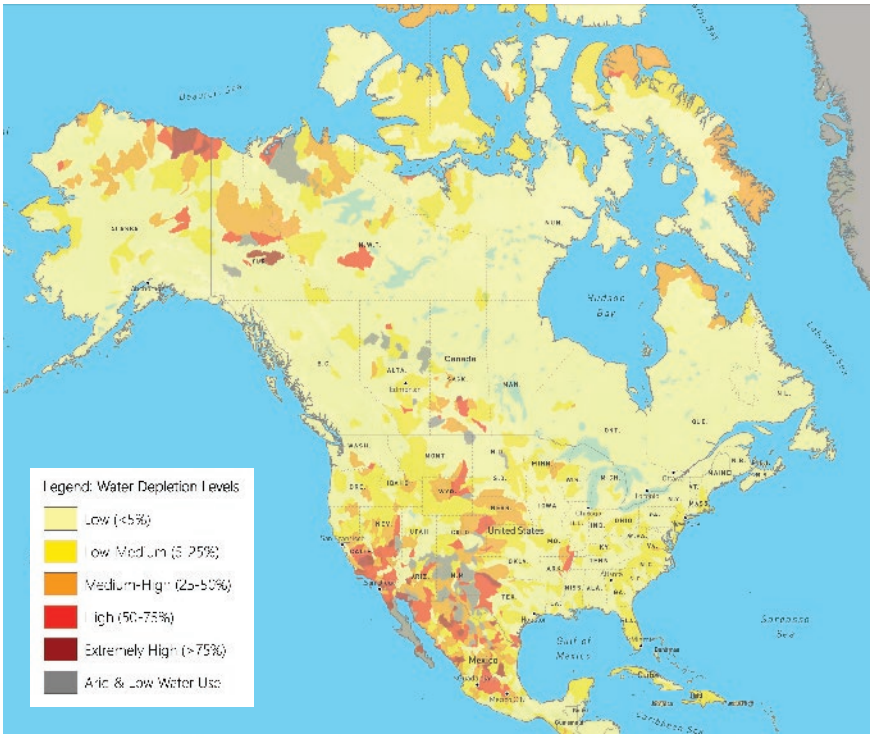
Most arid agricultural regions require irrigation to be productive. Unfortunately, many such regions are suffering from depleting groundwater sources (i.e., more water being used than contributed). In drier regions, irrigation increases the consistency of crop yield and allows for farmers to produce more diverse and higher-value crops. This has led farmers in arid and semi-arid regions across the globe to invest in irrigating their crops, even in areas where more water is withdrawn than recharged. In fact, it is estimated that approximately 11% of existing cropland globally could be vulnerable to water scarcity by 2050, and may stand to lose some productive capacity. A significant amount (20% or more) of the existing agricultural cropland in Europe, China, Africa, and the Middle East is potentially at-risk of water scarcity and lost productivity; in contrast, much less (approximately 1%) of Canada's existing cropland is thought vulnerable[4].

Canada contains 7% of the world's renewable freshwater[5]. Among developed countries, it has the second-most renewable freshwater per capita behind Iceland, approximately twice as much as Russia and Brazil, and over eight times as much as the U.S.[6]. While Canada has abundant renewable freshwater resources, many of the country's crop regions are rainfed and do not rely solely on irrigation. In fact, only approximately 2% of Canadian cropland is irrigated[7], largely for crops of higher value in regions with less consistent rainfall such as Southern Alberta. By comparison, the percentage of cultivated land that is irrigated in Australia, Brazil, and the U.S. is 7%, 8%, and 15%, respectively[7].

The exhibit below illustrates the extent to which water depletion exists in the U.S. compared with Canada. While there are a handful of relatively small pockets of concern in Saskatchewan, the Yukon, and the Northwest Territories due to aging hydroelectric dam infrastructure, most of Canada's agricultural regions are well-positioned for future renewable water withdrawal. This is not the case for many regions in the southern, western, and central United States. As groundwater levels deplete and freshwater use continues to rise in parts of California, Arizona, New Mexico, Colorado, Kansas, and Texas, water resources, and the agricultural products dependent on those resources, are expected to become increasingly scarce[8].

Bonnefield believes that Canada is uniquely positioned to develop a broad network of sustainable irrigation districts that can enhance growing conditions and drive farmland values across the country. Southern Alberta already provides a strong case study as arguably one of the most sustainable examples of irrigation management and governance globally.

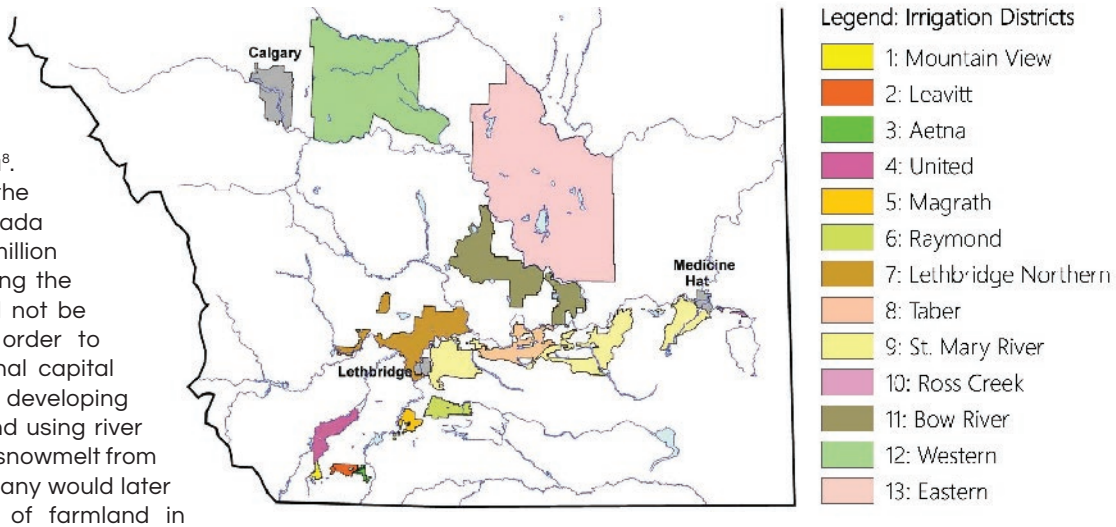
Exhibit 1: Water Depletion* in North America



* Water Depletion is defined as the ratio of total water consumption to available renewable water supplies.

Irrigation and Water Rights in Alberta

Exhibit 2: Alberta's Irrigation Districts Today[15]



Alberta began developing irrigation districts in the 1890s after the Canadian Pacific Railway (CPR) was established and settlers began immigrating to western Canada[8]. During the construction of the railway, the Government of Canada compensated CPR with 25 million acres of arable land. In surveying the land, CPR learned that it could not be farmed without irrigation[9]. In order to achieve a return on their original capital outlay, CPR invested in developing infrastructure to irrigate this land using river networks that are largely fed by snowmelt from the Rocky Mountains. The company would later sell these irrigated packages of farmland in 160-acre quarter sections or 320-acre half sections to immigrating farm families. In 1914, the Government of Alberta passed the Irrigation Districts Act, which permitted landowners to organize into cooperative groups that could issue bonds for the construction of large-scale irrigation projects. The Federal and Provincial governments aided in construction of infrastructure to divert, store, and convey water into the irrigation systems, and government guarantees were established to support farmers in obtaining loans secured by their land to fund the work done within the irrigation districts. The districts were also granted the authority to levy local taxes for operation and maintenance of the irrigation projects[10]. The irrigation districts thus became a central feature in promoting the movement of farmers to rural Alberta.

Ownership and governance of the irrigation districts changed hands after the Great Depression, and by 1950 all districts were owned by the Government of Canada. In the 1950s and 60s, most irrigated land used inefficient surface-flooding systems which lose water to evaporation and contribute to increased soil erosion. At that time, on-farm irrigation efficiency sat at 35% but due to significant technological advancements over the last number of years, Alberta is now on track to achieve irrigation efficiency of 85% by 2025[11]. Irrigation efficiency refers to the use of modern on-farm irrigation systems, such as low-pressure pivot or drip irrigation, that increase water savings and reduce energy usage compared to older systems[12].

Alberta's irrigation districts provide 8,000 kilometers of water distribution, accounting for approximately 70% of Canada's total irrigated surface area[13]. There are 13 irrigation districts that distribute, regulate, and manage water flows that are sourced largely from Rocky mountain snowmelt and rainfall. Alberta's irrigation system is unique in that it does not deplete groundwater[13], and instead retrieves the entirety of its inflow from the Oldman, Bow and St. Mary rivers, which are outlets for mountain snowmelt. Mountain snowpack in the Rocky Mountains is currently thought to be relatively less vulnerable to accelerated spring melt dates due to global climate change compared to other mountainous regions across the world, such as the Himalayas and several regions in Europe[14].

How Sustainable Irrigation Drives Value

Alberta's irrigation system highlights how sustainable water management can balance environmental concerns while driving economic value. It is widely considered among the most integrated renewable freshwater management systems in the world, incorporating UN guidelines to address the distribution, economic use, treatment, recycling, reuse and return to the environment[14]. However, the province's irrigation industry also contributes nearly $4 billion to provincial GDP annually and it increases GDP by $2.54 for every $1 of irrigation revenue[14]. It supports over 6,000 farmers annually, and it is measured for water stress and recharge each month to ensure the sustainable allocation and use of the resource[13]. The consistent yields that irrigation provides has promoted the establishment of various agri-food processing industries since the 1950's, from sugar beets and potatoes, to export forage and fresh vegetables[14].

Since Bonnefield began investing in irrigated Albertan farmland, we have improved the efficiency of over 2,500 acres of irrigated land. Bonnefield has not only purchased land and the associated water rights in irrigated regions, but it has also invested in efficiency improvements through pipeline, generator and pivot irrigation upgrades. Over this time, we have witnessed land values in irrigated regions grow at a faster rate than dryland farms in Alberta. Farm cash flows, vertical integration opportunities, and farmer sophistication are also noticeably greater in areas with sustainable irrigation systems in place[11].

Looking to the Future

As renewable water resources become increasingly scarce, regions with an abundance of renewable water resources and strong governance systems are expected to see disproportionately positive growth in value and importance to the global agricultural market. Regions drawing from non-renewable groundwater resources and water-stressed surface irrigation are likely to suffer declining crop yields and be limited to growing lower-value dryland crop varieties, creating a production gap in the face of growing global demand for food.

The responsibility to produce both 1) high-value, water-intensive crops and 2) total volumes of crops sufficient to close the anticipated production gap will likely fall on areas with the infrastructure and resources in place to expand production. As a result, we believe that Canada's already-prominent role as an exporter of key agricultural commodities will continue to increase. This dynamic creates a unique opportunity for investing in both irrigated farmland and irrigation infrastructure in Canada.

1- Food and Agriculture Organization of the United Nations (FAO), 2020

2 - Morgan Stanley Investment Management (Harmstone), 2019

3 - US Department of the Interior – US Geological Survey (USGS), 2018

4 - Global Environmental Change, Volume 58 (Fitton et. al.), 2019

5 - Government of Canada, 2018

6 - FAO Aquastat Database, 2017

7 - World Resource Institute: Aqueduct Project, 2019

8 - Alberta Irrigation Districts Association, 2002

9 - University of Alberta Libraries, 2005

10 - Alberta WaterPortal Society, 2014

11 - International Commission on Irrigation and Drainage, 2018

12 - Government of Alberta, 2018

13 - Alberta Irrigation Districts Association, 2015

14 - U.S. Department of Commerce National Oceanic and Atmospheric Administration, 2021

15 - Government of Alberta (via Alberta Irrigation Districts Association), 2018