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Water for Life Strategy in Alberta: Changing Priorities in Canadian Water Policy?

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The Issue

Water resources are being stretched to the limit in Alberta and irrigation activities account for more than 70 percent of consumptive water use in the province. Conflicts among users and potential users may be looming. Pollution of surface water and groundwater and outbreaks of water-borne pathogens have been increasing. Freshwater systems are likely to deteriorate further with impending climate change. Following passage of the Alberta Water Act in 1999 and the Irrigation Districts Act in 2000, which allowed limited transfers of water among water users, the Alberta government issued its Water for Life Strategy in late 2003. The strategy's principal goals include (1) evaluation of the use of economic instruments to manage water demand by 2007; (2) demonstration of best management practices by 2010; and (3) a 30 percent increase in productivity and efficiency over 2005 levels by 2015. This seems to presage a new era in water management in Alberta, but will the necessary changes in water management be forthcoming? This study examines the need for demand-based management and the



constraints that make effective changes in water policy problematic. Evidence from a recent study in the St. Mary's River Irrigation District highlights problems with water markets.

Implications and Conclusions

The establishment of the foundation for a water market in Alberta is one of a series of steps intended to enhance water management flexibility while at the same time achieving economic goals and enhancing conservation efforts. The changes in legislation that allowed water markets to develop have, however, produced limited results. There were minimal trades of water allocations during the drought year of 2001, and trades have been non-existent under normal snowpack and rainfall conditions. Further, evidence shows that while water markets enhance water use efficiency and productivity, they may compromise conservation efforts. Therefore, unless further policy changes are made, the Alberta government cannot rely on water markets to significantly contribute to the goals contained in the Water for Life Strategy.

Background

Alberta has 2.2 percent of Canada's fresh water supply, contained within several major river basins. Except for the Beaver River Basin, all other basins – the Peace/Slave, Athabasca, Hay, North Saskatchewan, South Saskatchewan and Milk – originate from glacier melt. These are depicted in figure 1.

Unfortunately, as is characteristic of water in many other parts of Canada, the greatest quantity of this resource is not located where it is needed most. In Alberta, 80 percent of water supplies lie in the northern part of the province while 80 percent of demand comes from the southern half (Alberta Environment [AENV], 2002). Under current legislation, transfers of water between major river basins are not allowed due to the potential damage to environment and aquatic ecosystems. This remains a contentious issue that likely will intensify over time.

Geography and the environment are not the only determinants of water availability in Alberta. Appropriation agreements with the United States and Saskatchewan dictate how much water must flow across borders to the south and to the east. The International Boundary Water Treaty between Canada and the United States governs water diverted from the St. Mary and Milk Rivers to the United States. During the growing season, three-fourths of the flow of the St. Mary River is allocated to Canada and one-fourth is allocated to the United States. The treaty allocates three-fourths of the flow of the Milk River to the United States and one-fourth to Canada. The Prairie Provinces Master Agreement on apportionment governs the share of water that must flow from the South Saskatchewan River to Saskatchewan. Under this agreement, Alberta is entitled to divert a quantity of water equal to one-half of the natural flow originating in or flowing through the province (AENV, 2002).

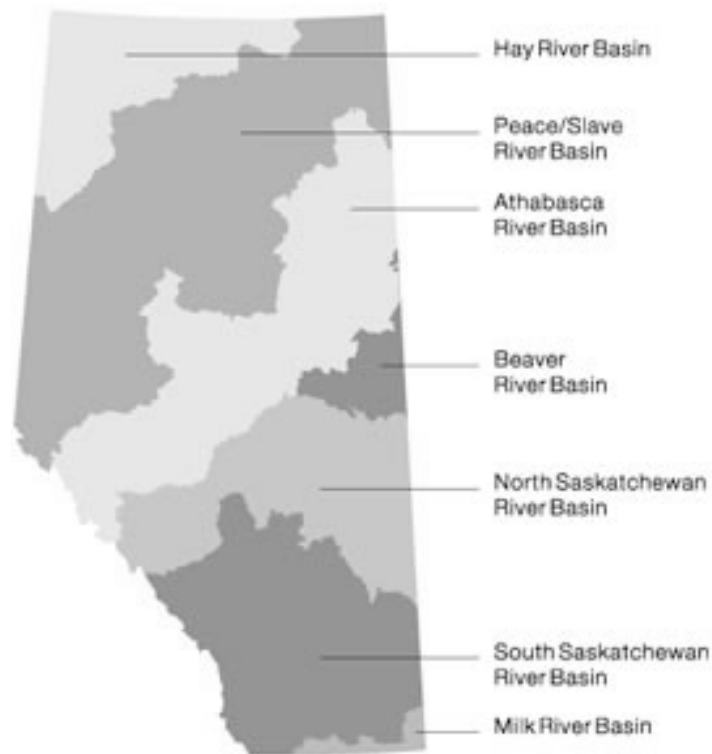


Figure 1 Major river basins, Alberta.

Source: <http://www.waterforlife.gov.ab.ca>

Surface water is the primary source for water consumption activities. Ninety-eight percent of water consumed in the province is taken from surface water sources. Only about 2 percent comes from groundwater. It is not known exactly how much groundwater is available. While it is estimated that Alberta has more groundwater than surface water, only .01 percent is thought to be recoverable (AENV, 2002).

There are three major water uses in the province: irrigation, commercial and industrial, and municipal. As the table below shows, together these uses account for over 90 percent of surface water consumption.

Table 1 Surface Water Consumptive Uses

Purpose	Proportion of total (%)
Irrigation	70.95
Commercial and industrial	14.80
Municipal	5.39
Other	8.86

Source: adapted from AENV, 2002

With regard to irrigation, the South Saskatchewan River Basin (SSRB) is central to this activity. All of the province’s 13 irrigation districts are found in this basin¹ (figure 2). Many private irrigators also undertake irrigation activity within this basin. Together, private irrigators and irrigation districts account for 75 percent of the total volume of SSRB allocation (AENV, 2002).

Land has been successfully irrigated in Alberta for more than a century, beginning in the 1880s. The total area irrigated has increased gradually over the years and now totals about 1.5 million acres. Irrigated land produces about 16 percent of the province’s agricultural output from only 4 percent of the total agricultural land (Alberta Agriculture, Food and Rural Development, 2000). Increases in primary production due to irrigation and its backward and forward linkages² are estimated to add about \$1 billion to agri-food GDP in Alberta (Alberta Irrigation Projects Association, 2002).

Irrigation permits the production of high-value crops such as potatoes, sugar beets, onions, beans and forage, prompting several commodity users to locate in southern Alberta. Among these are secondary industries, including vegetable processors, sugar beet refiners and high-density feedlots. Such industries, while creating demand for water-intensive crops, also create demand for water through their own production activities.

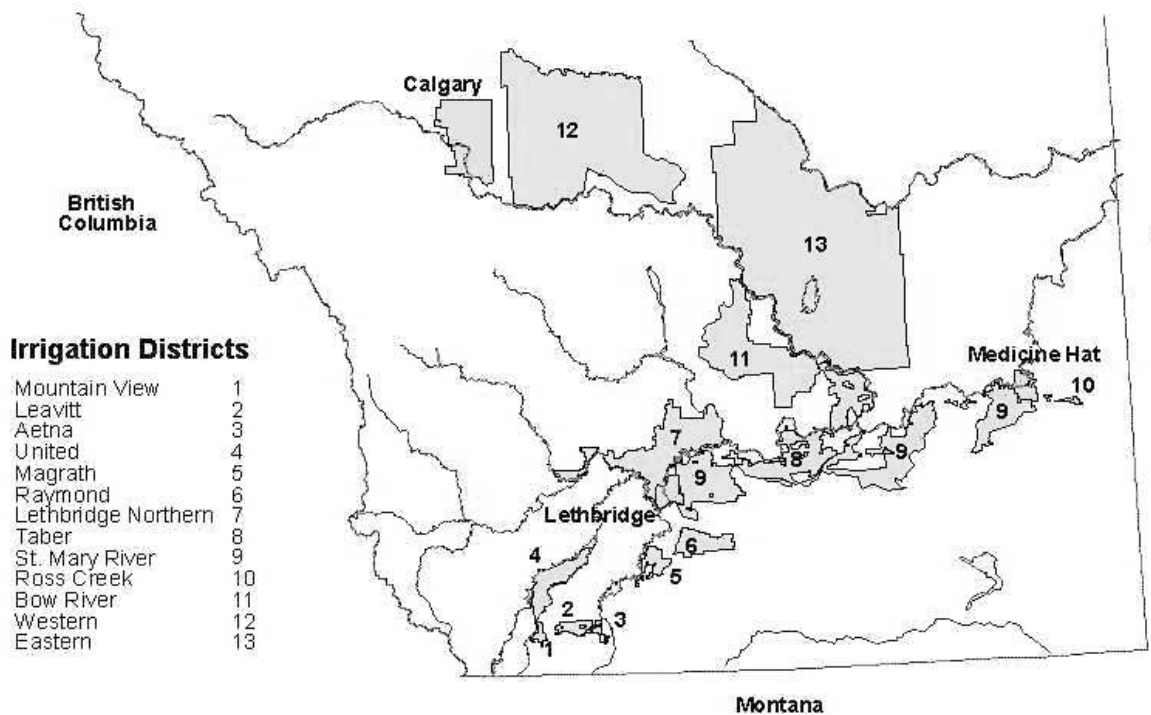


Figure 2 Thirteen irrigation districts in southern Alberta.
 Source: <http://www.agric.gov.ab.ca/irrigate/irrbase.html>

Current Policy and Legislation

Restrictions on water use in Alberta were imposed as early as 1991, when strains on water resources prompted the government to establish guidelines that set maximum amounts of water allocated for irrigation in the South Saskatchewan River Basin. The potential for more severe water constraints in the future prompted a review of Alberta's water management policy and legislation. This review culminated in the passage of the Water Act (1999) and the Irrigation Districts Act (2000). While the old Water Resources Act of 1975 was primarily a tool for allocating water, the Water Act of 1999 recognizes the present challenge is one of allocating limited surface water among competing users. The purpose of the Water Act is to support and promote the conservation and management of water, including its wise allocation and use, while recognizing the desirability of environmental sustainability and economic growth and prosperity (Klein, Nicol and LeRoy, 2004). The objectives of the Water Act are to

1. protect existing water licence holders that are in good standing;
2. prohibit the export of Alberta's water to the United States;
3. enable the transfer of water licenses on a temporary or permanent basis; and
4. prohibit inter-basin transfers of water between Alberta's major river basins.

The first-in-time, first-in-right principle for granting and administering water allocations is upheld in the act, but by allowing the transfer of water licences on a permanent basis, and water allocations on a temporary basis, the act establishes the foundation for deregulation of water. As Horbulyk and Lo (1998) note, the Water Act transforms "historical licenses into marketable commodities" (p. 245).

The Irrigation Districts Act of 2000 extends this capability to irrigators within irrigation districts, allowing the owner of irrigated land to transfer the entitled water to other irrigators within the same district. The government views this provision as a mechanism that will create increased flexibility in managing water and achieving economic goals. It also should enhance conservation efforts by "provid[ing] an incentive to current licensees to become more efficient, as any reduction in water use is allowed to be transferred to other users, resulting in monetary benefits for water saving" (AENV, 2003c, p. 37).

The broad foundation for the government's water management plan for the next decade is contained in the Water for Life Strategy. The principles and goals embodied in the strategy emerged from a public consultation process that took place between November 2001 and June 2002. When implemented, this could include the extension of the use of economic instruments in managing water beyond the transfer of water licenses and allocations. The government plans to evaluate and make recommendations on the merit of economic instruments by 2007 and states,

This could include examining the concept of putting a price on water. Other examples of economic instruments are taxes or financial incentives, ticketing or punitive penalties for wasteful practices, eco-certification product labeling and tradable water right (AENV, 2003a, p. 8).

Other goals include the demonstration of best management practices by all sectors by 2010 and an ambitious target of water productivity and efficiency enhancements of 30 percent by 2015 (AENV, 2003b).

Irrigation Water Markets in Southern Alberta

When southern Alberta was hit by a severe drought in 2001, a moratorium was imposed on additional allocation of surface water from the Belly, Waterton and St. Mary Rivers. The minister of environment indicated additional moratoriums are inevitable in southern Alberta (Swihart, 2003). As the province was faced with the severe water shortage in 2001, the recent passage of the Irrigation Districts Act (2000) provided an opportunity for a market for irrigation water to develop.

Casual discussions with representatives of irrigation districts revealed that water market activity was occurring in the St. Mary's River Irrigation District (SMRID) during the dry summer of 2001. Discussions with officials from SMRID revealed that 222 temporary trades of water allocations were registered in 2001. We then decided to survey irrigators in the SMRID to determine several characteristics of the water market. Questionnaires were developed and sent to all buyers and sellers of water who could be traced: 151 buyers and 114 sellers. In addition, questionnaires were sent to 50 percent of those who did not participate in the market (randomly chosen).

A number of hypotheses were developed, based on the findings of early water markets elsewhere in the world; the main hypotheses are summarized in the first column of table 2. A group of questions was designed to yield basic data about water market activity, such as quantity of water bought and sold, month of transfer, and price. These data were analyzed using descriptive techniques, including averages and percentages. A second group of open-ended, subjective questions was developed to determine the types of attitudes people hold about water transfers. A third category of questions provided data on the characteristics of the respondents. These data were combined with the first and second categories to allow for cross-sectional analysis of the data.

Results from the survey showed that the water market had many of the characteristics of early informal water markets elsewhere. Market activity in 2001 was, for example, very limited, in the order of 3 to 4 percent of total allocation in the district (Nicol, 2005). Knowledge of the water market, and of what water was worth, was limited in the SMRID. This resulted in water prices being highly variable. The average price of water was \$79 per acre-foot but ranged from as low as \$20 to as high as \$140 per acre-foot. Evidence suggests that demanders of water in that drought year were high-value specialty crop

producers who were anxious to successfully produce a crop and fulfill contracts with local processors.

The second column of table 2 summarizes the main results of the study and indicates that water moved largely off of wheat, barley and forage acreage onto potato, forage and other specialty crop acreage. Results also show that water moved from sellers who used relatively less efficient irrigation equipment, mainly wheel move and flood irrigation systems, to buyers who used relatively more efficient irrigation equipment, mainly pivots. To some extent, unused water was brought out of dormancy and sold. A significant number of sellers responding to the survey indicated they did not need water for their own crops, even in the drought year.

Sellers found the process of selling water allocations easier than buyers. Written responses revealed some frustration on the part of buyers in having to purchase water allocations that year and, in some cases, pay a significant price. It was expected that, in keeping with the informal nature of the temporary sale of water allocations, deals would be informal, mainly verbal. Within the SMRID in 2001, however, most deals were of a formal, contractual nature, often involving water buyers with large irrigated acreage purchasing relatively large quantities of water.

Table 2 Summary of Main Hypotheses and Results, Temporary Trade of Water Allocations

Hypothesis	Results
Early water markets were thin.	Yes. Total amount transferred in 2001 was 3.5 percent of the water allocated that year.
Price dispersion was high in early water markets.	Yes. The average price was \$79 per acre-foot and prices ranged from \$20 to \$140 per acre-foot.
Sellers sold unused water.	Yes. Sixty percent of sellers did not need the water for their own crops.
Water moved to higher value uses.	Yes. Approximately 80 percent of water was transferred from wheat, barley and forage acreage, and over 90 percent was transferred to potatoes, forage and other specialty crops.
Water moved from less efficient irrigation equipment to more efficient irrigation equipment.	Yes. Approximately 60 percent of sellers used wheel move and flood irrigation methods, while 75 percent of buyers used more efficient pivot irrigation systems.
The process of buying and selling water was easy.	Not necessarily. Ninety percent of sellers found the process very easy or fairly easy but only 52 percent of buyers found the process very easy or fairly easy.
Deals between buyers and sellers were informal.	Not necessarily. 53 percent of participants entered into written contracts.

Conclusions and Policy Implications

The ability of producers to buy water on a temporary basis helped ensure high-value crops were successfully grown to meet processing contracts within the SMRID in 2001. The water market exhibited characteristics typical of early water markets elsewhere. The water market was thin, prices were erratic and water moved from low to higher value uses and from producers using relatively less efficient irrigation equipment to those with more efficient equipment. Sellers viewed the market as an opportunity to dispose of excess water and earn additional income, thereby prompting water to move into use from an otherwise unused state.

In the broader water management context, the study concludes that water markets are creating activity that “at one and the same time support[s] and contradict[s] government’s management goals” (Nicol, 2005, p. iv). In support of these goals, the movement of water to higher value crops and more efficient irrigation equipment enhances water’s productivity and efficiency. However, the movement of water out of dormancy compromises the government’s conservation efforts.

Interviews with managers of the other 12 irrigation districts reveal that water market activity in 2001 within almost all those districts was minimal or non-existent. The absence of water scarcity under normal snowpack and rainfall conditions will prevent future market activity of any great extent. Aside from allowing a market where trading of surplus water can occur, existing legislation constrains water market activity, for example, through the provision that water allocations cannot be sold outside irrigation districts or between water basins.

Over the long term, environmental change may ultimately produce supply constraints that create a more robust water market in southern Alberta. Policy changes can also enhance water market activity. Consideration should be given to expanding opportunities to sell water rights and allocations outside irrigation districts, possibly to dryland operators on the periphery. Existing water supplies could thus be made available to a broader base of users. Efforts to increase the processing industry in southern Alberta should also be encouraged and promoted, as processing activity greatly enhances water’s productivity and constitutes an important source of water demand.

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Endnotes

¹ The 13 irrigation districts are Mountain View, Leavitt, Aetna, United, Magrath, Raymond, Lethbridge Northern, Taber, St. Mary River, Ross Creek, Bow River, Western and Eastern.

² Backward linkages occur through increased input requirements such as fertilizers, pesticides, irrigation equipment and special crop harvesting equipment; forward linkages occur through increased storage and transportation requirements, and meat and vegetable processing (AIPA, 2002)