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# An overview of water sharing and participation issues for irrigators and their communities in Alberta: Implications for water policy

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ABSTRACT

Water extraction in many of the world's rivers is reaching unsustainable levels and continued supply of water of adequate quality for human and productive needs is threatened. In response, authorities in many river basins have stopped issuing new water entitlements and there are increased calls to divert less water for consumptive use. New mechanisms for sharing existing water entitlements among competing users are therefore needed. Since agriculture accounts for up to 80% of current water entitlements in many stressed basins, it will have to play a central role in achieving water sharing objectives for a sustainable future. However, attempts to facilitate water sharing have met vocal opposition in many countries and across stakeholder groups. This paper uses the results from a number of studies in Alberta, Canada, to explore some of the underlying reasons for this opposition. It finds that policy makers and water managers' lack of understanding of what drives irrigators' behaviour, plus the heterogeneity of the irrigation sector, have been major factors. It recommends that water sharing solutions have to be context specific and take into account the aspirations and interests of people across the society in which they are to be implemented.



## 1. Introduction

The need to find new ways of sharing available water between competing users, including the environment, has increased over the last decades, especially in semi-arid and arid regions. This process has taken place in response to population and economic growth, growing environmental awareness, increasing recreational use of water bodies, and increased affluence resulting in the adoption of more water intensive lifestyles, including eating habits. This pressure is likely to continue and will be aggravated by future climate change. Some 1.6 billion people currently live in regions that experience severe water stress; by 2050, the OECD (2012) predicts that to increase to 3.9 billion. Many water-scarce regions of the world are therefore facing significant challenges meeting future water demand from new and existing users, while also meeting the needs of the environment.

In response to environmental impacts caused by the current level of water diversion, authorities in many river basins no longer issue new water entitlements. Hence, water managers and catchment stakeholders are faced with two simultaneous challenges: (a) to reduce water diversion for consumptive use and (b) to meet increased demand from all sectors of the economy and the environment. This can only be achieved by finding ways of sharing existing water entitlements and by reducing the current level of diversion. Since the irrigation sector accounts for 80% of all water entitlements in many water-scarce basins (Postel, 1999), it is inevitable that it will have to play a central role in meeting these challenges and ensuring a sustainable future.

Irrigators will need to find ways of sharing their allocated water with other sectors of the economy and the environment; failing to do so voluntarily will force governments to take other measures. However, a challenge for governments is that a reduction in irrigators' access to water may have significant socio-economic impacts on rural communities. If less water is available for irrigation, agricultural output might be reduced, which may result in job losses, decline in land values and municipal revenues, and reduced service levels. In many rural communities, irrigation is the engine that underpins thriving communities. However, the magnitude of such impacts will depend largely on how irrigators respond to such reductions and how they are implemented (Bjornlund et al., 2013a).

One way irrigators could respond is to increase their water use and irrigation efficiency, as well as productivity.[1] In these cases, the value and/or volume of production might remain relatively stable

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[1] We acknowledge that there are many definitions used in the literature for water use efficiency, irrigation efficiency and productivity. It is outside the scope of this

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minimising the negative impact of reducing overall diversion on the community. If reductions in diversion are achieved by governments buying water from irrigators, the proceeds could be used to finance an alternative way of living, to reinvest in more efficient irrigation technology, or to change to more water efficient crops (that is crops or varieties of crops that require less water to produce the same yield or produce a higher value crop per unit of water). In some instances, no on-farm changes might be needed as irrigators own surplus water (e.g. Wheeler et al., in this issue). In some situations, water markets could be used to facilitate voluntary reallocations among consumptive users. This could have at least two effects in limiting the socioeconomic impact of reducing total diversion: (i) more productive and efficient irrigators might buy water from less efficient irrigators and thereby increase overall agricultural efficiency and productivity and (ii) inefficient and unproductive irrigators could sell part, or all, of their allocated water and be compensated in the process (Bjornlund, 2004). Nevertheless, there are potential environmental impacts on groundwater and surface water systems that may occur from such a reallocation (Young, in this issue).

In some jurisdictions, such as Australia and the United States, attempts have already been made to introduce water sharing policies. In most instances, they have been met with opposition, especially from the irrigation sector, but also from other sectors of the society. In Alberta, Canada, the impact of water scarcity is emerging. The South Saskatchewan River Basin (SSRB) has been closed so that no new applications for licensed water allocations will be accepted. In response, Alberta has implemented water trading, as well as water planning and other water policies (Klein et al., 2012). The process in Alberta is relatively new compared to Australia and the United States and therefore provides an opportunity to investigate how this process has progressed during its early stages and how the policy reforms have been received by all sectors of the community. This paper provides a review of how irrigators have embraced water markets and adopted more efficient irrigation technologies; how they think water sharing should occur; and how their perceptions of water sharing differs from that of other social groups. This review is based on a number of surveys conducted across the SSRB from 2005 to 2011 and the results from the individual surveys have been published elsewhere (see Appendix A). The contribution of this paper is that it synthesises these results and uses them to provide an overall assessment of how successful water sharing policies have been in the past and their likely future success.

## 2. The Alberta context

Water resources, population pressure and economic activity are geographically dispersed and spatially mismatched in Alberta. The northern part is rich in water, but is sparsely populated and has little economic activity apart from mining. Water scarcity is not a big issue; however, water quality is emerging as a problem due to the activities of the mining sector, especially the oil sands (Kelly et al., 2010). The southern part has a diverse economy, is densely populated, and has a limited water supply. This is especially true in the SSRB, which contains some 65% of all irrigated land in Canada. The first strains on water resources were apparent in 1991 and forced the Alberta Government to introduce guidelines that set a cap for the amount of water that could be allocated for irrigation. Following the severe drought of 2001-02, the Alberta government placed a moratorium on the issuing of new licensed allocations within the southern tributaries of the Oldman River (AE, 2003a). By 2005, it became clear that the SSRB was fully, or over, allocated and many river reaches suffered negative environmental impacts as a result of the current level of diversion. 22 out of 33 main stem river reaches were rated as moderately impacted, five as heavily impacted and three as degraded (AE, 2005). Consequently, in 2005 Alberta Environment (the provincial government department responsible for water at the time), decreed that no new applications would be accepted for licensed water allocations, except for the Red Dear River (AE, 2005).

A number of factors have been identified which can exacerbate the current problem of water allocation within the SSRB: (i) water demand from the non-irrigation sector could increase by 35–67% by 2021 and by 52–136% by 2046; (ii) irrigation has the potential to expand by up to 10% and 20% in the Oldman and Bow Rivers respectively, and iii) SSRB's 1996 population of 1.3 million may increase to over two million by 2021 and to more than three million by 2046 (AE, 2005). In addition, current climate change predictions suggest that the region is likely to face a change in both the pattern and type of precipitation, which will put further pressure on water resources (Byrne et al., 2011). As a result, it is likely that, in the near to medium future, the region will be faced with a significant increase in demand for water for consumptive and environmental use.

While water in the SSRB is fully (or over allocated), the environmental impact of this has not yet been fully realised because most license holders only use a fraction of their licensed allocation. Hence, the political pressure is still not adequate to generate any drastic measures. However, an activation of this unused water is likely to increase the environmental stress within these rivers, as has been previously found in Australia (e.g. Young, 2013). There is a growing understanding that failing to address the water issue now might result in significantly higher economic and political costs in the future.

### 2.1. Water policy and law

The right to extract water in Alberta is granted in the form of licensed water allocations under the Water Act, 1999 and 75% of all such licenses in the SSRB are issued for irrigation purposes (AE, 2002). These licenses exist under the prior allocation system, which gives license holders access to extract water according to the seniority of their license. Non-government entities cannot hold licenses for in-stream purposes because licenses are only issued for diversion purposes. In February 2013 the Water Conservation Trust challenged this by applying for a licence for habitat enhancement and recreation, fish and wildlife, and water management based on a donation of a licensed water allocation from a private company. This application was denied and the Trust appealed the decision to the Alberta Environmental Appeal Board, on 20 September 2013 the Board denied the appeal (Calgary Herald, 20.09.13). This prevents individuals and non-governmental organisations (NGOs) from acquiring water licenses to support river flows for the benefit of the environment or recreational purposes as it has increasingly been done in other places such as the Western United States and Australia (Lane Miller et al., 2013).

The vast majority (82%) of all irrigated land is located within 13 irrigation districts, which hold the licensed allocations and control the infrastructure which supplies the water to the farmers' fields. Irrigators' rights to water are secured by having a specific number of irrigated acres registered on the district's assessment roll.

paper to enter into this debate. For a comprehensive discussion of these issues we refer to Perry (2011), Perry et al. (2009) and Klein et al. (2012). In the Alberta policy context, the terms water use efficiency and productivity has been widely used but without any definition. Klein et al. (2012) has illustrated the problems associated with this lack of definition. In this paper the following definitions are used (unless otherwise stated): (i) irrigation efficiency is the ratio between water diverted and water consumed by the crop; (ii) water use efficiency refers to yield per unit of water diverted (kg/m$^3$); and (iii) productivity refers to the dollar value of water produced per unit of water Perry (2011).

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