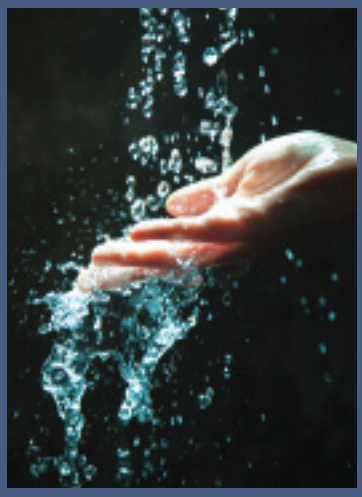
AGRICULTURAL WATER POLICY CHALLENGES IN BC

Hans Schreier



In June 2008, the Government of British Columbia announced its new water plan, "Water Smart Living." Hans Schreier, of the Faculty of Land and Food Systems at University of British Columbia, critically examines the plan's likely impact on water conservation and water quality, particularly in the province's agricultural sector. He concludes that "when it comes to water management, BC is truly the Wild West, and this new initiative is a good but very timid first step to improve our archaic water regulations." Without a much more aggressive approach to water conservation, water reallocation and water quality, he says, "we will continue to practice crisis management."

La Colombie-Britannique dévoilait en juin 2008 son plan pour l'eau « Water Smart Living ». Hans Schreier fait ici un examen critique des répercussions probables du plan sur la conservation et la qualité de l'eau, notamment dans le secteur agricole de la province. « La Colombie-Britannique fait figure de Far West en matière de gestion de l'eau, écrit-il, et cette initiative marque une étape importante mais très timide vers l'amélioration de notre réglementation archaïque des eaux. » Sans une approche beaucoup plus dynamique de conservation, de qualité et de réallocation de l'eau, « nous continuerons de faire de la gestion de crise », conclut-il.

In July 2008 the British Columbia government announced a new water initiative called *Water Smart Living*, which is an attempt to move water management and policy initiatives in BC into the 21st century. When it comes to water management, BC is truly the Wild West, and this new initiative is a good but very timid first step to improve our archaic water regulations. We in BC are among the greatest freshwater consumers in the world and have widespread problems with drinking water protection, non-point sources of pollution, groundwater management, controlling stormwater runoff and allocating water for environmental services.

Many of the proposed policy changes are long overdue, and although the government promotes this new initiative as a bold step, it is easy to realize that the targets the government has set are very timid and far too conservative considering the impact of anticipated land use changes, population growth and climate change over the coming years. Water conservation is clearly the most cost-effective action considering that the average daily water consumption per capita in BC is 426 litres. For example, in terms of water consumption, the new government plans to reduce per capita consumption by 33 percent by 2020.

This target could easily be accomplished by simply requiring all new houses to install low-flush toilets and give owners of old houses a grace period of 10 years to convert to low-flush devices. This alone could reach the government's target within 10 years without creating any economic hardship.

If we were more forward-thinking we could easily reduce all water consumption by 50 percent by introducing a more aggressive water conservation program that includes metering, roof-water harvesting for outdoor residential use, and low-water-use showerheads. All of these suggestions are already practised in many communities elsewhere and have proven to be cost-effective easily accomplished, and they require little legal and policy discussion.

Water consumption is only one part of the major water issues we are facing in BC. Water quality is of equal concern because many land use activities do not sufficiently protect source water. The need for better water laws to reduce consumption and protect water quality has been addressed in *Smarter Water Laws* (2008), by my colleague Linda Nowlan. My focus here will be water policies and regulations in agriculture.

While the overall water use in BC for agriculture is relatively small, agriculture is now the largest non-point source of pollution, next to urban land use. But in the drier climatic region, agriculture uses up to 70 percent of the freshwater resources. The Okanagan is clearly the canary in the mine in terms of an indicator of water stress. Given the current trends in production and the demand for water for domestic and recreational activities in this basin, we are likely heading for major water problems unless we embark on massive conservation programs that are much more aggressive and innovative than those proposed by the Water Smart Living strategy.

The second and equally important issue is the problem of agricultural pollution. Excess nutrient, trace metal and pathogen problems are widespread in all areas with intensive livestock operation, and this topic is poorly addressed in all policy measures. Continuous growth in meat production is creating a situation where manure is a waste product that needs to be treated rather than applied in excessive amounts to the land. But stocking regulations are absent in BC, manure management regulations are generally inadequate, and there is little willingness or capacity to enforce water quality guidelines in agriculture.

Fifty percent of the food needs in BC are met by local production, and there are great variances in water use in the different agricultural regions of BC.

The Okanagan Basin is the driest watershed in the country and is well known for its unique fruit and wine production capacity. The basin is facing a major water crisis because of the very rapid population growth, increasing demand for water from intensive agriculture and a very large influx of tourists during the summer, when water supplies are limited. Seventy percent of all freshwater resources in the Okanagan Basin are used for agricultural production, and the BC Ministry of Agriculture has embarked on a fairly comprehensive evaluation of water uses for all agricultural activities. There is clear evidence that almost all streams entering into the lake and the main stream channel are used at capacity and summer stream flows are at risk. Many tributary streams are in fact overallocated and will suffer during drought cycles, as was evident in the hot summer of 2003.

Hence, to meet the increasing demands, the short-term pressure is on exploration of groundwater. This poses three major problems: (1) the aquifers are poorly mapped and an inventory is currently under way; (2) the question of aquifer recharge has not been addressed; and (3) the BC government does not have groundwater legislation that controls water extraction from aquifers.

The groundwater inventory will help in identifying potentially new water resources but given that the annual rainfall varies between 250 and 500 millimetres, the question of aquifer recharge has to be of major concern.

In the new Water Smart Living strategy the government is proposing to address the issue of metering groundwater use in priority areas, which obviously should include the Okanagan. Given that BC is the only political jurisdiction in North America that has no groundwater extraction regulation, it is well overdue that such regulations should apply to all groundwater use in the province and not just selective priority areas. The governmentl also claims that by 2012 very large groundwater users will have to account for their water use, but such users are very few and are already required to conduct an environmental impact assessment prior to obtaining extraction rights. The Okanagan Basin is one of the most vulnerable watersheds in terms of increased climatic variability, and although steps are under way to complete a comprehensive water balance assessment, a much more aggressive policy has to be put in place to conserve water and to reduce the water footprint.

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For the agricultural sector in the Okanagan there is plenty of room to reduce water consumption, by improving the irrigation efficiency, and changing the crops to be grown in the basin based on use efficiency. Current modelling efforts have shown that large amounts of water can be saved by developing real-time climate and soil moisture monitoring systems that will allow the farmers to apply irrigation water when it is needed. Also, selecting the most effective irrigation system for each of the orchards, vineyards, and vegetable crops has the potential of saving large quantities of water.

If these efforts by the Ministry of Agriculture are aggressively being pursued and if groundwater extraction is being regulated, then it is likely that the water quantity issues for food production can be met in normal years. However, with increasing temperatures and massive demands for urban and recreational water use, the water problem in the basin will not be solved, particularly during periods of extended droughts. An example of the emerging conflict is the fact that the 45 golf courses use about the same

amount of water as all the grape-growing areas in the basin.

In contrast to the Okanagan the Lower Fraser Valley, which is the most productive food-producing area in BC, does not have a major water quantity problem. The issue in this region is water quality.

The Sumas watershed in the Lower Fraser Valley has the highest livestock density in the country, and the excess manure combined with fertilizer use results in an average annual surplus application to the agricultural land of over 100 kilograms of nitrogen and over 50 kilograms of phosphorus. This is above what the crops need, and this surplus will eventually end up in receiving waters, creating widespread eutrophication. In many areas between Langley and Chilliwack the stocking density is well above 4 AUE (animal unit equivalent) per hectare. As a point of comparison, Denmark regulates livestock production at 2.5 AUE per hectare.

There are now attempts to move manure from surplus areas to deficit areas, but this is not a sustainable process because shipping manure over large distances is not economically viable and is highly energy consumptive. The government policy is one of self-regulation by the farming community, and this is not working well because the livestock numbers have increased consistently over the past 20 years in spite of some short-term decreases as a result of avian flu.

One of the key case studies is the Abbotsford aquifer, which is the largest groundwater source in the Lower Fraser Valley. This is a highly vulnerable unconfined aquifer that over the past 20 years has been used extensively for irrigated agricultural and domestic drinking water. The nitrate levels in this aquifer have steadily increased over time, and many wells have levels of nitrate well above the national drinking water guidelines. In spite of considerable efforts by the researchers and farming community to reduce the inputs, it has not been possible to reduce the nitrate levels in the aquifers. At the same time that efforts were made to reduce fertilizer and manure applications on the aquifer, the number of chickens produced on the aquifer has steadily increased. This has now prompted a new initiative to remove chicken manure from the aquifer, but manure composting is practised and the amount removed is insufficient to improve the water quality in the aquifer.

If we are serious about maintaining a high quality of freshwater resources, we need to have policies in place that regulate stocking densities, and manure management procedures in place that do not contribute to the widespread eutrophication of receiving waters.

Another critical component of manure management is the practice of applying manure to the land in the late fall. This is necessary because few farmers have sufficient manure storage capacity for the winter months, when it is not appropriate to apply manure to the frozen soils. In order to create pit storage capacity farmers, apply manure in late fall after the summer crop is harvested. They have a window of about one month when such applications are possible and, depending on the year, October 15 is usually the deadline for late fall manure application.

This causes two problems: first, nutrients in manure are not needed to be taken up by plants because plant growth is minimal at that time; and second, the farmers apply as much manure as possible to the land, and this is happening just before the winter rainy season starts. This means that the soils become saturated with nutrients and water, which leads to surface runoff, soil erosion and significant transport of nutrients into the receiving waters. The Ministry of Agriculture has little capacity to monitor and enforce regulations, and abuse of this practice of unloading excess manure onto the land is widespread.

Another newer issue that is also not addressed by the Water Smart Living strategy is the daily additions of antibiotics, hormones and trace metals into the animal feed. Adding antibiotics is a prevention practice as a result of the avian flu outbreak, and the hormones and metals growth promoting substances. Since animals can effectively convert only a small portion of these substances, the remainder ends up in manure, which gets applied to the land and then ends up in the receiving waters.

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There is relatively little information and research available on these issues, but past research I have undertaken with some colleagues showed that zinc levels in sediment and soils have increased significantly over the past 15 years as a result of these practices. Most recently, Patricia Keen has also reported evidence of anti-microbial resistance in late fall in the same area.

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One of the vineyard that has made the Okanagan Valley in British Columbia famous. "The Okanagan is clearly the canary in the mine in terms of an indicator of water stress," affirms Hans Schreier. "Given the current trends in production and the demand for water for domestic and recreational activities in this basin we are likely heading for major water problems unless we embark on massive conservation programs."

These water quality issues are not properly addressed by the responsible ministries, and the government has so far ignored most of the water quality issues in agriculture. Monitoring programs are largely absent and the farming community is supposed to self-police bad management practices.

The options are either to regulate animal stocking densities or to start considering the treatment of manure for energy and nutrient recovery. The technologies for manure processing, energy extraction and converting nutrients into fertilizers have been well established elsewhere and it is suggested that the government start to provide some incentive in this direction if we hope to maintain a healthy aquatic environment. Here in Canada, researchers at the Department of Civil Engineering at the University of British Columbia have embarked on a major research project to recover methane and phosphate from chicken and dairy manure. This would be an appropriate strategy to improve conditions in the basin but innovative policies and financial resources are lacking.

Having intensive agriculture in source water areas is also creating concerns about pathogen problems in water. Studies by Environment Canada in 2008 and by Jamie Ross in 2007 have shown that a wide range of pathogens are prominent in all surface waters in livestock-intensive agri-

cultural areas. The Environment Canada National Agri-Environmental Standards Initiative has been trying to develop new water quality guidelines for pathogens in agriculture, but the provincial authorities are not particularly keen to adapt federal guidelines.

Finally, farmers in the rural areas will have to rely much more heavily on surface water in view of the anticipated global warming; and since their water demand is greatest during the summer when stream flows are already stressed, it is clear that a new conflict is emerging between water for environmental services and water for food. Again little attention is given to this topic in the Water Smart Living strategy in BC.

This concern is real. In his 2007 report, *Water for Food, Water for Life*, David Molden has estimated that global food production needs to be increased by 50 percent to meet the basic needs of a growing population, to adjust for changes in diet and to provide additional food for those who do not have enough. This is a formidable challenge because the land base for food production is decreasing, soil degradation is increasing, food crops are being converted into biofuel, and increased climatic variability is creating more extreme flooding and drought events. There are few countries with additional capacity to increase food production, and Canada is one of these countries.

With increasing expansion and intensification of agricultural production, water demands will increase, particularly if the focus is on meat production. The demand for meat is increasing rapidly, particularly in emerging economies like China and India. Since we are very efficient chicken producers in BC there are enticing opportunities to increase global trade in meat. This will require massive amounts of water, because meat production is far more water-intensive than staple crop production.

These economic opportunities are real but they do not account for the environmental cost in terms of water pollution, and they also do not account for the virtual water export (water embedded in food). If water in scarce areas like the Okanagan is used for food export, then that water is no longer available for other uses. A visionary government should put regulations in place in anticipation of these trends. If we do not account for water for environmental services, we are certainly not on a sustainable pathway.

Surface water allocation in BC has been done primarily on an ad hoc basis without having many scientific data to determine annual availability. In fact, conducting a water balance in watersheds is a very difficult proposition in BC, even more so over the past 15 years since the government has cut back massively on stream flow monitoring. As a result many streams are fully allocated or overallocated, and the global climate models for BC are telling us to anticipate earlier snowmelt, earlier freshet and longer dry summers, when the demand for water is highest.

In this changing context, it is imperative to rethink how we reallocate surface water. Unfortunately, none of this is a high priority in the Water Smart Living strategy adopted last year, and there is heavy resistance in Victoria to changing BC's archaic water laws.

But if we hope to arrive at environmental friendly water management practices, we need a much more aggressive approach to water conservation, water reallocation and water quality improvement. Without it we will continue to practise crisis management.

In order to be more proactive in the agricultural water management area, the government should initiate BC wide groundwater extraction regulation and not just suggest potential regulations in some selected critical areas in the future. This is long overdue and practiced in all other jurisdictions in North America. In addition, there also needs to be a better understanding of surface water allocations and this means that stream water monitoring needs to be significantly improved, because without it, it is very difficult to determine water balances and to allocate sufficient water for environmental services. A significant improvement is also needed in methods to determine minimum flow for environmental services. Finally, self-policing of non-point sources of pollution by the agricultural sector is not working, and some regulations should be put in place about animal stocking densities and manure application rates. Without some carrots and sticks it is unlikely that we will see much improvement in water quality in the intensively used agricultural area in British Columbia.

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Hans Schreier is professor at the Faculty of Land and Food Systems, University of British Columbia.