

# Rural Canada – A Developing Country?

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The provincial government in Saskatchewan both through its elected representatives and through its senior civil servants have tripped over each other to deny the obvious: that rural Saskatchewan has problems making high quality drinking water out of poor quality source waters. An Agriculture and Agri-Food Canada official described this in the June 5 Maclean's magazine as "Parts of Western Canada have some of the worst water in North America". A retired official who used to be Health Canada's coordinator on the Canadian Drinking Water Quality Guidelines stated in the June 12 Maclean's "Leaving small towns on their own in handling water treatment, which is so critical to health, is irresponsible".

The facts remain even in Saskatchewan: If a community or individual home is using chlorination to disinfect the water and there are still coliforms in the water after treatment, that particular community or home has very little protection from other microbes, such as protozoan parasites and viruses. It is simply due to the fact that coliforms are among the easiest microbes to kill using chlorine. That is actually why the use of coliform bacteria as an indicator organism for disease-causing microbes is not very good.

It was against this background the 9th National Conference on Drinking Water was held in Regina May 16-18, 2000. During the opening ceremonies Health Canada went out of its way to exclaim how wonderful federal-provincial relationships were, what great work they were doing and what excellent results they were achieving. As a representative of the Safe Drinking Water Foundation I questioned Health Canada about rural drinking water and how they could allow the mandate for

drinking water to be vested in provincial agencies. Provincial agencies including Saskatchewan's have abdicated responsibility and passed the buck to the municipalities.

One Saskatchewan RM wrote to the Safe Drinking Water Foundation stating that the responsibility for drinking water should be passed down even lower:

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*"It is quite true that safe drinking water is a concern for the health and well-being of people living in rural areas. And, people living in rural Saskatchewan are well aware of this fact. It is their choice to live in a rural area and they should personally donate to the research and development of water treatment systems should they deem it to be necessary."*

Maybe this RM is proud of the fact that they are the first municipal government to "pass the buck" to individual rural citizens! After all, the federal people passed it to the provinces, the provinces passed it to the municipalities, so why not continue to "pass the buck".

Should municipalities (or individuals) then stock up on medical and water treatment literature? Should municipalities directly collaborate with researchers to make sure the best ways to treat water are used? Should thousands of rural municipalities across Canada (and millions of rural people)

join efforts to protect themselves from unsafe drinking water? What is needed is research and development support for solutions that can be applied across rural Canada using the best science available anywhere in the world; it is not something individual farmers or municipalities can tackle in isolation.

Everybody is worried about E. coli especially E. coli O157:H7, which is the deadly strain that hit Walkerton. But, even in its deadly form, E. coli is very easy to kill with chlorine. But there are other disease-causing organisms we need to be concerned about that are not that easy to kill. The major issue with groundwater is the presence of bacteria and viruses that are more difficult to kill. Coliforms are not good indicators of viruses as most waterborne virus outbreaks have no detectable coliforms. The U.S. Environmental Protection Agency (USEPA) announced tough new regulations for the treatment of groundwater (the Groundwater Treatment Rule) in April 2000. USEPA announced this rule to prevent microbes that had clearly been shown to be problems in groundwater (including hepatitis A) from being distributed and consumed by humans.

Other waterborne viruses, such as Coxsackie B, were also targeted in the U.S. Groundwater Treatment Rule. Coxsackie B can cause insulin dependent diabetes and heart attacks. No determinations have been made for waterborne viruses that can cause human illness in Saskatchewan. But, right up to the Premier with his "twist of the wrist safe drinking water" (*The Rural Councillor April 2000*), the government is able to state that there are no problems with the quality of rural drinking water. The Ontario government isn't so lucky.



The Safe Drinking Water Foundation is setting up test methods for different types of bacteria and viruses so that the effectiveness of treatment methods can be tested. For example, E. coli is usually a benign organism, but when it comes in the form of E. coli O157:H7 then we better sit up and take notice. No routine testing can, however, tell if the E. coli present in the water is this strain or a less toxic one. To do so requires testing based on the genetic material of the organism; the Safe Drinking Water Foundation is developing such tests for use on rural ground and surface water sources.

Since we are not, at present, testing for most of the organisms that are of concern in rural drinking water, how could one get some idea of where things are at? We started to look at diseases that are reportable in all Canadian provinces. We then selected illnesses where the microbe causing the illness can be waterborne. Then we compiled the data for each province for five different diseases from 1990 to 1998 and calculated average levels. The five diseases were: giardiasis (caused by the protozoan parasite Giardia), campylobacteriosis (caused by the bacterium Campylobacter), haemorrhagic colitis or hemolytic uremic syndrome (caused by the bacterium E. coli O157:H7), shigellosis (caused by the bacterium Shigella), and hepatitis A (caused by the hepatitis A virus). While territories were included in this, the small population base results in widely varying rates and comparisons have been focussed on the provinces.

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The Canadian Prairies dominated the top three positions except for campylobacteriosis. For three of these reportable diseases, giardiasis (Beaver fever), shigellosis, and hepatitis A, Saskatchewan had the second highest (giardiasis), and highest (shigellosis and hepatitis A) levels among Canadian provinces. We presented this at the drinking water conference much to the dismay of Saskatchewan Health who had launched a hepatitis A vaccination campaign resulting in lower hepatitis A levels especially in 1999. We recognize Saskatchewan Health's efforts, but would have applauded much more if the underlying causes, unsanitary conditions and unsafe drinking water, had been dealt with.

Having vaccinated large numbers of people for hepatitis A now makes the use of this virus as an environmental indicator useless. The unfortunate part is that hepatitis A and any other microbe will rarely travel alone, and vaccination is not available for most of them. An example of this is the illness giardiasis. For this illness Saskatchewan had an average of 435 reported cases per year between 1990-1998. But the real numbers were much higher. A study from Ontario showed that the reported cases need to be multiplied by at least 10 to arrive at actual cases with clinical signs of giardiasis (asymptomatic carriers were not included, "Outbreak of waterborne giardiasis caused by sewage contamination of drinking water", *Environmental Health Review*, 42, 44-51, 1998).

So, there may have been more than 4,000 potential giardiasis cases in Saskatchewan every year and over the nine years this may have resulted in a whopping 39,000 cases. Anybody that has suffered from severe and prolonged stomach cramps, diarrhea, bloating and fatigue may have been a victim of this parasite. This parasite and many others, are not easy to kill with chlorine and need to be filtered out.

The Ontario government has known for years that there were problems with microbes in Walkerton and several other places, but has not taken action. Sounds similar to Saskatchewan. Lack of support for finding effective solutions to rural water quality problems can be seen in a zero expenditure on water research by

Saskatchewan Environment, and only \$5,000 by Sask Water Corp. (most recent data available, 1998). Compare that with an estimated \$10 million cost per year for waterborne illnesses in Saskatchewan.

The Safe Drinking Water Foundation was asked to comment publicly on the Walkerton situation. I was interviewed by Brian Stewart on CBC's National Magazine and by Allison Smith on CBC's Newsworld in addition to many other radio, TV, magazine and newspaper interviews. Before the Walkerton tragedy *Municipal World* published "Safe Drinking Water for Rural Areas - A Canadian Challenge" (May, 2000). You can read this article on the Safe Drinking Water Foundation's website (<http://safewater.org>). Urban Canada is waking up to one more plight facing rural Canadians!

It is clear that awareness is even starting to creep into government departments. That it had to take a tragedy like Walkerton to raise the awareness among provincial officials is sad. It is now ten years since a first Prairie Water Workshop was held in Saskatoon where problems with drinking water were identified. Sometimes it takes time for things to sink in. For example, the Human Immunodeficiency Virus (HIV), which is the cause of AIDS, was only clearly recognized some 20 years ago, yet it has now been shown that people died of this virus as early as 1959.

Sometimes it is a question of raising awareness and in other cases it is a question of making the connection between water, a microbe, and a disease. The realization that water is the best transport medium for microbes raises the importance of safe drinking water supplies. When safe drinking water is not available, waterborne illnesses will increase. Some will cause diarrhea, others will cause more severe illnesses. Many of the illnesses have not been connected to water before. For others, relatively mild illnesses can turn to quite severe reactions in some people. For example, campylobacteriosis, which is often associated with livestock, can cause paralysis in a disease called the Guillain Barre Syndrome. 83% of all paralysis cases in Canada are now attributed to



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this syndrome. There has not been one case caused by the polio virus for several years.

Another fact about waterborne illnesses is the sensitivity of infants because they don't have a fully developed immune system. People with a weakened immune system (elderly, immunocompromised etc.) are also at risk. For these groups the severity of the illness can be more than ten times that of a healthy middle-aged adult. This prompted us to have a look at another health statistic, infant mortality. Saskatchewan has had the highest infant mortality among the provinces from 1990 to 1997 (no official data for 1998 yet). In contrast to most other provinces Saskatchewan's infant mortality for the first four years (1990-1993) was actually lower than for the next four years (1994-1997). The rate increased by 13% while Alberta's decreased by 11%. Saskatchewan's infant mortality during the 1994-1997 period was 39% higher than Alberta's and 50% higher than the Canadian average. In 1997 Saskatchewan's rate was double that of PEI and Nova Scotia and almost double that of Alberta and B.C.

Rural Canada as a whole is not faring well on that point with a 40% higher infant mortality compared with urban areas. Can we afford to ignore the possibility of a connection between poor rural water quality and higher infant mortality? For urban areas it has been shown that income-level is related to infant mortality with low-income levels generating higher infant mortalities. Similarly, First Nations have high infant mortalities. First Nations, similar to other rural communities, have frequently difficulty to treat water with limited expertise on-reserve.

There are many effects of unsafe drinking water requiring solutions; these effects may have impacts on the health of a community and indeed a province. Livestock, such as cattle and hogs, are frequently sources of parasites, such as Giardia, and bacteria, such as E. coli O157:H7 and Campylobacter. Indeed, most cases of

illness caused by E. coli O157:H7 have occurred in North America and Europe possibly relating to high numbers of livestock. The close proximity to livestock, septic fields and drinking water in rural Canada highlights the

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need for source water protection and effective water treatment solutions.

Safe drinking water is often considered a basic human right, but for rural people, there is no public money to make sure everybody has access to the necessary tools to produce this basic commodity. At the Safe Drinking Water Foundation we rely on the support of foundations, corporations and individuals to find means of producing safe drinking water "at the twist of a wrist". Scientists from Japan and Europe will come to Saskatchewan this summer and help us in our safe drinking water work.

The way we have to raise funds to carry out some of this basic work is not dissimilar to how one needs to raise funds to help developing countries. Scientists and other volunteers work for no pay, but with a strong desire to improve the rural water situation. Maybe if we declared rural Canada a developing country, the Canadian International Development Agency would be able to support the pursuit of safe drinking water. Until then please help us in the quest of finding solutions for these problems. Please make a tax-deductible donation to the Safe Drinking Water Foundation, 11 Innovation Blvd., Saskatoon, SK, S7N 3H5 (<http://safewater.org>). Every penny and every drop count. There is no reason why rural Saskatchewan should not have access to the best science and technologies available anywhere in the world to make drinking water safe. ■