



HEWERS OF WOOD OR PROTECTORS OF WATER – MAKING CHOICES WHILE WE CAN

By Nigel Douglas, AWA Conservation Specialist

Planet Earth: the Blue Planet. From space, it hangs suspended like a sapphire in the blackness, sunlight reflecting back from the more than 70 percent of the planet’s surface that is covered with water: some 1,460,000,000 km³ of it! When we see images of Earth from space, perhaps it’s not surprising that we sometimes fail to appreciate just how precious and fragile our water supply is.

Once we begin to break down the numbers, though, this fragility becomes apparent. Roughly 97 percent of Earth’s water is salty; another 2 percent is frozen. Of the remaining 1 percent that is both fresh and liquid, nearly all – 99 percent – is underground. A mere 0.01 percent of Earth’s water is fresh, liquid surface water.*

Water, Water, Everywhere?

We tend to think of Canada as a relatively wet country, but that’s not the case. “Canada has 7 percent of the world’s land mass, and produces 7 percent of the world’s terrestrial runoff,” points out Dr. David Schindler, Canada’s premier freshwater scientist. “In other words, we have just an average supply of sustainable freshwater by global standards.”

Alberta itself is a relatively dry province. It makes up 7.2 percent of Canada’s land mass, but according to the Canadian Water Network, it holds just 2.2 percent of Canada’s freshwater supply. Significantly, most of the water in our rivers flows north and east, to the Arctic Ocean or Hudson’s Bay, whereas most of our demand for water – municipal and agricultural – is in the south (see map).

Thus the importance of the *source* of most of Alberta’s precious water – the mountains and foothills – begins to take shape. For example, in the whole of the Saskatchewan River basin – which



Annual Natural River Discharges (Alberta Environment). Blue shading represents volume of water.

stretches across southern Alberta and Saskatchewan, and into Manitoba – 87 percent of the water comes from Alberta’s mountains and foothills. Only 13 percent is added to the river’s volume between the foothills and Lake Winnipeg. Three of Canada’s great rivers – the Saskatchewan, Peace, and Athabasca – originate on Alberta’s Eastern Slopes. It follows then, that what we do in the watersheds of rivers like the North and South Saskatchewan has implications far beyond the boundaries of Alberta itself.

Calgary receives roughly half of its water from the Bow River, which begins in Banff National Park, and half from the Elbow River, which has its source in Kananaskis Country. Only about 56 percent of Kananaskis Country is protected; the remainder is managed for “multiple use,” including industrial activity. Similarly, the City of Edmonton receives most of its water from the North

Saskatchewan River, whose headwaters are partially in Banff and Jasper National Parks, but also in the unprotected Bighorn Wildland.

Other cities are less fortunate: Red Deer receives most of its water from the Red Deer River, which also has its source in the Bighorn; Medicine Hat receives water from the South Saskatchewan via its tributaries such as the Oldman, Castle, and Crowsnest rivers, whose headwaters are also unprotected. This is a large part of the reason why Alberta Wilderness Association has worked so hard for so many years to see increased protection of land in areas such as the Castle, the Oldman, and the Bighorn.

The Protection Pendulum

The recognition of this need to protect our headwaters is nothing new. As long ago as 1600 B.C., Emperor Yu of China wrote, “To protect your rivers, protect your mountains.” And Alberta has its own history of recognizing the vital role of protected headwaters. In 1896 J. S. Dennis, Chief Inspector of Surveys in the Government of Canada’s Department of the Interior, wrote to the Secretary of the Department (Cabinet ministers were typically called Secretaries then) to emphasize “the important part which the preservation of the forests on the eastern slope of the Rocky Mountains and the foothills plays in the permanence of the water supply.” Dennis stressed that “the permanency of our water supply is largely dependent upon the preservation of the forests at present covering the watershed, and this protection can only be secured by prohibiting the cutting of the timber.”

A 1927 Dominion of Canada brochure makes the same point: “It has been said that one of the primary aims of all National Forests is the production, in perpetuity, of a supply of timber. In mountainous regions this use of the forest may, by necessity, be subservient to another use – that of watershed protection.”

*All figures quoted are from the U.S. Geological Society. Published figures vary among different sources.

This emphasis was reiterated in Alberta's 1977 *Eastern Slopes Policy*: "The highest priority is placed on watershed management to ensure a reliable supply of clean water for aquatic habitat and downstream users." Although the publicly debated policy was unilaterally revised by the government in 1984, the theoretical emphasis on source water protection remained, and to this day the policy remains Alberta's official guiding document for the Eastern Slopes.

Perhaps more surprising than this continued early recognition of the importance of source water protection is just how far Alberta moved away from this in the latter part of the twentieth century. "A century ago, we had a better understanding of this than we do today," says Bob Sandford, Canadian Chair of the United Nations "Water for Life" Decade. "When Jasper Forest was set aside and protected [as Jasper National Park], it was principally as an upland watershed. We appeared to know more then about the role of logging of upland watersheds in the hydrological cycles." On a more optimistic note, he adds, "We are finally coming around now to see water as more important than wood."

Indeed, a series of droughts in the province in the early years of the twenty-first century served to focus attention on just how much we had been taking our water supply for granted. The 2003 *Water for Life* strategy marked an official recognition of this growing appreciation. But although the strategy states that "our quality of life, and life itself, depends on having a healthy and sustainable water supply for the environment, for our communities and for our economic well-being," its focus on headwaters is weak.

The Alberta government's current Land-Use Framework (LUF) process has also helped to profile the importance of protecting water supplies and reflects the growing recognition that we need to



The Bighorn Wildland contains the headwaters of rivers that provide drinking water to communities like Rocky Mountain House and the city of Edmonton. PHOTO: V. PHARIS

make better choices about priorities for watershed management. The results of a broad survey of Albertans' attitudes to land management issues are published in the 2007 *Land-Use Framework Workbook Summary Report*. Findings include the following:

- 74.3 percent of participants believed that "at present, the balance between developing and using our land versus conservation of our land is too focused on economic development and growth."
- 73.1 percent of participants would be "willing to accept limits to Energy Development to provide for more Watershed Protection."
- 95 percent of respondents were "very concerned" or "somewhat concerned" about the "failure to consider the impacts upon the water supply during land-use planning."

The draft LUF reflects Albertans' concern: "Historically, watershed and recreation were deemed the priority uses of the Eastern Slopes. These priorities should be confirmed, and sooner rather

than later." But the LUF is Alberta's great unknown. Will the encouraging words and sentiments ever be translated into concrete action, or will they just be more paper in the stack of documents that become subverted to facilitate the business-as-usual mentality that led to the land-use problems we face today?

Multiple Use: Anything, Anywhere, Anytime

As with so many issues in Alberta, many of the problems associated with the state of our watersheds and headwaters have their roots in the "multiple use" philosophy, which has been pervasive for the past few decades. Watersheds have been the source of our water, but they have also been the source of so many other things. Watershed forests became the source of a burgeoning forestry industry, and cattle grazing replaced the long-gone bison herds but without the natural constraints on landscape impact. Coal development in the 1940s and 1950s was followed by oil and gas development. A growing provincial population – with more money in its pocket and more free time to spend it – increasingly sought out the mountains and foothills as recreation playgrounds. The province's exploding population of off-highway vehicle users followed the profusion of industrial roads, seismic lines, and pipelines into previously inaccessible areas, adding to the impact. And, of course, urban and rural sprawl continues to eat up valuable watershed land.

Individually, each of these activities

AWA's VISION



For the well-being of all living things, Alberta has healthy, natural ecosystems in its river headwaters. There is plentiful clean water for all Albertans; province-wide awareness and stewardship of water as a precious, life-giving resource; and effective, ecosystem-based management of Alberta's watersheds, groundwater, river valleys, lakes, and wetlands.



“Those who would gamble with our natural resources believe that man’s needs for tap water are in competition with nature’s needs. I reject this notion. These needs are one and the same and should never be considered mutually exclusive.”
(Outdoor writer David Sikes, 2003) PHOTO: N. DOUGLAS

has its impact on water quality and quantity: cumulatively, this effect becomes multiplied. And for many years, Alberta has had no planning authority with the mandate to decide exactly what our priorities are in our watersheds. Alberta Energy and the Energy Utilities Board have decided where oil and gas leases will be sold; the Forests Division of Sustainable Resource Development has decided where forestry activities will take place; and for many years, by default, off-highway vehicle users were allowed to go virtually anywhere.

The casualties of this unbridled development have been wilderness, water quality and quantity, and wildlife populations. Increasingly, wildlife and fish populations have had to squeeze into the space left over from our activities. Native fish populations have declined with increasing disturbance of rivers and waterways, and sensitive species such as grizzly bear continue to struggle. As Bob Sandford stated in an August 2008 interview with the *Rocky Mountain Outlook*, “Over large parts of the world we have begun to deny nature the water it needs to perpetuate biodiversity-based ecosystem processes that are every bit as important to our survival in the long-term as our immediate needs are in the short term.”

Clearcut forestry operations in particular have had a detrimental effect on water quality and quantity. Sandford points to the “crucial importance of protecting upland watersheds, which store and capture water for slow release.” Healthy forests act like a gigantic sponge. Rain falls onto trees and trickles down through the leaves and the branches. It lands on the ground vegetation and is filtered by mosses and soil microorganisms as it percolates into the ground. It can take this forest “sponge” days, weeks, or even months to filter water through the ground and slowly release it into creeks and rivers.

This is in notable contrast to recently clearcut areas of forest, where the rain hits the denuded ground and runs straight down toward the nearest creek, carrying debris and sediment with it. The water does not get the natural filtering of plants and soils, and it hits the rivers much more quickly. The upshot is that in wet periods, stream flow levels rise quickly, with an increased risk of flooding. Conversely, in dry periods, there is no forest “sponge” to release its water, so downstream water shortages become more likely. When the Detailed Forest Management Plan for Spray Lakes Sawmill’s Forest Management Agreement in Kananaskis Country and the Ghost was released in

2006, it included a study which found that clearcutting operations would have a minimal effect on total stream flow volumes. But it received much criticism for failing to mention what the effects would be on seasonal peaks and troughs of water flow.

Protecting Headwaters

The arrival of Ted Morton as Minister of Sustainable Resource Development (SRD) in 2007 seemed to signal a new appreciation of the value of Alberta’s forests for production of clean water. As incoming minister, Morton inherited a draft Management Plan for the C5 Forest Management Area, which runs from Waterton Lakes National Park north to Kananaskis Country. Unlike his predecessors, Morton appeared to take seriously the concerns about the plan’s emphasis on logging – concerns expressed by many, including CROWPAC. In a May 2006 letter to the *Pincher Creek Echo*, this multi-stakeholder advisory group, set up specifically to provide input on the plan, wrote: “Important issues such as fragmentation, connectivity and habitat patches have not been addressed in the Forest Management Plan or in some form of environmental assessment, nor have the cumulative effects been considered in the planning process.”

Morton decided to delay implementation of the draft plan until the completion of a report by the Oldman Watershed Council on the state of the Oldman Basin and asked his staff to revisit the plan “with an eye to shifting priorities to better consider environmental protection” (*Calgary Herald*, March 13, 2007). In a 2007 speech to the Alberta Fish and Game Association, he stated, “In the next several years, as long as I’m the Minister here, we’re going to be moving to a new approach where our Forest Management Plans don’t just allow for other uses, but that will be specifically designed to promote and protect the other uses.” As of October 2008, the draft Forest Management Plan has still not been approved, although the down side of this is that the forest continues to be managed under the old outdated logging-centred management regime.

Protecting headwater areas for production of clean water goes well beyond forested land. Scientists are just beginning to understand the importance



PHOTO: N. DOUGLAS

of native wildflower meadows in supplying clean water. In a September 2008 article in the *Casper Star-Tribune*, Rebecca Huntington writes, “When functioning properly, [meadows] capture moisture from rain and snowmelt and filter out sediment, thus preventing soil from washing down slope and, ultimately, downstream to cutthroat trout spawning beds. When too much sediment settles in the spawning gravel where native trout lay their eggs, the sediment suffocates the eggs and young fish fry.” Huntington quotes retired Forest Service ecologist Alma Winward: “Increasing organic matter by 5 percent on the ground can allow the meadows to hold seven times as much water per square foot.”

Less clear is the role that Alberta’s Eastern Slopes play in the recharge of groundwater, Alberta’s hidden but critical resource. If water is rushing off the land and into the rivers more quickly, then how is this affecting the rate at which groundwater supplies are recharging? We have a good idea in Alberta of how much water there is in our rivers; we have a relatively good sense of how much groundwater is being extracted. But our knowledge of groundwater supplies – how much water there is, where it comes from and where it goes, and how quickly it recharges – is still shockingly poor.

As Brad Stelfox, landscape planner with Forem Technologies, describes it, “We have a pretty good idea how many straws are in the milkshake, and how much they are sucking up. But we have no idea how big the milkshake is.” We can add to this the fact that we also have no idea how fast the milkshake is refilling, if at all.

What Can We Do?

According to Alberta Environment, Canadians use about 1,600 m³ of water per person per year. This is more than twice the average individual use in France, about three times that of Germany, four times that of Sweden, and almost eight times as much as the average Dane. We can certainly take steps as individuals to reduce our water consumption, but are individual water conservation actions enough?

At least as critical as personal initiatives is the need to protect Alberta’s headwaters: the source of our water. “We need to protect the most important headwater and terrestrial ecosystems that allow water to be captured and held,” says Sandford. More than just protecting the creeks and rivers themselves, this

also means protecting the land that is so intricately linked to the production of clean water. In the words of hydrologists Kevin Bladons and Uldis Silins, “In a sense, land, watershed and habitat are synonymous terms; you cannot manage one without simultaneously managing the others.”

For this reason, AWA continues to work toward full legislated protection of land throughout the Eastern Slopes. Ten of AWA’s Areas of Concern fall within the Eastern Slopes, and increased protection in these areas will serve a number of purposes, not least of which is the protection of the source of a supply of clean, abundant water.

“There is nothing more valuable than an intact, healthy watershed ecosystem,” says Mark Bennett of the Bow River Basin Council. “If we can’t address water issues in a place as wealthy as Alberta, where in the world can we?” 🍷

For details on AWA’s upcoming headwaters workshop, “Our Place in the Headwaters: Managing the Commons,” see p. 28.

Case History: New York City

Protecting forests around headwaters makes financial sense. In its 2004 report, *Conserving Forests to Protect Water*, the American Water Works Association states, “Protecting forests – which reduces erosion and sediment, improves water purity, and in some cases captures and stores water – is a cost-effective way to provide clean drinking water.” Increased forest cover in the watersheds actually results in decreased water treatment costs for communities: “For every 10 percent increase in forest cover in the source area (up to 60 percent forest cover) treatment and chemical costs decreased approximately 20 percent.”

The City of New York has taken this message seriously. New York receives its drinking water supply from surrounding watersheds, including those of the Catskill, Delaware, and Croton rivers. These watersheds supply 1.3 billion gallons of water per day to New York City (WWF/World Bank, *Running Pure: The Importance of Forest Protected Areas to Drinking Water*, 2003).

In the late 1990s, the City of New York was faced with enormous projected costs for constructing a new filtration plant: the proposed operating cost was US\$3-5 billion over 10 years, on top of a construction cost of US\$6-8 billion.

To their credit, city staff decided to look at alternatives. Rather than treating the dirty water that entered the city, they researched the financial costs of preventing that water from becoming dirty in the first place. They decided on a range of measures, including protecting the city’s watershed, acquiring the necessary land, designing and implementing management programs, and compensating forestry companies and dairy operators for any lost earnings.

The total projected costs for this preventive approach were US\$1-1.5 billion over 10 years – a fraction of the cost of the conventional, default approach.

The WWF/World Bank report cited above concludes: “Well managed natural forests almost always provide higher quality water, with less sediment and fewer pollutants, than water from other catchments.”