**Water in Alberta's Boreal—Never a Dry Subject**

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Sherlock Holmes and Dr. Watson would go on camping trips, between bouts of crime-fighting. On an excursion to the Highlands of Scotland they cooked a simple dinner, drank a bottle of wine, and retired for the night in their tent. Some hours later Holmes wakes up and nudges his companion awake with an elbow to the ribs. "Watson, look up and tell me what you see."

Blinking and rubbing his eyes Watson replies, "I see millions, perhaps billions of stars, Holmes." "And what do you deduce from that Watson?" Watson ponders for a minute. "Well, astronomically it tells me we are in the galaxy called the Milky Way and beyond are others. Astrologically, the moon is in the seventh house and Jupiter aligns with Mars. Meteorologically I suspect tomorrow will be clear. Theologically I feel we are but a speck of dust in God's celestial kingdom. What does it tell you, Holmes?"

Holmes, the great detective is silent for a moment. "Watson, you are an idiot!" he shouts. "Someone has stolen our tent!"

Water and watersheds are like Holmes and Watson's tent—important but often overlooked; out of sight, sometimes out of mind. Sometimes we don't notice, what we see every day. We need to consider that for the boreal watersheds the ability to envision what is out of sight is just as important than merely seeing what's right in front of us. Sometimes the most obvious, important realities are the hardest to see and to talk about, like water.

Here are some thoughts on water, watersheds, water management, land use, and the human dimension for the future of Alberta's Boreal. Please fasten your seatbelts, this will be a fast ride.

An optimist sees the glass as half full of water; the pessimist as half empty. To an engineer, the glass is twice as big as it needs to be. So, there are many perspectives on water and how we manage it.

The disconnect between us and water grows wider. Rain isn't just a missed golf game, a snow flurry an annoyance of shoveling, or spring high water an assault on property. This is step one for a substance more precious, more useful, more perilous in supply than oil or gold or rare earths, one without which we would still be cosmic dust.

Water, as an elemental substance has a recurring theme in this world and in our lives. In the fullness of time every molecule of water has been around the world and back again. Some travelled as a passenger in an orange, an avocado, and even in a human body. A drop of water, if it could communicate its own history, could explain the universe to us. If water molecules could accumulate air travel miles the rewards would be staggering.

So, the same water that dinosaurs, saber-toothed tigers and Neanderthal man (and woman) drank, we drink today. The same water we brushed our teeth with this morning nourished the plants that formed Alberta's vast coal beds and petroleum pools. Water that transited through Genghis Khan, Charlemagne, and Sitting Bull, continues its endless journey through us. I hope this doesn't cause you some immediate anxiety as to the source of water in your glass.

At times that water is liquid. It can be harder than a frozen hockey puck. Sometimes it drapes the landscape in a soft, white covering. It can seem weightless, but visible as clouds. And, it can be invisible, even to a

discerning eye, as vapor reaching up into the stratosphere and shielding us from solar radiation. Like a changeling water is fluid, mobile, and changeable. It is a truism that thousands have lived without love but none have lived without water.

To W.C. Fields the thought of drinking water was anathema, because of what fish did in it. But it is still amazing stuff this water and perhaps it's time to stop treating it mainly as a diluent for scotch and coffee, a convenient cleanser for both body and industrial processes, a frozen platform to play our national sport on, and the backdrop for tourism posters.

Water isn't a linear feature, simply passing through and by us. It is us, up to 65 percent of our bodies. The rest is just framing and wiring and plumbing. Our brains have a larger constitution of water so when we think—if we think—it's the water that is the conduit for the magic of thought.

Aldo Leopold, an ecologist, and philosopher, observed that rivers are not linear but round. As a metaphor he used an early logger story, one of the marvels of early Wisconsin, of the Round River, a river that flowed into itself, and thus sped around and around in a never-ending circuit.

Paul Bunyan, a logger of mythical proportions and of myth, discovered it and the Bunyan tale is of how he floated logs down its waters that were somehow magically connected in a never-ending circle. It's not really magic and only partially metaphor to suggest all water is like the Round River.

As part of natural cycles and rhythms we float past our starting point endlessly, reversing the thought that we are simply either upstream or downstream residents. We are in and part of a loop. Water is a circle, a cycle of energy, from sun to plants to insects to fish to us. If the circle is broken, as it is by human activity or intervention, the entire continuum suffers, including us.

Shifts in hydrologic responses from logging, industrial development, increased nutrients from agriculture and cities, excess sediment from everything we do in the uplands, plus the loss of riparian filters profoundly change the linkages between the pieces that make up the connected arc. As the circle spirals out of round, out of connectedness, the pieces fall away, almost by centrifugal force. It is then hard, maybe mostly impossible, to square the water circle again.

Cloaked in what seems to be a blanket of endless greenery is the vastness of the boreal region. The boreal region covers an area larger than the combined area of Alberta's other landscapes yet it is more out of sight and regrettably more out of mind than the others. At the global level the boreal forest represents the Earth's most extensive terrestrial system and Alberta has a large share of it. It's a piece of real estate that seems almost trivialized by definition, categorization, and superlatives. Like the national debt it is difficult to grasp the immensity of the watersheds, especially the Peace and Athabasca drainages. Trying to perceive the boreal by driving on a road through a tunnel in the forest is like trying to observe the ocean in a bucket of seawater.

This part of Alberta saw the first European settlement and with the accumulation of over 230 years of journals, art, and photographs plus recollections and oral histories of native peoples that go back much further, this can paint an informed picture of watersheds prior to many of the sweeping changes of the last few decades. One thing a review can remind us of is the first economic boom of the Boreal—fur—and the subsequent crash. History has a nasty habit of repeating itself, when we don't pay attention to it.

There are hundreds of stakeholders in the boreal region, not an insignificant array of interests. As Charles de Gaulle once remarked in

frustration about France, “how can you govern a nation that has over 258 kinds of cheese?” As it turns out Charles was low by almost 100 cheese varieties. Be it cheese, watershed size, land uses, or expectations pulling people together is a challenge.

As a function of history, the decisions about land and water management over the last 100 years (including some outside Alberta) have provided substantial economic benefits, created ecological consequences, and foreclosed on opportunities for other choices, given the challenges of an uncertain future.

We find ourselves at a pivotal point that requires us to reflect about the past, understand our present circumstances, and weigh the trends and trajectories to plan a future that maintains a mix and balance of economic opportunity, environmental protection, and social needs for the residents of boreal watersheds. Key to this will be the understanding that the watershed (and the rivers, lakes, and streams that form it) requires a certain amount of water in order to serve its needs, as well as ours.

People farm, fish, trap, raise livestock, recreate, mine, harvest trees, process trees into lumber and paper, drill and extract gas and oil, guide and outfit and, of course, separate oil from sand. How do we rearrange our thinking to prepare ourselves for the realities of an uncertain future of climate change, increased population and development pressures, greater demands on a shrinking resource, and potential loss of key ecological functions and biodiversity?

Thinking like a watershed might lead us to the revelation that land management should be married to water management. The health of our water is a principal measure of how we live on and use the land. For too long we have separated, with administrative boundaries, bureaucratic silos, and differing economic interests what we do and manage in the uplands from how we manage water. It leads us to an artificial separation of the

headwaters (the water provider) from the downstream portion of the watershed (the water user).

Watershed level work seems overwhelming because of the scale. But it does not involve superheroes leaping tall buildings or stopping bullets with their hands. The real heroes are ordinary people who know the value of working together to make watershed scale work more manageable. There are many such heroes in tonight's audience.

The first step might be to recognize that we can manage cooperatively what we can't individually. That is an old, powerful concept called "community." Community is an appropriate concept, because to paraphrase John Donne, the English poet, no person is an island, no industry entire of itself, each of us is a piece of the landscape, a part of a greater watershed.

We might begin by creating a "community of communities" in the Boreal watershed that recognizes their connections are not solely through road networks but with the ecological connection of water. Linking people through the arteries that convey water is a key step to watershed thinking and activities in favor of watershed health.

All of you in the Boreal belong to some community, at some administrative level. It could be a small watershed group operating on one of the many tributaries to the major rivers. It could be industry working on provincial lands. At those levels, every community boundary includes a larger portion of the watershed than that of an individual property owner. Add the work of many communities (and watershed groups) together and a substantial start might be realized on working as an integrated watershed. All of you that live and work here are part of it and are connected to one another. Now the task is to recognize this reality.

There is only so much water circulating in the world, and then there is no more. Sustainable systems, be they agriculture, urban, industrial, or extractive must accept and work carefully within the limits of the water cycle, it being far from an inexhaustible supply. Indeed, if there was a first commandment for living successfully and sustainably on earth it is to understand how the water cycle—the Round River of Leopold's metaphor— and watersheds work together and adapt our behaviour accordingly.

There is a metric, one thousands of years in the making, available now if we have the inclination to employ it to evaluate and monitor our watersheds. It is one finely tuned to reflect changes beyond the range of natural variation, it can be both stream specific and watershed scale in scope, the elements measured reflect watershed history and presence or absence is a surrogate for other valued indicators, both aquatic and terrestrial.

The metric is fish and the ripples that extend outward from a pebble dropped in a stream containing fish inevitably find us. How well we have managed watersheds is embodied in the diversity, distribution, and population responses of these fish. It's applying a "fish ruler" to see how our management measures up. I wish I could say we are managing well, using native fish as a metric, but we're not.

The future of water management may well be to become better attuned to the watershed and to see what needs it has, to maintain its critical functions, upon which we depend. Our past practices will be a guide for the future, but not a template or recipe for water management. Albert Einstein remarked that, "You can't use an old map to explore a new world."

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key ecological functions and biodiversity? By the way, we're not on a course to hit the iceberg of climate change, we've already ploughed into it.

We, as Albertans, might brag about swimming in oil, but the real measure of wealth is water. It is an irony, given all recent space exploration has been a search for water, that we still have not achieved a full appreciation of the gift of water on Earth. I'm not sure we should be allowed to leave this planet until we've demonstrated we can care for water here. I make an exception for the likes of Elon Musk, as long as he agrees not to return to Earth.

We might begin by dealing more quickly, forcefully, and proactively with the perception, or myth, of abundant amounts of water in Alberta, even in the Boreal. There is no "magic" available to make more water. It is and will always be the primary limiting factor. We can make it run uphill, figuratively, and literally, as long as there is enough money and energy to push it, but that has undesirable side effects and represents a failure to confront and heed ecological limits.

Edmund Burke, an 18$^{th}$ century philosopher touched on this several centuries ago by saying: "The great error of our nature is not to know where to stop; not to be satisfied with any reasonable acquirement; not to compound our condition, but to lose all we have gained by an insatiable pursuit after more."

This race for water also has the potential, the very serious risk, of creating winners and losers. There is technology to clean the quantity we have polluted, but technology is expensive and the cost of cleanup often comes out of the pocket of the downstream user, not the entity that initially changed the quality of it.

I want to turn to beer at this point, not for escape but for a solution, maybe a warning. Christian Millman, writing in Discover Magazine, pointed out the Egyptians built the pyramids under the influence. Apparently, workers at Giza, the pyramid complex, received about four liters of beer a day. Not surprisingly, for the era, and like many parts of the world today, beer was a healthier drink than the water of the polluted Nile River. Beer was safer because it contains antimicrobial ethanol. Maybe that should be part of the label of an enterprising micro- brewery. Something like, “Avoid illness—Drink our antimicrobial ethanol.”

The oldest river in the world in terms of sustained human use is the Nile. Once, it was used sustainably, in a pattern of directing flood flows to fields that also conveyed sediment which enriched the soil. It was a simple system, with little adverse environmental effects and was manageable at the local level.

Enter foreign experts with a penchant to convert the country to Western-style agriculture, especially exports. The last stage of the transformation was the High Aswan Dam, a monumental chunk of concrete which created one of the largest impoundments in the world. Now the silt that naturally fertilized fields is trapped in the reservoir, the productive fishery of the Nile delta has disappeared, schistosomiasis has been introduced, plaguing villages, and the Nile valley has declined as an agricultural resource.

The lesson from this, maybe even the moral, is— “Build pyramids, not dams, and do it fueled by beer.” Alternatively, it is about water planning that is simple, scaled appropriately, and is capable of enduring for the long haul.

From this we can deduce the challenge for us in Alberta is not a new one; it is one that has been with human society for millennia. Aldo Leopold articulated it this way, in 1938:

“We end, I think, at what might be called the standard paradox of the 20th century: our tools are better than we are, and grow better faster than we do. They suffice to crack the atom, to command the tides. But they do not suffice for the oldest task in human history: to live on a piece of land [I might add— in a watershed] without spoiling it.”

Our watersheds can’t exist on the hopes and promises of tomorrow. The possibilities of a desired future will only become realities if we make ourselves responsible for that future, today. Our tools and those we can build are only as useful as our will to employ them in making the tough decisions.

My wife is always trying to pin me down on when I’m going to do some unpleasant household task. “Someday,” I say. She points out that I had said I'd do it yesterday and then yesterday, I said I’d do it today. Then today you’ll push it to tomorrow, and tomorrow, you'll shift it to "Someday.” “Do it now” she says! Procrastination is the bad habit of putting off until the day after tomorrow what should have been done the day before yesterday.

The watersheds of tomorrow require us to exercise restraint, thought, and stewardship now. If those principles guide us in Alberta, and in the Boreal, there is a good chance we will be remembered fondly by future generations.

There’s a saying that “no snowflake in an avalanche ever feels responsible.” I suppose you could argue that some interests, some stakeholders, some individuals in the boreal are like snowflakes in an avalanche, unable, maybe unwilling to feel responsible for their watershed. How then do you inspire people to recognize their commitment to one another and the place they live?

Maybe we need to start at a more fundamental level, starting at the visceral level, where emotions play more of a role. I think of some of the comments I've heard in breakout sessions, at coffee breaks, and around tables of more inspiring liquids. Comments like:

- I want my grandchildren to be able to swim in the lake.
- I want to catch fish and not worry about eating them.
- I want a job that lasts and I can feel good about.
- I want my business to survive and thrive, but not at the expense of the landscape.
- I want to be recognized as a good steward of the land.
- I want my community to be a part of decisions that are made.

Those comments build foundations to the cerebral part of planning—how much, where, limits, concentrations, policy, representations, and partnerships. We don't need to scan the skies in search of signs of solutions— a lot already exists in thoughts, aspirations, and comments. So pull up a chair, pour yourselves a coffee, and join in a conversation. There is much power in that.

Impossible you say! "It always seems impossible until it's done" said Nelson Mandela.

Boreal watersheds cannot satisfy everyone's interests all the time, everywhere. We have to acknowledge, in our hearts and minds, that limits exist and have been exceeded. Beyond those limits the attributes and functions of the watershed are at risk, many will deteriorate, and some will be lost.

If you are still skeptical of where an unrestrained development path leads, to cumulative effects and crossing ecological thresholds, try this simple, at home experiment— invite more and more people to live in your house, until the refrigerator is empty, the toilets are plugged, and the air reeks of sweat and old socks. Add a kid with a drum set to the mix. Then, ask yourself, was there a line, beyond which it just wasn't a good living arrangement?

When standing on the edge of a chasm, the best thing to do is step back. To reach a stage of protection and sustainability we need to reverse the trend in our land use footprint and engage in restoration. In a conversation on a similar topic Groucho Marx apparently said, "A child of five could understand this." Then he said, "Send someone to fetch a child of five."

Life asks us to make measurable progress in reasonable time. That's why they make those grade four chairs so small—so you won't fit in them as an adult. And yet, when it comes to progress on water, we seem stuck in those grade four chairs. For the sake of watersheds, those that live and depend upon them, including the wild things, we need to collectively graduate into larger chairs of understanding.

As Sherlock Holmes might have said, "It's elementary." After a meal it's alimentary. If the digestion of my words lasts longer than the digestion of the meal you have just enjoyed, my job is over and your task has just begun. I hope, instead of indigestion, it produces inspiration.

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