

FLOOD– The Other “F” Word?

Lorne Fitch, P. Biol.

Gordon Lightfoot, the icon of Canadian folk music, intones, “When the skies of November turn gloomy” as a warning to ships plying the waters of Lake Superior, even big iron ore carriers. In land locked and generally water short Alberta, Lightfoot’s words don’t have the same cachet, but recent storm events have begun to sensitize us.

The floods of 1995, 2002, 2005 and now 2013 have made us start to search the skies of May and June for signs of impending doom. Spring rain used to fill our prairie souls with joy; now the same rain, especially when it persists for days, fills us with a sense of angst.

With recent experiences we’ve started to look at a flood as the other “F” word. Are we justified in thinking of this phenomenon in such harsh terms?

Is it possible to have more than one “flood of the century”? Given the short reoccurrence interval, four major events in 18 years, a term like “flood of the century” seems meaningless, more joke than a measurement to the next big event. What we need to understand about return intervals of one in a hundred years is not that a major flood happens only once in a hundred year period but rather there is a one percent chance of it happening in any year. So we can have recurring large floods stacked up, one against another.

Why do large floods occur more frequently? Maybe we need to recognize that uncertainty and extreme variability are part of the new normal for us.

Floods happen and they reoccur in a predictable nature as the accumulated snow of winter meets the rising air temperature of spring. Water turns from a solid state to a liquid one and that transformation is faster than the earth’s absorption rate. That’s especially evident when heavy rain accompanies or follows snowmelt like the recent flood event. The surplus water swells the thousands of tiny drainages and coalesces in the smaller streams. Those hundreds of small streams feed the larger streams and rivers, as gravity pulls water from higher elevations lower.

A wave of water rolls downstream, filling the channel and often spilling into the adjoining low-lying areas. Most of these “floods” go by and we hardly

notice, short of some brownish water that can thwart the efforts of anglers and possibly with a greater than detectable taste of chlorine in the tap water.

What all floods have in common, the average and the not so average, is that measured over the year, this is the time of greatest volume, highest speed and most energy. All of these features are important to consider and understand flood dynamics.

Volume is the easiest one to observe; there is simply a lot more water. That water has to fit somewhere and when the volume exceeds the capacity of the channel (the area between the banks) it climbs out of the restriction into the low lying area called the floodplain. It's a rather clever adaptation to periodic bursts of water and provides a river with a safety valve to temporarily store the excess water, outside of its channel.

Because floodplains are only used on infrequent occasions we tend to forget they exist and what role they provide. Like house insurance, we hope we will never need it, but without it we shoulder tremendous risk. It's worthwhile taking a little windshield tour after floodwaters have receded to remind ourselves of the outer boundaries of the floodplain. The accumulated flood flotsam and jetsam are the silent messages of the river, telling us where it needs to be after the gales of June come slashing.

Speed and energy are inextricably linked. Water is a heavy substance, a cubic meter of it weighing almost as much as a Toyota Corolla. If you've ever been "bombed" by some trickster with a pail of water, you have instant understanding of the shock of an innocuous liquid hitting with such power.

Unlike the pail of water, a river's volume keeps pounding away, and as the speed increases so does the power of that water. A mere doubling of the velocity of the water quadruples its ability to erode; that's a lot of aqueous Toyota Corollas with more horsepower. When the energy of a flood comes rushing down the channel it can be alarming- pounding, grinding and carving away at the bank as it does.

This is the point where the safety valve of the floodplain becomes apparent, slowing the water down as it escapes the channel. It helps to have a floodplain bristling with trees and shrubs, natural infrastructure, because they blunt the force of that rushing water. Think of it this way- slower water, less energy.

The problem is that floodplains are such inviting places. They lure us with their flat nature, the pleasant umbrella of trees and the proximity to water. The river doesn't use them very often so why don't we develop them? To put this into perspective, Deerfoot Trail through Calgary has very little traffic on it at 2:00 am. Very little traffic still doesn't mean a mostly vacant freeway is a good place to pitch your tent. A periodically dry floodplain is no different.

When we forget how land and water function and interact, great consternation erupts from us when the river periodically reoccupies its land. Rivers become enemies, they need to be controlled, straightjacketed and made mindful of our developments. I wonder sometimes that in our pursuit of saving ourselves from rivers that we might think long term about saving rivers from ourselves.

We resort to engineering solutions, like channelization, berms, dikes, riprap and straightening, to keep the river off "our" land. Most of these "solutions" to mitigate flood effects are really just flood transferral devices that move the problem to a downstream neighbour. Sometimes those solutions work, or they seem to for a while and then a larger flood tests them and finds the weak spots. To watch a river work in flood times— probing, pushing, attacking and outflanking the "solutions"—is an exercise in military maneuvering that most generals would envy.

There is an axiom, rarely heeded, that says in the tension between water and land, water always wins. **Water always wins!** A river holds a mortgage on the shore; it will foreclose in the fullness of time, irrespective of our puny efforts to stall the debt with our engineering solutions.

It might be instructive to look at one of the longest running flood control and mitigation experiments, an initiative of the US Army Corps of Engineers for the Mississippi River and its tributaries. For almost 200 years they have engaged in an engineering contest with water. It has included humongous dams on the Missouri River, capable of holding several years worth of water, a massive set of levees paralleling the Mississippi River to prevent floodplains from being flooded, floodwalls (the "concrete" solution), floodways to periodically divert excess flows and channel "improvements" (read "dredging").

In spite of this, recurring floods have routinely overtopped levees inundating farms, fields, towns and homes. In the spirit of full cost accounting, these control and mitigation solutions have probably dramatically increased financial losses, not reduced them, because people felt it was safe to build, develop, farm and live in the floodplain.

The US Army Corps has had to resort to blasting open levees, allowing flood waters to reoccupy the floodplain, to save downstream businesses and people. Now, in the fullness of time and experience the Corps says “Whenever possible the best way to manage floods is within a natural floodplain”. The strategy now includes allowing more flooding to occur and discouraging development on floodplains to reduce risk and economic losses. Gee...who would’ve thought?

Mark Twain might have recognized this as early as 1883 when he wrote about the Mississippi; “Ten thousand River Commissions, with the mines of the world at their backs cannot tame the lawless stream, cannot curb it or confine it, cannot say to it, Go here or Go there, and make it obey. Cannot bar its path with an obstruction which it will not tear down, dance over, laugh at.”

This is cold (maybe wet) comfort to many who live on floodplains. Everyone can agree that floods, especially the big ones, can be frightening, devastating and the reactions to them emotionally charged. The reality is the threats and the losses are somewhat of our own making, notably development in floodplains, but also ignoring watershed scale impacts and routinely rebuilding to the same standards after floods occur. It has led to a raging debate over flood mitigation and costs.

A partial solution might include thinking about not only the volume of water in a flood but also how fast it is delivered to your front door. Water from snowmelt and rainfall used to take longer to get downstream. A survey of your watershed will likely show that collectively we’ve cleared, cultivated, logged, built roads, paved over portions, removed the meanders of streams, blown the beaver dams and drained the wetlands.

It’s a short and speedy run for water to a basement near you. You see, flooding isn’t simply a river issue; it is one of larger scale that begins within the watershed. Many watersheds have lost the capacity to slow down, hold, absorb and store run off. In effect, we’ve assisted gravity in the upper

portion of the watershed with our land use footprint and then tried to fight gravity downstream with engineered structures. That's a losing proposition.

Our efforts might be better placed, working at a larger scale, with all of our watershed neighbours. What we cannot change, like the reality of an altered climate we need to recognize, and adapt to greater variability, especially in river flows. There is no "get out of floods free" card, they will still occur but we may be able to moderate the effects.

Let's manage our watersheds by maintaining cover, allowing water to soak in and be stored in riparian areas and in the uplands, especially in our headwater forests. We can improve watershed management by restoring wetlands and letting floodplains do what nature designed them to do. If we recognize that roads, trails and land clearing (like logging, paving or cropping) speed up and deliver water faster to those downstream we might start to reverse the amount of our footprint.

These are all things we have control over and the capacity to change how they contribute to flooding. In terms of full cost accounting, investment in better watershed management might net us a less costly, long term response and answer to flooding. It is a different way to look at flood mitigation. But, to paraphrase the man's prayer recited by members of Red Green's Possum Lodge— "We're watershed residents, we can change, if we have to, we guess."

Oh, and let's not build anything else on the floodplain. If we continue to, Gordon may be inclined to pen another classic, maybe called "The Wreck of the Alberta Landscape". It will be a hit when the skies of May and June turn gloomy.

Lorne Fitch is the Provincial Riparian Specialist with Alberta Cows and Fish

www.cowsandfish.org