Forum Notes: Watershed Function & Climate Variability: Implications for Water Management

How watersheds function: understanding watersheds

- A **watershed** (or basin) is the **area of land** that catches snow and rain and drains it to a larger body of water, such as a marsh, lake, stream or river. **Topography** defines the entire watershed, as it shapes the course and speed of water moving through the area.
- Watersheds can **range in size** from a few hectares to thousands of square kms (the Alberta part of the Battle watershed is 30,000 km^2). All watersheds flow from headwaters (the headwaters of the Battle watershed come from Battle Lake) to outlets (the Battle River empties into the North Saskatchewan River), eventually ending in the ocean (Hudson's Bay).
- Watersheds fulfill three primary functions: to **capture** water, **filter** and **store** it in the soil then **release** it into a water body.
- Watersheds sit on top of groundwater. **Surface water** and **groundwater** are **connected** in a watershed. Surface water seeps through the soil, moving downward to fill the cracks and spaces between rocks and soil particles, thereby becoming **groundwater.** Groundwater is **stored** in the soil and rock. Many people believe that groundwater comes from fast flowing underground rivers and lakes. This is not true.
- Groundwater is always naturally in **motion**. **Recharge** areas are places where surface water soaks (infiltrates) into the soil to become groundwater. **Discharge** areas are places where groundwater seeps or flows into surface water (e.g. springs). The Battle River is fed by many springs along its length.
- **Run-off collects pollutants** as it flows across land in a watershed. Polluted run-off flows into rivers, creeks, wetlands and lakes. It also seeps through the soil into groundwater.
- **Wetlands** and **riparian vegetation** (plants growing alongside rivers, lakes, etc.) are like giant **sponges.** They store water, filter out pollutants and diseases, and slowly release the water into groundwater and/or rivers, creeks and lakes.
- Watersheds are **healthy** when: land and therefore run-off is unpolluted; there is plenty of vegetation to bind soils, there are many wetlands and riparian areas to help clean and store water; and surface water can flow naturally over floodplains and from headwaters to outlets.
- **Humans** affect the health of watersheds in their everyday lives, when they remove trees and plants, damage riparian vegetation, fill wetlands, pollute land or water, build homes or cultivate floodplains, create impervious surfaces (paved roads/parking lots), use large amounts of water, or change the flow of water with dams, weirs and culverts.

  Getting to Know Your Local Watershed:
  www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex5600

Future considerations- climate change and flow variability:

- **Climate** is always **changing,** and with it natural **water flows change**. 10,000 years ago, the Battle River was a large river fed by post-glacial Lake Edmonton (this is why the Battle River valley is so large).

- Today, the Battle River is not glacier-fed, so when there is no snow or rain, there is little water flow. Because of this, **the Battle River's natural flow varies widely**. In the past century, annual water volumes in the Battle have been as low as 50,000 m^3 and as high as 1.2 million m^3.

- Climate change projections suggest that the prairies could become even drier than they are now. While mean precipitation may not change much, evaporation & transpiration may increase. Greater fluctuations in river flows are also predicted, meaning more frequent droughts and floods. This means that the **Battle's flow will probably vary even more widely in the future**.

- Water management **decisions** must **consider the future variability** in the Battle River's flows.

The Effect of Climate Warming on Water Supplies for the W. Prairies:
www.parc.ca/pdf/conference_proceedings/2005_Lloydlecture_Schindler.pdf

Managing water: strengths and weaknesses of current practice

- Traditionally, water management in Alberta has **focused on surface water**, specifically how much water should be taken out /left in of a water body, and the quality of the water that is put back in (via water licenses and approvals). It has also focused on using engineered infrastructure such as **dams** and **weirs** to control water supply.

- Traditional water management **fails to address land-based activities** (such as farming, waste disposal, logging, filling wetlands and destroying riparian areas) that affect water quality and quantity. This creates a quandary when one jurisdiction has control over the water and another over the land.

- Traditional water management **does not address groundwater**, and has not always considered the long-term effects dams and weirs have on water quality and quantity and overall river health.

- Traditional water management has not typically engaged or partnered with communities to better manage our water and watersheds.

- Fluctuating and unpredictable water supply in recent years has stressed the **need to make changes** in how we manage water.

Framework for Water Management Planning: www3.gov.ab.ca/env/water/legislation/framework.pdf

Managing water using a watershed approach

- A watershed approach to water management takes into consideration the **connections** between **groundwater a**nd **surface water**, and recognizes the importance of **wetlands** and **riparian** areas.

- A watershed approach also recognizes the effects that ***land* use** and **infrastructure** (dams etc.) has on water quality and quantity.

- A watershed approach recognizes that **everyone** living on the landscape **impacts** water quality and quantity and therefore, is a stakeholder in management decisions. It involves **working with local communities** to understand local needs and to encourage locally led management decisions, water conservation and stewardship action.

Alberta's Water Strategy: www.waterforlife.gov.ab.ca