



SASKATCHEWAN RIVER BASIN

Water Quality

Big drops of rain or winter snowflakes, waves lapping on the shores of a lake, spray shooting out from an irrigation system, the roar and splash of rapids in a river, water running over the landscape during the spring melt. These are all images of water within the Saskatchewan River Basin, but is water the same everywhere throughout the basin? Is all of the water suitable for the many different uses of water? What factors influence water quality in the basin?

Water quality is defined as the characteristics of water which determine if it is suitable for different uses. These characteristics are chemical, biological and physical. The amount of oxygen in the water, the level of sediment and traces of pesticides are examples. For each use, we need to know which characteristics are important and how to measure them. We need to know the impact of human activities on the water system so that we can maintain good water quality. We especially need to know how water use changes the natural ecosystems, since a healthy ecosystem is the basis of sustainability.

WETLAND USES...

- Drinking Water Supply
- Recreation
- Irrigation
- Livestock Watering
- Industry
- fish and Wildlife
- Ecosystem Preservation
- Wastewater Assimilation

Measuring Water Quality

Measuring water quality indicators tells us the suitability of water for different uses. These indicators can be quantitative measurements, for example, the concentration of pesticides, and qualitative, for example, the odour of water. Indicators measure pollutants as well as desirable characteristics, such as the amount of dissolved oxygen in the water. Water quality objectives established by each province in the basin specify the acceptable levels for many substances, particularly the key indicators.

Key Indicators of Water Quality

Fecal Coliforms	<ul style="list-style-type: none"> •Indicator of bacteriological contamination •Largest source is from sewage plants and human waste •Monitored to determine suitability for irrigation, recreation and drinking water •Health problems can occur if concentrations are too high and water is consumed
Dissolved Oxygen	<ul style="list-style-type: none"> •A good measure of ecosystem health •A minimum level is needed to protect aquatic life •Excessive waste and algal blooms lead to oxygen depletion •Fish kills are the most obvious sign of insufficient oxygen
Salt	<ul style="list-style-type: none"> •Monitored to determine suitability for drinking water and irrigation •Too much reduces crop yields and causes irrigated fields to be infertile •Potential sources are concentration of salts from evaporation during irrigation, runoff, water softeners and road salt
Phosphorus	<ul style="list-style-type: none"> •Excess concentrations can negatively impact aquatic life •Major sources are fertilizers, runoff, soils and sewage effluent •Excess concentrations lead to algal blooms which increase water treatment costs and clog irrigation lines
Pesticides	<ul style="list-style-type: none"> •Monitored to protect drinking water, livestock water, irrigation and aquatic life •Enters water with runoff from fields and urban lawns and gardens

WATER QUALITY ISSUES

Water quality in the Saskatchewan River Basin is generally good. In some areas where human activities have impacted on water quality, actions have been taken to encourage the return to a healthy aquatic ecosystem. In other areas, however, there are signs that the aquatic ecosystem is under stress. For example, studies of fish tissues in some parts of the basin show residues of chemicals such as mercury. To maintain and improve water quality, the following issues must continue to be addressed.

Point Source Pollution

Point source pollution is direct and concentrated discharges such as sewage effluent or industrial waste. In the last few decades, the concentrations of many pollutants have been reduced or eliminated through regulation and environmental licencing. Some licences still permit the release of pollutants, however, and increased efforts, such as requiring the non-degradation of the receiving river or stream, are required.

Toxic Chemicals

Toxic chemicals are part of our daily lives and hundreds are used in our homes, industries and agriculture. Government approvals and regulations limit the impact, but toxic chemicals such as pesticides, PCBs and metals, enter our lakes and rivers in small amounts and may persist for long periods.

Eutrophication

Eutrophication means increases in the nutrient levels of lakes and rivers. This process occurs naturally, but human activities speed up the process. Agricultural runoff, sewage and industrial effluent add extra nutrients, especially phosphorus. Eutrophication leads to dense growths of algae and aquatic weeds, turning shallow prairie lakes green in the summer and making them unsuitable for drinking and recreation. Under certain conditions some blue-green algae may produce sufficient quantities of liver and nerve toxins to adversely affect human and animals that drink the water.



Photo credit: Ducks Unlimited Canada

Nonpoint Source Pollution

Nonpoint source pollution is often associated with runoff and erosion from agricultural areas, construction sites, forestry operations and our backyards. These sources may be difficult to identify in terms of contents, quantity and time of discharge. They are difficult to control. Although each source may only contribute a small amount of pollution, the impacts from many nonpoint sources can accumulate and be significant.

Waterborne Disease

Waterborne disease can be caused by micro-biological pollution if pathogens are consumed by humans and animals. Naturally occurring microbes can also cause disease such as giardiasis. Drinking water, irrigation and recreation are all affected. Beaches can be closed if fecal coliform levels are too high. Their largest source in major rivers is effluent from urban areas while in smaller rivers, agricultural operations may be the biggest source. Although treatment of sewage has greatly improved in some communities in the basin, untreated sewage periodically enters directly into rivers or streams when heavy rainstorms overflow the system pipe capacities.



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Oxygen

Oxygen levels in water are one of the better indicators of ecosystem health. All organisms need oxygen to live, including invertebrates and fish. Aquatic plants and algae produce and use oxygen during their growth cycle. When this vegetation dies, it decays and consumes oxygen in the process. Most prairie lakes and rivers are naturally very fertile and have a lot of natural growth. Nutrient loading from human activities, such as soil runoff, increases aquatic vegetation above normal levels and can lead to oxygen depletion. In some seasons, especially winter, the dissolved oxygen may drop sufficiently to cause fish kills, signaling that a problem exists.

Groundwater

Groundwater in the Saskatchewan River Basin is an integral element of the basin's aquatic ecosystem. The quality of water found below the surface in the wells and aquifers is just as important as surface water quality in lakes and rivers. Pesticides and nitrates can seep into ground water, contaminating wells used for drinking water and aquifers used for irrigation. Groundwater feeds streams, rivers and lakes, and substances dissolved in it can negatively impact aquatic life.

Sedimentation

Sedimentation and muddy waters are a common sight in the Saskatchewan River Basin, where many rivers carry a naturally high level of sediment at certain times of the year. Human activities increase sediment levels, mainly from soil erosion by water on agricultural and deforested lands. Increased sediment loads increase the costs for treatment of drinking water and reduce the aesthetic value and safety of water for recreation.



Photo credit: Ducks Unlimited Canada



Photo credit: Ducks Unlimited Canada

Drinking Water

The quality of the water we drink from our taps is of the highest concern to us. We want to be sure that we are protected from naturally occurring viruses and bacteria and from other contaminants such as metals and pesticides. Stringent guidelines for treated drinking water provide that protection, even if the quality of the source water is marginal. However, the higher the quality of the water source, the lower the costs for the treatment. We also like our drinking water to taste good and not have objectionable odours. Reducing human impacts of pollution, nutrient loading and algae growth helps maintain good water quality.

Salinity

Salinity occurs naturally in some areas of the basin, such as saline groundwater discharges in the Cumberland Marshes. Human activities can cause unnaturally high levels of saline. High salt levels degrade the quality of the water, and limit its uses. Irrigation and water softeners added to our drinking water are the two main sources of salts. During irrigation, water evaporates, concentrating the salts already in the water. As the water runs off the fields, it also picks up natural salts in the soil. Water softeners, added by municipalities or by individuals, contribute to high salt levels downstream. Road salts used during winter add a flush of salts with the spring runoff.

Pollution Solutions

Protection of our water resources and improvements in water quality are priorities for government, communities, industry and individuals. Many solutions have been found including: reviews, regulations and licencing, technology, land and water management practices, and public involvement. All solutions, no matter how small, can make a difference in the quality of our vital water supplies.



Photo credit Ducks Unlimited Canada

What YOU can Do!

- Reduce, then eliminate the use of hazardous cleaning products which find their way down the drain in your home. Purchase or make environmentally friendly alternatives from ingredients such as vinegar, baking soda and household ammonia. Reduce or eliminate water softeners from your home.
- Think about what you flush down the toilet. Put items such as dental floss and disposable diapers in the garbage. Compost vegetable food scraps. Do not flush waste household products: contact your provincial environmental department for advice on disposal options.
- Control weeds by non-chemical means, such as hand pulling, companion planting or using natural herbicides and mulching practices. Don't use pesticides and other hazardous materials in your garden or on your lawn.
- Take hazardous products, such as waste oil from your car, to a hazardous waste disposal site. Don't dump hazardous products down storm drains.
- Riverbank property owners should consider maintaining or planting vegetation along the water's edge to reduce runoff.
- Think about water quality when you are on holiday too. Make sure your cottage has a proper sewage disposal system. Control spills from power boats. When camping in remote areas bury biodegradable waste at least 60 metres from any water source and pack out non-biodegradable garbage.
- Get involved and stay informed. Participate in any hearings, open houses or other public events in your area about water quality. Let people know your opinion and listen to what others suggest.
- Become involved in river stewardship and water quality monitoring programs. Contact your provincial environment department for more information.

Individual action contributes to improvement in water quality. Several environmental organizations and government agencies have other suggestions: contact Partners FOR the Saskatchewan River Basin for more details.

For More Information

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