

Liquid Assets

Teacher Newsletter of the Slow the Flow Water Education Program

Spring 2009

What's Wrong With Lake Winnipeg?

It's hard to imagine that we can have an impact on a water body the size of Lake Winnipeg. But, in recent times, Manitoba's largest lake has shown signs of extreme eutrophication, also called nutrient enrichment. Nutrients, especially nitrogen and phosphorus, are essential for plant and algal growth. But lots of growth is not necessarily a good thing. Algal blooms, thick mats of proliferating algae, are becoming massive and widespread over Lake Winnipeg. Major blooms can actually be seen from space! And when these algae die, they decompose on the lake bottom, consuming dissolved oxygen in the process.

Changes in the lake related to increased nutrient levels include:

Toxic Water: Some algae produce toxins that can make humans and animals sick.

Changing Species: The type and number of species living in the lake will change. Certain species explode in numbers, while others disappear.

Choking Fish: Decomposing algal blooms consume dissolved oxygen, leading to frequent fish kills and loss of sensitive species.



Algal bloom at
Victoria Beach.
August 17th, 2008

This newsletter will cover one of the major issues facing our water-bodies today: nutrient enrichment. We'll learn what it is, where it comes from, and what part all of us can play to reduce the amount of nutrients entering our rivers and lakes.



Satellite photo of algae on
Lake Winnipeg.
September 3rd, 2006

DID YOU KNOW?

- Lake Winnipeg is the 10th largest lake in the world!
- Water flows into Lake Winnipeg from four provinces and two U.S. States. This "watershed" is the 2nd largest in the world, and is nearly 40 times the size of the lake.
- Fifty percent of Lake Winnipeg's Canadian watershed is agricultural. Seventeen million livestock live in the watershed.
- Almost 100% of the phosphorus from sewage can be directly taken up by algae, while 25 to 40% of phosphorus runoff from natural landscapes is insoluble in water and unavailable to algae.

Where do the nutrients come from?

Algae, and other plants, require nutrients to grow. The nutrient that is often most limiting in freshwater environments is phosphorus (P). Phosphorus is often bound up with other substances in the environment. But humans tend to produce a lot of extra phosphorus: from sewage, intensive agriculture, cattle and hog production, and usage of fertilizer. Humans also have been destroying wetlands, through water level regulation or land modification for agriculture. Wetlands are an essential part of Earth's filtration system. They slow the water down, so it can drop its sediments, and excess nutrients can be absorbed during the growth of wetland plants.

Floods speed water up, and therefore transport a lot of nutrients. The Flood of 1997 brought the highest known amount of nutrients ever into the South Basin of Lake Winnipeg. According to flood forecasters, we may experience higher water levels again this spring. In other words, we may see large amounts of nutrient-filled water surging into Lake Winnipeg. If this is the case, be prepared for more beach closures this summer!

Lake Winnipeg Curriculum

Manitoba Education, Citizenship & Youth is currently developing curriculum units about sustainability issues surrounding Lake Winnipeg. Future Liquid Assets will keep you updated on the progress of this project, and when this great resource will be available to teachers.

How does organic pollution affect freshwater?

Excess nutrients, especially phosphorus, often cause algae to grow very rapidly, producing algal blooms. Algal blooms consist of massive numbers of algae, and can make water look like green paint. As algae die and decay, the amount of oxygen in the water drops dramatically. Oxygen depletion can kill fish living in the water body. Many bloom-forming species, especially "blue-green algae," produce toxins that make humans and animals sick. Blue-green algae are often long and filamentous; small invertebrate herbivores find these algae difficult to move through and impossible to eat.

All of these factors make for a very sick lake. Sensitive species begin to disappear while pollution-tolerant species, like blue-green algae, explode in population size. Lakes become no longer safe for swimming and fishing.

What can we do?

Slow the Flow!

Any reduction in water use—less showering, less toilet water, less water on your lawn—translates into less water that needs to be treated in order to remove nutrients and fertilizers. The less water we spoil, the more clean the water remains in our lakes and streams.

Be Phosphate Free!

Phosphates are not only found in fertilizers. They can show up in things like laundry detergent and cleaning products. Check the label before you buy these products, and do your part to reduce nutrient loading.

Gardens For Our Climate

Xeriscaping is landscaping for drier environments. Dry-adapted plants require less water and fertilizer. There is less runoff to carry nutrients and fertilizers into our lakes and rivers.

Understand Our Soil

Manitoba's soil usually has enough phosphorus in it to nourish lawns and gardens. The City of Winnipeg is now restricting lawn fertilizer use. See "Links" for more information.

Wastewater Treatment Upgrades

The City of Winnipeg currently releases 3.8% of total nitrogen, 5.7% of total phosphorus into Lake Winnipeg. Proposed measures for more nutrient removal plan to reduce nitrogen load to 2.2% and phosphorus load to 2.4% by 2014.

Get Educated

Research how our province is dealing with Lake Winnipeg. Learn about how you and your class can get involved in riverbank restoration projects, city spring clean-up or wetland health and integrity projects. Ducks Unlimited offers great curriculum about wetlands. Your school could even become a Wetland Centre for Excellence! See <http://www.ducks.ca/resource/teachers/index.html> for more information.

FortWhyte Alive's Constructed Wetland

Wetlands are so good at cleaning nutrients and pollutants out of water, that they can be used as sewage treatment facilities!

At FortWhyte, wastewater from the Alloway Reception Centre toilets and sinks is converted into a rich fertilizer for aquatic plants. The water passes through two treatment lagoons, a rock filter and a disinfection tank before entering our constructed wetland. Here, aquatic plants such as cattails and water-weeds grow in profusion, and take up the excess nutrients from the water. In this way, our waste is purified and can be safely released into Lake Devonian.



Always wanted to know more about lake science?

Come out to FortWhyte Alive on March 22nd (World Water Day) at 1pm to try your hand at taking lake bottom and water samples in our lakes. Learn about the life and history of our lakes at the 2pm indoor presentation. FREE with regular admission.



Now is the Time...
to submit completed C.A.P. activities!

These activities, found at the end of each unit in your *Slow the Flow* binder, are great unit summaries that encourage your students to bring their knowledge of water conservation home. If you, the teacher, simply compile and submit your students' work on the provided fax-in summary sheets, your class will be eligible to receive great prizes! If you complete all six activities, start planning for your FREE field trip to FortWhyte Alive!

Blue Planet—It's Time!

This two hour school program, offered from April 13th to June 26th, pairs well with the Slow the Flow curriculum. Blue Planet is for Grade 7-8 students. They will come away with an understanding of water on a global scale, both in nature and in our lives. Blue Planet establishes core water knowledge and terminology, and highlights how water is essential to all living things, from humans to trees. The program moves into discussions of important issues such as water pollution and water conservation. Students explore water treatment hands-on in our "Water Washing" experiment, conceptualize global drinking water availability, and brainstorm practical strategies for water conservation at home. Pre- and Post-Visit Field Trip Kits are available on our website at www.fortwhyte.org/gp78. Please refer to your School Program Brochure for further information. To book a Blue Planet program, contact our bookings coordinator at schools@fortwhyte.org or by fax at 896-5753.

FREE to Borrow from our Movie Library

At the Turn of the Tap	12 minutes
Down the Drain	12 minutes

Call the Water Education Coordinator at 989-8358 to borrow a DVD (includes both episodes). Don't forget to ask about other FREE resources available to Slow the Flow teachers.



EXPERIMENT: Non-Point Source Pollution

(modified from EPA WaterSource Books)

www.epa.gov/safewater/kids/usb/index.html

MATERIALS

Waterway

Glass Aquarium

Storm Drain

Rectangular Box with hole in bottom

Rainstorm

Watering Can

Pollutants

Pesticides/Fertilizers:

Green food colouring

Motor Oil: Vegetable oil

Erosion: Soil and sand

Organic Waste: Grass clippings or paper, twigs

Trash: Candy wrappers from lunch

METHODS

- **Fill the aquarium 1/4 full with water.** Place the rectangular box (eg. Rubbermaid) with a ~5cm by 5cm hole in the bottom on top of the aquarium.
- **Discuss storm drains.** What goes down them? Where does it end up?
- **Break the students into groups and assign each group a pollutant.** Have them discuss amongst themselves how their pollutant is used in today's society and how it would come to enter a storm drain.
- **Have each group introduce their pollutant into the rectangular box.** Use the watering can to create a rainstorm that washes the pollutants into the waterway (aquarium).
- **Observe.** Discuss how each pollutant would damage the environment. Ask whether the people who introduce pollutants into the environment are conscious of the damage they are doing.
- **Conclude with a discussion of how changes could be made to prevent these types of pollutants from entering water ways.** How could we remove these pollutants from the water after they've been introduced? Some may be easier than others to remove. Connect this back to the real world by discussing waterways and water bodies in your community, and how pollutants could enter them.

GREAT LINKS!

Fertilizer Regulations: www.gov.mb.ca/seeinggreen/what_can_you_do/how_to_grow.html

Be Phosphate Free: www.gov.mb.ca/seeinggreen/what_can_you_do/phosphate_free.html

Constructed Wetlands: www.flemingc.on.ca/CAWT/index.cfm?page=wetlands
www.constructedwetlands.org/

Xeriscape Resources: <http://water.greenventure.ca/xeriscaping>
www.cmhc-schl.gc.ca/en/co/maho/la/la_006.cfm