Water a precious commodity

Researchers, industry leaders work to end waste of water supply

BY SHELAGH MCNALLY, FOR POSTMEDIA NEWS OCTOBER 13, 2010

Although water is plentiful in Canada today, studies suggest there may not be enough to go around for the generations to come.

Available water in southern Canada has been on a steady decline since 1971, according to research by Statistics Canada. The effect of climate change, poor management of stormwater run-off and antiquated sewage plants are contributing factors.

So is our rate of water consumption. The average Canadian uses 350 litres of water daily, compared to the average European (200 litres) and African (50 litres). Part of the problem is the belief that Canada has an unlimited supply of water.

"It's a convenient myth that has allowed water-heavy industries to develop in Canada. There is a false notion that we will always have clean water. But our watersheds are being destroyed at a rapid rate and we still don't have a national water strategy," says Meera Karunananthan, national water campaigner, Council of Canadians. "No one is minding the store when it comes to water protection."

While policy-makers and government agencies debate what needs to be done, innovative researchers and companies are creating products to help us use water more effectively -- even profitably.

Only 10 per cent of daily water use is for cooking and drinking; much of the rest goes down the drain. Montreal-based Brac Systems has developed a way to recycle some of this "greywater" -- specifically, the run-off from bathtubs and showers, laundry rooms and kitchens in single-family homes and multi-dwelling units. The Brac setup directs greywater through a filtering system before sending it either to toilets or an outdoor tap for watering the garden. The company also makes rainwater collection systems with built-in purifying filters.

"There has been a lot of interest in greywater recycling, particularly in regions with water shortages," says Vincent Vegas, communications manager, Brac Systems.

STORMWATER A MAJOR SOURCE OF POLLUTION

Serious attention is also being paid to environmental waste water. According to a report by Environment Canada, stormwater is a major source of pollution that carries about 200 identified chemicals, grit, debris and disease-causing pathogens into waterways.

"The increased use of hardscaping (impervious pavements) in our major urban areas allows the direct run-off of oil and other contaminants into the stormwater system, preventing the recharging of groundwater levels and natural purification of the run-off water," says Richard McGrath, director of codes and standards, Cement Association of Canada.

The CAC is promoting the use of pervious concrete -- cement mixed with larger stones and using no fine aggregate such as sand. Its porous, honeycomb structure means stormwater runs straight through to the soil where it can make its way into the groundwater and become purified along the way. Municipalities are starting to use pervious concrete for sidewalks, driveways, parking areas and roads with light traffic in an effort to reduce stormwater run-off.

Waste is also associated with the country's water treatment plants. Many of these are increasingly outdated and inadequate: According to Ecojustice, municipal waste water treatment facilities are the top 14 water polluters in Canada. The environmental organization says in 2008 over 85 per cent of all reported water pollution discharges were from treatment facilities.

Green-tech researchers are using microbiology to try to revolutionize sewage treatment. The goal is to make treatment plants both sustainable and profitable by turning them into energy sources.

Most conventional sewage plants use micro-organisms to clean waste water. But these bugs require a lot of energy. One type of bacteria eats the organic waste, converting it to methane. But it leaves behind ammonium and phosphates, which must be removed before releasing the water. So another bacteria is used that eats the ammonium and converts it to nitrate. But this bug needs a steady supply of oxygen. Another bug, which needs methanol, then eats the nitrate and converts it to nitrogen gas. Treatments plants use huge amounts of electricity to keep the various bacteria supplied with the gas they require to thrive.

One new treatment plan was the result of a marriage at Stanford University between environmental engineering and rocket science. Craig Criddle, a professor of civil and environmental engineering, and Brian Cantwell, a professor of aeronautics and astronautics, joined forces to try to create a green sewage plant.

The Stanford experiment reduced the level of oxygen, encouraging a different type of bacteria to flourish -- one that produces nitrous oxide and leaves more carbon material to be converted into methane. More energy is produced and less is used. "In a typical treatment plant, aeration is responsible for about half of the operating expenses," says Cantwell. "So pumping less oxygen could save a lot of money."

Production of nitrous oxide is usually not encouraged: It's a greenhouse gas approximately 300 times more potent than carbon emissions. To get rid of the gas Cantwell brought out one of his space thrusters, which are fuelled by nitrous oxide. This is a surprisingly clean gas that when burned converts to just oxygen and nitrogen.

WORLD WATER COUNCIL FACTS:

- 1.1 billion people live without clean drinking water

- 2.6 billion people lack adequate sanitation

- 1.8 million people die every year from diarrheal diseases

- 3,900 children die every day from water borne diseases

- More than 260 river basins are shared by two or more countries, mostly without adequate legal or institutional arrangements

Daily per capita use of water in residential areas:

- 350 litres in North America and Japan

- 200 litres in Europe

- 10-20 litres in sub-Saharan Africa