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The Benefits of Rainwater Harvesting For Water Conservation

Chris Davies, President, Flow Source Inc.

The ever growing trend of being “green” or “eco-friendly” continues to move at a rapid pace. New technology and more information about products and practices seem to be hitting the mainstream daily. Our industry has already experienced the reduction in pesticides and the focus on water efficiency for irrigation. So why the persistent concern about water in Canada when everyone says we have the most freshwater available in the world? While this may be true, taking a closer look at some hard facts can be illuminating.

World Water Facts

Approximately 70 percent of the world is covered in water: 97.5% of that water is saltwater which leaves 2.5% as freshwater. Of this 2.5%, 68.9% exists in the form of glaciers or permanent snow melt. An additional 30.8% is groundwater including soil moisture, swamp water and permafrost. Therefore, only 0.3% of the world’s freshwater is stored in lakes and rivers.

Globally, one billion people do not have access to safe drinking water while 2.4 billion do not have proper sanitation. The addition of chlorine to drinking water has greatly reduced the risk of waterborne diseases.

Currently about 3,800 cubic kilometres of freshwater are withdrawn annually from the world’s lakes, rivers and aquifers. This is twice the amount that was extracted as recently as 50 years ago.

Canadian Water Facts

Canada has the largest area of wetlands in the world representing approximately 25% of the earth’s total. Our wetlands cover more than 1.2 million km², about 14% of our land area. Since 1900, 50% of the world’s wetlands have been lost.

In Canada, 9% of the country is covered in freshwater. This represents about 891,163 km². Canada has more lake area than any other country in the world. Approximately 60% of the country’s freshwater drains north, while 85% of



FOCUS ON WATER

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the population lives within 300 km of our southern border with the United States. Only about 1% of the water in the Great Lakes is replenished each year by snow melt and rain. Approximately 8.5 million Canadians rely on the Great Lakes for their water supply. Turn to page 11 for a breakdown of water usage in an average Canadian household. >>>



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The Benefits of Rainwater Harvesting For Water Conservation

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FOCUS ON WATER Continued from our front cover.

What is Rainwater Harvesting?

Rainwater harvesting is the gathering, or accumulating and storing, of rainwater. This can be done in many ways ranging from small residential barrels to large industrial systems. Rainwater is used worldwide for drinking water, domestic water, water for livestock, and water for irrigation. In Canada, we have some restrictions regarding its use. Currently we are allowed to use rainwater internally in a home or business to flush toilets, and externally for irrigation and general cleaning. Many

committees and focus groups are working with the Canadian Building Code to adapt further uses such as laundry and potentially someday, showers and dishwashing.

Why Use Rainwater Harvesting?

Rainwater usage has increased steadily due to the shortage of freshwater and the cost of municipal water treatment. Many have chosen to use non potable water for applications where potable water is not required. Water shortage concerns across North America have become more public in the last few years. The common water bans for irrigating lawns and washing vehicles continue throughout municipalities across Canada during summer months and more severe circumstances are now being seen.

In 2006, the town of Tofino, British Columbia, had to force their community's

businesses to shut down due to water shortages. Water was being used from a backup reservoir and a boiling water alert was issued due to water quality. In 2007, groundwater levels in southwestern New Brunswick reached such a low that the Environment Minister had to issue water conservation recommendations so that local wells did not become completely depleted. The 2007-2008 drought in Georgia saw Lake Lanier reach new record lows dropping approximately 20 feet below the norm. All of these figures are indications that the two largest users of water in the world (United States and Canada respectively) need to make water conservation a priority.

This growing concern has broadened the focus to look at the costs of providing treated water to homeowners and businesses. In January 2008, a study for Ontario's

Independent Electricity System Operator (IESO) released information based on 145 municipalities across Ontario. These 145 municipalities represented about 72% of Ontario's population. The study revealed that 33% of the dollars spent on electricity in Ontario were going to the treatment and pumping of water and sewage. Figure 1 shows the breakdown of this usage which totals \$680 million dollars annually. Therefore, over \$224 million is spent each year on water in Ontario alone.

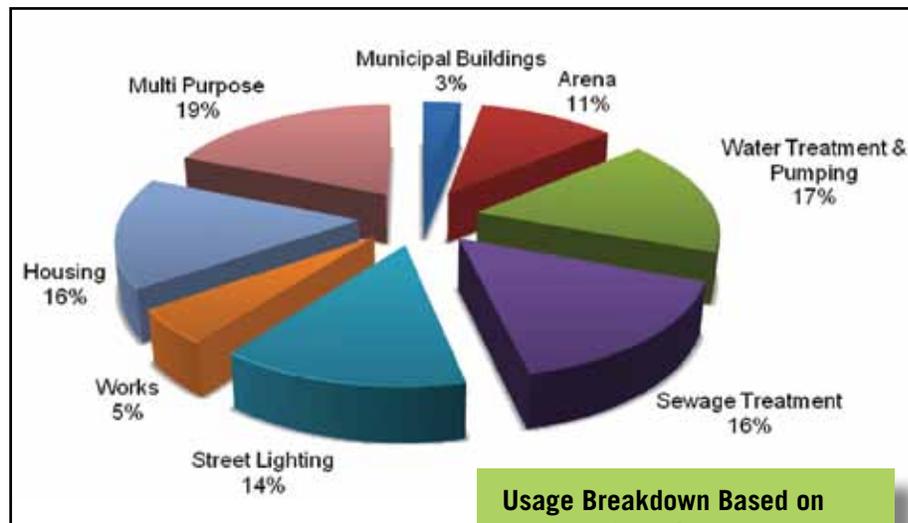
Sewage is included in this discussion because rainwater is classified as storm water sewage and therefore becomes a cost to the municipality for treatment. Urban growth will continue to present challenges to municipalities to keep up with the growing demand for water.

Due to these circumstances, many citizens and corporations have decided to make a difference and take a more sustainable approach to water usage. This is where rainwater harvesting can make an impact. Rainwater is a natural source of water that provides an on site supply for all non potable uses approved by the government.

With deteriorating pipe networks in many cities across Canada, on site water sources have many benefits. By eliminating the need for city water, the pressure on municipal water lines is reduced as the property can use rainwater for flushing toilets and outdoor uses. Rainwater harvesting not only reduces mainline requirements saving the city overhead dollars but contributes to a better water source for plants and turf. Rainwater is collected and stored at a warmer temperature which reduces shock to the plant from cold city water. Rainwater also provides a chemical free water source which is a healthier option for the plant being irrigated.

Storing rainwater reduces water runoff in sewer piping. This reduction prevents the overflow of sewers and flooding during large precipitation events. This directly affects contamination of homes, lakes and rivers by keeping sewage contained in the piping network. Less sewage also reduces the need for treatment which saves municipalities chemical, manpower and electricity costs. Lastly, the decreased

Figure 1. Average municipal water consumption by usage (Ontario).



Usage Breakdown Based on Average Canadian Household

35%	Bathing & Showering
30%	Toilets
20%	Laundry
10%	Kitchen & Drinking
5%	Cleaning

flow on the piping network lowers usage which can contribute to fewer pipe breaks, maintenance and longer life of the sewage system.

What Makes a Rainwater Harvesting System?

Rainwater harvesting systems are made up of several components and can be customized for each project. Some systems are very simple and have only a tank with a screen, but still require monitoring and maintenance to keep them functioning with efficiency. Others are very complex and have electronics that monitor factors throughout the system. Here is a description of each component:

Source. This is the area from which the water is to be collected during a precipitation event. A source can be a small home, large industrial building or the entire area of a soccer field. It is becoming common practice today to use the area of an artificial turf field as a collection area and channel the water through the drainage system into a holding tank for use on a nearby natural turf field. This is a very effective option as the amount of rain collected from one field doubles the water available for the field to be irrigated. Therefore if a site gets 1/2 inch of rain, the natural field will receive that watering first and then have approximately the same amount stored for the next irrigation cycle.

Pre-filter. Pre-filtration is used to collect debris before it reaches the tank so that the storage tank does not get full of sediment and has its full capacity available for water storage. Filters come in many forms. A basket filter is the simplest and usually least expensive form of filtration, however it requires more maintenance. Cascade and Vortex filters are other options that are commonly used for larger systems as they can filter greater amounts of water from large collection areas.

Storage. This is the holding unit for the filtered water collected from the source. Storage units can come in many forms, sizes and shapes. There are two main options for storage units, above ground or below ground. Above ground units are usually in the form of a tank that is made of a material that will withstand UV exposure and have an option of colours to match the



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Top. Installation of an underground rainwater harvesting system. **Above.** Typical above ground rainwater harvesting system

area where it will be located. These units are common in smaller applications and are seasonal in Canada due to our freezing climate in the winter. Underground storage can come in many forms as well. The most common are tanks or a modular system that uses structural blocks and a liner to hold

the water. Due to the need for excavation, underground systems are normally larger and have the advantage of being buried out of sight. Storage units can come in a variety of materials including concrete, fiberglass, plastic and sometimes steel.

Pump. Pumps allow water to be transferred from the storage unit to the location where the water is required. Pumps are customized for each project according to need. The most common pumps used are submersibles that are placed in a storage unit or centrifugals that are outside the storage unit.

Water is fast becoming a commodity in the same league as oil and will likely become much more highly regulated in the future.

Treatment. Some systems require water treatment from the storage unit. This is usually done when the rainwater is being used in an indoor application. UV filters that kill any bacteria that may be present are the most commonly used.

Backup. A backup is an electronic or mechanical valve that is connected to an alternative water source such as a municipal line or well to provide water to the storage unit when rainwater is not available.

Control. The most advanced rainwater harvesting systems can have a control that monitors water levels, filters, pumps and treatment. These are not always used but may become a regular option as the industry evolves.

Sustainability

Water affects the climate, the survival of humans and wildlife (plants and animals), and

is one of our most precious resources. So how do we use it effectively and efficiently in the turf industry? Most sports fields are located near a facility that can be used as a source. Arenas, schools, maintenance buildings and even artificial fields act as catchment areas for rainwater harvesting. Irrigation is 100% a non potable usage of water and therefore can be a more sustainable resource for your facility. Irrigation is not the only avenue for rainwater use. Many new facilities are using rainwater internally for lavatory needs. The Green Building Council's L.E.E.D. (Leadership in Energy

and Environmental Design) program allows points to be earned by recycling rainwater. This is a growing standard for new and renovation construction and may be a target for your next project.

Water is fast becoming a commodity in the same league as oil and will likely become more regulated in the future. Be a part of a sustainable future and embrace the changes coming to the irrigation industry. Use recycled rainwater as your water source.

Chris Davies is President of Flow Source Inc., www.flowsource.ca, email chris@flowsource.ca. Visit www.ene.gov.on.ca/en/water/opportunities/index.php for the Proposed Water Opportunities and Water Conservation Act. The website address for the environmental registry is <http://news.ontario.ca/ene/en/2010/05/leading-the-world-in-water-innovation-and-conservation.html>.

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