Think Again: Rainwater Harvesting For Irrigation

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Do you ever contemplate why we use treated drinking water on our landscapes? It is no wonder that many people do in the West Coast of Canada, as this is the very place where there is the highest amount of precipitation per year. Inquiries are increasing on Rain Water Harvesting (RWH), but there does not seem to be as much implementation as there is "talk." Many people feel that water is abundant in this part of the world; yet, they rarely think about the cost to filter, treat and build new infrastructure required to supply the water back to the utility system of municipalities, as well as directly to the individual properties and sites that need to turn on the tap.

Mission Heritage Park (Barr Plastics Photo)

Brushing your teeth and flushing toilets is small scale compared to how much water an irrigation system will use. These estimates have the potential to be even higher as often there are undetected leaks in systems and deficiencies, such as long run times that lead to water waste or water run-off. Now, try to imagine 30 million litres a year for one City Park or recreation facility's irrigation use. According to the City of Victoria, Topaz Park uses 4 million gallons per year on irrigation (over 15 million litres) to irrigate 3 parks.

Rain Water Harvesting, which is the collection of rainwater into tanks on site, continues to be placed on the back burner by property owners and developers. This could be due to the cost of installing a Rain Water Harvesting system, or simply the effort needed to carefully plan for reusing what is natural to benefit irrigation systems.

Some countries have cut their consumption by 50-70 percent, including Australia and Germany. After interviewing people for this article, it makes one think that the best thing the cities have done, including the City of Abbotsford, was to install water meters. Although this is a controversial statement, we actually do have water concerns here in our own backyard. Other countries are having similar issues; in the Southern USA, water is scarce. Therefore, why not look at ways to protect Mother Nature and collect precipitation as a natural, re-useable resource.

Look at the City of Abbotsford, which had a ban on outdoor water use in 2010. Why? Their peak day water demand was almost at its limit; thus, alternatives were investigated, resulting in the referendum of the P3 that was voted down. The Abbotsford Mission Water Sewer Commission (AMWSC) and the City of Abbotsford have taken an innovative approach to continue to implement projects that will reduce the impact on peak day water demand, including the Heritage Park, the City of Abbotsford Works Yard, and the Abbotsford Entertainment and Sports Centre (AESC). "Our Water Matters" is their motto and they are living by it. The City of Abbotsford uses rainwater from the works yard building roof, which collects in above ground storage tanks, to wash vehicles and to fill water trucks to water planters and small garden beds. In addition to this, members of the Abbotsford Heat hockey team play hockey on ice made by rainwater at the Abbotsford Entertainment and Sports Centre (AESC). It is the first professional grade indoor ice arena to use rainwater. According to Amy Wakeford, who is the Water Conservation Program Coordinator at the City of Abbotsford, the project is an 8-year return on investment, anticipated to save approximately 83 cubic meters per season.

There is a growing list of projects that are well known in the coastal region of the Lower Mainland. The Richmond Oval was acknowledged for the "Sustainability Star" because of rainwater harvesting and other green features. According to Matthew Hoekstra, a reporter at the Richmond Review, the green-building features include a unique storm water

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management system where rainwater is re-used in toilets and irrigation, and retained in a landscape pond. It is encouraging to see this concept of water re-use adopted and designed for facilities of this size and prominence, as well as to see the positive effects this has on the environment.

Rain System (Barr Plastics Photo)

Dean Barrett, ~~the~~ owner of Barr Plastics, who supplied the products for this project and many others, is passionate about rainwater. He has been in the plastic tank business since 1995 for storage and water systems, mainly in rural areas. After seeing a sell through of white tanks to the Gulf Islands of BC, he decided to pick up product lines for national distribution. "It's unfortunate that some developments see water as an afterthought," Barrett says.

A candidate for Canada's first Living Building is the Simon Fraser University Childcare Centre that opened in April of 2012. "Simon Fraser University (SFU) Childcare had installed a 10,000 g tank below ground and wanted to be self sufficient for toilets and irrigation. That is what needs to be considered for every new build," says Barrett of Barr Plastics. Barrett is correct. Space2Place Architects designed the SFU Childcare project led by project manager Dale Mikkelsen and was awarded a 2013 National Citation Award by the Canadian Society of Landscape Architects in the Design Category. The facility has rainwater that is collected and treated with UV filters, then used to flush the toilets and run the laundry. An entire year's supply of water is stored in a giant cistern under the outdoor play area. According to an article in The Vancouver Sun in April 2012, the building is designed to collect more water than it flushes as well as generate enough energy to sustain itself, and have some left over for its neighbours. After reading the details of this incredible design, it is deserving of a sole publication on its benefits to not only the children of our future, but also the environment. Remember, the environment?

In 2011, the Irrigation Industry Association of BC (IIABC) offered American Rainwater Catchment Systems Association (ARCSA) certified courses at the convention in Victoria, BC to meet the growing need of future RWH system installs. With education highly regarded by the IIABC, it was decided that offering these courses was the right approach to pilot the introduction of ARCSA into the educational opportunities for that year. Karen Van der Gulik, the Executive Administrator of IIABC, included the course into the convention to add to the array of existing certified courses. Ted Van der Gulik, (Sr Engineer in the BC Ministry of Agriculture, IIABC Certification Board Chair and Chair of the Water Balance Model Partnership) and Reuben Butterfield (IIABC President at the time), decided irrigation systems should be designed and installed with quality workmanship and efficient standards with RWH in the future. With a Certified Irrigation Design (CID) course, the Fundamentals of Drip Irrigation course, and the Certified Irrigation Technician (CIT) courses, contractors and consultants wanted to feel confident working with Rainwater Harvesting Systems. Irrigation contractors and consultants could see that the cost of water was increasing and understood the importance of how irrigation and rainwater harvesting go hand in hand. The IIABC is also combining efforts with the Partnership for Water Sustainability in BC to host a Rainwater Harvesting Workshop at the IIABC's Convention this coming December in Richmond, BC, focusing on sustainable water use.

Recently, a Vancouver based contractor, University Sprinkler Systems Inc, worked on two projects that focused on RWH. One project for the Heritage Park in the District of Mission focused on collecting rainwater off the roof of the Heritage Park building to feed a three zone drip irrigation system that watered the rose garden and herb garden. The lead contractor for this project, Whalen Bishop of University Sprinklers, stated that this above ground system, comprised of a 3000 g tank, collects water from a downspout where a pump sucks water out of the tank and enters into the irrigation system. This water is quickly emptied within two weeks without rain. If this occurs, the rainwater tank is topped up with city water. "The idea is to save as much city water as possible," says Whalen. "We have many people asking us to put in systems for toilet flushing and laundry and some irrigation." "It's the first system of its kind in Mission," says Ted Alden of the District of Mission. "We are a registered heritage park and this represents Mission's past

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and Mission's future," says Don Brown, manager of Fraser River Heritage Park. It is evident that the Fraser Valley area is ahead of the curve on RWH, which it should be. It is a fast growing population that will need more water.

Dean Barrett also supplied products for this project and said, "For parks and recreation, it is the widest open area of opportunity. Arenas have large roof areas and collection surfaces. They can go through 8000g per day to flush toilets during a convention. I don't think people realize that facilities can collect this in one day with half the roof size of a trade show facility."

After speaking with Barrett and listening to his insight and excitement to change the slow growing industry, it makes one reflect. He referred to commercial big box stores such as Home Depot, who have over 60 stores in Florida, which have installed systems to water their garden centers in addition to fire protection and irrigation. So why is it that parks and recreation facilities are not using RWH more for water? "It's the return on investment," says Bishop of University Sprinklers.

When Barrett was asked about his frustration, he says, "My frustration is the lack of foresight. If we do experience growth in the way we predict, where will you get your water?" According to Barrett, the Gulf Islands have surpassed the big city folk, as they want their water independence and do not want to have to rely on anyone else. He pauses and then concludes, "ROI is not considering the increase in water rates. We are aware that our water is cheap here (in BC). Prices in Alberta and Ontario are higher than BC, but we will be there within 5-10 years, if not sooner."

There is the cost of water and re-use, as well as the conscious decision of being green and resourceful. Ken Nentwig, a Landscape Architect who also taught Landscape Architecture in Ontario at the University of Guelph, is one of the Governors for CANARMS' BC Jurisdiction of the Canadian Association for Rainwater Management (CANARM). As a strategic partner of the American Rainwater Catchment Systems Association (ARCSA) in the United States, this association has been developed with many diverse individuals who have moved swiftly and strategically to develop their association, and influence change through collaborative partnerships. After speaking to both Ken Nentwig and Jeff Irvine, CANARM President , there is no doubt that this group of individuals will be an operational board to finally motivate and educate the industry to help our future generations. They immediately reached out to partners including the IIABC to see how the associations could help out one-another, share resources and education, and keep members updated on this growing opportunity and be ready for it. Irrigation systems should be designed and installed with RWH in mind. It makes sense to be inclusive of all parties that use and distribute water.

Irrigation is the biggest user of water. The cost of implementing this solution does not seem to be exorbitant, ranging from $1.00 to $1.50 per gallon installed for affordable, easy to use and easy to install plastic tanks. The actual cost of the below ground systems range from $1.50 to $2.00 per gallon installed, with the most common system being the modular cube type systems. Yet, other costs of municipal permits and inspections can add up. People are often motivated by the idea of "being green" and efficient. Municipal governments may want to find a way to encourage the implementation of these systems. Or, is this a quandary? Could this be lost short term revenue for long term sustainability? Unlike waste, we cannot offset water costs with tipping fees.

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Besides being the "right" thing to do, how does one start to evaluate utilizing RWH for irrigation as a viable alternative? The BC Government released a guidebook in 2002, which was the first provincial or state government in North America to adopt the Water Balance Methodology. This book, along with other resources on the www.Waterbucket.ca website, can assist others with researching and scaling a project to include water use and water re-use. "Developed as an extension of Stormwater Planning: A Guidebook for British Columbia", released in 2002, the Water Balance Model demonstrates how to achieve a lighter water footprint. This helps planners and designers wrap their minds around how to implement 'design with nature' solutions on-the-ground. The stream health methodology embedded in the Water Balance Model enables a watershed target to be established. It also enables the user to assess how to meet the watershed target at the site scale," explains Ted Van der Gulik. Thanks to the vast information on the World Wide Web and advice from Nentwig of CANARM, these are the basics that will get you started.

Mission Heritage Park
(Barr Plastics Photo)

Tank Load
(Barr Plastics Photo)

First off, requirements for irrigation of the turf area need to be determined. This will help decide whether rainwater harvesting (RWH) will be a sole source or an augmentation of other sources, such as municipal or ground water.

Second, water catchment structures, whether they are above or at ground level, will need to be determined. If there is a large building nearby, diversion of the roof, catchment may be possible. Otherwise, relying on parking areas and landscape grading to channel water into a storage containment will be required. The water collected on the ground, especially from parking lots and roadways, needs to be treated or filtered in some way for pollutants, debris, sand and silt. This is part of the detailed system design.

Third, storage and containment location, logistics, capacity and materials need to be addressed based on requirements for the area to be irrigated. Above-ground storage only works for above-ground catchment, although a pump is a possibility. Below-ground storage is possible if grades allow for water to flow into it without pumping, although that too is possible.

There are also plumbing considerations, engineer specs, and city permits to apply for. "If cities seriously supported alternative solutions such as RWH, they may want to relook at this in their policy to encourage sustainability and water re-use. The costs to get approved can be quite high," says Bishop. For new developments, this is much easier and cost effective than an existing retrofit. As Bishop says, "If you are going to excavate for development, why not throw a tank in there?"

So what does this all mean to you, the reader? Think again. It is great to see innovative and green projects happening right here locally where we think we have an abundant resource. "Water conservation is more important than we realize," says Barrett. "We are lucky...for now." Let's not wait until it is too late. ❑

The Guidebook for British Columbia and other rainwater resources can be found at: http://waterbucket.ca/guidance-resources/.

Contact the Irrigation Industry Association of BC at: http://www.irrigationbc.com