Reuse of Greywater to Help Address Unsustainable Water Resource Demand

Of the overall available water resources on earth, approximately 97% is in the oceans with the remaining 3% available for direct use; however, out of this 3% the water available for use by humans is estimated at one one-hundredth. Survival remains one of the key factors of water use along with food production, industry, and domestic needs.

Global demand for water has or will soon reach or exceed natural capacity of watersheds. Much of the world is affected by acute water shortage and over-exploitation of water resources resulting in the destruction of these resources and high levels of freshwater pollution resulting from anthropogenic factors. Urbanization, industrialization, and population growth have resulted in unsustainable water demand which affects cost to business, ability to operate and quality of life. Canada is not immune to these problems.

As growth and demand continues where will the water come from to sustain industry, food production, ecological and human activities? The widespread reuse of grey water is a viable option that should be explored to meet some of this demand for water. In 2019, the Camrose Chamber of Commerce and Sherwood Park & District Chamber of Commerce identified this issue; however, it was defeated as it was felt that the business case for this important resolution was not articulated. This revised proposal emphasizes the serious repercussions of water shortages and how this resolution can address part of this important business issue.

Background

Greywater refers to wastewater drained from sinks, showers, machines, and other domestic, agricultural, commercial, and industrial sources. Greywater differs from black water in that it does not contain human waste. The average person in a developing country consumes approximately 20 to 30 litres of water per day; however, Canadians are one of the highest global users of water, generating >300 litres of waste water each day.[1] Canada has yet to realize the realities of a global water crisis to the degree that much of the world has already felt. In order to address the water crisis, UNESCO International Hydrological Programme promotes the collection and recycling of grey water to preserve global water supply.[2]

With global warming, increasing domestic and global populations and concomitant increases in industrialization and urbanization, there is tremendous need for freshwater resources worldwide with sources becoming increasingly scarce. To achieve effective greywater treatment and reuse, extensive contributions from technical and non-technical experts is required.

Greywater treatment and reuse if embraced and enforced can lead to a substantial decline in over-reliance on freshwater resources for non-potable uses (e.g., industrial and commercial processes, agriculture, domestic use, etc.). Current research is endeavouring to address dwindling water resources by reducing demand, increasing efficiency, and developing alternative sources previously considered unusable. Of these, “greywater” is a viable source. The increased use of reclaimed water presents one of the greatest untapped opportunities to better use and manage existing water supplies. Greywater might also provide a supplementary source to existing water sources in areas where there is acute water crisis, regionally, nationally, and internationally. Recycled greywater can be used for different water-demanding commercial, industrial, agricultural and domestic activities.

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[1] http://www.ecosanres.org/pdf_files/ESR_Publications_2004/ESR4web.pdf

[2] https://en.unesco.org/themes/water-security/hydrology

Reuse of greywater is an old practice but requires innovation and largescale application to assist in the reduction and over-reliance on freshwater, potable resources and to reduce the overall growing pollution caused by the discharge of untreated greywater into freshwater resources. The development of innovative technologies used to recycle greywater provides a world-leading opportunity to provide innovative technologies and solutions to address a national and international crisis. Although some technologies have been developed to treat or remove specific pollutants, quality criteria differ for each type and greywater composition and generation rates vary greatly from one system or region to another. To be universally effective, systems must be designed to be efficient and effective on a large scale and take into consideration regional variability and complexities such that effluent from treatment systems can meet water quality criteria.

With the spread of the novel coronavirus COVID-19, and related health and economic implications, concerns could arise with respect to the safe reuse of recycled water. The principal transmission route of COVID-19 is close contact with infected persons (e.g., respiratory droplets). Human coronaviruses are more fragile than other viruses and although research is still ongoing, scientific data suggest that coronaviruses die off rapidly in wastewater, with a 99.9% reduction in 2–4 days[3]. The design and operation of processes used to disinfect water and wastewater are based on the most resistant and more transmissible viruses as such existing conventional disinfection methods would be expected to readily inactivate COVID-19.[4] The WHO stated, there is "no current evidence that they are present in surface or groundwater sources or transmitted through contaminated drinking water".[5] Greywater usually undergoes a 3- to 4-stage treatment (multi-barrier system) including disinfection, before the recycled (grey)water is safely used for non-potable applications.

Business Case for this Policy

Industry, and business in general, is becoming subject to high water costs and being challenged to do more with less water. Businesses are often in conflict with local domestic uses, other industries, agriculture, tourism, and ecosystem needs and protection bylaws. This restriction on water use and resources has direct implications to business and the Canadian economy. Lack of water often means curtailment of production and certain activities, intermittent shutdowns and production limitations, limitations on land development, and unsustainable practices. Modern and developed jurisdictions must lead the development of water reuse management practices.

In Canada, BC is a leader in developing policy and legislation to safely manage the recovery and reuse of municipal wastewater. Recovery and reuse of municipal wastewater (reclaimed water) for non-contact commercial and institutional, household and landscape purposes could increase the amount of net water available without effecting current consumption patterns, volumes, or lifestyles. More than ever, building codes and reclaimed water standards need to be updated to reflect current

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[3] Gundy, P.M., Gerba, C.P. and Pepper, I.L. (2009) Survival of Corona viruses in water and wastewater. Food and environmental Virology, 1: 10-14

[4] Centers for Disease Control and Prevention (CDC) https://www.cdc.gov/coronavirus/2019-ncov/php/water.html

[5] *WHO. Water, Sanitation, hygiene and waste management for COVID-19. Technical Brief 19 March 2020.* https://www.who.int/publications-detail/water-sanitation-hygiene-and-waste-management-for-covid-19

economic and environmental requirements. Currently, as per the Canadian Guidelines for Domestic Reclaimed Water for Use in Toilet and Urinal Flushing[6], Canada bases its plumbing requirements for non-potable water systems are addressed by CSA Standard B128.1-06/B128.2-06, Design and installation of non-potable water systems and maintenance and field testing of non-potable water systems (CSA, 2006).[7] These standards and guidelines are now outdated and need to be re-examined.

Reusing grey water for industrial use, irrigation and other non-potable water applications will help in reconnection of urban habitats to the natural water cycle, which will contribute significantly to sustainable urban development and the economy. Industrial facilities have an important role to play, and, therefore, should be consulted when developing new guidelines and regulations. Reuse of greywater can help in substituting precious drinking water in applications which do not need drinking water quality such as industrial, agricultural, and domestic applications. The major benefits of greywater recycling can be summarized as reduced freshwater extraction from rivers and aquifers, less impact from wastewater treatment plant infrastructure, nutrification of the topsoil, reduced energy use and chemical pollution from treatment, replenishment of groundwater aquifers, increased agricultural productivity, reclamation of nutrients and improved quality of surface and groundwater.

Protection of public health is of paramount importance while devising any greywater reuse program. As solutions are investigated, proper treatment, operation and maintenance of greywater recycling systems are essential to maintain public protection and confidence. Were Canada to become a global leader in greywater reuse, it would benefit both the environmental and public as well as industry, economy and place Canada on the leading edge of innovation and technological advancement on a topic of global importance and economic benefit.

THE CHAMBER RECOMMENDS

That the federal and provincial Governments:

1. commit to developing effective, nationally consistent, building codes and integrated reclaimed water standards in consultation with technical and non-technical experts, such as industrial facility operators, to reflect current national and international economic and environmental requirements; and,
2. provide incentives measures to ensure Canada leads innovation and product development and sales in the development of water reuse management practices.

Submitted by the Surrey Board of Trade

[6] https://www.canada.ca/en/health-canada/services/publications/healthy-living/canadian-guidelines-domestic-reclaimed-water-use-toilet-urinal-flushing/canadian-guidelines-domestic-reclaimed-water-use-toilet-urinal-flushing-page-3.html#exe
[7] https://www.scc.ca/en/standardsdb/standards/23075